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STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY AMENDMENTS TO	)	
35 Ill. Adm Code 302.208(e)-(g), 302.504(a),	)	R02-11
302.575(d), 303.444, 309.141(h); and	)	(Rulemaking-Water)
PROPOSED 35 Ill. Adm. Code 301.367,	)	
301.313, 301.413, 304.120, and 309.157	)	

P.C. #18

NOTICE OF FILING

PLEASE TAKE NOTICE that on this date, April 12, 2002, I filed with Dorothy Gunn, Clerk of the Illinois Pollution Control Board, James R. Thompson Center, 100 West Randolph, Suite 11-500, Chicago, IL 60601, the enclosed *Post-Hearing Comments of Environmental Law and Policy Center, Prairie Rivers Network and Sierra Club* in the above-captioned proceeding.

Albert F. Ettinger

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(312) 673-6500

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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POST-HEARING COMMENTS OF ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK AND SIERRA CLUB

Introduction

The Board should not adopt the Illinois Environmental Protection Agency's proposal to change the cyanide standards and deoxygenating wastes rules based on the current record. Further, unless the record is substantially supplemented, the Board should reject most or all of the Agency's petition outright.

The proposed change in the cyanide standard offers no known benefit and may pose a threat to highly valued fish populations and mussel species already on the verge of extirpation. The proposed change in the deoxygenating waste rule should not be accepted by the Board until the Agency develops implementation rules that will prevent violations of the state dissolved oxygen standard. The other proposed changes in the standards may be acceptable but that is not clear. As of the date of the filing of these comments, the Agency has not shown the Board or the public its proposed implementation rules although it has stated repeatedly that draft rules would be available in this proceeding.

At the end of the March 6, 2002 hearing, there was considerable discussion of whether there should be an additional hearing in this case prior to First Notice. At that time, Sierra Club, Prairie Rivers Network and the Environmental Law and Policy Center of the Midwest ("Environmental Groups") felt that an additional hearing was warranted before going to First Notice. But there is no way now to know when, if ever, the Agency will provide draft implementation rules. Accordingly, we now believe that the better practice would be to reject the Agency petition with the exception of those portions of the proposal which the Board is confident there is sufficient existing guidance in federal rules or elsewhere that state implementation rules are unnecessary.

I. The Board Should Require that the Agency Produce Draft Implementation Rules regarding Hardness, Reasonable Potential Testing, Dissolved Oxygen and the Metals Translator.

In his pre-filed testimony and at the January 29, 2002 hearing, Robert Mosher on behalf of the Agency testified at length that the Agency would present implementation rules in this proceeding and testified of the importance to the Board and the public of knowing how the Agency would implement the proposed standards. Specifically, we were told to expect draft implementation rules regarding hardness factors, reasonable potential and the metals translator. (Mosher Testimony, Jan, 29, 2002, Transcript at 41-44). The most important of these rules would clearly be the reasonable potential rules about which Mosher testified:

> One of the main parts of this Agency implementation rule will be how the Agency will do what is called a reasonable potential analysis to determine if a certain substance needs to be regulated in that NPDES permit. Is there a reasonable potential for it to exceed the water quality standard. If so, we have to put limits in that permit for that substance. And that involves a statistical procedure. We intend to spell all that out and it will take many, many pages to do that. (Mosher Testimony, January 29, 2002, Tr.43)

We do not know the contents of the draft implementation rules that the Agency has not made public. We do know that draft "reasonable potential" rules, which were circulated in 1997, were 21 pages long and were designed "to establish procedures for determining the concentrations of substances that must be regulated in NPDES permits in order to assure that water quality standards will be met in the general use waters of the State" and covered hardness and other matters. (Exhibit 1, the cover letter and three pages of the 1997 draft). Logically, the draft implementation rules should at least cover reasonable potential testing and other matters relating to implementation of the new proposed standards regarding nickel, zinc, cyanide, dissolved oxygen and dissolved metals.

It is critical for the Board to see the implementation rules in its consideration of water quality standards. The implementation rules often make all the difference as to whether a standard is protective of aquatic life, overly stringent or useless. Just to discuss hardness as one factor, it can make a very large difference in the NPDES permit limits for many metals where instream hardness is measured in the stream to receive the discharge (or sometimes another stream thought by the Agency to have a similar hardness) and what figure for hardness is used in calculating permit limits given varying hardness measurements and the number of data points collected. (See Exhibit 1 and 35 Ill. Adm. Code 302.504)

In the R94-1(B) ammonia water quality standards proceeding, there was discussion of the implementation rules regarding "effluent modified waters" (See 35 Ill. Adm. Code 302.213) and a number of other issues regarding implementation, but the Agency never showed the Board or the public a draft of the implementation rules it would propose. This resulted in very serious disputes that led to delay in consideration of hundreds of permits and much other acrimony. Although filed years after the Board completed its consideration of ammonia standards in R94-1(B), the recent testimony of Mr. Michael Callahan on behalf of the Illinois Association of Wastewater Agencies in

R02-19 is still full of bitterness stemming from the fact that the parties to R94-1(B) came away from the proceeding without a clear understanding of the likely implementation rules to be put in place by the Agency. (R02-19, Callahan Testimony, March 25, 2002, Tr. 16, 25-8) [1] Based on this bad experience, IAWA properly did not go forward with its new ammonia proposal without being confident of the implementation rules that would be applied by the Agency. (Id.)

Since R94-1(B), the Agency has provided the Board with draft implementation rules in the only two major water quality standards proceedings of which we are aware, R97-25 (the Great Lakes standards) and R01-13 (Antidegradation). In both cases, the ability of the Board and the public to understand how the standards would be implemented was critical to the proceeding. In both cases, the Board saw fit to adopt a portion of the draft Agency implementation rules as Board rules.

Why the Agency has not offered the promised implementation rules in this proceeding is unclear. Whether the Agency's failure to provide draft rules is calculated or accidental, the Board should not proceed without them.[2]

II. The Board Should Not Adopt Cyanide Standards That May Not Be Protective Of Endangered Species And Highly-Valued Fish Populations

Among the few things that we know for sure about the proposed change in the cyanide standard is that there is no reason to adopt it now. The Agency knows of no discharger that would be helped by the less protective standard. (Mosher Testimony, March 6, 2002, Tr. 61) IEPA knows of no mussel data and obtained the new standard by throwing the cold water fish data out of the mix used by U.S. EPA to establish its criteria. (Mosher Testimony, March 6, 2002, Tr. 68)

Adjusting the national criteria to eliminate protections for species that do not live in Illinois makes some sense when there is relevant data for all of the more sensitive species in Illinois and that data shows that the resulting standard would be protective of these species. That is emphatically not the situation here. The Agency freely admits that there is no data on cyanide toxicity to mussels and that it is proceeding with this standard without knowing whether it will protect federal and state endangered mussel species. (Olson Testimony, March 6, 2002, Tr. 59-60) There is no reason to assume that the endangered mussels are less sensitive to cyanide than the cold water species that that the Agency tossed out of its equations. Recent studies cited by the United States Fish & Wildlife Service indicate that mussels are, if anything, more sensitive to some pollutants than salmonids. (Exhibit 2)[3]

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[1] To avoid burdening the record in this proceeding with extra paper, the Environmental Groups hereby ask that the Callahan testimony filed in R02-19 be incorporated by reference into this record. The Environmental Groups will also spare this record a discussion of what they thought the implementation rules were to be following R94-1.

[2] At the March hearing, there was testimony that the dissolved metals portion of the Agency proposal did not actually need implementation rules because there exists a detailed federal guidance. Davis Testimony, March 6, 2002 Tr. 80-2. If this is true, perhaps this portion of the Agency proposal can properly be adopted by the Board.

[3] While perhaps these not yet published studies should not be controlling if there were good reasons to change the current rule, there are no such reasons.

Further, no cool water fish (e.g. sculpin) have been taken into account although they are known to be present in Illinois waters (Mosher Testimony, March 6, 2002, Tr. 140, see also Skrukrud Testimony, March 6, 2002, Tr. 86)

The Agency's answer to concern about weakening a standard without information as to whether the change will affect numerous highly-valued Illinois species is that Illinois can rely on its newly adopted antidegradation standard to protect against damage to those species. (Mosher Testimony, March 6, 2002 Tr. 140) That is not quite true. While proper implementation of Illinois antidegradation standard should prevent permitting of new cyanide loadings to any water containing sensitive species, it may not require limits on current dischargers that are newly found to have cyanide in their discharge.

Following federal regulations, IEPA requires Illinois dischargers to periodically test their discharge for a wide array of pollutants. For example, cyanide was found in the discharge of the City of Alton in 1998 at levels that might have required a permit limit if Alton discharged into a small stream. (Exhibit 3) If the cyanide standard is weakened, the Agency may fail to establish a permit limit that is necessary to protect indigenous species.

Still further, the 1984 federal criteria document relied on by the Agency cites a "Kimball" study finding the Bluegill cannot reproduce properly even at the current chronic standard concentration for cyanide (p.8)[4] The Bluegill is Illinois' State Fish voted as such by the children of Illinois in 1986. (Exhibit 4) While the validity of the conclusions of the Kimball study are open to question, the safe thing to do would be to wait until more research is done. The Agency has offered no reason to proceed in the face of ignorance about the effect of cyanide on endangered species and the state fish.[5]

III. Deoxygenating Waste Rule Should Be Protective Of Dissolved Oxygen Levels

Much of the discussion at the hearings in this case has focused on what testing is best to determine whether a sewerage treatment plant is operating properly and whether a Dr. John Pfeffer meant "BOD5" or "CBOD5" in his testimony given to the Board in a proceeding decided over 30 years ago. All of this profoundly misses the point. In this proceeding the Board should focus on the environmental dangers of proceeding as the Agency is proceeding with regard to implementation of Illinois' dissolved oxygen standards.[6]

To the extent that the history of the deoxygenating waste rule is relevant, it is not Dr. Pfeffer's intent that is relevant, but the intent of the Board. All we know specifically as to the

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[4] Even ignoring the Kimball reproduction study, the USEPA calculates a safe chronic concentration for Bluegill at 13.56 ug/l, only 2.5 parts per billion higher than the proposed standard.

[5] The MWRDGC obtained a site-specific standard proving circumstances that are not generally relevant to the rest of the state. (See R95-14, Opinion of August 24, 1995) The sensitive species that are of concern here are unlikely to reside in the degraded streams that receive the MWRDGC effluent.

[6] The critical issue for the environment is not what test is used to determine whether sewerage treatment plants have been run properly. A well-run plant that discharges NBOD at levels that harm the receiving water is not the object here.

Board's intent is that it used "BOD5" even though it knew the difference between BOD and CBOD (Opinion of the Board, March 7, 1972, Hearing Ex. 10, p. 15) and was specifically urged by at least one witness to adopt a definition of BOD5 for the standard as being "carbonaceous BOD only." (R71-1, Troempe Testimony, Dec. 7, 1971, Tr.8). Certainly, the position taken by some participants to this proceeding, that the use by the Board of "BOD5" instead of "CBOD5" was some sort of typo, is hard to square with the Board's 1972 decision and impossible to reconcile with numerous subsequent Board opinions that discuss the difference between BOD and CBOD. (see e.g. decisions cited in note 8 below).

Much more interestingly, we know that the Board in 1972: (i) adopted a standard based on what it thought was technologically feasible, (ii) was concerned about the effect of ammonia on dissolved oxygen levels, and (iii) established a rule that would require that the actual effect of the discharge on dissolved oxygen levels be determined in most cases through use of modeling techniques. (Hearing Ex. 10, pp.15-6) Further, when the Board revised the rule in 1980 to expand the "Pfeffer exemption," it conditioned the change on the Agency doing specific dissolved oxygen studies. In the Matter of: Amendments to the Water Pollution Control Regulations, R77-12, (Docket C), 1980 Ill. Env. Lexis 427 (February 21 1980) slip op. pp. 9-10)[7]

To the extent that this Board feels it should follow the thinking of the Board of 1972, the true lesson from Board decisions from 1972 (and thereafter) is that the Board should:

- adopt a rule for deoxygenating wastes that protects dissolved oxygen standards, and
- should not allow discharges of deoxygenating wastes unless such discharge is necessary.

The key finding of the hearing is that in many cases the Agency is granting NPDES permits that are not protective of the dissolved oxygen water quality standard because the Agency does not take nitrogenous oxygen demand ("NBOD") into account. Everyone, from Dr. Pfeffer in 1971 to Dr. Skrukrud (Tr.87-88) and Mr. Callahan (Tr. 129-30) at the March Hearing in this proceeding, has testified that CBOD5 does not measure the total oxygen demand of the discharge, which may be much larger than the total CBOD5.[8] There is a sizable contribution to BOD from nitrogenous compounds, but the Agency admits that it essentially never regulates ammonia discharges to prevent violations of dissolved oxygen ("DO") standards. (Mosher Testimony, March 6, 2002, Tr. 34)

Further, the change to the rule proposed by the Agency would allow discharges that are technically and economically unnecessary.

[7] If these studies were ever done, the results have not been presented in this proceeding. And nobody claims that one can protect dissolved oxygen levels without controlling for nitrogenous oxygen demand in some manner.

[8] See also, ~~In Matter of: Site Specific Rulemaking for the Sanitary District of~~ Decatur, Illinois, R85-15, 1987 Ill. Env. Lexis 424 (Jan. 22, 1987); slip op. 7-11, 18, (Board finds that CBOD5 is only 61% of BOD5 in that case and that discharge of 1.5 mg/L ammonia may cause DO violation); In the Matter of: Site Specific Exception to Effluent Standards for the Greater Peoria Sanitary and Sewerage Disposal District, R87-21, 1988 Ill. Env. Lexis 470 (Oct. 7, 1988) (Board discusses components of BOD in decision requiring Peoria to continue ammonia treatment because of effect of ammonia discharge on DO levels in the Illinois River)

A. The Dissolved Oxygen Standard Continues To Be Violated in Many Illinois Waters

A major theme of the Agency and the discharger representatives who have testified in this proceeding is that it is okay that the Agency now generally ignores nitrogenous oxygen demand in setting limits on deoxygenating waste because the ammonia limits will protect against low dissolved oxygen. Further, there were many suggestions at the hearings that low dissolved oxygen levels are just not a problem anymore. We wish this were true. The facts indicate that Illinois needs more stringent controls on deoxygenating wastes, not weaker controls.

As usual, the data is not as complete as could be wished. Still, the existing data shows that there are continuing serious violations of the dissolved oxygen standards and that discharges from sewerage treatment plants and other point sources cause or contribute to these violations. The most recent IEPA 305(b) report shows impairments caused by "organic enrichment/low DO" for numerous important Illinois waters including the Des Plaines River, the Du Page River, the Fox River, Salt Creek (Du Page Co.), Lake Kincaid, the Mississippi River and Rend Lake. (Exhibit 5)[9] In fact, the Agency states there are 2,687 miles of streams and 86,575 lake acres impaired by low DO levels. (Id.)

With regard to the Illinois River, the situation is unclear. Because the numeric data taken in the main channel of the Illinois did not find over 11% violations of the standards, the Illinois River is not listed as impaired in the IEPA 305(b) report. However, it is known that historically the Illinois River has suffered from low dissolved oxygen as a result of ammonia discharges. See e.g. In the Matter of: Site Specific Exception to Effluent Standards for the Greater Peoria Sanitary and Sewerage Disposal District, R87-21 1988 Ill Env. Lexis 470 (Oct. 7, 1988) slip op. 17. Published U.S. Geological Survey data shows at least one violation at Valley City in 1998 (Exhibit 6) and recent unpublished data passed out by IEPA at a meeting last year shows prolonged and continuous DO violations in August 2001. (Exhibit 7)

The IEPA 305(b) list and the other published numeric data probably greatly understates the problem. Recent not yet published studies of the Fox River, which looked more carefully at biological and chemical data for a specific water than is generally done through IEPA monitoring, found many more impairments than had been found through IEPA monitoring. (Exhibit 8)[10]

It is true that in many cases an ammonia limit based on ammonia toxicity will incidentally provide protection against violations of the dissolved oxygen standard. But Illinois cannot rely on that. As the Board rules make clear, ammonia limits depend on pH and temperature factors that may not correspond to the danger of violations of the dissolved oxygen standards. See 35 Ill. Adm. Code 302.212. Further, even the 1.5 mg/L to 4.0 mg/L ammonia limits typically provided in

[9] As to each of these impairments "municipal" point sources are listed as a source of impairment. (Id.) Long reaches of the Mississippi River are listed as impaired by low DO levels with the source of the impairment identified only as "unknown". (Id.)

[10] Researchers from the Max McGraw Wildlife Foundation report measuring DO levels less than 5 mg/l at 9 out of 11 impoundments studied on the Fox River. In some cases, the standard was violated over a period of 16 hours. IEPA's discussion of the Illinois River in its 305(b) report acknowledged that its monitoring did not look at biological data for rivers in which one cannot wade and that it did not cover the biologically critical side channels and wetlands. (Exhibit 5)

Illinois NPDES permits may not be protective of DO levels. See In Matter of: Site Specific Rulemaking for the Sanitary District of Decatur, Illinois, R85-15, 1987 Ill. Env. Lexis 424 (Jan. 22, 1987); slip op. 7-11, 18 (Board finds that discharge of 1.5 mg/L ammonia may cause DO violation)

Still further, in many cases, the availability of dilution in the receiving water will cause there to be no ammonia limit or a very loose one. As the problems of the Mississippi River demonstrate, it is possible to have large dilution and still have a dissolved oxygen problem. This is because, as is often the case with environmental problems, the cumulative effect of relatively small sources of pollution can add up to a big problem. See e.g. Sierra Club v. Penfold, 664 F.Supp. 1299, 1303 (D. Alaska 1987) An example of this is the problems of the Mississippi River pool above the Quad Cities for which U.S. EPA required special BOD limits because of existing dissolved oxygen problems. (Exhibit 9)

The fact that in many cases toxicity-based ammonia limits are protective of dissolved oxygen does not mean that the Agency should ignore the cases where such limits are not protective. Further, it cannot go without being noted that, to the extent the Board loosens the toxicity-based ammonia standard in R02-19, the ammonia standard will be less able to serve as an indirect control on nitrogenous oxygen demand. Finally, we have no idea what effect the Agency's casual extension of its CBOD proposal to industrial dischargers will have on the amount of deoxygenating wastes discharged into Illinois waters.

B. The Board Should Not Adopt Rules That Ignore the Nitrogenous Component of BOD.

The Board should not adopt the proposed change in the Deoxygenating Waste rule. Instead, it should ask IEPA to develop proper methods for protecting DO levels in Illinois waters. Waiting to change the standard until there are proper DO protections will not as a practical matter affect NPDES permit limits because the Agency has already shown its vast willingness to issue permits that contain only CBOD5 limits although the Board rules currently call for BOD5 limits.

The Environmental Groups have not been able to conduct a broad study of how dissolved oxygen standards are protected in other states. It is known that Michigan for its permits separately calculates limits on CBOD, nitrogenous oxygen demand and ammonia toxicity. (Exhibit 10)

For most waters, Illinois should use both technology-based limits on BOD that assure minimum controls and calculate whether any additional requirements are necessary to protect dissolved oxygen levels. To the extent the Board should allow any change in the minimum control levels required of dischargers, it should recognize in its rules that CBOD makes up less than all of the BOD.

In other jurisdictions, in those cases where it is allowed to substitute a CBOD5 limit for a BOD5 limit, it is not allowed to substitute CBOD5 for BOD5 without recognizing that CBOD is significantly less than 100% of the BOD. Thus, the federal rule that defines "secondary treatment" for technology-based limit purposes states that *25* mg/L CBOD5 may be substituted for *30* mg/L

BOD5. 40 CFR § 133.102.[11] Similarly, while requiring an individual calculation for most waters (NR 210.05(1)(e) (Exhibit 11), Wisconsin allows a CBOD5 limit of *12* mg/L to be substituted for waters where a limit of *15* mg/L BOD5 is required and allows *16* mg/L CBOD5 to be used in place of a BOD5 limit requirement of *20* mg/L. (NR 210.05 (2)(f), (3)(e)) (Id.)

Moreover, there is really no reason to allow a CBOD5 limit of 20 mg/L on a widespread basis. Numerous authorities, including witnesses before the Board in numerous proceedings beginning in 1971 and continuing thereafter, have recognized that CBOD5 limits of 10 mg/L are readily attainable by almost all dischargers.[12] As was stated by Mr. Callahan at the March hearing regarding the 10 mg/L BOD5 (or CBOD5) standard:

> I believe [it is economically reasonable] --It is readily attainable. I think the industry has a very high compliance rate with that on zero low flow streams across the state right now and it seems to be done with moderately appropriate user fees and citizen tax rates. (Tr. 131)

Thus, even were the Board inclined to adopt a portion of the Agency's proposal regarding deoxygenating wastes, it certainly should not allow CBOD5 limits to be set under 35 Ill. Adm. Code 304.120(b) above 10 mg/L or, following Wisconsin, 16 mg/L.

CONCLUSION

The Board should not grant the petition based on the current record. If at some point the Agency provides the draft implementation rules and biological studies needed to gauge the effect of the proposal, the Board can revisit the issue.

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Counsel for Environmental Law & Policy Center, Prairie Rivers Network and Sierra Club

April 12, 2002

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[11] The Agency recognizes this requirement in its proposal by generally forbidding CBOD5 limits over 25 mg/L.

[12] Among the decisions noting that that it is not difficult to meet the 10 BOD5 standard are ~~In the Matter of: Proposed~~ Amendments to 35 Ill. Adm. Code 304.120, Deoxygenating Wastes Standards, R86-17(B) 1988 Ill. Env. Lexis 56 (Oct. 20, 1988) slip. op. 9 (10 mg/L BOD5 standard can be met using land treatment) and In the Matter of Proposed Site Specific Water Pollution Rules and Regulations Applicable to Citizens Utilities Company of Illinois' Discharge to Lily Cache Creek, R81-19 1983 Ill. Env. Lexis 278 (May 5, 1983) sip op. 14 ("no question about the technical feasibility of achieving compliance with [10 BOD5]").

Toby Frevert

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 *Mary A. Gade, Director*

217-782-1654

November 10, 1997

RE: Draft Rules for Determination of Water Quality Based Effluent Limits for Discharges to General Use Waters

Dear Sir or Madam:

Enclosed is a draft of Agency procedures to guide the issuance of water quality based effluent limits (WQBELs) in the NPDES permit program. This draft contains general procedures for establishing WQBELs in permits, a reasonable potential analysis method that allows the Agency to decide when a given chemical parameter must be regulated in an NPDES permit, and a method for regulating substances that have water quality standards or criteria which are more stringent that analytical methods can detect. Additionally, the draft contains methods that address the establishment of the recently adopted Illinois Pollution Control Board water quality and effluent standards for ammonia nitrogen (December 19, 1996) in permits.

We anticipate that interested parties will have questions and comments concerning this document. During the next thirty days we invite comments regarding this draft which will help us decide on a plan for future public information meetings. Please contact Toby Frevert at the above number or Bob Mosher at 217-782-3362 with questions or comments on this draft by December 9, 1997.

I look forward to working with you in this rulemaking process.

Sincerely,

James B. Park

James B. Park
Chief
Bureau of Water

JBP:RGM:djp/amruldis

EXHIBIT 1

November 7, 1997

Environmental Protection
Subtitle C: Water Pollution
Chapter II: Environmental Protection Agency

Part 353
Determination of Water Quality Based Effluent Limits
For Discharges to General Use Waters

Subpart A: Introduction

Section 353.101 Purpose, Scope and Applicability

a) The purpose of this Part is to establish procedures for determining the concentrations of substances that must be regulated in NPDES permits in order to assure that water quality standards will be met in the general use waters of the State. These standards are established by the Pollution Control Board at 35 Ill. Adm. Code 302; Subpart B and C and the water quality criteria determination procedures of Subpart F.

b) This Part addresses the effluent standards of 35 Ill. Adm. Code 304.105 and 304.122 which stipulate that effluents must be regulated to assure that waters meet water quality standards outside of areas of allowed mixing, mixing zones, zones of initial dilution (ZIDs), or areas designated as effluent modified waters (EMWs) as provided by this Part. This Part must be administered in accordance with Part 354, Determination of Allowed Mixing, Mixing Zones and ZIDs.

c) All effluents discharged to general use waters and public and food processing water supply intakes are subject to the procedures established in this Part. Discharges to Lake Michigan or the Lake Michigan basin are subject to the provisions established at 35 Ill. Adm. Code Part 352. Site-specific water quality standards of Part 303 are to be applied in conjunction with the procedures of this Part.

d) Technology based limits as required by USEPA or effluent standards found at 35 Ill. Adm. Code Part 304 shall be applied wherever they are more restrictive than the water quality based effluent limits determined from this Part.

e) This Part provides a methodology to determine the need for regulating substances in an NPDES permit when an effluent or point source discharge has the potential to exceed water quality standards or criteria. When a potential to exceed a water quality

November 7, 1997

Section 353.405 Parameters for the Mass Balance Calculation

a) Q_E - Discharge Flowrate - The discharge flowrate shall be representative of the maximum expected discharge during the term of the permit that coincides with the critical stream flow conditions given at 35 Ill. Adm. Code 353.309. Discharge flowrates to coincide with these conditions will be determined as follows:

1) for dischargers of treated domestic wastewater, the discharge flowrate will be based on the average of the lowest three months of effluent flow for the most recent full calendar year, unless the discharger demonstrates that this value does not accurately represent plant low flow discharge. Adjustments will be made from this value to reflect any major change in flow expected during the term of the permit (e.g., major sewer extensions, an increase in the Facility Planning Area, projected development, etc.);

2) for industrial dischargers the discharge flowrate will be based on the highest monthly average flow from the previous 5 year period unless the discharger demonstrates that this value does not accurately represent maximum predicted flow discharge. Adjustments will be made from this value to reflect any major change in flow expected during the term of the permit (e.g., change of processes, industrial plant expansions, non-contaminated stormwater).

b) Q_{US} - Dilution Flowrate - The allowable dilution flow will be determined consistent with the Agency rules for implementation of allowed mixing and mixing zones; Part 354.

c) C_{US} - Upstream concentration - This is the long term average concentration of the substance present in the dilution flow prior to mixing with the discharge (e.g., Ambient stream concentration upstream of the discharge). Acceptable sources of data include the Agency's ambient water quality monitoring program, Agency conducted facility and stream surveys and discharger or third party collected data if adequately quality assured.

d) Standard - This is the applicable water quality standard or criterion contained in or derived from the Illinois Pollution Control Board Regulations, 35 Illinois Administrative Code, Part 302. For any particular substance there may be as many as four applicable standards or criterion; e.g., Acute aquatic life, chronic aquatic life, human health, and wildlife. The mass balance calculation and derivation of a WQBEL shall be completed for whichever of these criteria "Reasonable Potential" has been established pursuant to Subpart B.

November 7, 1997

Section 353.407 Determining Instream Hardness

The toxicity of several metals is dependent on the hardness (as $CaCO_3$) of the water investigated. In order to determine numeric water quality standard values from the water quality standards formulae, a hardness factor is required. The hardness value used shall reflect the conditions present in the stream once the effluent mixes with the ambient stream water. Also, the hardness value used shall reflect conditions of hardness present at low stream flow because the effluent will be more concentrated in the stream during these periods thus affecting local hardness conditions.

Stream hardness values used to compute values for metals standards shall be taken from the nearest downstream AWQMN sampling station. When no downstream AWQMN station exists or the nearest downstream AWQMN station is not representative of the receiving water, a value from a AWQMN station from an adjacent and similar watershed shall be used. When there is no AWQMN station on an adjacent and similar watershed, an average of values from all AWQMN stations in the basin containing the receiving water shall be used. The hardness values used shall be determined as follows:

a) where the stream flow at the AWQMN station is measured, the tenth percentile hardness concentration, expressed as mg/L $CaCO_3$ hardness, obtained from samples collected at the lowest ten percent of stream flow will be used as the value for hardness;

b) where the stream flow at the AWQMN station is not measured, the 25th percentile hardness value will be used;

c) alternatively, a discharger shall have the option to collect hardness data at a point downstream of the effluent discharge representative of complete mixing and the resulting 25th percentile hardness value may be used to compute the pertinent metals standards. At least 26 hardness values must be present in the data set and these values must be representative of all seasons of the year and gathered in a manner representative of the sampling period.

Section 353.409 Receiving Water Stream Flow Conditions

a) Acute and Chronic water quality standards and criteria and the other standards cited at 35 Ill. Adm. Code 353.301(d), shall be applied as permit limits according to the provisions of this Part using 7Q10 stream flow as the basis of determining dilution factors.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
WQ-16J

October 25, 2001

Mr. Toby Frevert, Manager
Division of Water Pollution Control
Illinois Environmental Protection Agency
1021 North Grand Ave. East
Springfield, Illinois 62702

Toby:

Thank you for the opportunity to review and comment on the Illinois Association of Wastewater Agencies' (IAWA) proposed changes to Illinois' water quality standards for ammonia. The United States Environmental Protection Agency, Region 5 (USEPA Region 5) prepared the following preliminary comments on the proposed rule revisions. These comments do not constitute final review and/or approval or disapproval of the proposed revisions. USEPA Region 5 will take final action on any changes to Illinois' water quality standards if and when the revisions are adopted by the Illinois Pollution Control Board and submitted to USEPA Region 5 for review and approval.

The comments below fall into four principle areas: the determination of when early life stages are absent, the determination of design flows, the determination of design pH and temperature, and the protection of mussels species. Each of these areas is discussed in greater detail below.

Making Early Life Stage Absent Determinations

In its 1999 Update of Ambient Water Quality Criteria for Ammonia (1999 Ammonia Update), the U.S. Environmental Protection Agency (EPA) recommends two chronic values: one value when early life stages of fish are expected to be present and a second value when early life stages of fish are expected to be absent. This is a departure from EPA's usual practice in which it recommends a single chronic value that protects both early life and adult stages of fish. Since early life stages could experience chronic toxicity wherever they are exposed to levels that are above the early life stage value, even where such levels are below the value for adults, States and Tribes should ensure that early life stages of fish are not present where the early life stage absent values are implemented. EPA recommends that States and Tribes conduct a thorough assessment across all locations in the state or reservation in determining where and during which periods of the year early life stage absent values could be applied.

EXHIBIT 2

For larger States, especially for States whose north-south distance is relatively long, it is likely that the period of the year when early life stages are absent will vary with location, and it becomes more difficult to generalize about where and when early life stages are absent. The larger the area of consideration for the early life stage absent values, the greater should be the extent of data collection and analysis. Large States can ensure protection by applying a considerable degree of conservatism in making an across-the-state determination regarding early life stage absence.

In its proposal, IAWA indicates that April would be an acceptable starting point for assuming the presence of early life stages of fish. USEPA Region 5 believes that early life stages of fish are likely to exist in Illinois outside of the period determined by IAWA. A cursory review of the literature on the spawning periods of fish in the Upper Mississippi Basin shows that a significant number of ubiquitous species spawn in March, and that several species spawn in mid-February. In addition, there is some information that suggests that several late fall spawners produce larvae that survive over winter in some locations under ice near the shore.

IAWA addresses this more localized spawning scenario by stating that, "In water bodies that provide habitat for a period of time other than March through October for early life stages that are sensitive to ammonia...the water body shall meet the summer water quality standard during the period of time early life stages are present." This statement gives the impression that IAWA has not analyzed all waters in the state where it intends to apply the early life stage absent values. EPA recommends that the analysis of early life stage absence occur prior to the application of the absent chronic values to a given waterbody.

In conducting an assessment for determining early life stage absence, EPA recommends the following steps:

Step 1: Identify all species expected to be present in each waterbody of the state,
Step 2: Determine spawning periods and early life stages for each of these species for each waterbody where their early life stages preside,
Step 3: Based on the species and early life stage information, determine when and where the early life stage values could be applied. The early life stage absent values should be applied only in those waterbodies and for those periods of the year where the analysis shows that no early life stages of fish are expected to be present.

USEPA Region 5 would like to provide Illinois EPA with a more thorough analysis of the early life stage component of the IAWA proposal and is aware that IAWA will offer testimony at the public hearing regarding its determination of when the early life stage absent values should apply in Illinois. However, given that IAWA has not yet provided the technical basis for its determination of early life stage absence, it is not possible for USEPA Region 5 to provide such a review until IAWA makes its data and analysis method available. In addition, it would be useful to ask the Illinois Department of Natural Resources the times of the year when early life stages of fish are likely to be absent across Illinois.

Design Flow

In implementing the freshwater aquatic life CCC (Continuous Chronic Concentrations) in the 1999 Ammonia Update, EPA recommends a 30-day averaging period, which is a departure from its recommendation of a four-day averaging period for the CCC of its other criteria. A 30-day averaging period for the ammonia CCC suggests a modification to the procedures in the Appendix D of the *Technical Support Document for Water Quality-based Toxics Control* (TSD) for calculating NPDES permit limits. In addition to the equations (and corresponding "multiplier tables") presented in the TSD, which assume a 4-day averaging period, EPA recommends that a long term average (LTA) also be evaluated based on a 30-day average. Hence, EPA recommends that three LTAs be considered for ammonia (i.e., acute, chronic, and *sub*-chronic), instead of the two LTA equations that EPA recommends for its other aquatic life criteria. EPA recognizes that Illinois' practice of permit derivation may not exactly correspond to EPA's recommendations in the TSD, however, Illinois should be able to modify its procedure for deriving ammonia permits so as to parallel EPA's recommended modification for ammonia. It appears that IAWA's proposal would incorporate this modification to the TSD for ammonia into its technical guidance for permit derivation, but I have included the following excerpt from the Ammonia FR Notice so that Illinois can compare IAWA's proposal with EPA's recommendation:

In the TSD, the acute long term average (LTA_a) is determined from the acute wasteload allocation (WLA_a) using the equation:

$$LTA_a = WLA_a\ e^{[0.5\sigma^2 - z\sigma]}$$
$$\text{where } \sigma^2 = \ln(CV^2 + 1)$$

The chronic long term average (LTA_c) is determined from the chronic wasteload allocation (WLA_c) using the equation:

$$LTA_c = WLA_c\ e^{[0.5\sigma_4^2 - z\sigma_4]}$$
$$\text{vhere } \sigma_4^2 = \ln(CV^2/4 + 1$$

A comparison of the LTA_a and LTA_c is then performed and the minimum value is selected (LTA_{MIN}). The maximum daily limit (MDL) is then calculated from the LTA_{MIN} using the equation:

$$MDL = LTA_{MIN}\ e^{[z\sigma - 0.5\sigma^2]}$$
$$\text{where } \sigma^2 = \ln(CV^2 + 1)$$

The average monthly limit (AML) is calculated from the LTA_{MIN} using the equation:

$$AML = LTA_{MIN}\ e^{[z\sigma_n - 0.5\sigma_n^2]}$$
$$\text{where } \sigma_n^2 = \ln(CV^2/n + 1)$$

Since the 1999 Update recommends a 30-day averaging period for deriving the CCC, the equation for determining the LTA_c an additional LTA_c should be calculated as follows:

$$LTA_c = WLA_c \, e^{[0.5\sigma_{30}^2 - z\sigma_{30}]}$$

$$\text{where } \sigma_{30}^2 = \ln (CV^2/30 + 1)$$

A comparison of the LTA_a, $LTA_{c(4)}$, and the $LTA_{c(30)}$ is then performed to determine the MDL and AML from the LTA_{MIN}.

Design pH and Temperature:

IAWA proposes using the 75th percentile of the pH and temperature values (i.e., 75 percent of the values are less than the 75th percentile) in setting the ammonia permit levels, *unless* the resulting criteria are below 1.5 and 4.0 mg/L for the acute and chronic criteria, respectively, in which case it will use the 50th percentile of pH values. USEPA Region 5 has concern about this approach because there does not appear to be any water quality basis for such a practice. USEPA Region 5 is concerned that the 50th percentile of pH (as well as temperature) values under any conditions may not reflect an appropriate level of protection. In addition, it might be preferable to use percentiles that more closely matches the different criteria (acute, *sub*-chronic and chronic). For example, a higher percentage (90th) would be appropriate for the acute criterion; a lower percentile (although no lower than the 75th percentile) may be appropriate for the chronic criterion.

Protection of Mussels Species

Surveys conducted over the past few decades in Illinois indicate that mussels populations in many parts of the state are experiencing a substantial decline. The decline is so serious that freshwater mussels are the most endangered aquatic life group in Illinois, many of which are Federally-listed as threatened or endangered. In ensuring that the ammonia revisions under consideration are protective of these declining mussels populations, Illinois should familiarize itself with any recent ammonia toxicity data on mussels species. For your convenience, I have attached a draft report by Dr. Tom Augspurger of the U.S. Fish and Wildlife Service, which analyzes recent ammonia toxicity studies on mussels.[1] If, after reviewing this report, as well as other data on mussels, Illinois were to determine that its mussels species would not be protected by the proposed revisions to its ammonia criteria, it should modify the ammonia revisions under consideration. Illinois could do this by using EPA's recalculation procedure (*Interim Guidance*

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[1]Several of the mussels species considered in the draft report reside in Illinois, including *Utterbackia imbecillis, Pyganodon grandis, Villosa iris, Lampsilis siliquoidea, and Lampsilsis cardium*. The authors of the studies include M. Black and M. Barfield, 2000, A. Keller 1999, Wade 1992 (*Utterbackia imbecillis*); Scheller et al. 1996, Scheller 1997 (*Pyganodon grandis*); Goudreau et al. 1993, Scheller et al. 1996, Scheller 1997 (*Villosa iris*), Myers-Kinzie 1998, 1999 (*Lampsilis siliquoidea*); and T.J. Newton, preliminary data (*Lampsilsis cardium*).

on Determination and Use of Water Effect Ratios for Metals, February 1994, EPA-823-B94-001) or other scientifically defensible method to reset the criteria in accounting for the presence of a sensitive species. Where specific species residing in Illinois are not included in the attached analysis, USEPA Region 5 suggests that Illinois consider data from the same genera.

Under Section 7 of the Endangered Species Act, EPA consults with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service when approving new and revised water quality standards submissions to determine if such new or revised standards would likely jeopardize the continued existence of any Federally-listed endangered or threatened species or destroy or adversely modify their critical habitat. Because there are a substantial number of Federally-listed mussels species in Illinois, EPA recommends that Illinois anticipate the consultation on the ammonia revisions by reviewing any toxicity data on Federally-listed mussels species prior to the adoption process. Where toxicity data on Federally-listed mussels species are not available, Illinois could use, as a surrogate approach, toxicity data from non-listed mussels species residing in the state.

Thank you again for the opportunity to comment on this proposal. If you have questions regarding these comments, please have your staff contact Mr. Brian Thompson of my staff. Mr. Thompson may be reached at 312-353-8640.

Sincerely,

Mary Pat Tyson
Acting Chief
Water Quality Branch

BT 10/25/01

MPT WQB 10/25/01

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Review of Ammonia Toxicity to Freshwater Mussels January 2001 fwmamm2.wpd

Augspurger, T.P., U.S. Fish and Wildlife Service, Raleigh, NC; Black, M.C., University of Georgia, Athens, GA; Keller, A.E., U.S. Environmental Protection Agency, Athens, GA and Cope, W.G., North Carolina State University, Raleigh, NC.

Abstract:. Published and unpublished sources of ammonia toxicity data for freshwater mussels (Unionidae), a significantly imperilled taxa, are summarized. Twenty 24-96 hour LC_{50}'s, covering eight species in seven genera, were used to calculate genus mean acute values (GMAV) which ranged from 0.20 to 0.49 mg/l (un-ionized ammonia) and from 3.4 to 7.5 mg-N/l (total ammonia as N, normalized to pH 8, which is the basis for the new water quality criteria calculation). All GMAVs are less than the lowest GMAV in the criteria document. By pooling data, a unionid family mean acute value (FMAV) was calculated. The FMAV was multiplied by 0.5 (an empirically derived factor which converts from a 50% lethality concentration to a minimal-lethality concentration) to approximate a mussel specific criteria maximum concentration guidelines of 0.18 mg/l (un-ionized ammonia) and 2.8 mg-N/l (total ammonia as N, pH 8). No sublethal chronic endpoints were found. An acute:chronic ratio of 7.2 (from two 9-15 day LC_{50}'s with unionids) was multiplied by a factor of 2 to approximate an acute:chronic ratio for sublethal effects. This was used to derive a unionid specific criteria continuous concentration guidelines of 0.02 mg/l (un-ionized ammonia) and 0.40 (total ammonia as N, pH 8). Comparison of these values with the recently revised national ammonia water quality criteria reveals scenarios where the criteria may not be protective. The criteria documents outline approaches for incorporating concerns with particularly sensitive species, including those that are threatened or endangered, which allow for additional protection through site-specific standards or adjustments to the standards. These options may be necessary in waters important for unionid conservation.

Introduction

Many factors are cited in the decline of freshwater mussel (Family Unionidae) populations in North America and for the listing of greater than 70% of native unionids as endangered, threatened, or of special concern (Williams et al. 1993, Neves et al. 1997). Habitat alteration, introduction of exotic species, over-utilization, disease, predation, and pollution are considered causal or contributing factors in many areas of the United States (Fuller 1974, Havlik and Marking 1987). Among North Carolina's approximately 70 endemic unionids, five are federally listed as endangered and 13 are recognized as species of concern that may merit similar protection.

Point source discharges to streams supporting these species are permitted under the National Pollutant Discharge Elimination System (NPDES). Wastes are permitted at levels designed to maintain water quality at or better than the State's water quality standards. However, there is currently no State standard for ammonia. Permit limits are used to control ammonia discharge to the environment; limits are based on toxicity information on a variety of freshwater fauna, but few freshwater mussel toxicity data are in the database currently used for calculation of standards. Hence, the protectiveness of the current approach, relative to native freshwater mussels, is not known. Compounding the need to address this issue are two additional factors:

1) Keller (1993, 1996), Masnado et al. (1995), and Keller and Ruessler (1997) found the cladocerans *Ceriodaphnia dubia* and *Daphnia magna* to be more sensitive to the acute effects of organic chemicals (herbicides, organochlorine insecticides, an organophosphate, and solvents) and a simulated mine effluent than the freshwater mussel *Utterbackia imbecillis*. However, information from limited toxicity testing indicates a potential for early lifestages of mussels to be among the most sensitive aquatic organisms yet tested for impacts of chlorine (Goudreau et al. 1993), metals (Keller and Zam 1991, Jacobson et al. 1993), and paper mill effluent (Wade et al. 1993, McKinney and Wade 1996).

2) Ammonia is a natural biological degradation product of nitrogenous organic matter, and as such, it is a common environmental contaminant. Significant sources of ammonia enrichment include industrial waste, municipal waste water treatment plants, and agricultural run-off (animal wastes as well as chemical fertilizers). In the environment, sediment pore water concentrations of ammonia typically exceed those of overlying surface water. The unionids' anchorage in the substrate places them in the environmental compartment where ammonia concentrations are expected to be among the highest (Frazier et al. 1996).

To address this issue, available published and unpublished ammonia toxicity data for freshwater mussels were located and summarized. Existing data for ammonia toxicity to early lifestages of freshwater mussels were retrieved from the literature (Toxline search) and by contacting those involved in mussel toxicity testing. The pooled data were used to derive water quality guidelines protective of most freshwater mussels which are then compared to the recently updated national criteria.

The toxicity of ammonia varies with temperature and pH (which determine the fraction of total ammonia which exists in the ionized and un-ionized states). Recommended water quality criteria for ammonia have been presented on an un-ionized ammonia basis (NH_3) (USEPA 1985) and total ammonia as nitrogen basis ($NH_3 + NH_4^+$ - N) (USEPA 1999). In this review, we present raw data and recommendations in both formats; because no cited reports present data on a total ammonia as nitrogen basis, we used the equations in appendix 3 of the USEPA (1999) revised ammonia criteria document with reported or discerned temperature and pH data to derive this format.

Results

Twenty-four unionid LC_{50}'s were retrieved, covering nine species in eight genera (Table 1). Two data points were for adult mussels (which may not be the most sensitive lifestage) and two additional data points were for subchronic exposures (i.e., $\geq$ 96 hours). Additional relevant data are available in Horne and McIntosh (1979) for the genera *Amblema, Utterbackia, Cyrtonaias,* and *Toxolasma*, but those authors tested only one concentration of ammonia 5 mg / l total ammonia as N) and reported lethality from 55 hours to 165 hours (i.e., no 96 hour LC_{50} available from this paper).

For early lifestages of unionids, there were a total of twenty acute ($\leq$ 96 hours) exposure assays, covering eight species and seven genera. In general, glochidia were approximately 1.5 to 3.7 times more sensitive than juveniles in the three species for which acute data are available for both lifestages (Table 2).

To compare these data to that for species considered in the national criteria document for ammonia (USEPA 1999), data are summarized by the methodology of the national numeric water quality criteria guidelines (Stephan et al. 1985) (Table 2). Tables 3 and 4 present genus mean acute values for all data combined and for adult and juvenile data only (i.e., excluding the glochidia...an attempt to address the concerns of some over this test procedure, but we feel these data have merit). In the pooled dataset, genus mean acute values (GMAV, or the geometric mean of all LC_{50}'s for $\leq$ 96 hr exposure duration within a given genus) ranged from 4.24 to 8.88 mg-N/l (total ammonia as N, pH 8) (Table 3). These values are uniformly at the sensitive end of the range of GMAVs reported in the literature. Excluding the more sensitive glochidia from these calculations affects GMAVs and their ranks, but it does not appreciably change the overall apparent sensitivity of unionids relative to other taxa represented in the database (Table 4).

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Table 1. Toxicity Data for Ammonia and Freshwater Mussels

Species	Life stage	Duration	T °C	pH	LC_{50} (mg/l) (Un-ionized)	LC_{50} (mg/l) (Total as N, pH 8)	Reference
Villosa iris	glochidia	24-hr	22	8.1	0.284	5.18	Goudreau et al. 1993
Villosa iris	glochidia	24-hr	20	7.9	0.11	2.25	Scheller et al. 1996, Scheller 1997
Villosa iris	juvenile	96-hr	25	8.2	0.62	9.44	Scheller et al. 1996. Scheller 1997
Villosa iris	juvenile	96-hr	25	8.2	0.56	8.54	Scheller et al. 1996. Scheller 1997
Villosa iris	juvenile	96-hr	25	8.1	0.38	5.50	Scheller et al. 1996. Scheller 1997
Utterbackia imbecillis	glochidia	48-hr	25	8	0.33	5.12	M. Black and M. Barfield, unpub. data 2000
Utterbackia imbecillis	glochidia	48-hr	25	8.1	0.40	7.46	A. Keller, unpub. data 1999
Utterbackia imbecillis	juvenile	96-hr	25	8	0.38	5.79	M. Black and M. Barfield, unpub. data 2000
Utterbackia imbecillis	juvenile	96-hr	25	8	1.28	19.67	A. Keller, unpub. data 1999
Utterbackia imbecillis	juvenile	96-hr	25	8	0.45	6.89	A. Keller, unpub. data 1999
Utterbackia imbecillis	juvenile	9-day	24	7.7	0.153	2.83	Wade 1992

Pyganodon grandis	adult	96-hr	25	7.5	0.44	8.74	Scheller et al. 1996, Scheller 1997
Pyganodon grandis	adult	96-hr	25	7.7	0.54	9.03	Scheller et al. 1996, Scheller 1997
Lasmigona subviridis	juvenile	24-hr	25	8	0.43	6.61	M. Black and M. Barfield, unpub. data 1999
Lasmigona subviridis	juvenile	24-hr	25	8	0.43	6.61	M. Black and M. Barfield, unpub. data 1999
Lasmigona subviridis	juvenile	24-hr	25	8	0.34	5.19	M. Black and M. Barfield, unpub. data 1999
Lasmigona subviridis	juvenile	15-day	22	8	0.03	0.57	M. Black and M. Barfield, unpub. data 1999
Fusconaia masoni	glochidia	24-hr	25	8	0.34	5.18	M. Black and M. Barfield, unpub. data 2000
Actinonaias pectorosa	glochidia	48-hr	25	8	0.25	3.76	A. Keller, unpub. data 1999
Actinonaias pectorosa	juvenile	96-hr	25	8	0.91	14.05	A. Keller, unpub. data 1999
Medionidus conradicus	glochidia	48-hr	25	8	0.28	4.24	A. Keller, unpub. data 1999
Lampsilis siliquoidea	juvenile	96-hr	24	8.3	0.05	0.73	Myers-Kinzie 1998, 1999
Lampsilis siliquoidea	juvenile	96-hr	24	8.3	0.15	2.26	Myers-Kinzie 1998, 1999
Lampsilis cardium	juvenile	96-hr	19	8.2	0.99	21.64	(T. J. Newton, preliminary data, Upper Midwest Environmental Sciences Center, LaCrosse, WI).

Table 3. Comparison of Freshwater Mussel Genus Mean Acute Values (all data) for Ammonia Toxicity to Other Sensitive Taxa, Listed in Order of Increasing Sensitivity

Genus	Species Used in GMAV Derivation	GMAV (mg/ l total ammonia as N, pH 8)
Oncorhynchus	Golden trout Cutthroat trout Pink salmon Coho salmon Rainbow trout Chinook salmon	21.95
Etheostoma	Orangethroat darter	17.96
Notemigonus	Golden shiner	14.67
Prosopium	Mountain whitefish	12.11
Pyganodon	**Giant floater**	**8.88**
Utterbackia	**Paper pondshell**	**7.86**
Actinonaias	**Pheasantshell**	**7.27**
Lasmigona	**Green floater**	**6.10**
Villosa	**Rainbow**	**5.53**
Lampsilis	**Plain pocketbook** **Fatmucket**	**5.26**
Fusconaia	**Atlantic pigtoe**	**5.18**
Medionidus	**Cumberland moccasinshell**	**4.24**

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Table 4. Comparison of Freshwater Mussel Genus Mean Acute Values (juveniles and adults only) for Ammonia Toxicity to Other Sensitive Taxa, Listed in Order of Increasing Sensitivity

Genus	Species Used in GMAV Derivation	GMAV (mg/ l total ammonia as N, pH 8)
Oncorhynchus	Golden trout Cutthroat trout Pink salmon Coho salmon Rainbow trout Chinook salmon	21.95
Etheostoma	Orangethroat darter	17.96
Notemigonus	Golden shiner	14.67
Actinonaias	**Pheasantshell**	**14.05**
Prosopium	Mountain whitefish	12.11
Utterbackia	**Paper pondshell**	**9.22**
Pyganodon	**Giant floater**	**8.88**
Villosa	**Rainbow**	**7.63**
Lasmigona	**Green floater**	**6.10**
Lampsilis	**Plain pocketbook** **Fatmucket**	**5.26**

Derivation of Water Quality Guidelines

We next pooled all unionid early lifestage acute data (n = 20) across genera to derive water quality guidelines for this family and for comparison to criteria and ambient water concentrations. The first step was the calculation of an early lifestage freshwater mussel family mean acute value of 0.36 mg/l un-ionized ammonia and 5.7 mg/l total ammonia as N, pH 8 (geometric mean of all available short term tests).

The family mean acute values were then multiplied by 0.5 (an empirically derived conversion factor used in water quality criteria development which converts from a 50% lethality concentration to a minimal-lethality concentration) to approximate mussel specific criteria maximum concentration guidelines of 0.18 mg/l (un-ionized ammonia) and 2.8 mg-N/l (total ammonia as N, pH 8). These concentrations should not be exceeded in waters important for unionid conservation.

There were no applicable acute:chronic ratios for sublethal ammonia impacts to freshwater mussels. In order to approximate a freshwater mussel criteria continuous concentration, the following values could be used (and debated) for the acute:chronic ratio:

100 from the North Carolina State water quality standards at .0208(a)(1) for circumstances where an acute:chronic value is lacking

20 from the State's standards at .0208(a)(1) for circumstances where an acute:chronic value is lacking and the compound has a half-life of less than 96 hr

13.3 an ammonia acute:chronic ratio from juvenile *Lasmigona subviridis* studies based on a geometric mean 24-hour LC_{50} of 0.40 mg/l and the 15-day LC_{50} of 0.03 mg/l; all tests by same researcher in same water (Black and Barfield, unpub. data)

6.5 based on other data for freshwater mussels (manganese exposure *to Utterbackia imbecillis* with a 9-day LC_{50} of 39 mg/l and 90-day NOEC of 6.0 mg/l (Schweinforth and Wade 1990)

3.9 an ammonia acute:chronic ratio from juvenile *Utterbackia imbecillis* studies based on a geometric mean 96-hour LC_{50} of 0.60 mg/l (various studies) and the 9-day LC_{50} of 0.153 mg/l (Wade 1992)

Because there were no applicable data on sublethal ammonia impacts, we used the geometric mean (7.2) of the two freshwater ammonia acute:chronic ratios based on lethality (13.3 and 3.9) and multiplied by 2 to approximate a sublethal effects ratio of 14.4. Mussel family mean acute values were divided by this value to derive mussel specific criteria continuous concentration guidelines of 0.02 mg/l (un-ionized ammonia) and 0.40 mg-N/l (total ammonia as N, pH 8). In waters important for unionid conservation, a 4-day average ammonia concentration should not exceed these values.

Comparison to Water Quality Criteria

The significance of these derivations are illustrated in two ways. First, the early lifestage freshwater mussel criteria maximum concentration and criteria continuous concentration are compared to the newly recommended national criteria (USEPA 1999). These criteria are expressed as total ammonia as N, and vary depending upon pH; the chronic criteria also varies with temperature (i.e, both national criteria are equation-based to normalize for these physicochemical parameters). Also, the acute criteria varies depending on the presence or absence of salmonids in the waters to which the criteria is to be applied, and the chronic criteria varies depending on whether or not early life stages of fish are present. Correspondingly, direct comparisons require that combinations of temperature and pH be specified (all values are total ammonia as N (mg-N/l):

Federal Criteria Maximum Concentration at pH 8	**Salmonids present**	**5.62**
	Salmonids absent	**8.40**
Freshwater Mussel Criteria Maximum Concentration Guideline		**2.8**

Federal Criteria Continuous Concentration, pH 8, 20°C,	**Fish early lifestages present**	**1.71**
	Fish early lifestages absent	**1.71**
Freshwater Mussel Criteria Continuous Concentration Guideline		**0.4**

Summary

Freshwater mussel data are not included in the current database for calculation of the federal water quality criteria for ammonia. Recently available data for this family includes eight GMAVs which are less than those in the criteria document, supporting the contention that the tested mussel species are sensitive to ammonia relative to other invertebrates and fishes. The current numerical criteria may not be protective of this taxa, and other options, such as site-specific water quality standards and criteria re-calculations should be considered in important freshwater mussel habitat.

Our approach did not consider additional margins of safety that could be recommended for protection of endangered species where information is specifically lacking (more of a political science question than a toxicological one). Because the criteria maximum and continuous concentration guidelines we derived exceed LC_{50}'s for some species, additional margins of safety are recommended in areas with threatened and endangered species if species-specific ammonia toxicity testing cannot be accomplished to establish protective limits.

The acute data for freshwater mussels and ammonia are relatively robust and should support standard setting. Chronic exposure data and sublethal endpoints assessments are generally lacking and should be initiated.

Ammonia may be a significant limiting factor for unionids given that ambient concentrations well-above the guidelines we derived have been documented. We have several documents on file that can be supplied to support this point.

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Table 2. Species mean and genus mean acute values for unionids and ammonia. Relative sensitivity of unionid glochidia and juveniles to ammonia are available for the *Villosa, Utterbackia, and Actinonaias* .

Species	Lifestage	Duration	Temp	pH	Total ammonia (total N @ pH 8)	Species mean acute values	Genus mean acute values
Villosa iris	glochidia	24 hr	22	8.1	5.17		
	glochidia	24 hr	20	7.9	2.25		
	juvenile	96 hr	25	8.2	9.44		
	juvenile	96 hr	25	8.2	8.54		
	juvenile	96 hr	25	8.1	5.50	5.53 (all data) 3.41 (glochidia) 7.63 (juvenile)	5.53 (all data) 3.41 (glochidia) 7.63 (juvenile)
Utterbackia imbecillis	glochidia	48 hr	25	8	5.12		
	glochidia	48 hr	25	8.1	7.46		
	juvenile	96 hr	25	8	5.79		
	juvenile	96 hr	25	8	19.67		
	juvenile	96 hr	25	8	6.89	7.86 (all data) 6.18 (glochidia) 9.22 (juvenile)	7.86 (all data) 6.18 (glochidia) 9.22 (juvenile)
	juvenile	9 day	24	7	2.83 (enough data present to calc FCV)	Chronic	chronic

Pyganodon grandis	adult	96 hr	25	7.5	8.74		
	adult	96 hr	25	7.7	9.03	8.88 (all adult)	8.88 (all adult)
Lasmigona subviridis	juvenile	24 hr	25	8	6.61		
	juvenile	24 hr	25	8	6.61		
	juvenile	24 hr	25	8	5.9	6.10 (all juvenile)	6.10 (all juvenile)
	juvenile	15 day	22	8	0.57	Chronic	Chronic
Fusconaia masoni	glochidia	24 hr	25	8	5.18	5.18 (glochidia)	5.18 (glochidia)
Actinonaias pectorosa	glochidia	48 hr	25	8	3.76		
	juvenile	96 hr	25	8	14.05	7.27 (all data) 3.76 (glochidia) 14.05 (juvenile)	7.27 (all data) 3.76 (glochidia) 14.05 (juvenile)
Medionidus conradicus	glochidia	48 hr	25	8	4.24	4.24 (glochidia)	4.24 (glochidia)
Lampsilis siliquoidea	juvenile	96 hr	24	8.3	0.73		
	juvenile	96 hr	24	8.3	2.26	1.28 (juvenile)	
Lampsilis cardium	juvenile	96 hr	19	8.2	21.64	21.64 (juvenile)	5.26 (juvenile)

Draft -- Draft -- Draft

Notes:

3.39 final chronic value for juvenile *Utterbackia imbecillis* based on the 9-day geometric mean of NOEC and LOEC (Wade 1992)

ACR calculations:

7.86 (all data)/3.39 = 2.32
9.22 (juvenile)/3.39 = 2.72

Data to determine FCV for Lasmigona subviridis is available (Black and Barfield, unpublished data).

Illinois Association of Wastewater Agencies
SANGAMON TOWERS □ SUITE 100 □ 424 NORTH FOURTH STREET
SPRINGFIELD, ILLINOIS 62702 □ 217-523-1814 □ FAX: 217-544-0086
WEBSITE: www.ilwastewater.org

January 18, 2002

Mr David Pfeifer WT-15J
Life Scientist
U.S. Environmental Protection Agency
77 W. Jackson Blvd.
Chicago, IL 60604

Dear Mr. Piffer,

I am writing you concerning the present effort underway in Illinois by the Illinois Association of Wastewater Agencies (IAWA) to request that the Illinois Pollution Control Board (Board) adopt an ammonia nitrogen water quality standard as prescribed by the USEPA 1999 Ammonia Guidance. I am the current President of the IAWA and as such wish to outline to you and your staff the present IAWA understanding of discussions to date between your office and various representatives of IAWA in this matter. Further, I wish to thank you and your staff for your consideration of the IAWA position in these proceedings.

During the summer of 2001, the IAWA and the Illinois Environmental Protection Agency (IEPA) jointly composed a draft of the proposed regulation which was sent to you for review. While this rulemaking effort is solely undertaken and funded by the IAWA, the IAWA has requested that IEPA review and comment on all work in the development of the regulation such that the proposal ultimately presented to the Board is a proposal IEPA can comfortably support. This draft proposal was sent to your office several months ago. A return comment from your office was received by IEPA and discussed with IAWA.

Mr. Mike Callahan, Chairman of the IAWA Ammonia Water Quality Subcommittee, met with you in November and discussed the comments made by USEPA. During the November meeting you suggested that IAWA representatives contact Mr. Brian Thompson of your office to address several of the technical issues involved with the draft proposal. The IAWA has retained Dr. Robert Sheehan of the Southern Illinois University Fisheries Research Laboratory as a technical consultant and advisor in this matter. During December, 2001, Dr. Sheehan discussed the proposal several times with Mr. Thompson, and, upon Mr. Thompson's recommendation, with Dr. Brooks Burr also of SIU. The issues discussed and Dr. Sheehan's interpretation of their resolution follow.

Early Life Stage Determination: the IAWA proposal considers the month of March to be the advent of the early life stage season throughout Illinois. This month was selected, by Dr. Sheehan in consideration of two main issues. First, waters in the southern part of the state obviously warm earlier in the spring than those in the northern portion of the state. Consequently, many ubiquitous species in Illinois could readily begin the spawning season earlier in the spring in southern Illinois than in northern Illinois and therefore would need earlier seasonal protection in that area. Secondly, northern Illinois contains a significant population of northern pike not found in southern Illinois. The northern pike begins spawning at colder water temperatures than most other indigenous Illinois species. These water temperatures favorable to northern pike spawning can be realized in northern Illinois in March. These two early life stage scenarios involve different considerations but both indicate that March should be considered as the beginning of the early life stage statewide.

Species Distribution: This consideration was not directly referenced as an issue in the USEPA comment on the draft proposal, but has been discussed among Mr. Thompson, Dr. Sheehan and Dr. Burr during their consideration of the early life stage timing. Two species considered indigenous to Illinois were thought to be conceivably not protected by the early life stage season of March through October. These were the burbot and the cavefish. Dr. Sheehan is unaware of any spawning populations of burbort outside of Lake Michigan in Illinois. The proposed ammonia nitrogen water quality standard does not affect Lake Michigan and would therefore not impact the burbot. The cavefish is very limited in distribution in Illinois and is found in areas that are extremely unlikely to realize elevated concentrations of ammonia nitrogen. However, in consideration of the unlikely occurrence of either of these species in waters which might be affected by the proposed water quality standard, the IAWA has included an extra degree of protection in the draft proposal which allows for IEPA to apply early life stage ammonia nitrogen protection during winter to waters which may contain these species or any others found to need additional protection.

Dr. Burr indicated he believes he may have observed fry of the redfin shiner, spotfin shiner and the mottled sculpin through stream ice cover in November. While the possible presence of the early life stages of these species is considered by Dr. Sheehan and Dr. Burr to be minimal, Dr. Burr has indicated he believes some research into the extent of the percentage of each of these species populations present as fry in November might be appropriate. Again, as discussed with the burbot and the cavefish in the preceding paragraph, the special protection afforded by the draft proposal is applicable to these

MEMORANDUM

DATE: 05-Jun-98

TO: Bob Mosher, Planning

FROM: Landon Niedringhaus

SUBJECT: Reasonable Potential to Exceed Standards -- Need for Further Analysis

---

DISCHARGER	City of Alton		IL00	27464	
UPSTRM 7Q10	21490	cfs	STP DAF	10.5	MGD
HARDNESS	226	mg/l as CaCO3	STP LO FLO	5.92	MGD
WQ STATION	I 84		DILUTION	2345.0	Calculated
PERMIT EXPIRES	10/31/98		ANALYSIS NEEDED BY		

PARAMETER		MAX. EFF CONC.	NO. OF SAMPLES	MULTIPLY BY	95% POTENTIAL	WATER QUALITY STANDARDS		(304) LIMITS	FURTHER ANALYSIS
						ACUTE	CHRONIC		
ARSENIC	<	0.004	2	3.8	0.0152	0.36	0.19	0.25	No
BARIUM	<	0.6	3	3.0	1.8	*	5.0	2.0	No
CADMIUM	<	0.005	3	3.0	0.015	0.0244	0.0022	0.15	Yes
CHROM (Hex)	<	0.005	3	3.0	0.015	0.016	0.011	0.1	Yes
CHROM (Total)		0.03	2	3.8	0.114	3.3860	0.4036	1.0	No
CN (Dissociable)		0.007	2	3.8	0.0266	0.022	0.0052	*	Yes
CN (Grab < 24 hr)		0.01	3	3.0	0.03	*	*	0.1	No
COPPER	<	0.02	3	3.0	0.06	0.0382	0.024	0.5	Yes
FLUORIDE		1.24	1	6.2	7.688	*	1.4	15.0	Yes
IRON		0.1	3	3.0	0.3	*	1.0	2.0	No
LEAD	<	0.05	3	3.0	0.15	0.10	*	0.2	Yes
MANGANESE	<	0.015	1	6.2	0.093	*	1.0	1.0	No
MERCURY	<	0.0002	2	3.8	0.00076	0.0005	*	0.0005	Yes
NICKEL		0.04		0.0	0	*	1.0	1.0	No Data
OIL & GREASE		2		0.0	0	*	*	15.0	No Data
PHENOL	<	0.01	3	3.0	0.03	*	0.1	0.3	No
SILVER	<	0.01	3	3.0	0.03	*	0.005	0.1	Yes
ZINC	<	0.1	3	3.0	0.3	*	1.0	1.0	No

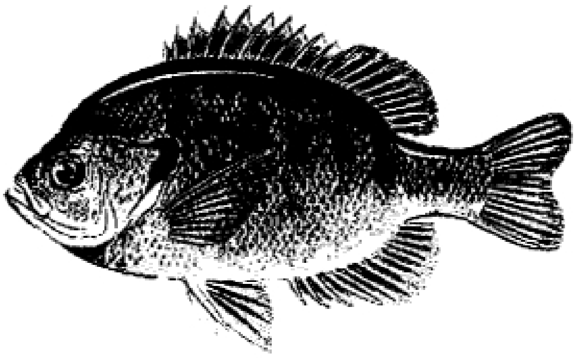
Notes:

EXHIBIT 3

C:\SPREADSH\CALC\METALS1.WB1

Illinois State Museum State Symbols of Illinois ©1995 ISM

State Fish -- Bluegill



About the symbol

The bluegill (*Lepomis macrochirus*) is a very common fish throughout the state. It is most abundant in clear lakes with large amounts of aquatic vegetaion. However, it occurs in a large variety of habitats including pools, overflow ponds, oxbows, swamps, and man-made impoundments. They often occur in small loose schools that have up to 20 to 30 individuals in them.

They are generally small to medium-sized fish. The largest one reported from Illinois weighed 1.6 kilograms (3 lb. 8oz.). More typically, one would weigh about 0.3 kilograms (12 oz.) and would be about 24 centimeters (9.5 in.) long.

Bluegills are generally carnivorous. They mainly eat aquatic insects and insect larvae; in addition, they eat smaller fish, crayfish, and snails. When other food is in short supply, they will also eat algae.

In the summer male bluegills build nests in water less than about 60 centimeters (2 ft.) deep). These nests are shallow, circular depressions and are frequently in areas with gravel bottoms. Often many males build nests in a small area. Females lay eggs in the nests. The males then guard the eggs until they hatch.

These references have more information on bluegills.

If this interested you, you might be interested in these other Internet resources on fish.

How did it become a state symbol?

(from Illinois Blue Book, 1993-1994)

EXHIBIT 4

The State Fish was selected by schoolchildren in 1986.

Illinois
Environmental
Protection Agency

Bureau of Water
P.O. Box 19276
Springfield, Illinois 62794-9276

April 2000

IEPA/BOW/00-005

Illinois Water Quality Report 2000

Illinois Environmental Protection Agency

Bureau of Water

EXHIBIT 5

(not supporting) their designated uses. Overall use, which is equivalent to aquatic life use since aquatic life is considered to be the best measure of ecosystem health and integrity, was fully or partially attained on 98.6 percent of all stream miles assessed (Figure 1-1). The major causes (pollutants or stressors) of less than full support include habitat and flow alterations, nutrients, organic enrichment/low dissolved oxygen, siltation, metals, and suspended solids. The major sources include agriculture, habitat modification, point sources, resource extraction and urban runoff.

Illinois River and Backwater Lakes

The Illinois River and its backwater lakes are an extremely important water resource system, providing recreation, transportation/navigation, public water supply, flood control, wildlife habitat and other beneficial uses. The protection and restoration of this resource is a complex task, made more difficult since the Illinois River watershed encompasses nearly one-half of the state. Because of its importance to the state, this system is the object of numerous local, state, and national efforts to protect and restore its quality for future generations.

In reviewing Figure 1-1, it should be noted that the vast majority of the mainstem river (from its origin at the confluence of the Des Plaines and Kankakee Rivers to the Mississippi River) has been assessed in this report as having "good" overall quality (fully supporting designated uses) based on chemical water quality parameters measured. Part 3 of this report describes the methodologies used by the Agency to assess rivers and streams in the state, taking into account the type, quantity and age of data available. In the case of the Illinois River mainstem, only chemical water quality data are available for assessment purposes. Data collected over the past three year period were compared to the general use water quality standards, as required by Section 305(b). For each parameter measured, the percentage of violations of each standard were calculated and compared to established assessment criteria (see Table 3-2). In summary, standards violation rates were less than 11% for each parameter measured. Therefore, from a chemical water quality perspective, the majority of the Illinois River is rated as "good."

Nearly 30 years of point source pollution control efforts, and more recent efforts to reduce nonpoint source pollution, have demonstrably improved water quality on the Illinois River mainstem. Indicative of this success are the professional fishing tournaments being held up and down the river. By comparison, such events were unthinkable due to poor water quality 25 years ago. *(While this is good news, the reviewer and users of this report are cautioned to remember that assessment data, and overall assessment results, can change from one reporting period to the next. The time, place, type, and amount of data collected are ever-changing; thus, overall assessment results (i.e., good, fair, poor) can also change from one reporting cycle to the next.)*

Limited data have been collected by the Agency on Illinois River backwater lakes. Data that are available are now considered too old for proper assessment purposes (i.e., >15 years). Therefore, use support attainment assessments have not been made for the vast majority of these resources. However, excessive sedimentation is known to exist in portions of the mainstem river (i.e., Peoria Lake) and the majority of the backwater lakes and tributary streams. Information provided by the Illinois Department of Natural Resources (IDNR) show that both the rate of sedimentation and volume lost due to sedimentation are severely impacting the ability of these shallow, nutrient-rich resources to support recreation, flood control, aquatic life and other beneficial uses. Figure 1-2 depicts impairment due to excessive sedimentation in portions of the Illinois River mainstem and backwater lakes as specifically documented by IDNR (Bhowmik and Demissie, June 2000).

The Lieutenant Governor's Office has taken the lead role in recent years to address continuing concerns over excessive sedimentation in parts of the Illinois River system. "Illinois Rivers 2020" is a bold, new, voluntary, incentive-based initiative that builds upon the success of the Illinois River Conservation Reserve Enhancement Program (CREP). Illinois Rivers 2020 utilizes existing agencies, programs and delivery mechanisms in the federal Farm Bill and Clean Water Act (CWA) programs, and seeks special consideration under the Water Resources Development Act (WRDA). This comprehensive program is the next logical step for restoration of the Illinois River Basin and its backwater lakes.

Lakes

More than 3,000 lakes (six acres or more in size) covering nearly 250,000 acres exist in Illinois. Like rivers and streams, inland lake resources are a vital component of the economic and social well-being of the state. Some 90 million visitor days of general lake recreation generates an estimated $1.78 billion annually to the state's economy.

Most publicly-owned lakes with 20 or more surface acres were assessed for this report, along with public and non-public lakes monitored in conjunction with Illinois EPA's Volunteer Lake Monitoring Program.

As shown in Table 1-2, like rivers and streams, the monitoring of inland lake resources increased substantially from the 1986 through the 1988 reporting periods, resulting in a sevenfold increase in lake acres assessed. Prior to the 1988 report, only monitored assessments were made. Water quality assessments were based on Agency collected data (Ambient Lake Monitoring Program, Lake Water Quality Assessment Program and Federal/Illinois Clean Lakes Program) no older than five years. In 1988, U.S. EPA changed their 305(b) guidance to include evaluated assessments. Evaluated assessments included those that were based on Agency collected data that is greater than five, but less than 16, years old, data collected through the Volunteer Monitoring Program or best professional judgement. Since 1988, total lake acreage assessed for each reporting period has continued to increase through the 1999 report. Note, however, that total lake acreage reported in the 1990 and 1992 reports was falsely elevated. A database counting error resulted in reporting 21,640 more lake acres than were actually assessed. The error was subsequently corrected in the 1994 report.

For this 2000 report, a total of 154,795 acres (62.2 percent of total lake acreage) were assessed for degree of use support, a reduction of 33,689 acres from the 1999 report. The reduction in acreage is due to eliminating waterbody assessments that were based solely on best professional judgement, a single sampling event, or on data collected prior to 1983. Because 305(b) information is used to determine 303(d) list eligibility, evaluated assessments were included in the 2000 report only when monitoring data to support the assessment were available and no more than 15 years old.

Causes of Less Than Full Support

Causes of use impairment for rivers and streams not fully supporting uses are summarized below in Table 3-11.

Table 3-11. Statewide Causes - Rivers and Streams (miles).

Causes Category	Total Impact
Ammonia (unionized)	88
Cause Unknown	175
Chlorine	14
Cyanide	123
Excessive Algal Growth/Chlorophyll a	58
Flow Alteration	431
Habitat Alterations (other than flow)	2,816
Metals	1,634
Nutrients	3,210
Oil and Grease	20
Organic Enrichment/D.O.	2,687
Other Inorganics (Fluoride)	44
Pathogens	37
PCBs	96
pH	589
Priority Organics	643
Salinity/TDS/Chlorides	704
Siltation	2,330
Sulfates	349
Suspended Solids	1,492
Thermal Modification	22

Causes of Less Than Full Support

Causes of use impairment for all lakes not fully supporting uses are summarized below (Table 3-29).

Table 3-29. Statewide Causes - All Lakes.

Causes Category	Total Impact	
	Number	Acres
Priority Organics	36	31,776
PCBs	8	15,682
Metals	13	13,199
Unionized Ammonia	10	4,368
Nutrients	148	126,797
pH	17	3,951
Siltation	129	118,761
Organic Enrichment/Low D.O.	45	86,575
Salinity/TDS/Chlorides	1	26
Thermal Modification	2	6,007
Habitat Alterations	2	1,968
Pathogens	3	6,096
Suspended Solids	92	111,903
Noxious Aquatic Plants	95	71,618
Excessive Algae Growth/Chlorophyll *a*	112	54,150
Exotic Species	9	541
Pesticides (half life ≤90 days)	1	4,040

(9) Designated Uses - Use Support and Designated Uses are identified by the following numeric codes:

Use Support is identified by a letter code attached to the corresponding designated use code.

F = Full
T = Threatened
P = Partial Support
N = Nonsupport
X = Indicates that a particular designated use was not assessed

Designated Uses are identified by the following numbers:

1 (old Code 01) = Overall Use
20 (old Code 04) = Aquatic Life
21 (old Code 02) = Fish Consumption
42 (old Code 05) = Swimming
44 (old Code 06) = Secondary Contact
50 (old Code 07) = Drinking Water Supply

(10) Causes of Impairment - indicates causes of impaired uses from the codes below. Also indicated is the magnitude to which the cause contributes to the use impairment (H = high; M = moderate; S = slight).

0000 = cause unknown
0300 = priority organics
0410 = PCBs
0420 = dioxins
0500 = metals
- 0510 = arsenic
- 0520 = cadmium
- 0530 = copper
- 0540 = chromium
- 0550 = lead
- 0560 = mercury
- 0570 = selenium
- 0580 = zinc

0600 = ammonia (unionized)
0700 = chlorine
0720 = cyanide
0750 = sulfates
0800 = other inorganics (fluoride)
0900 = nutrients
- 0910 = phosphorus
- 0920 = nitrogen
- 0930 = nitrates

1000 = pH
1100 = siltation
1200 = organic enrichment/low DO
1300 = salinity/TDS/chlorides
1400 = thermal modification
1500 = flow alteration
1600 = habitat alteration (other than flow)
1700 = pathogens
1900 = oil and grease
2100 = suspended solids
2200 = noxious aquatic plants
2210 = excessive algal growth/chlorophyll a
2600 = exotic species
3000 = pesticides (half life ≤ 90 days)
- 3100 = atrazine
- 3200 = cyanazine
- 3300 = alachlor
- 3400 = metolachlor
- 3500 = metribuzin
- 3600 = trifluralin
- 3700 = butylate

(11) Sources of Impairment - indicates the sources that contribute to the causes listed above. Also indicated is the magnitude to which the source contributes to the use impairment (H = high; M = moderate, S = slight).

POINT SOURCES

0100 : industrial point sources
0200 : municipal point sources
0400 : combined sewer overflows
0500 : collection system failure
0800 : wildcat sewer
0900 : domestic wastewater lagoons

NONPOINT SOURCES

1000 Agriculture
- 1050 : Crop Related Sources
  - *1100* : nonirrigated crop production
  - *1200* : irrigated crop production
  - *1300* : specialty crop production (e.g., truck farming and orchards)
- 1350 : Grazing Related Sources
  - *1400* : pasture land
  - *1500* : range land
- 1600 : feedlots - all types
- 1700 : aquaculture
- 1800 : animal holding/management areas
- 1900 : manure lagoons

2000 Silviculture

3000 Construction
- 3100 : highway/road/bridge
- 3200 : land development

4000 Urban Runoff/Storm Sewers

5000 Resource Extraction
- 5100 : surface mining
- 5200 : subsurface mining
- 5300 : placer mining
- 5400 : dredge mining
- 5500 : petroleum activities
- 5600 : mill tailings
- 5700 : mine tailings
- 5800 : acid mine drainage
- 5900 : abandoned mining

6000 Land Disposal
(runoff/leachate from permitted areas)
- 6100 : sludge
- 6200 : wastewater
- 6300 : landfills
- 6350 : inappropriate disposal/wildcat dumping
- 6400 : industrial land treatment
- 6500 : on-site wastewater systems (septic tanks, etc.)
- 6600 : hazardous waste
- 6700 : septage disposal

7000 Hydrologic/Habitat Modification
- 7100 : channelization
- 7200 : dredging
- 7300 : dam construction
- 7350 : upstream impoundment
- 7400 : flow regulation/modification
- 7500 : bridge construction

7550 Habitat Modification
- 7600 : removal of riparian vegetation
- 7700 : streambank mod./destabilization
- 7800 : draining/filling of wetlands

8100 Atmospheric Deposition
8200 Waste Storage/Storage Tank Leaks
8300 Highway Maintenance and Runoff
8400 Spills (Accidental)
8500 Contaminated Sediments
8600 Natural Sources
8700 Recreation and Tourism Activities
8900 Salt Storage Sites
9000 Source Unknown

APPENDIX TABLE A-2. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE DESPLAINES RIVER WATERSHED, 1998.

Waterbody ID:	Segment ID:	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Date	Key Sample Type/Methods	Assessment Uses	Designated Impairment	Causes of Impairment	Sources of
ILG01	G 01	07120004	DesPlaines R.	2.405	2000	01/01/1998	M / 860	N21,P1,P20	410,500,530,540, 560,900,910,920, 1500,1600	100,200,4000,7000, 7100,7400,8500	
ILG01	G 12	07120004	DesPlaines R.	9.4	2000	01/01/1989	E / 150	N21,P1,P20,X44	410,500,530,540, 560,900,910,920, 1500,1600	100,200,4000,7000, 7100,7400,8500	
ILG01	G 24	07120004	DesPlaines R.	4.185	2000	01/01/1994	M / 300	N21,P1,P20	410,500,540,560, 900,910,920,1500, 1600	100,200,4000,7000, 7100,7400,8500	
ILG01	GD	07120004	Cedar Cr.	7.95	2000		E /	X1,X20			
ILG08	G 08	07120004	DesPlaines R.	0.98	2000	01/01/1998	M / 230,700, 860	F1,F20,F21,P42			
ILG08	G 25	07120004	DesPlaines R.	6.92	2000	01/01/1997	M / 700,860	P1,P20,X21	1100	3000,3200,4000	
ILG11	G 03	07120004	DesPlaines R.	8.575	2000	01/01/1998	M / 200,700, 860	P1,P20,P21	300,720,900,910, 920,1200,1220,1300, 1320,1500,2100	200,4000,7000,7100, 7400,8500	
ILG11	G 11	07120004	DesPlaines R.	3.18	2000	01/01/1998	M / 230,700, 860	N21,P1,P20,P42	300,720,900,910, 920,1200,1220,1300, 1320,1500,2100	200,4000,7000,7400, 8500	
ILG11	G 39	07120004	DesPlaines R.	15.97	2000	01/01/1998	M / 230,700, 860	N42,P1,P20	300,720,900,910, 920,930,1300,1320, 1330,1500,2100	200,400,4000,7000, 7400,8500	
ILG23	G 23	07120004	DesPlaines R.	3.165	2000	01/01/1998	M / 230	N21,P1,P20,P44	410,500,510,530, 540,550,560,580, 720,900,910,920, 1200,1220,1500,1600, 2100	100,200,400,4000, 7000,7100,7400,8500	
ILG30	G 07	07120004	DesPlaines R.	10.28	2000	01/01/1998	M / 230,700, 860	F1,F20,F21,N42			
ILG30	G 15	07120004	DesPlaines R.	3.49	2000	01/01/1998	M / 230	F21,N42,P1,P20	900,910,920,930, 1200,1220,1300,1320, 2100	200,400,3000,3200, 4000,8300	
ILG30	G 22	07120004	DesPlaines R.	4.12	2000	01/01/1998	M / 230	F1,F20,P42			

APPENDIX TABLE A-2. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE DESPLAINES RIVER WATERSHED, 1998.

Waterbody ID:	Segment ID:	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILGBK05	GBKA01	07120004	Spring Brook	3.55	2000	01/01/1987	E / 150	N1,N20	500,530,720,900, 910,930,1300	200
ILGBK05	GBKB01	07120004	Kress Cr.	7.28	2000	01/01/1977	E / 150	X1,X20		
ILGBL10	GBL 02	07120004	E. Br. DuPage R.	8.89	2000	01/01/1997	M / 300,420, 700,860	F1,F20,X21		
ILGBL10	GBL 05	07120004	E. Br. DuPage R.	3.17	2000	01/01/1997	M / 300,420	P1,P20,X21	900,910,920,930, 1200,1220,1300,1320, 1600,2100	200,3000,3200,4000, 7000,7100
ILGBL10	GBL 08	07120004	E. Br. DuPage R.	6.41	2000	01/01/1997	M / 300,420	P1,P20,X21	720,900,910,920, 1100,1200,1500,1600, 2100,2210	200,3000,3100,3200, 4000,7000,7100,7350, 7400
ILGBL10	GBL 10	07120004	E. Br. DuPage R.	4.65	2000	01/01/1998	M / 230,300, 420,700	N42,P1,P20	900,910,920,930, 1100,1200,1300,1600, 2100,2210	200,3000,3100,3200, 4000,7000,7100
ILGBL10	GBL 11	07120004	E. Br. DuPage R.	3.88	2000	01/01/1997	M / 300,420	P1,P20,X21	900,910,930,1600	200,3000,3200,4000, 7000,7100,7600,7700
ILGBL10	GBLA	07120004	Prentiss Cr.	3.96	2000	01/01/1997	E / 170	X1,X20		
ILGBL10	GBLB01	07120004	St. Joseph Cr.	4.28	2000	01/01/1997	M / 300,420	P1,P20	1200,1600,1900,2100, 2210	200,3000,3200,4000, 7000,7100,7550,7600, 7700,9000
ILGBL10	GBLC	07120004	Lacey Cr.	3.76	2000	01/01/1995	E / 170	X1,X20		
ILGC02	GC 02	07120004	Jackson Cr.	10.55	2000	01/01/1991	E / 150	F1,F20		
ILGC02	GC 03	07120004	Jackson Cr.	14.4	2000	01/01/1997	M / 700	F1,F20,X21		
ILGC02	GCA 01	07120004	Manhatten Cr.	8.33	2000	01/01/1997	M /	F1,F20,X21		
ILGCB01	GCB	07120004	Jackson Br.	8.96	2000	01/01/1991	E / 150	P1,P20	900,910,930	200
ILGF01	GF 01	07120004	Sugar Run	6.58	2000	01/01/1983	E / 150	P1,P20,X21	500,510,900,920, 1000,1100,1200,1220	1000,1100,3000,3200, 4000
ILGG02	GG 02	07120004	Hickory Cr.	9.95	2000	01/01/1998	M / 230	N42,P1,P20	900,910,920,1300, 1320,1500,2100	200,400,3000,3200, 4000,7000,7400

APPENDIX TABLE A-2. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE DESPLAINES RIVER WATERSHED, 1998.

Waterbody ID:	Segment ID:	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILGBK05	GBKA01	07120004	Spring Brook	3.55	2000	01/01/1987	E / 150	N1,N20	500,530,720,900, 910,930,1300	200
ILGBK05	GBKB01	07120004	Kress Cr.	7.28	2000	01/01/1977	E / 150	X1,X20		
ILGBL10	GBL 02	07120004	E. Br. DuPage R.	8.89	2000	01/01/1997	M / 300,420, 700,860	F1,F20,X21		
ILGBL10	GBL 05	07120004	E. Br. DuPage R.	3.17	2000	01/01/1997	M / 300,420	P1,P20,X21	900,910,920,930, 1200,1220,1300,1320, 1600,2100	200,3000,3200,4000, 7000,7100
ILGBL10	GBL 08	07120004	E. Br. DuPage R.	6.41	2000	01/01/1997	M / 300,420	P1,P20,X21	720,900,910,920, 1100,1200,1500,1600, 2100,2210	200,3000,3100,3200, 4000,7000,7100,7350, 7400
ILGBL10	GBL 10	07120004	E. Br. DuPage R.	4.65	2000	01/01/1998	M / 230,300, 420,700	N42,P1,P20	900,910,920,930, 1100,1200,1300,1600, 2100,2210	200,3000,3100,3200, 4000,7000,7100
ILGBL10	GBL 11	07120004	E. Br. DuPage R.	3.88	2000	01/01/1997	M / 300,420	P1,P20,X21	900,910,930,1600	200,3000,3200,4000, 7000,7100,7600,7700
ILGBL10	GBLA	07120004	Prentiss Cr.	3.96	2000	01/01/1997	E / 170	X1,X20		
ILGBL10	GBLB01	07120004	St. Joseph Cr.	4.28	2000	01/01/1997	M / 300,420	P1,P20	1200,1600,1900,2100, 2210	200,3000,3200,4000, 7000,7100,7550,7600, 7700,9000
ILGBL10	GBLC	07120004	Lacey Cr.	3.76	2000	01/01/1995	E / 170	X1,X20		
ILGC02	GC 02	07120004	Jackson Cr.	10.55	2000	01/01/1991	E / 150	F1,F20		
ILGC02	GC 03	07120004	Jackson Cr.	14.4	2000	01/01/1997	M / 700	F1,F20,X21		
ILGC02	GCA 01	07120004	Manhatten Cr.	8.33	2000	01/01/1997	M /	F1,F20,X21		
ILGCB01	GCB	07120004	Jackson Br.	8.96	2000	01/01/1991	E / 150	P1,P20	900,910,930	200
ILGF01	GF 01	07120004	Sugar Run	6.58	2000	01/01/1983	E / 150	P1,P20,X21	500,510,900,920, 1000,1100,1200,1220	1000,1100,3000,3200, 4000
ILGG02	GG 02	07120004	Hickory Cr.	9.95	2000	01/01/1998	M / 230	N42,P1,P20	900,910,920,1300, 1320,1500,2100	200,400,3000,3200, 4000,7000,7400

APPENDIX TABLE A-2. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE DESPLAINES RIVER WATERSHED, 1998.

Waterbody ID	Segment ID	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILGJ01	GJ 01	07120004	Sawmill Cr.	6.37	2000	01/01/1998	M / 300	F1,F20		
ILGK03	GK 03	07120004	Flag Cr.	7.75	2000	01/01/1989	E / 150	P1,P20	900,910,920,930, 1300,1320,1600	200,3000,3200,4000, 7000,7100,7550,7700
ILGL09	GL	07120004	Salt Cr.	11.2	2000	01/01/1975	E / 150	X1,X20,X21		
ILGL09	GL 03	07120004	Salt Cr.	10.44	2000	01/01/1995	M / 300,700, 860	P1,P20,X21	300,410,900,910, 920,930,1200,1220, 1300,1320,1600,2100	200,400,500,3000, 3200,4000,7000,7100 8500
ILGL09	GL 09	07120004	Salt Cr.	11.8	2000	01/01/1998	M / 230,300, 420,700, 860	N42,P1,P20,X21	300,410,900,910, 920,930,1300,1320, 1500,2210	200,400,500,4000, 7000,7350,7400,850(
ILGL09	GL 10	07120004	Salt Cr.	3.68	2000	01/01/1995	M / 300,420, 700	F21,P1,P20	900,910,930,1300, 1320,1500,1600	200,4000,7000,7100, 7350,7400
ILGL09	GL 19	07120004	Salt Cr.	3.09	2000	01/01/1995	M / 300,420, 700,860	P1,P20,X21	300,410,500,720, 900,910,930,1200, 1220,1600,2100	200,400,3000,3100, 4000,7000,7100,850
ILGL09	GLB 01	07120004	Spring Brook	3.28	2000	01/01/1995	M / 300,420	P1,P20	300,900,910,930, 1100,1200,1220,1500, 1600,2100,2210	200,4000,7000,710(7350,7400,8500
ILGL09	GLB 07	07120004	Spring Brook	4.41	2000	01/01/1995	M / 300,420	F1,F20,X21		
ILGL09	GLBA	07120004	Meacham Cr.	2.88	2000	01/01/1987	E / 150	P1,P20	1200,1220,1500	4000,7000,7400
ILGLA01	GLA 02	07120004	Addison Cr.	6.65	2000	01/01/1998	M / 230,300, 420	N42,P1,P20	300,500,540,900, 910,920,930,1200, 1220,1300,1320,1330, 1600,1900,2100,2210	200,400,4000,7000, 7100,7350,7550,7600, 7700,8500
ILGLA01	GLA 04	07120004	Addison Cr.	4.72	2000	01/01/1995	M / 300,420	P1,P20	300,410,500,530, 900,910,920,930, 1200,1220,1500,1600, 2100,2210	200,4000,7000,7100, 7350,7400,7550,7600, 7700,8500
ILGO01	GO 01	07120004	Willow Cr.	7.69	2000	01/01/1983	E / 150	P1,P20	900,910,920,1300, 1320	200,4000
ILGU02	GU 02	07120004	Indian Cr.	10.67	2000	01/01/1997	M / 700,860	P1,P20,X21	300,900,920	200,3000,3200,4000, 8500

APPENDIX TABLE A-4. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE LOWER FOX RIVER WATERSHED, 1998.

Waterbody ID	Segment ID	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILDT38	DT 03	07120007	Fox R.	5.84	2000	01/01/1996	M / 700,860	F1,F20,F21,N42		
ILDT38	DT 09	07120007	Fox R.	6.655	2000	01/01/1998	M / 230,700, 860	F21,P1,P20,P42	300,600,900,920, 1200,1220,1500,2100	200,400,4000,7000, 7400,8500
ILDT38	DT 38	07120007	Fox R.	12.135	2000	01/01/1998	M / 230	F1,F20,N42,X21		
ILDT38	DT 58	07120007	Fox R.	4.285	2000		E /	F1,F20,X21		
ILDT38	DT 69	07120007	Fox R.	4.65	2000	01/01/1996	M / 700,860	F21,P1,P20	300,900,920,1200, 1500	200,4000,7000,7400, 8500
ILDT38	DTP 01	07120007	Whites Cr.	1.34	2000		E /	X1,X20		
ILDT38	DTZJ01	07120007	Morgan Cr.	8.23	2000	01/01/1988	E / 150,860	P1,P20	0	9000
ILDT38	DTZN01	07120007	Norton Branch	4.55	2000		E /	F1,F20		
ILDT38	DTZO01	07120007	Brewster Cr.	5.82	2000		E /	X1,X20		
ILDT46	DT 01	07120007	Fox R.	2.89	2000	01/01/1998	M / 230	F1,F20,F21,F42		
ILDT46	DT 02	07120007	Fox R.	11.22	2000		E /	F1,F20		
ILDT46	DT 11	07120007	Fox R.	3.595	2000		E /	F1,F20		
ILDT46	DT 36	07120007	Fox R.	2.595	2000	01/01/1996	M / 700,860	F1,F20,X21		
ILDT46	DT 41	07120007	Fox R.	12.185	2000		E /	F1,F20		
ILDT46	DT 46	07120007	Fox R.	4.495	2000	01/01/1998	M / 230	F1,F20,P42,X21		
ILDT46	DTZA	07120007	O'Neill Branch	4.72	2000		E /	X1,X20		
ILDT46	DTZC	07120007	Brumbach Cr.	8.8	2000		E /	X1,X20		

APPENDIX TABLE A-16. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE MISSISSIPPI RIVER NORTH CENTRAL WATERSHED, 1998.

Waterbody ID:	Segment ID:	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILLDD01	LDD-C3	07080104	Cedar Cr.	3.05	2000	01/01/1994	M / 300	P1,P20	410,900,910,920, 930	200,400,1000,1800, 4000,8500
ILLDD01	LDD-C3a	07080104	Cedar Cr.	2.55	2000	01/01/1994	M / 300	P1,P20	410,900,910	200,400,1000,8500
ILLDD01	LDD-C6	07080104	Cedar Cr.	5.62	2000	01/01/1994	M / 300	P1,P20	410,900,910,920, 1100	1000,7000,7550,7700, 8500
ILLDD01	LDDA	07080104	Johns Cr.	8.53	2000		E /	X1,X20		
ILLDD01	LDDAA	07080104	Davids Cr.	11.69	2000		E /	X1,X20		
ILLDD01	LDDB	07080104	Talbot Cr.	9.77	2000		E /	X1,X20		
ILLDDC01	LDDC	07080104	Markham Cr.	5.75	2000	01/01/1994	M / 300	P1,P20	900,910,920,1100, 1200,1300	200
ILLDE01	LDE 01	07080104	N. Henderson Cr.	30.78	2000	01/01/1994	M / 700	F1,F20		
ILLDE01	LDEA	07080104	Snake Cr.	4.42	2000		E /	X1,X20		
ILLDE01	LDEC	07080104	Goose Run	5.74	2000		E /	X1,X20		
ILLDG01	LDG 01	07080104	Middle Henderson Cr.	14.26	2000	01/01/1994	M / 700	P1,P20	900,930,1100	1000,7000
ILLDG01	LDGA	07080104	Toms Cr.	6.48	2000		E /	X1,X20		
ILLDH01	LDH	07080104	S. Henderson Cr.	11.7	2000		M /	X1,X20		
ILLE01	LE 03	07080104	Pope Cr.	24.01	2000	01/01/1991	E / 150	F1,F20		
ILLE01	LE 04	07080104	Pope Cr.	7.31	2000	01/01/1991	E / 150	F1,F20		
ILLE01	LE 05	07080104	Pope Cr.	25.03	2000	01/01/1991	E / 150	F1,F20		
ILLE01	LEA	07080104	Mad R.	7.38	2000		E /	X1,X20		
ILLE01	LEB	07080104	Wildcat Cr.	6.42	2000		E /	X1,X20		
ILLE01	LED	07080104	Pike Run	6.99	2000		E /	X1,X20		
ILLE01	LEE	07080104	Dugout Run	4.21	2000		E /	X1,X20		

APPENDIX TABLE A-19. WATERBODY SPECIFIC INFORMATION FOR RIVERS AND STREAMS IN THE MISSISSIPPI RIVER CENTRAL WATERSHED, 1998

Waterbody ID	Segment ID	Catalog Unit	Segment Name	Size in Miles	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILK01	K 09	07110004	Mississippi R.	6.21	2000	01/01/1998	E / 190	P1;P20,P21	300,1200	9000
ILK01	K 98	07110004	Mississippi R.	29.3	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK01	TK 07	07110004	Mississippi R.	7.29	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK02	KE	07110001	Curtis Cr.	6.58	2000		E /	X1,X20		
ILK02	TK 12	07110001	Mississippi R.	10.96	2000	01/01/1998	E / 190	F50,P1,P20,P21	300,1200	9000
ILK02	TK 13	07110001	Mississippi R.	5.54	2000	01/01/1998	E / 190	F50,P1,P20,P21	300,1200	9000
ILK03	KZQ	07110001	Shuhart Cr.	5.86	2000		E /	X1,X20		
ILK03	TK 15	07110001	Mississippi R.	2.51	2000	01/01/1998	E / 190	F50,P1,P20,P21	300,1200	9000
ILK03	TK 16	07110001	Mississippi R.	14.62	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK03	TK 17	07110001	Mississippi R.	3.95	2000	01/01/1998	E / 190	F50,P1,P20,P21	300,1200	9000
ILK06	K 02	07110004	Mississippi R.	32.13	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK06	KZF	07110004	West Point Cr.	3.1	2000		E /	X1,X20		
ILK06	KZN	07110004	Indian Cr.	3.3	2000		E /	X1,X20		
ILK06	TK 01	07110004	Mississippi R.	2.37	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK07	K 14	07110004	Mississippi R.	11.94	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK07	TK 04	07110004	Mississippi R.	23.31	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILK07	TK 06	07110004	Mississippi R.	0.43	2000	01/01/1998	E / 190	P1,P20,P21	300,1200	9000
ILKC01	KC 01	07110004	The Sny	12.65	2000		E /	X1,X20		
ILKC01	KCK	07110004	Fox Cr.	5.92	2000		E /	X1,X20		

APPENDIX TABLE B-26. WATERBODY SPECIFIC INFORMATION FOR LAKES IN THE BIG MUDDY RIVER WATERSHED, 1998.

Waterbody ID	Segment ID:	Catalog Unit	Segment Name	Size in Acre	Cycle Year	Key Sample Date	Assessment Type/Methods	Designated Uses	Causes of Impairment	Sources of Impairment
ILRNA	RNA	07140106	CRAB ORCHARD	6965	2000	05/01/1997	M / 205	F20,N11,P1,P21, P42,X50	300,410,900,910, 920,1100,1200,2100, 2210	1000,1050,1100,1350, 1400,6000,6600,7550, 7700,8500,8700,8930, 8960
ILRNB	RNB	07140106	REND	18900	2000	05/01/1995	M / 869	F21,F50,P1,P11, P20,P42	900,1100,1200,2100, 2200	200,1000,1050,1100, 1350,1400,4000,5000, 5100,5200,5500,5700, 7550,7700,8300,8500, 8700,8960
ILRNC	RNC	07140106	KINKAID	3475	2000	05/01/1997	M / 205	F20,F50,N21,P1, P11,P42	500,560,900,910, 920,1100,1200,2100, 2210	200,1000,1050,1100, 1350,1400,7550,7700, 8500,8600,8700,8960
ILRND	RND	07140106	MURPHYSBORO	143	2000	05/01/1997	M / 205	F20,P1,P11,P42, X21,X50	900,910,920,1100, 1200,2210	1000,1350,1400,7550, 7700,8940,8960
ILRNE	RNE	07140106	CEDAR (JACKSON)	1800	2000	05/01/1997	M / 205	F20,F42,F50,N21,	300,500,560,900, 920,1100,1200	1000,1050,1100,1300, 1350,7550,7700,8500, 8600,8960
ILRNG	RNG	07140106	DUQUOIN	244	2000	05/01/1998	E / 814	F20,N42,P1,P11, X21,X50	900,910,920,2210	1000,1050,1100,6000, 6500,8960
ILRNH	RNH	07140106	PINCKNEYVILLE	165	2000	05/01/1997	M / 205	F1,F20,F21,F50, P11,P42		
ILRNI	RNI	07140106	CARBONDALE CITY	135.6	2000	05/01/1997	M / 205	F20,F50,P1,P11, P42,X21	300,900,910,920, 2210	1000,1050,1100,1350, 1400,8500,8960
ILRNJ	RNJ	07140106	DEVILS KITCHEN	810	2000	05/01/1997	M / 205	F1,F11,F20,F42, X21,X50		
ILRNK	RNK	07140106	LITTLE GRASSY	1000	2000	05/01/1997	M / 205	F1,F11,F20,F42, X21,X50		
ILRNL	RNL	07140106	MARION	220	2000	05/01/1997	M / 205	F1,F20,F21,F50, P11,P42		
ILRNM	RNM	07140106	WASHINGTON CO.	295	2000	05/01/1998	M / 205	F50,P1,P11,P20, P42,X21	300,900,910,920, 1100,1200,2100,2210	1000,1050,1100,6000, 6500,7550,7700,8960
ILRNN	RNN	07140106	MOSES	169.6	2000	05/01/1978	E / 811	X1,X11,X20,X21, X42,X50		

ILLINOIS RIVER BASIN

05586100 ILLINOIS RIVER AT VALLEY CITY, IL

LOCATION.--Lat 39°42'12", long 90°38'43", in SE1/4NW1/4 sec.34, T.15 N., R.14 W., Scott County, Hydrologic Unit 07130011, on upstream side of Norfolk & Southern Corporation Railroad bridge at Flints Creek, 0.4 mi east of Valley City, 1.8 mi downstream from Mauvaise Terre Creek, and at mile 61.3.

DRAINAGE AREA.--26,743 mi^2, does not include diversion from Lake Michigan through the Chicago Sanitary and Ship Canal, which has occurred since Jan. 17, 1900.

PERIOD OF RECORD.--Water-quality records, water years 1975 to 1993, 1996 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

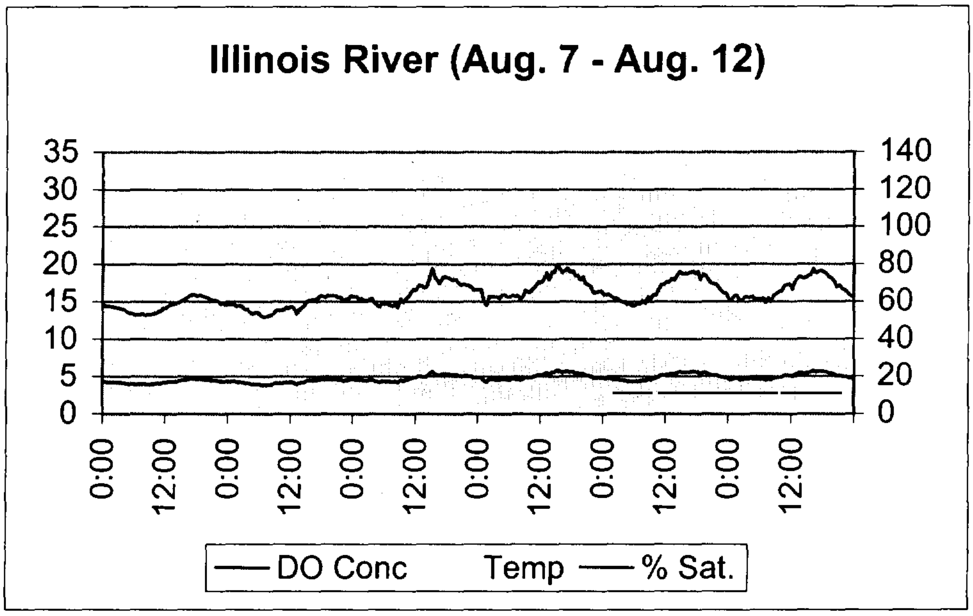
DATE	TIME	AGENCY COLLECTING SAMPLE (CODE NUMBER) (00027)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	GAGE HEIGHT (FEET) (00065)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	STREAM WIDTH (FT) (00004)	NUMBER OF SAMPLING POINTS (COUNT) (00063)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT 1997												
21...	1310	81700	80020	2.00	6630	700	10	16.3	735	7.8	9.3	95
NOV												
18...	1330	81700	80020	2.47	8280	660	10	5.1	776	7.7	12.5	98
DEC												
16...	1320	81700	80020	3.22	10900	700	10	2.3	826	8.1	14.4	105
JAN 1998												
13...	1450	81700	80020	10.25	39300	900	10	2.0	720	7.7	12.8	93
FEB												
04...	1330	81700	80020	7.77	27300	800	10	3.5	762	8.0	12.7	96
MAR												
10...	1530	81700	80020	12.08	39900	800	10	4.5	598	8.1	12.3	96
APR												
01...	1600	81700	80020	18.43	69600	1000	10	13.6	594	7.8	8.8	85
14...	1250	81700	80020	17.83	59100	1200	10	13.3	610	7.9	9.4	90
28...	1220	81700	80020	14.55	46000	1000	10	15.2	699	8.3	10.3	102
MAY												
12...	1250	81700	80020	17.46	69300	2000	10	19.6	574	8.0	8.6	94
27...	1240	81700	80020	16.98	61300	2000	10	21.4	519	7.5	5.9	67
JUN												
09...	1830	81700	80020	10.39	32800	900	10	19.3	688	7.9	7.4	81
18...	1330	81700	80020	14.01	49800	900	10	22.8	491	7.5	6.7	78
23...	1350	81700	80020	17.80	63900	2000	10	24.7	491	7.5	6.0	72
JUL												
07...	1250	81700	80020	14.98	50400	800	10	27.8	623	7.8	5.7	72
07...	1251	81700	9720	--	--	--	--	--	--	--	--	--
21...	1400	81700	80020	10.12	35400	800	10	30.1	574	7.7	5.2	69
21...	1401	81700	9720	--	--	--	--	--	--	--	--	--
AUG												
04...	1510	81700	80020	3.05	9680	700	10	27.6	669	7.9	7.5	96
04...	1511	81700	9720	--	--	--	--	--	--	--	--	--
12...	1750	81700	80020	7.20	21500	800	10	28.4	630	7.7	4.9	63
18...	1230	81700	80020	3.82	12400	800	10	28.6	621	7.5	5.3	69
18...	1231	81700	9720	--	--	--	--	--	--	--	--	--

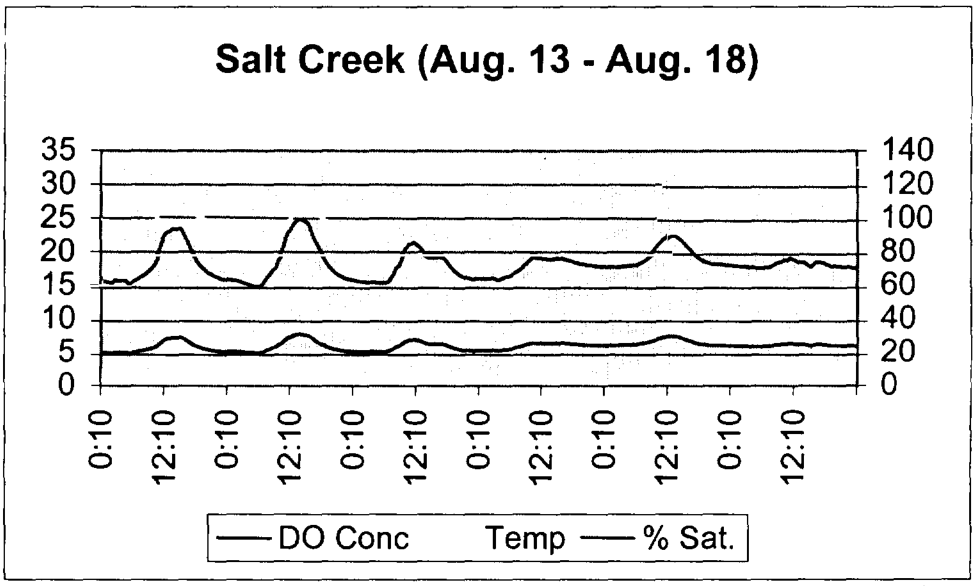
EXHIBIT 6

SEP												
01...	1230	81700	80020	3.20	10200	760	10	27.0	659	7.9	5.4	68
01...	1231	81700	9720	--	--	--	--	--	--	--	--	--
15...	1230	81700	80020	2.17	6600	680	10	24.7	685	7.8	6.4	78
15...	1231	81700	9720	--	--	--	--	--	--	--	--	--

DATE	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT DIS TOT IT FIELD MG/L AS $CACO_3$ (39086)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO_3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO_3 (00453)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SULFATE DIS- SOLVED (MG/L AS SO_4) (00945)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO_2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
OCT 1997												
21...	63	25	51	5.2	192	0	234	78	81	.51	3.4	446
NOV												
18...	66	27	54	4.8	196	0	239	77	82	.45	5.7	488
DEC												
16...	73	30	56	4.4	200	0	244	85	81	.41	5.3	509
JAN 1998												
13...	69	28	38	3.7	178	0	217	75	58	.30	8.4	430
FEB												
04...	77	32	40	3.4	208	0	254	73	72	.30	8.2	478
MAR												
10...	63	28	23	2.9	160	0	195	51	56	.23	6.6	374
APR												
01...	58	24	27	3.0	158	0	193	52	46	.28	7.4	352
14...	63	26	24	2.8	176	0	215	45	54	.26	7.1	373
28...	75	30	29	2.7	212	10	239	57	65	.25	3.9	432
MAY												
12...	57	25	19	3.2	178	0	217	36	48	.24	4.7	340
27...	53	22	15	3.3	156	0	190	29	41	.22	7.8	315
JUN												
09...	68	30	28	3.3	212	0	259	46	60	.31	6.0	410
18...	50	22	15	3.9	142	0	173	27	37	.29	8.0	286
23...	48	21	13	3.6	144	0	176	24	35	.21	7.2	317
JUL												
07...	64	26	21	3.5	202	0	246	39	50	.32	7.2	367
07...	--	--	--	--	--	--	--	--	--	--	--	--
21...	58	26	21	3.5	176	0	215	35	45	.29	6.6	360
21...	--	--	--	--	--	--	--	--	--	--	--	--
AUG												
04...	63	29	30	3.5	210	0	256	46	57	.36	6.1	371
04...	--	--	--	--	--	--	--	--	--	--	--	--
12...	52	22	39	4.4	154	0	188	53	61	.44	6.1	377
18...	54	23	33	4.7	170	0	207	51	58	.39	7.2	360
18...	--	--	--	--	--	--	--	--	--	--	--	--
SEP												
01...	57	26	38	4.4	182	0	222	58	63	.37	5.3	402
01...	--	--	--	--	--	--	--	--	--	--	--	--
15...	54	25	46	5.0	172	0	210	69	68	.49	4.3	410
15...	--	--	--	--	--	--	--	--	--	--	--	--

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, NO_2+NO_3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)
OCT 1997											
21...	.137	.061	.55	1.2	1.93	.453	.274	.225	<3.0	3.5	4.4
NOV											
18...	.187	.047	.62	.86	4.05	.435	.395	.341	<3.0	2.5	4.3
DEC											
16...	<.020	.097	.56	.69	3.82	.436	.383	.291	<10	<4.0	4.3


Illinois River (Aug. 7 - Aug. 12)
35
30
25
20
15
10
5
0
140
120
100
80
60
40
20
0
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
DO Conc
Temp
% Sat.


Salt Creek (Aug. 13 - Aug. 18)
35
30
25
20
15
10
5
0
140
120
100
80
60
40
20
0
0:10
12:10
0:10
12:10
0:10
12:10
0:10
12:10
0:10
12:10
0:10
12:10
DO Conc
Temp
% Sat.

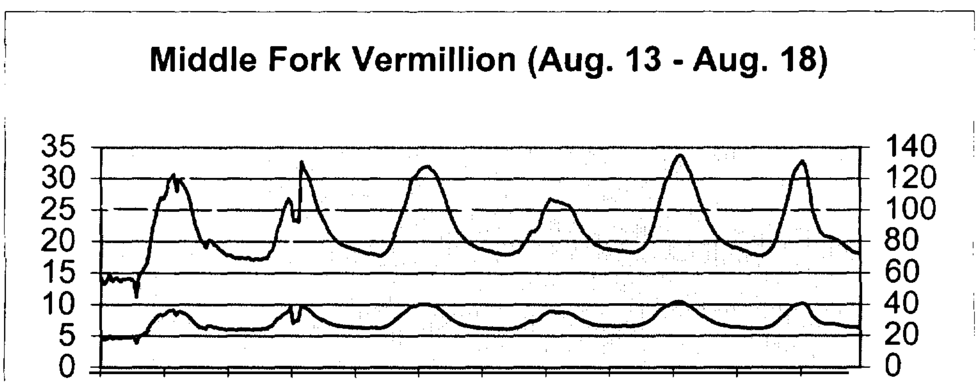

Middle Fork Vermillion (Aug. 13 - Aug. 18)
35
30
25
20
15
10
5
0
140
120
100
80
60
40
20
0

EXHIBIT 7

FOX RIVER NEWS

The Fox River Ecosystem Partnership's newsletter for the Fox River Watershed community

WINTER 2002

Our partnership is known as **FREP**

The Fox River Watershed lies mainly within the counties of:

Cook
DeKalb
DuPage
Kane
Kendall
Lake
LaSalle
McHenry

Fox River Watershed Facts:

- 1,720 square miles
- 130 miles in length
- Over 400 lakes
- 15 dams
- 214,000 people depend on the Fox River for drinking water
- Over 150 state-threatened & endangered species within the Watershed
- The Watershed Biodiversity Inventory includes over 360 sites: prairies, marshes, fens, bogs, woods, preserves, wetlands & bluffs

FOX RIVER ECOSYSTEM PARTNERSHIP

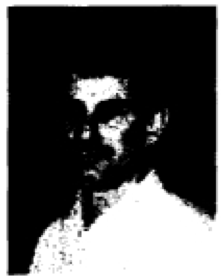
Fox River Fish Passage Feasibility Study

There are 15 mainstem dams and numerous tributary dams in the Illinois portion of the Fox River watershed. Many of these dams were originally built in the 1800's to provide mechanical power for grist or lumber mills, but today serve little function except to maintain flat-water pools/impoundments upstream of the dams. The Max McGraw Wildlife Foundation has recently completed a two-year study to determine the effects of dams on fisheries, macroinvertebrates, physical habitat, and water quality in a 100-mile stretch of the Fox River between the Chain of Lakes and Dayton, Illinois. In addition, fish passage options were identified for each of the 15 mainstem dams. Options included complete dam removal and river restoration or retrofitting dams with ramps, fishways, or bypass channels to provide fish and/or canoe passage. Cooperators on this project include the USEPA, the Illinois Department of Natural Resources, and Steve Gephard, a Fish Passage Specialist from Connecticut.

Sampling for the study took place during summer low-flow conditions at 40 sites located in free-flowing river areas directly below dams, impounded river directly above dams, and free-flowing or impounded mid-segment areas between dams. Results convincingly showed that dams are having a detrimental effect on the Fox River by reducing biodiversity of fishes and altering macroinvertebrate communities. Dams appeared to influence these aquatic organisms by degrading habitat and water quality conditions and fragmenting the river by acting as barriers to fish movement.

By Guest Columnist

Victor J. Santucci, Jr.
Research Biologist
Max McGraw Wildlife Foundation
Dundee, Illinois



Following are highlights of the study results, or ten ways dams are impacting the Fox River.

- Dams adversely affect fish communities. Based on fish community index values, free-flowing river reaches (below dam or mid segment free-flowing stations) averaged a "B" rating or highly valued aquatic resource, whereas impounded reaches (above dam and mid segment impounded stations) averaged a "D" rating or limited aquatic resource.
- Free-flowing reaches supported more abundant sport fish communities than impounded reaches.
- Dams were found to restrict distributions of 30 species of fish.
- Dams alter and degrade macroinvertebrate communities. Stations within free flowing reaches of the river had an abundance of mayflies and caddis flies whereas impounded stations had high proportions (>95%) of tolerant midge larvae (chironomids) and benthic worms (oligocheates).
- Dams may be preventing freshwater mussel recolonization of improved sections of river because mussel larvae use fish as a means for dispersal and dams block fish migrations.
- Habitat quality indices indicated good habitat quality in the free-flowing river and severely degraded habitat in impoundments.

Continued on page 2

Inside... The ***Honor Roll of Endorsements*** for FREP's ***Integrated Management Plan for the Fox River Watershed***

EXHIBIT 8

Fox River Fish Passage Feasibility Study, continued

- The 15 Fox River dams are impounding 47% of river miles and 55% of surface area in the nearly 100 miles of river between the Chain of Lakes and Dayton, Illinois.
- Nutrient concentrations (total phosphorus and nitrogen) and algal biomass were extremely high in the river during the summer low-flow period.
- Dissolved oxygen concentrations fluctuated widely at impounded stations (2.5 - > 20 mg/l), but not at free-flowing stations (5-8 mg/l). Dissolved oxygen fluctuations appear to be driven by daytime photosynthesis (oxygen is produced) and nighttime respiration (oxygen is consumed) of planktonic algae.
- Minimum dissolved oxygen levels fell below the IEPA recognized standard of 5 mg/l at 9 of 11 impounded reaches of river between McHenry and Dayton, Illinois. Substandard oxygen sags occurred throughout impounded reaches not just immediately above the dams, lasted from 1.5 to 16 hours in a 24-hour period, and occurred during periods of low flow and high water temperature or from July through September in 2001.

A project final report will be available in May. In the report, we will summarize all of the data collected during the study and recommend that some form of fish passage be considered at all Fox River dams. Determining the correct passage option for an individual dam is a complicated decision involving many stakeholders (i.e., dam owners, government agencies, local municipalities, organizations, and the public) and a variety of social, economic, and environmental issues. Our data suggest that dam removal is the best option when the ecological health of the river is of prime consideration. Removing dams will eliminate barriers to migration for all types and sizes of fish, restore high quality river habitat, and eliminate lake-like conditions that support high algal biomass and substandard dissolved oxygen levels. Ramps, fishways, and bypass channels will allow fish to get over or around dams but will do little or nothing to improve habitat and water quality conditions in the river. These alternatives should be considered only when dam removal is ruled out as a fish passage option.

1. McHenry	6. St. Charles	11. Aurora
2. Algonquin	7. Geneva	12. Aurora
3. Carpentersville	8. Batavia - North	13. Montgomery
4. Elgin	9. Batavia - South	14. Yorkville
5. South Elgin	10. North Aurora	15. Dayton

HONOR ROLL OF ENDORSEMENTS for the *Integrated Management Plan for the Fox River Watershed in Illinois*

Applied Ecological Services, Inc.
Batavia Park District
Blackberry Creek Watershed
City of Aurora
Dundee Township
Fox Valley Land Foundation
Fox Valley Park District
Friends of the Fox River
Illinois Smallmouth Alliance
Kane County Board
Kane County Forest Preserve
Kane-DuPage Soil & Water Conservation District
Kendall County Forest Preserve
Kendall County Soil & Water Conservation District
Lake County Soil & Water Conservation District
LaSalle County Soil & Water Conservation District
Lake County Stormwater Management Commission
Land Foundation of McHenry County
Max McGraw Wildlife Foundation
McHenry County Conservation District
McHenry County Defenders
McHenry County Soil & Water Conservation District
Nippersink Creek Watershed Planning Committee
North Cook Soil & Water Conservation District
Oswegoland Park District
Sierra Club of Illinois
Sierra Club/Valley of the Fox Group
The Conservation Foundation
The Nature Conservancy
US Fish & Wildlife Service/Chicago Field Office
Village of Fox River Grove
Watershed Resource Consultants, Inc.

This list is growing - but our goal is to have all the stakeholder organizations, agencies & communities of the Fox River Watershed included. If you aren't on it — We need YOU!

Endorsing & Implementing the *Integrated Management Plan*

FREP created this plan for our watershed and we need everyone's involvement. An Implementation Tool Kit assists "stakeholders" in studying and utilizing Plan recommendations. Governmental bodies and organizations within the Watershed are asked to adopt/endorse the *Integrated Management Plan*. A sample endorsement resolution is included in the Tool Kit.

To obtain a copy of the Tool Kit:
Email **foxriverinfo@aol.com**
or call Becky Hoag, FREP Communications Manager at:
630/482-9157

Components of the Tool Kit can be obtained in Adobe PDF format from our website: **foxriverecosystem.org**

Draft Fox River aquatic life use support for 2002 (based on 2000 or earlier data).

Segment ID	Aquatic Life Use Support	Potential Causes
DT-35	Full	
DT-23	Not Assessed	
DT-22	Partial	Nitrate, siltation, flow alteration, other habitat alteration, suspended solids
DT-06	Partial	Priority organics, nitrate, siltation, low DO, flow alteration, other habitat alteration, suspended solids
DT-20	Partial	Low DO, flow alteration, other habitat alteration
DT-18	Partial	Priority organics, nitrate, siltation, low DO, flow alteration, other habitat alteration, suspended solids
DT-09	Partial	Priority organics, nitrate, siltation, low DO, flow alteration, other habitat alteration, suspended solids
DT-69	Partial	Priority organics, nitrate, siltation, low DO, flow alteration, other habitat alteration
DT-58	Partial	Low DO, flow alteration, other habitat alteration
DT-38	Partial	pH, siltation, low DO, flow alteration, other habitat alteration, suspended solids
DT-03	Full	
DT-11	Partial	Priority organics, phosphorus, pH, siltation, low DO, flow alteration
DT-41	Full	
DT-02	Full	
DT-36	Full	
DT-46	Partial	pH, siltation, flow alteration, suspended solids
DT-01	Partial	pH, siltation, flow alteration, other habitat alteration, suspended solids, excessive algal growth.

Fox River Segments in upstream to downstream order (River Miles from Healy, 1979).

Segment ID	Description
DT-35	From: Grass Lake (RM 110.1) To: Illinois/Wisconsin state line (RM 115.1)
DT-23	From: Stratton Dam (RM 97.7) To: Pistakee Lake (RM 105.0)
DT-22	From: Tower Lake trib (RM 88.6) To: Stratton Dam (RM 97.7)
DT-06	From: unnamed trib upstream Carpentersville Dam (RM 78.6) To: Tower Lake trib (RM 88.6)
DT-20	From: Jelkes Creek (RM 74.6) To: unnamed trib upstream Carpentersville Dam (RM 78.6)
DT-18	From: Poplar Creek (RM 68.8) To: Jelkes Creek (RM 74.6)
DT-09	From: Ferson Creek (RM 60.9) To: Poplar Creek (RM 68.8)
DT-69	From: Mill Creek (RM 53.0) To: Ferson Creek (RM 60.9)
DT-58	From: Indian Creek, Aurora (RM 49.0) To: Mill Creek (RM 53.0)
DT-38	From: Waubonsee Creek (RM 42.7) To: Indian Creek, Aurora (RM 49.0)
DT-03	From: Morgan Creek (RM 37.8) To: Waubonsee Creek (RM 42.7)
DT-11	From: Rob Roy Creek (RM 31.3) To: Morgan Creek (RM 37.8)
DT-41	From: Somonauk Creek (RM 20.1) To: Rob Roy Creek (RM 31.3)
DT-02	From: Indian Creek, Wedron (RM 9.4) To: Somonauk Creek (RM 20.1)
DT-36	From: unnamed trib (RM 6.9) To: Indian Creek, Wedron (RM 9.4)
DT-46	From: O'Neill Branch (RM 2.5) To: unnamed trib (RM 6.9)
DT-01	From: confluence with Illinois River To: O'Neill Branch (RM 2.5)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF: WN-16J

OCT 06 1998

Mr. Thomas G. McSwiggin
Manager, Permits Section
Division of Water Pollution Control
Illinois Environmental Protection Agency
Post Office Box 19276
Springfield, Illinois 62794-9276

Re: Minnesota Mining & Manufacturing Co. -
Cordova Plant
Cordova, Illinois
Permit No.: IL0003140
Draft Permit Modification: July 27, 1998

Dear Mr. McSwiggin:

In follow up to our September 9, 1998, letter related to the subject permit, please find enclosed a March 18, 1998, letter from the Iowa Department of Natural Resources (IDNR) to the Archer Daniels Midland Company (ADM) specifying BOD limits in a reissued permit and the basis for not increasing the BOD limits as requested by ADM. In our discussion related to the September 9, 1998, letter, you indicated that IDNR had increased BOD loading for ADM and the Illinois Environmental Protection Agency (IEPA) felt that a similar increase for the subject facility would be appropriate.

Since this is not the case and water quality standards for dissolved oxygen are not being met, this office firmly believes that BOD increases for the subject facility are not warranted, and we would have to officially object to any permit with BOD increases based on regulations at 40 Code of Federal Regulations 122.44(d) and 35 Illinois Administrative Code 304.105. If IEPA wishes to pursue this issue, it would be appropriate that a TMDL process be initiated or provide us with a firm basis as to why the BOD increase should be allowed.

EXHIBIT 9

Please let us know as soon as possible your decision related to this issue. USEPA, reluctantly, would have to object within 90 days to such an increase without further information. Please let me know your decision at your earliest convenience.

Sincerely yours,

Eugene I. Chaiken, Chief
NPDES Support and Technical Assistance Branch

Enclosure

EPA-RALPH SUMNER

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

March 16, 1998

Mr. Harry Sutcliffe
WWTP Superintendent
Archer Daniels Midland Company
1251 Beaver Channel Parkway
Clinton, Iowa 52732-5935

RE: Final NPDES Permit No.: 23-26-1-01

Dear Mr. Sutcliffe:

This letter transmits the final NPDES permit for the discharge from the ADM facility in Clinton, Iowa and responds to comments provided in a February 27, 1998 letter from Mr. Mark Calmes, Director of Corporate Environmental Services for ADM. This final permit differs from the draft permit mailed to you August 4, 1997 as follows:

1. The final permit includes an average BOD_5 limit of 18,000 pounds per day rather than the 21,400 pounds per day limit previously proposed.

2. The final permit contains a narrative effluent limit that prohibits the discharge of substances that cause or contribute to a violation of state water quality criteria, specifically the prohibition on discharges that cause aesthetically objectionable conditions in the receiving stream.

3. The final permit defines how the department will determine compliance with the narrative water quality criteria.

4. The final permit contains a modified reopener clause that provides the opportunity to increase the average BOD_5 limit in the future upon a demonstration that higher limits will not violate either technology based limits specified in 40 CFR part 405 or state water quality criteria

5. The final permit includes requirements for monitoring of ground water in the vicinity of the new anaerobic treatment unit.

6. The final permit requires monitoring of the newest aeration basin, basin "F".

The department originally proposed a monthly average BOD_5 limit of 21,400 pounds per day, the same limit that was contained in the previous permit. EPA recommended, and the department agreed, that the permit should not authorize an increase in the discharge of BOD_5 above present levels while there are violations of water quality criteria. We reviewed existing monitoring data and determined that the 18,000 pounds per day limit is representative of current discharges and is achievable without additional treatment. The permit limit does not restrict ADM's ability to increase production it only restricts the amount of pollutants that may be discharged.

The narrative permit limit reiterates the water quality criteria specified in 567 61.3(d) I.A.C. that prohibits the discharge of substances in a wastewater discharge that will create aesthetically objectionable conditions in the receiving stream. Rule 567-64.7(2)(f)(1) allows the department to include in a permit any limitation necessary to meet water quality standards, treatment or pretreatment standards, or schedules of compliance established pursuant to any Iowa law or regulation, or to implement the policy of nondegradation in 567-subrule 61.2(2). The permit does not revise any water quality standard but rather specifies how the department will determine compliance with the narrative water quality limit. This is an appropriate permit condition, was requested by ADM staff on at least two occasions, and is no different than the requirements in the permit that describe how compliance with the temperature limits is determined. Furthermore, ADM has not proposed alternative methods that would be appropriate for determining compliance.

ADM requested that the department issue a permit that: 1) contains an average BOD_5 permit limit of 21,400 pounds per day; 2) allows ADM to continue and complete the facility improvements currently underway, and; 3) allows ADM to design and implement a sampling plan., The final permit, with the exception of the BOD_5 limit, fulfills each of these requests.

You have the right to appeal any of the conditions specified in this permit by filing a written notice of appeal and request for administrative hearing with the director of the department within 30 days of your receipt of the permit. Please call me at 515-281-8884 or contact me by E-mail at swillia@max.state.ia.us should you have questions about the permit. You should call Diana Hansen at 515-281-6267 if you have questions about appeal procedures.

Sincerely,

Steven N. Williams

Steven N. Williams
Environmental Specialist
Wastewater Section

Enclosure

cc: Ralph Summers, USEPA, Region VII
Jodi Millar, USFWS
Mark Herwig, Izaak Walton League
Mark Calmes, ADM - Decatur

State of Michigan
DEQ
Department of Environmental Quality

Surface Water Quality Division

Permits Section

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand, or BOD, is a measure of the quantity of oxygen consumed by microorganisms during the decomposition of organic matter. BOD is the most commonly used parameter for determining the oxygen demand on the receiving water of a municipal or industrial discharge. BOD can also be used to evaluate the efficiency of treatment processes, and is an indirect measure of biodegradable organic compounds in water.

Imagine a leaf falling into a stream. The leaf, which is composed of organic matter, is readily degraded by a variety of microorganisms inhabiting the stream. Aerobic (oxygen requiring) bacteria and fungi use oxygen as they break down the components of the leaf into simpler, more stable end products such as carbon dioxide, water, phosphate and nitrate. As oxygen is consumed by the organisms, the level of dissolved oxygen in the stream begins to decrease

Water can hold only a limited supply of dissolved oxygen and it comes from only two sources- diffusion from the atmosphere at the air/water interface, and as a byproduct of photosynthesis. Photosynthetic organisms, such as plants and algae, produce oxygen when there is a sufficient light source. During times of insufficient light, these same organisms consume oxygen. These organisms are responsible for the diurnal (daily) cycle of dissolved oxygen levels in lakes and streams.

If elevated levels of BOD lower the concentration of dissolved oxygen in a water body, there is a potential for profound effects on the water body itself, and the resident aquatic life. When the dissolved oxygen concentration falls below 5 milligrams per liter (mg/l), species intolerant of low oxygen levels become stressed. The lower the oxygen concentration, the greater the stress. Eventually, species sensitive to low dissolved oxygen levels are replaced by species that are more tolerant of adverse conditions, significantly reducing the diversity of aquatic life in a given body of water. If dissolved oxygen levels fall below 2 mg/l for more than even a few hours, fish kills can result. At levels below 1 mg/l, anaerobic bacteria (which live in habitats devoid of oxygen) replace the aerobic bacteria. As the anaerobic bacteria break down organic matter, foul-smelling hydrogen sulfide can be produced.

BOD is typically divided into two parts- carbonaceous oxygen demand and nitrogenous oxygen demand. Carbonaceous biochemical oxygen demand (CBOD) is the result of the breakdown of organic molecules such a cellulose and sugars into carbon dioxide and water. Nitrogenous oxygen demand is the result of the breakdown of proteins. Proteins contain sugars linked to nitrogen. After the nitrogen is "broken off" a sugar molecule, it is usually in the form of ammonia, which is readily converted to nitrate in the environment. The conversion of ammonia

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to nitrate requires more than four times the amount of oxygen as the conversion of an equal amount of sugar to carbon dioxide and water.

When nutrients such as nitrate and phosphate are released into the water, growth of aquatic plants is stimulated. Eventually, the increase in plant growth leads to an increase in plant decay and a greater "swing" in the diurnal dissolved oxygen level. The result is an increase in microbial populations, higher levels of BOD, and increased oxygen demand from the photosynthetic organisms during the dark hours. This results in a reduction in dissolved oxygen concentrations, especially during the early morning hours just before dawn.

In addition to natural sources of BOD, such as leaf fall from vegetation near the water's edge, aquatic plants, and drainage from organically rich areas like swamps and bogs, there are also anthropogenic (human) sources of organic matter. If these sources have identifiable points of discharge, they are called point sources. The major point sources, which may contribute high levels of BOD, include wastewater treatment facilities, pulp and paper mills, and meat and food processing plants.

Organic matter also comes from sources that are not easily identifiable, known as nonpoint sources. Typical nonpoint sources include agricultural runoff, urban runoff, and livestock operations. Both point and nonpoint sources can contribute significantly to the oxygen demand in a lake or stream if not properly regulated and controlled.

Performing the test for BOD requires significant time and commitment for preparation and analysis. The entire process requires five days, with data collection and evaluation occurring on the last day. Samples are initially seeded with microorganisms and saturated with oxygen (Some samples, such as those from sanitary wastewater treatment plants, contain natural populations of microorganisms and do not need to be seeded.). The sample is placed in an environment suitable for bacterial growth (an incubator at 20° Celsius with no light source to eliminate the possibility of photosynthesis). Conditions are designed so that oxygen will be consumed by the microorganisms. Quality controls, standards and dilutions are also run to test for accuracy and precision. The difference in initial DO readings (prior to incubation) and final DO readings (after 5 days of incubation) is used to determine the initial BOD concentration of the sample. This is referred to as a BOD_5 measurement. Similarly, carbonaceous biochemical oxygen test performed using a 5-day incubation is referred to as a $CBOD_5$ test.

Water Quality Standards for BOD

Although there are no Michigan Water Quality Standards pertaining directly to BOD, effluent limitations for BOD must be restrictive enough to insure that the receiving water will meet Michigan Water Quality Standards for dissolved oxygen.

Rule 64 of the Michigan Water Quality Standards (Part 4 of Act 451) includes minimum concentrations of dissolved oxygen that must be met in surface waters of the state. This rule states that surface waters designated as coldwater fisheries must meet a minimum dissolved oxygen standard of 7 mg/l, while surface waters protected for warmwater fish and aquatic life must meet a minimum dissolved oxygen standard of 5 mg/l.

Biochemical Oxygen Demand Limitations in NPDES Permits

Typically, $CBOD_5$ limits are placed in NPDES permits for all facilities which have the potential to contribute significant quantities of oxygen consuming substances to waters of the state. These limits are developed in direct correlation with limits for ammonia nitrogen and dissolved oxygen. The nitrogenous oxygen demand is computed separately because of the difference in oxygen demand (as explained above) and because the rate of oxygen consumption over time varies from carbonaceous oxygen demand. Ammonia is further considered separately because in sufficient levels (dependant upon several variables) it can also be toxic to living organisms.

In determining $CBOD_5$ limits, stream modelers use computer models which simulate actual stream conditions. Model inputs include the flow of the receiving stream, the quantity of water to be discharged, the decay rate for the particular type of wastewater, the stream's slope, and temperature. Other upstream or downstream dischargers are also considered in the model. The modeler determines maximum limits for $CBOD_5$ and ammonia nitrogen and minimum limits for dissolved oxygen. These limits are selected to insure that Water Quality Standards for dissolved oxygen are met in the receiving water.

Permit-related questions and comments? Contact Fred Cowles, cowlesf@michigan.gov
Web page maintained by Sean Syts, sytss@michigan.gov
Last revision: April 30, 2001

http://www.deq.state.mi.us/swq/permits/parameters/bod.html

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Chapter NR 210

SEWAGE TREATMENT WORKS

Note: Chapter NR 210 as it existed on October 31, 1986 was repealed and a new chapter NR 210 was created effective November 1, 1986. **Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, March, 1997, No. 495.**

NR 210.01 Purpose. The purpose of this chapter is to establish effluent limitations, performance requirements and monitoring provisions to be used in permits for discharges from publicly owned treatment works and privately owned domestic sewage treatment works under s. 283.13 (4) and (5) and 283.55 (1), Stats.

History: Cr. Register, October, 1986, No. 370, eff. 11-1-86.

NR 210.02 Applicability. This chapter is applicable to all publicly owned treatment works and all privately owned domestic sewage treatment works which discharge to surface waters.

History: Cr. Register, October, 1986, No. 370, eff. 11-1-86.

NR 210.03 Definitions. The definitions of terms and meanings of abbreviations used in this chapter are set forth in s. 283.62, Stats., chs. NR 205 and 218 and as follows.

(1) "7-day average" means the arithmetic mean of pollutant parameter values for samples collected in a period of 7 consecutive days.

(2) "30-day average" means the arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

(3) "$CBOD_5$" means the 5-day carbonaceous biochemical oxygen demand.

(4) "Disinfection" means the operation of an ultraviolet lamp unit, or the addition of chemical disinfectants with adequate mixing and detention times, to provide pathogen reductions.

(5) "Effluent concentrations consistently achievable through proper operation and maintenance" means:

(a) For a given pollutant parameter, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions, and

(b) A 7-day average value equal to 1.5 times the value derived under par. (a).

(6) "Facilities eligible for treatment equivalent to secondary treatment" means treatment works which meet all of the following:

(a) The BOD_5 and SS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum level of the effluent quality set forth in s. NR 210.05 (1) (a) and (b);

(b) Trickling filters, aerated lagoons or waste stabilization ponds are used as the principal processes; and

(c) The treatment works provide significant biological treatment of municipal wastewater.

(7) "NH_3-N" means ammonia nitrogen.

(8) "Percent removal" means a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

(9) "Privately owned domestic sewage treatment works" means those facilities which treat domestic wastewater and are owned and operated by nonmunicipal entities or enterprises such as mobile home parks, restaurants, hotels, motels, country clubs, resorts, etc., which are permitted under ch. 283, Stats.

(10) "Significant biological treatment" means the use of an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of at least 65% removal of BOD_5.

History: Cr. Register, October, 1986, No. 370, eff. 11-1-86.

NR 210.04 Monitoring requirements. (1) Discharges subject to the provisions of this chapter shall at a minimum monitor the effluent for BOD_5, SS, and pH.

(2) Influent wastewater strengths and volumes shall be characterized at treatment facilities subject to the monitoring provisions of sub. (1) by monitoring for flow, BOD_5 and SS.

(3) Monitoring requirements may be adjusted on a case-by-case basis depending on wastewater characteristics and their potential to degrade water quality.

(4) The department shall require the use of 24-hour flow proportional samplers for monitoring influent and effluent wastewater quality except where the department determines through the permit issuance process that other sample types may adequately characterize the influent or effluent quality. In evaluating permit monitoring requirements, the department may consider:

(a) Treatment facility design flow and actual flow;

(b) Type of treatment processes used at the facility;

(c) Previous performance records as reported on the discharge monitoring report;

(d) Type of wastewater treated: domestic, municipal or industrial wastewater; and

(e) Final effluent limitations.

(5) The methods of sampling shall be as described in s. NR 218.04 (10) to (17).

History: Cr. Register, October, 1986, No. 370, eff. 11-1-86.

NR 210.05 Effluent limitations. Publicly owned treatment works and privately owned domestic sewage treatment works shall meet as a minimum the effluent limits specified in this section.

(1) Where the receiving water is classified as fish and aquatic life in s. NR 102.02 (3):

(a) The following effluent limits for BOD_5 apply:

1. The 30-day average may not exceed 30 mg/l.

2. The 7-day average may not exceed 45 mg/l.

3. The 30-day average percent removal may not be less than 85%.

(b) The following effluent limits for SS apply: 1. The 30-day average may not exceed 30 mg/l.

2. The 7-day average may not exceed 45 mg/l.

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3. The 30–day average percent removal may not be less than 85%.

(c) The effluent pH shall be within the range of 6.0 to 9.0.

(d) Upon request by the permittee, pursuant to s. NR 210.07 (4), the department may substitute the parameter $CBOD_5$ for the parameter BOD_5 and the levels of effluent quality specified in par. (a). The following effluent quality levels of $CBOD_5$ shall be applicable:

1. The 30–day average may not exceed 25 mg/l.

2. The 7–day average may not exceed 40 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(e) More stringent effluent limitations than those specified in pars. (a) to (d) may be imposed for any pollutant where necessary to meet water quality standards for water receiving the treated discharge.

(2) Where the receiving water is classified as intermediate aquatic life as defined in s. NR 104.02 (3) (a):

(a) The following effluent limits for BOD_5 apply:

1. The 30–day average may not exceed 15 mg/l.

2. The daily maximum may not exceed 30 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(b) The following effluent limits for SS apply:

1. The 30–day average may not exceed 20 mg/l.

2. The daily maximum may not exceed 30 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(c) The following effluent limits for NH_3–N apply:

1. The 7–day average may not exceed 3.0 mg/l from May 1 through October 31.

2. The 7–day average may not exceed 6.0 mg/l from November 1 through April 30.

(d) The effluent pH shall be within the range of 6.0 to 9.0.

(e) The daily minimum effluent dissolved oxygen level shall be 4.0mg/l.

(f) Upon request by the permittee, pursuant to s. NR 210.07 (4),the department may substitute the parameter $CBOD_5$ for the parameter BOD_5 and the levels of effluent quality specified in par. (a). The following effluent quality levels of $CBOD_5$ shall be applicable:

1. The 30–day average may not exceed 12 mg/l.

2. The daily maximum may not exceed 25 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(g) More stringent effluent limitations than those specified in pars. (a) to (f) may be imposed for any pollutant where necessary to meet water quality standards for water receiving the treated discharge.

(3) Where the receiving water is classified as marginal surface water as defined in s. NR 104.02 (3) (b):

(a) The following effluent limits for BOD_5 apply:

1. The 30–day average may not exceed 20 mg/l.

2. The 7–day average may not exceed 30 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(b) The following effluent limits for SS apply:

1. The 30–day average may not exceed 20 mg/l.

2. The 7–day average may not exceed 30 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(c) The effluent pH shall be within the range of 6.0 to 9.0.

(d) The daily minimum effluent dissolved oxygen level shall be 4.0mg/l.

(e) Upon request by the permittee, pursuant to s. NR 210.07 (4),the department may substitute the parameter $CBOD_5$ for the parameter BOD_5 and the levels of effluent quality specified in par. (a). The following effluent quality levels of $CBOD_5$will be applicable:

1. The 30–day average may not exceed 16 mg/l.

2. The 7–day average may not exceed 25 mg/l.

3. The 30–day average percent removal may not be less than 85%.

(f) More stringent effluent limitations than those specified in pars. (a) to (e) may be imposed for any pollutant where necessary to meet water quality standards for water receiving the treated discharge.

(4) Effluent limitations may be imposed for pollutants other than those specified in subs. (1) to (3) where necessary to meet water quality standards for waters receiving the treated discharge.

History: Cr. Register, October, 1986, No. 370, eff. 11–1–86.

NR 210.06 Disinfection requirements. (1) Disinfection shall be required of dischargers subject to the provisions of this chapter when the department determines, based on the information identified in sub. (3), the discharge of wastewater poses a risk to human and animal health. Disinfection shall be required:

(a) From May 1 through September 30 annually to protect recreational uses, or

(b) Year–round to protect public drinking water supplies.

(c) The period during which disinfection under pars. (a) and (b) is required may be adjusted in a WPDES permit where necessary to protect human and animal health.

(2) Where disinfection is required, the following effluent limitations shall apply:

(a) The geometric mean of the fecal coliform bacteria for effluent samples collected in a period of 30 consecutive days may not exceed 400mg/100 ml.

(b) When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.1mg/l. In addition, when chlorine is used for disinfection, a dechlorination process shall be in operation for the period during which disinfection is required.

Note: The 0.1 mg/l total residual chlorine limit reflects best analytical technique for domestic wastewater effluents. An effluent limitation for total residual chlorine based on best available technology for dechlorination of effluents was determined to be below detection levels of currently available analytical techniques.

(3) A permittee subject to this chapter shall at the time of application for a WPDES permit provide information identified in this subsection which the department shall use in the determination of the need for effluent disinfection. The following information shall be used in identifying risks to human and animal health:

(a) Proximity of the wastewater outfall to swimming beaches and other waters which have a high level of human contact recreational activities.

(b) Proximity of the wastewater outfall to public drinking water supply intakes. At a minimum, whenever a drinking water intake is within a radius of 5 miles of a wastewater outfall in a lake or impoundment or within 20 miles downstream of a wastewater outfall on a flowing surface water, disinfection shall be provided.

(c) Proximity of the wastewater outfall to wetlands which support populations of waterfowl subject to disease outbreaks, which may be caused by the discharge of wastewater which has not been disinfected.

(d) Quality of the wastewater being discharged.

(e) Dilution and mixing characteristics of the wastewater with the receiving water.

(f) Bacterial indicator organism levels or sanitary survey results from sampling conducted in the vicinity of the wastewater outfall and near the sites used for recreational purposes.

(g) The classification of the receiving water and downstream waters as determined in s. NR 104.02 (1).

(h) The detention time of the wastewater treatment system. Except in extenuating circumstances, the discharge of wastewater to surface water from a treatment system with a detention time of 180 days or longer does not pose a risk to human and animal health.

(i) Other factors that are necessary to determine if there is a risk posed to human and animal health by the discharge of wastewater that has not been disinfected.

(4) Permittees shall be given a reasonable compliance schedule in their WPDES permit if they are unable to meet the effluent limits contained in s. NR 210.06 (2) at the time of permit issuance. However, in no case may the date for compliance with sub. (2) extend beyond 3 years from the date of permit issuance, unless circumstances beyond the permittee's control, such as an environmental impact statement, require additional time for compliance. In such circumstances the date for compliance with sub. (2) may not extend beyond 5 years from the date of permit issuance.

(5) Final determinations made under subs. (1) and (4) shall be made at the time of permit issuance, reissuance, or in response to a request for modification of an existing permit.

(6) The department shall include in the public notice issued under s. 283.39, Stats., its tentative determinations made under subs. (1) and (4). Those tentative determinations shall be subject to review under s. 283.49, Stats. Final determinations made under subs. (1) and (4) shall be subject to review under s. 283.63, Stats. Tentative determinations and final determinations made under subs. (1) and (4) are not subject to review under s. 283.15, Stats.

(7) In the absence of a specific determination under sub. (1), all dischargers which are required to disinfect as of the effective date of this rule shall continue to disinfect and comply with all terms of their WPDES permit in effect on that date.

History: Cr. Register, October, 1986, No. 370, eff. 11-1-86.

NR 210.07 Effluent limitation variance categories.

Modifications to limitations specified in s. NR 210.05 (1) to (3) may be approved as follows:

(1) INDUSTRIAL WASTES. For publicly owned treatment facilities receiving effluent from certain categories of industries, the applicable effluent limitations for BOD_5 and SS as set forth in s. NR 210.05 (1) may be modified. The limitations for BOD_5 and SS in s. NR 210.05 (1) may be adjusted upwards provided that:

(a) The discharge of such pollutants attributable to the industrial category will not be greater than that allowed by applicable effluent limitations if such industrial category were to discharge directly into the waters of the state; and

(b) The flow or loading of such pollutants introduced by the industrial category exceeds 10% of the design flow or loading of the publicly owned treatment works. When such an adjustment is made, the limitations for BOD_5 or SS in s. NR 210.05 (1) shall be adjusted proportionally.

(2) AERATED LAGOONS AND STABILIZATION PONDS. A variance for SS may be made in cases where aerated lagoons or waste stabilization ponds are the principal treatment processes. The SS limitation may be raised to a maximum of 60 mg/l for a 30-day average. This variance is not applicable to polishing or holding ponds which are preceded by other biological or physical/chemical treatment processes.

Note: See s. NR 110.24 for design requirements of aerated lagoons and stabilization ponds.

(3) pH. The effluent pH limitations may be adjusted on a case-by-case basis if the permittee or the owner can demonstrate that the limits need to be adjusted based on the following:

(a) Inorganic chemicals are not added as part of the treatment process; and

(b) In the case of a publicly owned treatment works, contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0.

(4) $CBOD_5$. Upon request by the permittee, the parameter $CBOD_5$ may be substituted for the parameter BOD_5, provided the following conditions are met:

(a) For treatment facilities with BOD_5 limitations specified in s. NR 210.05 (1) (a), (2) (a), or (3) (a), the permittee shall provide paired sampling of the effluent for BOD_5 and $CBOD_5$ for the months of January and July. The sample frequency shall be at the same frequency as required by the permit for BOD_5 sampling. Additional sampling for nitrogen compounds (NH_3-N, NO_3-N) or other sampling may also be required on a case-by-case basis.

(b) For treatment facilities with BOD_5 limitations established in accordance with those specified in s. NR 210.05 (1) (e), (2) (g), or (3) (f), the permittee shall provide paired sampling of the effluent for BOD_5, $CBOD_5$, NH_3-N and NO_3-N. At the end of the BOD_5 test, an analysis of that BOD_5 sample for NO_3-N shall also be conducted.

1. This sampling shall be provided for the months of January, February, July, and August at a frequency of 3 times weekly for facilities with a design flow over 0.5 MGD and for those facilities which discharge to trout waters or may impact trout waters.

2. This sampling shall be provided for the months of January and July at a sample frequency as required by the permit for BOD_5 sampling, with a maximum of 3 times weekly for facilities with a design flow less than 0.5 MGD.

(5) TREATMENT EQUIVALENT TO SECONDARY TREATMENT. (a) Facilities eligible for treatment equivalent to secondary treatment as defined in s. NR 210.03 (6) shall provide the following minimum level of effluent quality in terms of the parameters BOD_5, SS, and pH. All requirements for the specified parameters in subd. 1., 2. or 3. shall be achieved except where provided for in sub. (2) or par. (b), (c), or (d).

1. The following effluent limits for BOD_5 apply:

a. The 30-day average may not exceed 45 mg/l.

b. The 7-day average may not exceed 65 mg/l.

c. The 30-day average percent removal may not be less than 65%.

2. The following effluent limits for SS apply: except where SS values have been adjusted in accordance with s. NR 210.07 (2):

a. The 30-day average may not exceed 45 mg/l.

b. The 7-day average may not exceed 65 mg/l.

c. The 30-day average percent removal may not be less than 65%.

3. The requirements of s. NR 210.05 (1) (c) shall be met.

(b) Except as limited by par. (d) and subject to EPA approval, the department may after notice and opportunity for public comment, adjust the minimum levels of effluent quality set forth in par. (a) 1. a., 1. b. 2. a., and 2. b. for trickling filter facilities and in par. (a) 1. a. and 1. b. for waste stabilization pond facilities to conform to the BOD_5 and SS effluent concentrations consistently achievable through proper operation and maintenance by the median (50th percentile) facility in a representative sample of facilities within a state or appropriate contiguous geographical area that meet the definition of facilities eligible for treatment equivalent to secondary treatment.

(c) Where data are available to establish $CBOD_5$ limitations for a treatment works subject to this subsection, the department may substitute the parameter $CBOD_5$ for the parameter BOD_5 in pars. (a) and (b), on a case-by-case basis.

1. The levels of $CBOD_5$ effluent may not be less stringent than the following:

a. The 30-day average may not exceed 40 mg/l.

b. The 7-day average may not exceed 60 mg/l.

c. The 30-day average percent removal may not be less than 65%.

2. To apply for the $CBOD_5$ variance, the permittee shall provide the data outlined in sub. (4).

(d) Any permit adjustment made pursuant to this section may not be any less stringent than the limitation required pursuant to sub. (5) (a). The department shall require more stringent limitations when adjusting permits if:

1. For existing facilities the permitting authority determines that the 30–day average and 7–day average BOD_5 and SS effluent values that could be achievable through proper operation and maintenance of the treatment works, based on an analysis of the past performance of the treatment works, would enable the treatment works to achieve more stringent limitations, or

2. For new facilities, the department determines that the 30–day average and 7–day average BOD_5 and SS effluent values that could be achievable through proper operation and maintenance of the treatment works,considering the design capability of the treatment process and geographical and climatic conditions, would enable the treatment works to achieve more stringent limitations.

(6) COMBINED SEWERS. Treatment works which have a combined sewer system may not be capable of meeting the percentage removal requirements established in sub. (5) (a) 1. c. and 2. c. or in s. NR 210.05 (1) (a) 3. and (b) 3. during wet weather where the treatment works receive flows from combined sewers. For each treatment works, the decision shall be made on a case–by–case basis as to whether any attainable percentage removal level can be defined, and if so, what the level should be.

History: Cr. Register, October, 1986, No. 370, eff. 11–1–86.

NR 210.08 Emergency operation. **(1)** All treatment works which are subject to the provisions of this chapter shall be equipped for emergency operation. Emergency power shall be provided in accordance with s. NR 110.15 (5) (d). Sufficient emergency power shall be provided so that:

(a) All facilities shall, at a minimum, be able to maintain primary settling and effluent disinfection under all design conditions.

(b) All facilities discharging to class I, II, or III trout streams, or other critical stream segments as determined by the department, shall be able to operate all units critical to meeting the effluent limits as set forth in the WPDES permit for a minimum emergency period of 24 hours under all design flow conditions.

(2) Main lift stations, defined for the purpose of this section as those lift stations which discharge more than 20% of the daily system flow, or which serve more than 100 homes or the equivalent, shall be equipped for emergency operation to prevent the discharge of raw or partially treated sewage to a surface water or to a ground water and to prevent sewage backups into basements. Main lift stations shall provide emergency operation in accordance with s. NR 110.14 (7).

History: Cr. Register, October, 1986, No. 370, eff. 11–1–86.

NR 210.09 Analytical methods and laboratory requirements. Methods used for analysis of influent and effluent samples shall be as set forth in ch. NR 219 unless alternative methods are specified in the WPDES discharge permit.

History: Cr. Register, October, 1986, No. 370, eff. 11–1–86.

NR 210.10 Requirements for certified or registered laboratory. Bacteriological analyses of groundwater samples, and all radiological analyses, shall be performed by the state laboratory of hygiene or at a laboratory certified or approved by the department of agriculture, trade and consumer protection. Other laboratory test results submitted to the department under this chapter shall be performed by a laboratory certified or registered under ch. NR 149. The following tests are excluded from the requirements of this section:

(1) Temperature,

(2) Turbidity,

(3) Bacteria tests in wastewater effluent,

(4) pH,

(5) Chlorine residual,

(6) Specific conductance,

(7) Physical properties of soils and sludges,

(8) Nutrient tests of soils and sludges,

(9) Flow measurements.

History: Cr. Register, October, 1986, No. 370, eff. 11–1–86.

NR 210.11 Compliance maintenance annual report (CMAR). The CMAR shall be submitted on or before June 30, 1987. Thereafter, the CMAR shall be submitted to the department on March 31 of each subsequent year. The content of the CMAR is described in ch. NR 208. The CMAR shall be completed and signed by a duly authorized representative of the owner. In the case of a publicly owned treatment works, a resolution from the municipality's governing body shall accompany the CMAR and shall include the information specified in s. NR 208.04 (3).

History: Cr. Register, February, 1987, No. 374, eff. 3–1–87.

CERTIFICATE OF SERVICE

I, Albert F. Ettinger, certify that I have filed the above Notice of Filing together with an original and 9 copies of the *Post-Hearing Comments of ELPC, Prairie Rivers Network and Sierra Club* with the Illinois Pollution Control Board, James R. Thompson Center, 100 West Randolph Street, Suite 11-500, Chicago, IL 60601, and served all the parties on the attached Service List by depositing a copy in a properly addressed, sealed envelop with the U.S. Post Office, Chicago, Illinois, with proper postage prepaid on April 12, 2002.

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R02-11 Notice List

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R02-21 Notice List

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