BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
PROPOSED AMENDMENTS TO AMMONIA NITROGEN STANDARDS 35 ILL. ADM. CODE 302.212, 302.313 AND 304.122	)	R02-19 (Rulemaking-water)

The following is a transcript of the above-entitled matter taken stenographically before TERRY A. STRONER, CSR, a notary public within and for the County of Cook and State of Illinois, at Suite 09-40, 100 West Randolph Street, Chicago, Illinois, on the 25th day of March, A.D., 2002, commencing at 10:30 o'clock a.m.

A P P E A R A N C E S:

ILLINOIS POLLUTION CONTROL BOARD,
100 West Randolph Street
Suite 11-500
Chicago, Illinois 60601
(312) 814-6923
BY: MS. CATHERINE F. GLENN, HEARING OFFICER

BOARD MEMBERS PRESENT:
Ronald Flemal
Nicholas Melas
Anand Rao
Michael Tristano

HEARING OFFICER GLENN: Good morning. My name is Cathy Glenn and I'm the hearing officer in this proceeding.

I would like to welcome you to this hearing being held by the Illinois Pollution Control Board in the matter of Proposed Amendments to Ammonia Nitrogen Standards, 35 Illinois Administrative Code 302.212, 302.213 and 304.122.

Present today on behalf of the Illinois Pollution Control Board and seated to my left is Dr. Ronald Flemal, he is the Board member coordinating this rulemaking. Seated to my right are both Member Michael Tristano to my far right and Member Nicholas Melas. Member Tristano and Member Flemal and Member Tanner Girard are the three Board members that have been assigned to this rulemaking. Unfortunately, Member Girard could not be with us here today.

I have placed copies of the notice and service list sign-up sheets in the back at the table. If you would like to sign up on either of those sheets, please be aware that if you're on the notice list you will be receive copies of any hearing officer orders that might be put out by

myself or by Board orders or -- you'll also receive copies of Board orders. If you're on the service list you will, in addition to these items, receive anything that is filed in this case regarding prefiled testimony, public comments, things such as that.

On January 17th, 2002, the Illinois Association of Wastewater Agencies, which I will refer to as the IAWA, filed a proposal for rulemaking under Section 27 of the Environmental Protection Act to change regulations governing ammonia found in the Board's rules at 35 Illinois Administrative Codes 302.212, 302.213 and 304.122.

On January 24th, 2002, the Board accepted the matter for hearing. Pursuant to Section 27 of the Environmental Protection Act, the Board has scheduled two hearings. As announced in the hearing officer order dated January 30th, 2002, today's hearing is to conduct -- is conducted to allow the IAWA and all other interested parties the opportunity to present testimony on the proposed rule.

The second hearing is for the

by affected entities and all other interested parties.

The second hearing is currently scheduled for Tuesday, April 23rd, 2002 at 10:30 in the morning in Room 403 of the Board's Springfield office located at 600 South Second Street in Springfield.

The second hearing will begin with presentation of testimony and comments that were not presented at the first hearing either because of time constraints or by the request of other testifiers.

This hearing will be governed by the Board's procedural rules for regulatory proceedings. All information which is relevant and not repetitious or privileged will be admitted. All witnesses will be sworn and subject to cross questioning.

The purpose of today's hearing is to hear the prefiled testimony of the IAWA and to hear questions of them. There are six people who will be testifying on behalf of the IAWA, they have

all filed prefiled testimony. One person from the Agency will also testify. All the witnesses will

read their testimony into the record. We will allow all of the witnesses to testify before any questions are raised. Anyone may ask a question, however, I do ask that you raise your hand and allow me to recognize you before you ask your question. Also, at the request of the court reporter, if you have questions if you would please step to the front of the room here so that she may have a better opportunity to hear you. We would appreciate that. After I acknowledge you to ask your question, please state your name and who you represent, if anyone, in this matter and please note that any questions that might be asked by a member of the Board or the Board staff are intended to help build a complete record for the Board's decision and they do not express any preconceived notion or bias.

I would like to also remind any witnesses that step forward to testify today to please speak up for the court reporter, she will be seated rather close to you. Today the noise factor should not be a problem.

We will allow anyone else who wishes to testify the opportunity to do so as time permits at the end of the day and one last note, we

do have some members of the Board staff up here that I have not introduced, Anand Rao is from the Board's technical unit and seated in the back also with the Board's technical unit is Ailsa Lie and in the way back we have two Board assistants, we have Mary Tipsord who is the Board assistant to Member Girard and then seated next to her is William Murphy who is the assistant to Board Member Tristano.

Are there any questions regarding the procedure we will be following today? I see no questions. Dr. Flemal?

DR. FLEMAL: I'd just like to take a moment to welcome everybody, a lot of familiar faces in this group and we welcome back those familiar faces and look forward to your continuing participation with the Board. Before the Board I notice as well a few faces which at this stage at least are unfamiliar, if that makes you new to the Board, we welcome you as well. Perhaps mostly for the sake of the latter, let me just take a very

short run through how the Board will proceed with this material before it.

Our purpose, as the Hearing Officer indicated, is to build a complete record in

support or otherwise for the proposal that's before us. We will do that by the testimony received today, the various questions that hopefully will shed further light on the merits of the proposal. The second hearing as well, any public comments that are filed in the next several weeks also will go into the early stages of the record. Once that record is before us, the Board will sit down and deliberate on the merits of the proposal. There are three possible outcomes that the Board at that stage could decide to follow, one would be to move forward with the proposal as submitted to us. Alternatively, we could move forward with the proposal amended as the Board would see justification to do so and, of course, there's always the option that if the Board finds the proposal is not meritorious that the Board will terminate the proceedings and decline to move forward further.

Under the assumption that the Board will move forward with this proposal at least in some form or another, the next step would be to go to what's called first notice. The Board would issue an opinion and order in which it could state

its evaluation of the merits of the proposal and why there is decisions that are inherent in moving the proposal forward have been made. That opinion is then available for the public, including yourselves, of course, to further comment on the proposal of the nature of hopefully that all the Board's decisions are clear to all interested persons and allow you a good basis upon which to offer further comments if you so desire.

After that first notice, the Board entertains further opportunity for input into the record, that may be by additional public comment or if the Board deems that it is justified, perhaps even additional hearings may be held. At the end of that phase, the Board then makes a decision, again, as to how to -- or what disposition the rule thereafter has, assuming that it is to continue to move forward, we would then go to something called

second notice at the end of which another opinion and order will be issued by the Board explaining any revised decisions that it may have made as a result of the later editions to the record.

There's yet a further stage where the rule passes out of the hands of the Board and

goes to a subcommittee of the general assembly, JCAR, which we review the rule from their perspective and if it passes that hurdle the Board is then in a position to make the ultimate disposition on the ruling and actually adopt the rule.

This is a long process, it's a fairly elaborate process, but it's a very robust process in the extent that this rule will be examined in great detail by many great minds sitting out there bringing advice to the Board as to how to make the appropriate decision and in the end hopefully we will have a good solid rule that will do what it's supposed to do. Thank you.

HEARING OFFICER GLENN: Thank you, Dr. Flemal. Member Melas or Member Tristano, anything to add?

MR. MELAS: No. Just looking forward to hearing the testimony and welcome everyone here.

HEARING OFFICER GLENN: Wonderful. All right. With that Mr. Harsch, would you like to make an opening statement? Mr. Kissel?

MR. KISSEL: My name is Richard Kissel, I'm with the law firm of Gardner, Carton &

Douglas and we represent the Illinois Association of Wastewater Agencies in this proceeding. To my left is Roy Harsch, who is an attorney with Gardner, Carton as well as Shelia Deely who is to my right and we will be, to the extent you want us to, sheparding the testimony and the witnesses and giving you the evidence with which we hope you will adopt -- use to adopt this proposed rule.

I think it's important for us to tell the Board that IAWA is a very well represented organization throughout the state. It has a number of members who operate publicly owned treatment works and probably is the premier agency -- or association in that regard. It follows the Board's rules with great regulatory and participates in them as it has in the past, but this is really a first in

that IAWA has taken it upon itself to propose a rule to the Board, that has never been done before and just so the Board understands from an association standpoint, that was a very, very large step and they had to believe that what they were proposing to the Board was technically sound, economically sound and correct. So it has gone for your view through a substantial amount of review before it ever got

here, but obviously we want you to have the separate independent review of that.

Essentially, what we are doing here is asking for an update of the ammonia rule, which is found in 302.212 and the other sections which the hearing officer alluded to and the basis of that is that the rule adopted by the Board which is now currently in affect was based upon a criteria document developed by the United States Environmental Protection Agency I think in 1984, 1986.

In 1999, the USEPA came out with -- published a new criteria document based upon newer science and it is that criteria document which forms the basis of our proposed water quality

criteria for the Board's consideration and hopefully adoption.

We had participated in a great degree in the prior rules and in addition when we put this rule together before we ever submitted it to the Board for its consideration, we dealt with a number of state agencies and the USEPA had a number of meetings, I'm sure the Board will hear testimony to that regard, and with environmental groups to see

what -- how they would feel about this and so this rule has gone through -- the proposed rule has gone through a lot of peer review and public review before it ever got to you. I think it's important that you know that. With that, we will -- I think there's -- with that we would like to start our witnesses and I want to add one other thing before Mr. Callahan comes up. I was telling Dr. Flemal that I was the hearing officer in the water quality regulations in 1970 and '72 and so I've taken it upon myself to propose a new water quality regulation every 30 years. Whether I do it in the next 30 years or not is a lot -- is not dependent so much on me, but the good Lord will keep me on this

earth.

In any case, Mr. Callahan? Mike came from Bloomington, Normal today and says that he was only going 35 miles an hour in the snow with four-wheel drive on to get here and left at four in the morning so apparently he did make it on time so...

HEARING OFFICER GLENN: Mr. Callahan, could we get you sworn in?

(Mr. Callahan was sworn in by the court reporter.)

MR. CALLAHAN: Good morning. As Dick said, I would principally just like to read my prefiled testimony at this time.

My name is Michael Callahan. I am here on behalf of the Illinois Association of Wastewater Agencies to petition the Illinois Pollution Control Board to adopt the 1999 United States Environmental Protection Agency's 1999 update of ambient water quality criteria for ammonia published in final form in the Federal register on December 22nd, 1999, as the basis for the ammonia nitrogen water quality standard for Illinois.

I am keenly aware of the

uniqueness of the current position of IAWA before the Board advocating such a rulemaking. Ordinarily, this type of advocacy before the Board would be undertaken by the Illinois Environmental Protection Agency. However, the Agency was unable to develop this petition in a timely manner due to the severe time demands placed upon its personnel by the many other issues simultaneously being considered in the area of water pollution control within Illinois. The IAWA has asked the Agency for advisement on the tenets of this issue as well as approval of the

petition presented to the Board today. The Agency has been very helpful in this regard and we understand the Agency will offer supportive testimony later in this proceeding.

The IAWA has elected to undertake the time commitment and cost of approximately $70,000 to prepare the petition for rulemaking before the Board because of the importance the IAWA places upon the protective and economically justifiable ammonia nitrogen water quality standard for the state.

The importance to IAWA of the

adoption of this USEPA criteria as the Illinois standard is multi-faceted. Later in this testimony I will elaborate upon these various facets as well as explain the recent history of the ammonia nitrogen water quality standard rulemaking in Illinois, which has created our current situation. Further, I will share with the Board the steps in the IAWA development of the proposed standard as well as justifications for key determinations made in that development.

The IAWA is petitioning the Board to modify Sections 302.212, 213 and 304.122 of Title

35, Subtitle C, of the Illinois Administrative Code. Also included with this action are minor modifications to Section 355, but not submitted to the Board for approval. Section 355 addresses the Agency's implementation procedures for this matter. The Agency prefers, and the IAWA currently agrees, that this implementation procedure should remain within the jurisdiction of the Agency. However, the IAWA strongly emphasizes that the modifications to and ultimate content of Section 355 as currently proposed are of absolute essential importance to the

successful resolution of a protective and equitable ammonia water quality standard for Illinois. Should the Board approve this petition absent a successful modification of Section 355, the IAWA may return to the Board for action on this implementation procedure. This, however, is not the desired intent of IAWA at this time. My later testimony will illustrate the importance of this position and elaborate upon the matter.

Following my testimony will be testimony of Dr. Robert Sheehan, Professor of Fisheries and Zoology, Southern Illinois University. Dr. David Zenz, consulting engineer with Consoer,

Townsend, Envirodyne Engineers, Incorporated, formerly with the research and development department of the metropolitan water reclamation district of greater Chicago; Mr. Tim Bachman, director of waste treatment operations of the Urbana & Champaign, Illinois Sanitary District; Mr. Michael Zima, director of the DeKalb, Illinois Sanitary District and Mr. James Daugherty, district manager of the Thorn Creek Basin Sanitary District. Each of these individuals will provide testimony relevant to

their area of expertise and experience in critical areas of this matter.

I have a bachelor of science degree in biological sciences and environmental health from Illinois State University, Normal, Illinois. I further obtained a master of arts degree in biological sciences from the University of Missouri; Columbia, Missouri. I pursued doctoral studies at Illinois State University in biological sciences. All of my graduate studies involved nutrient cycling in biological systems. I am a member of the Phi Sigma Biological Sciences Honor Society.

I have been employed by the

Bloomington and Normal Water Reclamation District since 1973. Since 1988, I have been the executive director of the BNWRD. The BNWRD and/or I have received awards for operational or program excellence from USEPA, the Agency and various professional organizations during my tenure as executive director. I have held an Illinois Environmental Protection Agency Class I wastewater treatment plant license since 1977. I have authored

and presented many papers on a variety of issues concerning municipal sector wastewater treatment topics. I have been a member of many professional organizations and have held offices in many of these organizations, including president of the IAWA, president of the Illinois Water Pollution Control Operators Association and chairman and trustee of the Illinois Section of the Central States Water Environment Association. I have belonged to the WEF since 1975.

I ask the Board to bear with me in revisiting the complicated sequence of historical events that have resulted in the present ammonia regulatory picture in Illinois. This history has direct bearing on the standard I am advocating to be

developed from the 1999 USEPA guidance. This history is reflective of the importance to IAWA of the Board's adoption of the proposed ammonia water quality standard. This history also illustrates the overwhelming need, as the Board is acutely aware, for adoption of water quality standards for Illinois that are founded on complete scientific investigation, that are economically justifiable and

that are technically attainable.

The present ammonia nitrogen water quality standard for Illinois was developed through Board Docket R94-1. The rule was finally adopted in 1996 amidst considerable input and compromise by all participating parties. The original proposal of R94-1 by the Agency was derived from the 1984 USEPA national criteria document for ammonia. The 1984 guidance was modified to consider ammonia toxicity of only warm water species indigenous to Illinois. The Agency proposal also addressed the fact that the water quality standard derived from that document would result in effluent NPDES permit limits that pushed the limit of technical attainability of many of the treatment facilities in Illinois, particularly in the winner season. Mr. Jim

Daugherty, representing the IAWA in the R94-1 proceedings, testified to that point. At the Agency's request prior to the R94-1 proceedings, the IAWA undertook a member survey for nitrification capabilities of existing treatment facilities. This survey consisted of two years of daily operating nitrification data collected from

approximately, and I would correct a typo here, that should be 35 rather than 45, wastewater treatment plants within Illinois. This survey and its subsequent review by the Agency was the partial basis for the Agency testimony in R94-1 that 1.5 milligrams per liter and 4.0 milligrams per liter were the existing consistent levels of treatment attainability for nitrification in Illinois.

The 1984 USEPA guidance document proposed ammonia toxicity in a manner that has since been found to be errant. The 1999 USEPA guidance subsequently addressed this error and now considers ammonia toxicity through a different mechanism than that used by the 1984 document. Dr. Robert Sheehan will elaborate on this mechanism in his testimony today. However, at this time I would like to offer a brief and simple explanation of the two different

toxicity assessments to illustrate the difference in the subsequently derived water quality standards resulting from each USEPA guidance document.

Ammonia exists in aquatic systems in the form of a dynamic equilibrium between the un-ionized ammonia molecule form, NH3, and the

ammonium ion form, NH4 plus. This equilibrium is very dynamic and is responsive to both temperature and pH. Essentially the mechanism employed in the 1984 guidance document assigned all of the ammonia toxicity to the un-ionized ammonia molecule. The assignment of all such toxicity to the un-ionized ammonia form of the equilibrium resulted in very low concentrations of un-ionized ammonia being indicated as necessary to protect aquatic life. The 1999 USEPA guidance assigns toxicity to total ammonia, not just un-ionized ammonia.

The present water quality standard in Illinois is derived from this errant consideration of the toxicity mechanism. Since the ammonia equilibrium is temperature responsive, both winter and summer acute and chronic standards were developed as a result of 94-1. The current standard, when back-calculated in NPDES permit

limits, does not present many difficulties in terms of technical attainability and compliance during warm summer months even though the standard for such periods is much lower than that enacted for cold winter months. Wastewater treatment processes are

much more efficient at the biological oxidation of ammonia at warm temperatures than they are at cold temperatures.

The current summer standard resulting from the Board's ruling in R94-1, in many situations throughout the state, allows for NPDES permit limits higher than the monthly average limit of 1.5 milligrams per liter generally allowed within the state by the standard that preceded it. Likewise, this proposed standard may allow for NPDES permit limits for ammonia greater than the customary 1.5 milligram per liter summer NPDES permit limit. However, anti-backsliding constraints generally result in previous permit limits being retained. Consequently, these anti-backsliding requirements will continue to provide a very conservative level of ammonia protection during the early life stage present period.

The acute winter standard does not

present many such compliance difficulties due to relatively high acute toxicity tolerance of ammonia as compared to the alleged chronic toxicity tolerance. The difficulty experienced with the

current ammonia water quality standard exists when the winter chronic toxicity water quality standard is back-calculated into winter NPDES discharge permit limits. The chronic toxicity standard is roughly equivalent to the monthly average standard contained in such permits. The consideration by the 1984 guidance document of all ammonia toxicity resulting from the un-ionized form of the ammonia equilibrium resulted in the development of unnecessarily low un-ionized ammonia standards. Even though cold temperatures drive the ammonia equilibrium towards the ionized NH4 plus form of the equilibrium, the mistaken assignment of all ammonia toxicity to the un-ionized form resulted in winter chronic NPDES permit limits that were at or below the limit of technical attainability in many wastewater treatment processes in place throughout Illinois.

In recognition of this dilemma, the Agency proposed, and the Board approved, a

concept in R94-1 called effluent modified waters. The EMW concept allows for exceedance of the chronic toxicity water quality standard downstream of an

NPDES permitted discharge to the distance necessary to achieve compliance with the chronic toxicity standard by depletion of ammonia through the natural nitrification capability of the receiving stream. Discharges into such an EMW were not allowed to exceed a monthly average NPDES permit limit of 4.0 milligrams per liter ammonia during the winter season, which is November through March, and 1.5 milligrams per liter during the summer seasons, April through October. An additional condition of EMW designation required that no ammonia impairment exists in the water body so designated. An EMW designation did not allow dischargers relief from acute toxicity standard. As discussed previously, the only relief really needed and therefore requested by the regulated community was from the very low winter chronic standard.

The EMW concept had been approved by USEPA prior to the R94-1 proceeding. The Board action in R94-1 approved the ammonia nitrogen water quality standard and the concept of effluent

modified waters. The Board action did not address the implementation policy concerning either the

standard or the EMW designation. The Agency preferred at that time to retain development of these policies as their own implementation rules and codify them through the Joint Committee on Administrative Rulemaking.

In testimony during R94-1, the Agency indicated that no biological sampling in waters thought to qualify for EMW status had indicated biological ammonia impairment. Therefore, the interpretation of the Board rule by the Agency and the regulated community was that EMW designation could be extended state-wide in situations where the chronic water quality standard would require NPDES permit limits less than 4.0 milligrams per liter during the winter or 1.5 milligrams per liter during the summer.

Upon issuance of the Board rule, the Agency began issuing NPDES permits using the EMW designation and also began codification of its implementation policy with JCAR. At this time, a 60-day notice of intent to sue was served on USEPA Region V alleging that the EMW concept in Illinois

was not affording adequate protection of the state's

waters as required by the Clean Water Act. In response to this notice, USEPA advised the Agency that it would not approve the implementation policy that was being developed for proposal to JCAR. The result of the intervention of USEPA into the development of the implementation policy by the Agency was a significant change in the manner by which EMW relief could be given.

The implementation policy that resulted from this intervention demands that an exhaustive field evaluation of candidate receiving streams be undertaken, which included hydrologic, physical, chemical, habitat and biological considerations. Additionally, submission of all known existing data relevant to this stream was required as well as consultation by the Agency with other natural resource agencies within the state. The net effect of this modified implementation policy is to tremendously complicate both the application for and approval of an EMW designation. The unfortunate aspect of this existing EMW policy lies in the fact that it was taken to avoid a lawsuit and in no way allowed for public hearing of

the issues in an open forum such as that provided by the Board rulemaking process.

The IAWA had supported the Board's adoption of the new water quality standards in R94-1 despite strong reservations about the appropriateness of the toxicity mechanism used in the USEPA 1984 guidance document. This reservation is stated in Mr. Daugherty's testimony in R94-1. Such support had, however, been ultimately extended with the understanding that the EMW designation would allow assignment of the 1.5 milligrams per liter summer and 4.0 milligrams per liter winter monthly average NPDES permit limits. This support was also extended with the understanding that the Agency's testimony indicated no ammonia impairment existed within the state that would prohibit EMW designations. Such EMW designations would not, therefore, involve lengthy and complicated site by site demonstration of the appropriateness of each such designation.

Regrettably, when the Agency finally codified the ammonia implementation procedure on June 9th, 1999, the IAWA membership and all other point source dischargers throughout

Illinois were facing the grim prospect of complying with effluent limits which were at or below the limit of technical attainability with very limited prospects of relief. Realization of an EMW designation had become such a complicated and onerous undertaking, as a result of the implementation procedure eventually codified, that the regulated community saw little chance of being successful in realizing any such designation.

To date, six years after the adoption of the Board's rules, I am not aware of one EMW application in Illinois that has been attempted. The net effect of the procedures by which the current ammonia water quality standard has been implemented was to offer the regulated community conditional relief from the chronic winter standard for which compliance had been determined to be marginal at best and, then, pull that relief out at the last minute.

The regulated community had been left hanging. Needless to say, there was great relief felt throughout the Illinois regulated community when within two months of the codification of the existing implementation procedure the 1999 USEPA guidance was released and indicated that the 1984

guidance was in error. Further, this guidance recommended a different mechanism by which to consider ammonia toxicity. The greatest irony was the fact that the mechanism advocated by the 1999 USEPA guidance results in a winter chronic toxicity standard which is attainable by existing wastewater treatment processes. This relief afforded by the 1999 USEPA guidance is the motivation for the IAWA current petition before the Board to adopt the proposed ammonia water quality standard.

Upon receipt of the 1999 USEPA guidance, the IAWA strongly encouraged the Agency to immediately undertake a new rulemaking which would result in adoption of the criteria recommended in the guidance as the Illinois water quality standard for ammonia. The Agency regrettably told IAWA that the other program development requirements before it at that time did not allow enough personnel to initiate such action. The IAWA thus decided in January of 2000 to undertake the action itself. The Agency subsequently told IAWA that it would support such an effort providing that the resulting proposal satisfied all Agency concerns regarding both compliance with the 1999 USEPA

guidance and necessary protection of Illinois waters.

The 1999 USEPA guidance itself is a compelling testament for the standard presented to the Board for consideration today. The IAWA did not revisit any of the methodology used in the development of the 1999 USEPA guidance, but rather drafted the proposed standard directly from the formula in the document. The IAWA proposal, however, does not contain provisions for protection of cold water species. The proposed standard is not applicable to Lake Michigan. That portion of the regulations is not proposed to be changed by these proceedings. The generally agreed upon consensus within the state is that cold water species are not indigenous to any of the waters of Illinois other than Lake Michigan.

The IAWA subcommittee assigned to the development of this proposal initially canvassed the IAWA membership to determine the capability of existing facilities in Illinois to maintain compliance with the NPDES permit limits which would result from adoption of this proposal. Many of the facilities queried indicated that the ammonia limits

lower than those in effect prior to R94-1 would probably be added to NPDES permit limits as a result of this proposal. However, the membership also determined that existing wastewater technology could consistently achieve compliance with these limits.

The proposed standard differs from previous attempts to regulate ammonia in Illinois by recognizing an increased ammonia toxicity by the early life stages of fish as compared to adult fish individuals. The 1999 document also finds that early life stages of fish species are more sensitive to ammonia than are invertebrate species. To evaluate the correct manner by which to apply this concept of early life stage protection in Illinois, the IAWA retained Dr. Sheehan as a consultant. Dr. Sheehan will elaborate upon his developmental work on this issue in later testimony. In essence, Dr. Sheehan and IAWA were comfortable initially in advocating an early life stage present period of April through October. This season is the same as the existing regulation's summer season. The early life stage absent period thus becomes November through March. Some uncertainty remained with this determination, however, due to the waters of

southern Illinois warming earlier in the year than those of northern Illinois. Also, the Northern Pike has a life history indicating that it could begin to spawn in March. The Northern Pike is essentially limited to northern Illinois. Consequently, the IAWA included a clause in the proposal which stipulates the Agency is empowered to assign early life stage present protection to selected waters on a site-specific basis as may be found appropriate. This clause is found in Section 302.212(e).

Upon review of this proposal, Agency biologists indicated that they would be more comfortable in extending total early life stage protection to the month of March. The Agency thus advocated an early life stage present period of March through October and an early life stage absent period of November through February. The IAWA agreed to this request and such is the format currently before the Board. The IAWA did, however, retain the clause at Section 302.212(e) such that the Agency is empowered to extend early life stage protection to winter months on a site-specific basis or to the extent that such protection is found to be warranted in the future.

The language and format of the proposed regulation was drafted by Ms. Debra Williams, counsel for the Agency, and Mr. Roy Harsch, counsel for IAWA. The language of the proposal thus is such that the Agency is comfortable with the water quality protection extended, the compatibility of the regulation with other Agency regulations and the regulation's ability to be enforced.

Dr. Sheehan and various IAWA ammonia regulation subcommittee members then attempted to discuss the newly drafted and Agency approved proposal with various stakeholders throughout Illinois. Dr. Sheehan will elaborate upon his discussions in this regard. We believe that all individuals with whom this proposal was discussed were satisfied with the ammonia protection it affords. Included in this proceeding as IAWA's Exhibit 10 are letters from me to Mr. Joel Cross, Division of Fisheries, Illinois Department of Natural Resources; Mr. Glen Kruse, Division of Natural History, IDNR; and Mr. Keith Shank, Division of Endangered Species, IDNR. These letters formally

between Dr. Sheehan and these gentlemen of the Illinois Department of Natural Resources. The proposed regulation accompanied each of these letters. Each letter requests follow up contact if difficulties with the regulation are foreseen. The IAWA has not received any response to these letters. The Agency submitted the proposed regulation to USEPA Region V for comment. Region V responded by raising four issues. Included with Exhibit 10 is a letter from Mr. Tom Muth, IAWA president to Mr. David Pfeifer, Region V, USEPA, responding to three of these comments. The comment not addressed by Mr. Muth's letter involved consideration of flows in determination of effluent NPDES permit limits. The issue is addressed by the Agency's use of its mass balance calculation procedure for determination of effluent limits and also by the Agency's allowance for no dilution of ammonia concentrations on zero low flow streams.

The first of the Region V comments concerned the early life stage present time period. The issue was discussed among Dr. Sheehan, Dr.

Brooks Burr, Professor of Fisheries and Zoology, Southern Illinois University and Mr. Brian Thompson

of Region V USEPA. It is our understanding that this discussion concluded with agreement that the proposed standard extends adequate ammonia early life stage protection. Dr. Sheehan will elaborate on this issue in later testimony.

The second issue raised by USEPA Region V comment involved the use of the selected percentile rankings of pH and temperature for determining the appropriate water quality standard. This issue, while of fundamental importance in the successful implementation of this proposed rule, is listed as a Section 355 modification and is thus not before the Board for action at this time. However, prudence and past experience as discussed above requires IAWA to offer a complete explanation of this matter to the Board should further action be necessary. The procedure used in the proposed regulation is exactly that presently used for the existing ammonia water quality standard. The 75th percentile temperature and pH of the water body are used for determination

of the acute and chronic early life stage present and early life stage absent standards. If use of the 75th percentile pH value results in a chronic

standard less than 1.5 milligrams per liter for the early life stage present period or 4.0 milligrams per liter for the early life stage absent period, the 50th percentile shall be used to recalculate these chronic standards. The standards obtained with the use of the 50th percentile shall be met. Under no circumstances shall use of the 50th percentile pH result in standards greater than 1.5 milligrams per liter for the early life stage present period or 4.0 milligrams per liter for the early life stage absent period. The subchronic standard is 2.5 times the final calculated chronic standard.

The chronic standard is a 30-day average. A monthly average standard assumes that half of the variance can be in excess of the standard and half of the variance can be less than the standard. Consequently, the use of the median, 50th percentile value, for the determination of the standard is mathematically appropriate. Dr. Sheehan

will discuss this issue further in his testimony.

The fourth issue raised in the USEPA Region V comment addresses protection of mussels. The 1999 USEPA guidance considered mussels

in the analysis of invertebrate species. The Region V comment states recent research work indicates that the 1999 USEPA guidance might not provide adequate protection to mussel species.

Dr. Sheehan and I have attempted to review some of this work for this proceeding. I am not an authority on the Molusca, however, I was unable to find much of it referenced in the customary abstract indicies. I was finally able to obtain some of these citation references by requesting them from the Agency. A significant portion of this work is unpublished. Some of the work has been published but in some of the published work the experimental designs are not necessarily appropriate for application to development of national criteria guidance. One of the citations referenced by USEPA is for a paper published jointly by Dr. Sheehan and other which Dr. Sheehan indicates might not be appropriate for criteria development

purposes. Dr. Sheehan will address this matter in his testimony.

At this time I would like to address a component of the contemporary rulemaking process which I find indirectly related to this

consideration of mussel protection. The issue is referenced in Mr. Muth's letter to Mr. Pfeifer. Specifically, none of the data which has been referenced suggesting potential lack of mussel protection generated through recent research work nor the peer reviewed or non-peer reviewed articles generated therefrom has been subjected to the Federal criteria guidance public review process. I am very concerned with the consideration of research results for rulemaking purposes which have not yet withstood the rigors of public review and comment. Such a rush to regulate for the sake of regulation seems to be an extraordinary opportunity to repeat the error inherent in the 1984 USEPA ammonia guidance document.

The IAWA objected before the Board to the basic tenants of toxicity modeling associated with the 1984 USEPA document. However, these

objections were essentially mollified by the fact that the document had been through the national review process and thus stood as the basis from which water quality standards should be derived. The IAWA accepted this situation as the necessary due process in rulemaking. I maintain that the same

standards need to be held to the 1999 USEPA guidance and action which originates from it.

The Board will shortly hear testimony from representatives of two municipalities in our state that are potentially facing millions of dollars of plant upgrade expense to comply with the existing Illinois water quality standard which was derived from the 1984 USEPA criteria guidance document. These municipalities, specifically the taxpayers of these municipalities, will not have to face this expense with the proposed water quality standard derived from the 1999 USEPA guidance document. The 1999 USEPA guidance document must stand as the present basis from which cost to the public must be considered. If future scientific investigation and subsequent public review indicates that additional ammonia treatment and associated

expense is warranted, then decisions on how to affect such treatment can be made at that time. If future investigation determines that such additional treatment and expense is not warranted, the cost to these communities, if forced to construct facilities now, cannot be recovered. There is no trade-in or redemption value for

unnecessary capital wastewater treatment facilities.

The Board has historically been very mindful of the economic impact of the regulation it enacts. The citizens of Illinois can be very grateful to the Board for demonstrating that wisdom. Balancing necessary environmental protection with responsible stewardship of public money is a task of the Board which most people find unenviable. A misinterpretation of the mechanism of ammonia toxicity in the 1984 USEPA guidance document has resulted in the Board enacting, in good faith, an overly protective and economically unjustifiable water quality standard for ammonia based on that document. The Board at that time, and rightly so, felt the existing standard was necessary to protect the waters of Illinois. The Board recognized the

need to extend some form of relief to the regulated community from the seemingly unrealistic demands of the winter chronic ammonia standard resulting from the 1984 guidance document and did so. Regrettably, that relief was virtually eliminated in a venue beyond the Board's jurisdiction through threat of judicial action against USEPA. The water quality standard presented to the Board today provides for

adequate water quality protection as recognized by sound and accepted contemporary science. The IAWA is adamantly committed to providing levels of wastewater treatment necessary to protect the waters of our state. The historic presence of the IAWA before the Board is testament to that commitment. The IAWA is grateful to the Board for providing an open and public forum where such matters can be freely discussed and resolved. The proposed water quality standard which the Board is hereby requested to consider for adoption strikes the necessary balance between water quality protection and public cost which the Board and IAWA have both historically sought. Thank you.

HEARING OFFICER GLENN: Thank you,

Mr. Callahan. Before we proceed with our next witness, Ms. Deely, do you have an extra copy of the letters referenced by Mr. Callahan in his testimony?

MS. DEELY: Sure.

HEARING OFFICER GLENN: I would like to, unless somebody objects, admit a copy of those letters as Exhibit 1. It was part of the --

MR. ETTINGER: Specifically, is the Region V letter in that package?

MS. DEELY: It should be. I put it in that package.

HEARING OFFICER GLENN: We'll wait to rule on the motion until Mr. Ettinger --

MR. ETTINGER: Is the letter from Region V in that package?

MS. DEELY: No, it's not.

MR. ETTINGER: Would there be any objection to the offering of the letter from Region V so that we have the whole correspondence?

MS. DEELY: I don't have that letter.

HEARING OFFICER GLENN: Does anyone object to specifically allowing these letters at this point? Seeing no objection, I will admit the

letters referenced by Mr. Callahan's testimony as Exhibit 1. If we could go off the record for just a moment.

(Whereupon, a discussion was had off the record.)

HEARING OFFICER GLENN: The letters referenced by Mr. Callahan in his testimony he did reference as Exhibit 10 that is how they were filed with the Board on the 5th of March, but we aren't sticking to those exhibit numbers. Ms. Williams,

could you identify yourself for the record?

MS. WILLIAMS: I'm Debra Williams from the Illinois EPA. I didn't realize, were those filed with the -- I don't have nine, eight, seven, six, five.

MS. DEELY: They were all filed, right. There's an extra copy if you don't have it. Yes, they were filed.

HEARING OFFICER GLENN: The other numbers you referenced, Ms. Williams, were primarily the prefiled testimony presented here today. When they filed the prefiled testimony they submitted it in a binder for purposes of ease in the Board

accumulating all the information and assembling it. So we will -- we're not going to stick with the exhibit numbers as they were presented to the Board. Are there any other questions on the letters specifically?

MR. ETTINGER: Does the Board want to accept the Region V letter -- the letter from Region V October 25, 2001 to which Mr. Muth's letter responds?

HEARING OFFICER GLENN: Does anyone object to the Board accepting the USEPA Region V

letter as Exhibit 2 as presented by Mr. Albert Ettinger?

MR. KISSEL: None. Just for the purpose of the record, Exhibit 1 then will be a multiple exhibit which will include the letter of November 8th to Mr. Joel Cross, the letter of November 19th to Mr. Keith Shank, the letter of November 8th to Mr. Glenn Kruse and the letter of November 20th to Mr. Keith Shank and a letter of January 18th, 2002 to Mr. Dave Pfeifer.

HEARING OFFICER GLENN: And Exhibit No. 2 will be to Mr. Toby Frevert at the Agency from

Mary Patson (phonetic) acting chief of the water quality branch of the USEPA Region V dated October 25, 2001.

THE REPORTER: I need a minute to change my paper. Let's go off the record for a minute.

(Brief pause.)

HEARING OFFICER GLENN: Back on the record. Mr. Sheehan?

MR. SHEEHAN: Good morning. I am going to read from a prefiled written testimony.

HEARING OFFICER GLENN: I'm sorry. Could we swear you in first?

(Mr. Sheehan was sworn in by the court reporter.)

MR. SHEEHAN: I am going to read from a prefiled written testimony which I entitled Justification and Approach for Adoption of the United States Environmental Protection Agency's Approach for Setting Ambient Water Quality Criteria for Ammonia in Illinois Surface Waters.

I am Robert J. Sheehan, Professor of Fisheries in Zoology and assistant director of

the Fisheries and Illinois Aquaculture Center, Southern Illinois University, Carbondale.

My purpose here today is to explain the justification and approach for what I believe Illinois should use to establish water quality criteria for the state's surface waters. I believe that recent information indicates that current ammonia water quality criteria used by Illinois appear to not be protective enough under certain circumstances and they appear to be overly protective under other circumstances. I believe that Illinois should use methods described by the United States Environmental Protection Agency,

USEPA, in their latest national criteria document for ammonia, the 1999 update of ambient water quality criteria for ammonia, 1999 update.

Section one, professional credentials: I base my testimony on more than 15 years of experience with ammonia toxicity issues. For example, colleagues and I published in the international journal, Hydrobiologia, what is to my knowledge the first paper examining the tolerance of larval Glochidia unionid mussels to ammonia, that's

Goudreau, et al., 1993. This paper was considered in the 1999 ammonia update. A colleague and I also published in Transactions of the American Fisheries Society, Sheehan and Lewis, 1986, a study that was also included as part of the database upon which the 1999 ammonia update was based. This work was the basis for two best paper awards conferred on us by the American Fisheries Society. I was selected by the Cadmus Group, a consulting firm employed by USEPA, to be one of the five national reviewers for the 1999 ammonia update. I was the only biologist amongst the reviewers. I have taught a graduate level class, zoology 565, environmental physiology of fishes, for more than ten years that covers in

depth the methods for calculation of numeric and narrative water quality criteria. I have also taught these methods in the University of Illinois' Envirovet curriculum. Envirovet is a program for training veterinarians in aquatic animal health. I am the Illinois Chapter of the American Fisheries Society's representative to the Illinois Environmental Protection Agency's, IEPA, Total Maximum Daily Load Work Group. I am a member of

IEPA's science committee for developing water quality standards for nutrients.

Other indications of my professional stature include the more than two million dollars of funding I have received for research on aquatic systems. This funding was obtained from approximately 20 different sources. Most of this research has been directed at Illinois surface waters and in particular rivers and streams, but some has been international, for example, the Amazon River, in scope. I have authored more than 25 peer-reviewed publications on river and stream organisms. These include one, invited author of the Large Rivers chapter, Sheehan and Rasmussen, 1993, in the American Fisheries Society's textbook on

fisheries management, Inland Fisheries Management in North America, an updated revision of that work has recently been completed, Sheehan and Rasmussen, 1999 and two, invited author of the chapter on Wetlands and Fisheries Resources of the Mississippi River in the Pennsylvania Academy of Sciences book, Ecology of Wetlands and Associated Systems. I serve as a member of numerous government agency teams or

committees such as the Mississippi River Coordination Team and the Lower Platte River Task Force. I have been an expert witness for the Washington University Environmental Law Clinic at a hearing before the Missouri Clean Water Commission. I have also been an expert witness in a hearing before the Illinois Pollution Control Board that concerned ammonia in the Galesburg Sanitary District discharge. Lastly, I was appointed to the Pallid Sturgeon Recovery Team by the director of the U.S. Fish and Wildlife Service; this is the only federally listed endangered fish species in the Mississippi River.

Section two, justification: As Mr. Callahan testified, ammonia exists in solution in a dynamic equilibrium in two forms,

as ammonium ion, NH4, and as an un-ionized molecule, NH3. Current water quality standards for Illinois are derived from the U.S. Environmental Protection Agency's national criteria document, Ambient Water Quality Criteria for Ammonia, 1984, which was published in 1985 hereafter referred to as the 1985 ammonia guidance. The 1985 ammonia guidance was

formulated under the so-called joint toxicity theory, which holds that un-ionized ammonia is the more toxic form, but ionized ammonia is also toxic. Further, as pH, temperature or both decrease, the proportion of the toxicity attributable to ionized ammonia will increase due to the effects of temperature and pH on the ammonia equilibrium. Toxicity appears to increase as pH, temperature or both decrease if one considers un-ionized ammonia concentrations, because more ionized ammonia will be found in lower pH and/or lower temperature solutions. Thus, the 1985 ammonia guidance expressed water quality criteria in terms of un-ionized ammonia with corrections for the effects of temperature and pH on ammonia toxicity. It was noted in the 1985 ammonia guidance that the joint toxicity model did not appear to be consistent with

some data sets that were available at that time.

In the 1999 ammonia update, USEPA concluded that a definitive, thorough theoretical approach for describing pH effects on ammonia toxicity is lacking. Further, USEPA concluded in the 1999 ammonia update that there is no adequate

theoretical basis or scientific understanding for specifying how temperature adjustments to un-ionized ammonia criteria can be made. Rather than trying to make square-peg data fit into the round-hole joint toxicity theory, the 1999 ammonia update took an empirical approach to describe how pH and temperature affect ammonia toxicity. This meant that in the opinion of the USEPA in the 1999 ammonia update, the approach used in the 1985 ammonia guidance was flawed because it was formulated based on the belief in the joint toxicity theory, a belief that seemed to be refuted especially with applied to temperature effects on ammonia toxicity.

Application of the 1999 ammonia update to Illinois water quality laws is warranted at this time. The 1999 ammonia update is superior to the 1985 ammonia guidance approach for a number of reasons.

First, the 1999 ammonia update recognizes that the effects of temperature on ammonia toxicity are not strongly indicative of joint toxicity. Second, models used to describe the effects of pH on ammonia toxicity use empirical

components in recognition of the incomplete knowledge of joint toxicity effects. Third, expressing ammonia toxicity on the basis of total ammonia eliminated the need for a temperature correction for ammonia criterion maximum concentrations. Fourth, using total ammonia to express ammonia toxicity generally resulted in reduced variability among data sets and better fit to existing data sets. Fifth, permit limits are usually expressed in total ammonia so expressing criteria on the basis of total ammonia would eliminate conversions to un-ionized ammonia. Sixth, another water quality criterion that 1999 ammonia update believes is necessary to protect aquatic life will be established, wherein the highest four-day average will not be allowed to exceed 2.5 times the chronic criterion. Lastly, the results of more than 40 new scientific studies with a number of additional species were added to

the ammonia toxicity database. Studies representing a broad range of species are necessary for developing adequately protective water quality criteria. More data in general reduces the risk of

criteria being overprotective as well as under protective.

Section three, proposed changes to Part 302, Subpart B, Section 302.212.

Methods for calculating water quality criteria are taken from the 1999 ammonia update. All criteria will be on the basis of total ammonia. The 1999 ammonia update provides two relationships for calculating the criterion maximum concentration, CMC, or acute criterion for ammonia. One equation is used when salmonid fishes are present and the other when they are absent. Since no reproducing salmonid populations are found in Illinois waters that receive NPDES point source discharges, the salmonid fishes absent approach is warranted in Illinois.

The 1999 ammonia update provides two relationships for calculating the criterion continuous concentration, CCC, or chronic criterion for ammonia. One relationship is to be used when

early life history stages of fish are present and the other when they are not. The equation used when early life history stages are present results in a

more protective water quality criterion, which is necessary to protect fishes during sensitive developmental stages.

I complied a list of spawning dates for fish species in Illinois to determine when the early life history stages present water quality criteria should be applied. These spawning dates may be found as IAWA's Exhibit 11.

Spawning dates were derived from many sources and based on the best information available. Although spawning dates have been reported for most species, information specific to Illinois is not available for many species, so professional judgment was also used. Primary sources of spawning date information included Fishes of Illinois, Smith 1979, the Fishes of Missouri, Pflieger 1997, and Fishes of Wisconsin, Becker, 1983.

I consulted with Dr. Brooks Burr, an ichthyologist at my institution. I also consulted with Mr. Brian Thompson of the U.S.

Environmental Protection Agency, Region V. It is my understanding that Mr. Thompson then

consulted with a colleague in his office, Mr. Ed Hammer. Mr. Hammer is knowledgeable of fishes in Illinois. To the best of my knowledge, the following rationale for determining periods when early life history stages of fishes are present in Illinois waters is representative of and consistent with the outcome of these consultations.

Most Illinois species spawn in the spring and summer seasons so the months of April through August are without doubt within the early life history stages present period. The earliest spawning species in Illinois' inland waters is the harlequin darter, Etheostoma histrio, which is believed to spawn as early as February.

The harlequin darter is found in Illinois in the Embarras River between the towns of Charleston and Newton and in the Wabash River between Beall Woods State Park and the town of Rising Sun.

It is reasonable that the early life history stages present should be considered to begin in February in these two river reaches to afford protection to the harlequin darter, unless this species proves to be

relatively tolerant to ammonia.

Elsewhere in the waters of Illinois, exclusive of Lake Michigan, the earliest spawning species are most probably members of the Esociade, the grass pickerel Esox americanus and the northern pike E. lucius. These two escoids probably typically initiate spawning in most of their Illinois range in March. Consequently, designating March as the beginning of the early life history stages present period in waters where the harlequin darter is not found is warranted.

Illinois fish species that spawn as late in the year as September include the sand shiner Notropis ludibundus banded killifish Fundulus diaphanous and mosquitofish Gambusia affinis. However, time should be permitted for the young of these species to grow out of the most sensitive developmental stages so it appears justifiable to extend the early life history stages present period through October.

Two species that reportedly spawn in the winter were not used to determine when early life history stages are present for the following reasons. The burbot Lota lota has been found in the

Illinois River. It is thought to spawn during the winter, but it is doubtful that this species reproduces in any Illinois waters with the exception of Lake Michigan. The spring cavefish Chologaster agassizi may spawn at various times of the year, including winter, but this species is subterranean and unlikely to be affected by ammonia in discharges.

In summary, the early life history stages not present period should be considered to be November through February in most of the state. In waters where the harlequin darter occurs, however, the early life history stages present period should be considered to be November through January unless it can be shown that this species is relatively tolerant to ammonia. The early life history stages not present period could be extended through February in harlequin darter waters if this species is not very sensitive to ammonia.

The 1999 ammonia update suggests the use of a third criterion, a four-day average that should not exceed 2.5 times the CCC. I believe that there is justification for this subchronic ammonia criterion. It will afford

an additional level of protection for the state's aquatic biota that is not present in the existing law.

Section four, use of the 50th percentile pH to calculate chronic effluent standards.

Stephan et al., 1984, defined USEPA's general guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses. This document established USEPA's intent in regard to water quality criteria development. The 1999 ammonia update is an example of the mechanics of water quality criteria development for a particular toxic-ammonia. According to Stephan et al., quote, the concentration of a pollutant in a body of water can be above the CCC without causing an unacceptable effect if A, the magnitudes and durations of the excursions above the CCC are appropriately limited and B, there are compensating periods of time during which the concentration is below the CCC. The 1999 ammonia update approach establishing a subchronic standard effectively accomplishes A above. It limits the magnitudes and durations of excursions

above the CCC. This protection is not present under current law.

Since un-ionized ammonia is considered the more toxic form, solutions become more toxic at elevated pH values. This is an important consideration when protecting organisms from lethal concentrations. Thus, a very conservative 75th percentile pH is used to calculate effluent standards to meet acute criteria. However, chronic effects deal with important yet less harmful responses such as effects on growth. The intent of the CCC is to prevent unacceptable chronic effects such as unacceptable effects on growth. By suing the 50th percentile pH, excursions above the CCC will be completely compensated for by periods when pH is below the 50th percentile. Thus, a chronic effect, such as reduced growth will be no worse on average than is considered acceptable based on the CCC.

The establishment of the subchronic criterion will provide the level of protection against extended duration and high magnitude excursions above the CCC as described by Stephan, et al., 1984, see A above.

The subchronic standard and the protection it provides are not present under the current law. This alone provides a great deal of justification for modification of the current law. The 50th percentile pH will ensure that the CCC is met on average also consistent with the intent of the CCC as described by Stephan, et al., 1984, see B above.

Also, the overall approach used in the 1999 ammonia update for chronic ammonia criteria development is superior to that of the 1985 ammonia guidance. In the 1985 ammonia guidance, chronic water quality criteria were derived from estimates of chronic effects threshold concentrations or the geometric means of the lower and upper chronic limits, in essence, the highest concentration in a test that did not cause an unacceptable adverse effect and the lowest concentration that caused an unacceptable adverse effect respectively. There is a high degree of statistical and scientific uncertainty in estimates of chronic effects threshold concentrations using this method.

In the 1999 ammonia update,

chronic criteria are set by interpolating a single value, the EC20, from a concentration-toxicity relationship developed from an entire data set. Thus, in the 1985 ammonia guidance chronic criteria are determined using only two data points taken from the portion of the concentration-toxicity relationship where statistical error and scientific uncertainty are high. In the 1999 ammonia update, an entire data set that includes values with lower statistical error rates and higher scientific certainty is used to develop chronic criteria.

Section five, mussels.

USEPA Region V has provided a document with a list of studies examining ammonia toxicity in mussels due to concerns that the 1999 ammonia update did not adequately address this taxonomic group.

The vast majority of the referenced studies are not published in the peer review literature and most certainly had not been subjected to USEPA procedures or public comment regarding their suitability for inclusion in databases for water quality criteria development. By my count, 13 works were referenced and only two of those were published in the peer reviewed scientific literature. I am a co-author,

Goudreau, et al, 1993, of one of the two published papers. Because of my familiarity with that work, I was somewhat surprised that the LC50 value we obtained was included in the proposed mussel database without any comment regarding its appropriateness. Our study was cutting edge research at the time, the first study to examine ammonia toxicity in larval glochidia mussels. However, the toxic response we measured, closure of the values, occurred in up to 50 percent of the control glochidia, a problem we described in the paper. According to generally acceptable guidelines for toxicity tests, USEPA 1991, no more than 10 percent of control group animals should show the toxic response if a toxicity test is to be considered valid. Some mention of the problem we encountered with control animals should at least have been mentioned and I'm correcting a typographical error in the submitted written testimony, instead of method it should be mentioned.

I was also surprised to read in the document provided by Region V USEPA that there were no applicable acute-chronic ratios for

because we reported both an EC50 and an LC50 value for which an acute-chronic ratio for mussels could have been obtained. It should be mentioned that our Goudreau, et al, 1993, paper was considered in the 1999 ammonia update, but it did not affect the outcome of chronic criteria that were developed.

Given the lack of both USEPA and public review as well as a lack of peer review by the scientific community for most of the mussel studies provided in the document from Region V, I do not believe that there is compelling evidence regarding the tolerance of mussels to ammonia to justify modification of criteria based on the 1999 ammonia update at this time.

Section six, summary conclusions. The theoretical framework used to formulate Illinois ammonia water quality criteria was based on USEPA guidelines; USEPA now questions the theoretical basis of that framework.

Two, USEPA now proposes that models developed using empirical methods be used to determine water quality criteria; these models

are the best available for this purpose at this time and I believe Illinois regulations should be

revised according to the new models proposed by USEPA.

The method for calculating chronic criteria that is described in USEPA's latest guidance is superior to the previous method and should be adopted in the state's regulations.

Four, I urge that Illinois establish another water quality criterion, the subchronic criterion described in the latest USEPA guidance to more fully protect the organisms in the state's waters.

Five, the early life history stages, instead of states, present period used to establish chronic criteria should be considered as March through October in most of the state.

In waters where the harlequin darter is found, the early life history stages present period should be considered as February through October unless this species proves to be relatively insensitive to ammonia.

Lastly, using the 50th percentile

pH for calculating effluent limits to meet chronic ammonia criteria is consistent with current USEPA guidance.

HEARING OFFICER GLENN: Thank you, Dr. Sheehan. Before we continue, I would like to move -- if no one objects, I would like to admit Dr. Sheehan's testimony as Exhibit No. 3. No objections, then we'll admit that Exhibit 3 and then in the context of his testimony today he referenced Exhibit 11, which is a table of spawning periods for fishes in Illinois, I would like to admit that as a hearing Exhibit No. 4. Does anyone object to that? Okay. Give me just a moment then. Let me just go off the record for two minutes here.

(Whereupon, a discussion was had off the record.)

HEARING OFFICER GLENN: Just to summarize, we have added as Exhibit No. 3 Dr. Sheehan's testimony. Exhibit No. 4 is the table one, spawning periods for fishes in Illinois. I would also like to admit at this time if no one objects to the 1999 update for ambient water quality criteria for ammonia from the USEPA referenced in

Dr. Sheehan's testimony. Any objections? Okay. That will be Exhibit 5. Additionally, it's been brought to my attention that Exhibit No. 2, the USEPA letter to Mr. Toby Frevert had an attachment

to it so we are going to add that attachment to Exhibit 2 if there's no objection. Okay. I see no objection so that will be added to Exhibit 2. Okay. Dr. Sheehan, I think we're done now with you and we're ready for the next witness. Thank you. We'll get him sworn in, please.

(Mr. Zenz was sworn in by the court reporter.)

MR. ZENZ: Introduction.

MR. HARSCH: State your name.

MR. ZENZ: My name is David Zenz. Introduction: The Illinois Association of Wastewater Agencies has presented a proposal to the Illinois Pollution Control Board requesting that the IPCB adopt new water quality standards for ammonia nitrogen in the state of Illinois. The technical content of the petition is based upon the United States Environmental Protection Agency's 1999 update of ambient water quality criteria for ammonia published in final form in the

Federal register on December 22nd, 1999. This update was prepared by USEPA after an extensive review of the available literature on ammonia toxicity to aquatic life. In the 1999 update, EPA has issued freshwater aquatic life criteria

for ammonia which supersedes all previous criteria.

The IPCB's existing water quality standards for un-ionized and total ammonia nitrogen in Part 302 were issued in 1996. Clearly, the IPCB should carefully consider the IAWA petition since the basis of the IAWA's petition is the USEPA's 1999 update. The 1999 update indicates that the states should consider the USEPA's 1999 ambient water quality criteria for ammonia in the development of water quality standards which are protective of aquatic life. Since the 1999 update serves as a guide to the states in developing water quality standards for ammonia, the IAWA petition should be given serious consideration by the IPCB.

Focus of my testimony:

My testimony will focus on the issue of the capabilities of the wastewater treatment technology to meet ammonia nitrogen National Pollutant

Discharge Elimination System permit limits which would ultimately result from IPCB's existing ammonia water quality standards. This issue was considered by the IPCB when it deliberated the existing IPCB water quality standards for ammonia based upon the previous version of the national guidance which has

been superceded by the 1999 updated guidance document for ammonia.

Credentials: I have a bachelor of science degree in civil engineering and a master of science and doctor of philosophy degrees in environmental engineering. All these degrees are from the Illinois Institute of Technology.

I received my Professional Engineering license in 1972.

I was certified through examination by the America Academy of Environmental Engineers as a specialist in wastewater treatment in 1986.

For 30 years, I was employed in the research and development department of the Metropolitan Water Reclamation District of Greater Chicago. For my entire career at the MWRDGC,

I worked in the research and technical services division which is responsible for developing wastewater treatment processes for use by the MWRDGC. I was employed by the district from 1967 through 1997 during which the district developed and implemented biological nitrification, ammonia removal, processes to meet IPCB water quality

standards for ammonia.

Since leaving the district in 1997, I have been employed at Consoer Townsend Envirodyne Engineers, Inc.,(CTE), where I have been working with clients who have been struggling to meet the ammonia water quality standards adopted by the IPCB in R94-1. Most notably, these clients are the Urbana and Champaign Sanitary District and the DeKalb Sanitary District.

I have published and/or presented over 70 technical papers on wastewater treatment and biosolids management. Ten of these technical papers deal with biological nitrification. A full listing of these technical papers are contained in the attached resume.

I have received a number of

awards. Most notably, I have received the President's Award from the Association of Metropolitan Sewerage Agencies and the Sidney Bedell Award from the Water Environment Federation.

In 1998, I was named the Alva Todd Professor because of accomplishments as an adjunct professor in the department of environmental engineering at the Illinois Institute of Technology.

A complete resume giving the details of my education and experience is attached.

Permit limits based upon existing IPCB water quality standards for ammonia nitrogen:

The IPCB enacted the existing water quality standards for ammonia in 1996. These water quality standards, Section 302, include numerical values for un-ionized ammonia nitrogen which are converted by the IEPA into site specific NPDES permit limits. Basically, the IEPA uses available receiving stream data on flow, temperature and pH to calculate ammonia nitrogen permit limits for a particular treatment plant. Of course, permit limits are highly variable depending upon the particular receiving stream and treatment plant

performance under compliance with existing ammonia standards.

Compliance with existing IPCB ammonia water quality standards:

It is difficult to say how many plants in Illinois would be unable to meet the existing 1996 IPCB water quality standards for ammonia. In testimony from the IEPA in R94-1, the Agency indicated that a significant number of

wastewater treatment plants would not be able to meet the 1996 IPCB standards. The Agency testified that 19 out of 181 facilities over one MGD capacity were at risk of non-compliance with the IPCB standards. The Agency indicated that they were fairly certain that most of these facilities would have to be at least partially redesigned to meet the standards. The IEPA did not study the impact of the 1996 water quality standards for ammonia nitrogen on the over 600 wastewater treatment plants with design flows of less than one MGD. The Agency also did not study the impact upon industrial discharges of ammonia to publicly owned treatment works.

There are two municipal agencies

in the state of Illinois which are definitely impacted by the existing IPCB ammonia water quality standards for which I have firsthand knowledge. These are the DeKalb Sanitary District and the Urbana and Champaign Sanitary District.

The DeKalb Sanitary District wastewater treatment plant processes an annual average flow of about 6.4 MGD. The current NPDES permit for the DSD, DeKalb Sanitary District, requires compliance with the IPCB's 1996 water

quality standards by December 2003. The permit limits which take effect in December 2003 require that the DSD to meet a monthly average ammonia nitrogen concentration of 1.2 milligrams per liter from November through March and 1.3 milligrams per liter from April through October.

For the Urbana and Champaign Sanitary District, southwest plant, design flow of 5.9 MGD, the IEPA has issued an NPDES permit requiring compliance with IPCB's 1996 water quality standards by November of 2003. This permit has a monthly average limit of 0.7 milligrams per liter of ammonia nitrogen throughout the year. For UCSD's

northeast plant, design flow of 17.3 MGD, the IEPA also requires compliance with the 1996 IPCB ammonia water quality criteria by November 2003. The monthly average permit limits are 0.9 milligrams per liter from April through October and one milligram per liter November through March.

Ability of biological nitrification systems to achieve effluent ammonia nitrogen concentrations less than 1.5 milligrams per liter:

Today, POTWs in Illinois remove

ammonia from effluents before discharge to receive streams using biological nitrification systems. These systems are designed to contain a high population of nitrifying organisms which can convert or oxidize ammonia to nitrate. Unfortunately, biological treatment systems for ammonia removal are notoriously affected by low temperature. During the winter months, sewage temperatures in Illinois can be as low as 45 degrees Farenheit when the reaction rate of nitrifying organisms is relatively low. It is typical for effluent ammonia concentrations to rise during the winter months.

The IEPA testified in R92-1, Mr. Studer, November 1994, that biological nitrification is capable of achieving monthly average ammonia concentrations of 1.5 milligrams per liter from April through October and four milligrams per liter from November through March. This prompted the IEPA to request that the IPCB adopt the concept of effluent modified waters for facilities which could not consistently meet the monthly averages of 1.5 milligrams per liter, four milligrams per liter. The IPCB enacted the EMW concept advocated by IEPA. This was an attempt to rectify the disparity between

protective water quality standards and the technical feasibility of providing treatment to meet these standards.

The United States Environmental Protection Agency, the USEPA, in September of 1993 published its latest manual on nitrogen control. The manual discusses the performance of various ammonia removal technologies. In this discussion, the USEPA indicates that there are three levels of biological nitrification possible with so-called mechanical plants using suspended and attached

growth technologies. The three levels of treatment are: Stringent, less than 2.5 milligrams per liter of effluent ammonia nitrogen; high, 2.5 to 5.0 milligrams of effluent ammonia nitrogen and intermediate, five to ten milligrams per liter of ammonia nitrogen.

Pages 68 and 69 of the USEPA manual gives design examples to illustrate the design principles for biological nitrification processes. Stringent effluent limits for one design example are as follows:

Ammonia nitrogen, monthly average, two milligrams per liter; weekly average, three

milligrams per liter.

Given good operation and adequate capacity, biological nitrification systems whether fixed film, trickling filter, or suspended growth, activated sludge, can produce monthly average ammonia nitrogen concentrations less than 2.5 milligrams per liter. Typically, well-operated suspended growth systems with adequate capacity should be able to produce effluent ammonia nitrogen concentrations of 1.5 milligrams per liter.

However, fixed film systems typically contain 1.0 to 3.0 milligrams per liter of effluent ammonia nitrogen, Metcalf and Eddy, 1991, and do not produce consistent effluent ammonia nitrogen levels of two milligrams per liter, USEPA Process Design Manual for Nitrogen Control, 1992.

The inherent variability in performance of biological nitrification systems is well illustrated in the Water Environment Federation Manual of Practice Number 8, Design of Municipal Wastewater Treatment Plants, 1998. The manual discusses the performance of activated sludge systems designed for nitrification. Table 11.45 of the manual contains the following data on

performance of nitrification plants:

Annual average, plant A, 2.1 milligrams per liter of ammonia nitrogen; plant B, 0.7 milligrams per liter; plant C, 1.3 milligrams per liter and plant D, 1.7 milligrams per liter of ammonia nitrogen.

The data clearly shows that a suspended growth system can produce average effluent ammonia nitrogen concentrations of 0.7 milligrams

per liter but a range of values up of 2.1 milligrams per liter.

On page 179 of USEPA's Nitrogen Control Manual the performance of fixed film nitrification systems are discussed. The performance of three plants in the Midwest are highlighted which had effluent ammonia nitrogen levels as follows: Average ammonia nitrogen concentrations, plant A, 2.0 milligrams per liter; plant B, 0.5 milligrams per liter and plant C, 0.2 milligrams per liter.

Based upon an assessment of the data from the Midwest plants and those from other localities, the USEPA manual concludes that, quote, the results indicate that all plants were achieving

less than two milligrams per liter of ammonia nitrogen 50 percent of the time with four of the plants at less than 2.0 milligrams per liter 90 percent of the time. The plants were all operating with conservative ammonia surface loading rates. Both the Urbana/Champaign Sanitary District and the DeKalb Sanitary District employ fixed film nitrification systems to remove ammonia nitrogen.

Since both are currently faced with the imposition of monthly average NPDES permit limits from 1.2 milligrams per liter to as low as 0.7 milligrams per liter, it appears obvious that the existing 1999 IPCB water quality standards are an extremely stringent standard for these two municipalities. Both the UCSD and the DSD are faced with the very real possibility of not being able to meet the IPCB's existing water quality standards with their existing fixed film biological nitrifications systems. Again, this is not an atypical situation given the IEPA testimony in R92-1, which predicted that at least 19 POTWs in Illinois greater than one MGD in capacity would have to undergo redesign because of the IPCB existing standards.

Options for meeting the IPCB

standards:

For some treatment plants like those of the DeKalb Sanitary District and the Urbana/Champaign Sanitary District, it will be necessary to consider using a physical/chemical process to consistently and reliably reduce ammonia levels to below 1.5 milligrams per liter. Such

physical/chemical systems would be employed as an add-on process to remove or polish the relatively small amounts of ammonia remaining after biological nitrification.

There is relatively little experience with physical/chemical systems used as the principal ammonia removal system and almost no experience using such systems to polish an effluent from a biological nitrification system. The physical/chemical systems which are potential candidates for removing the small amounts of ammonia from nitrified effluents are one, ammonia stripping; two, ion exchange; three, reverse osmosis and lastly breakpoint chlorination.

Ammonia stripping would involve adding lime to elevate the pH of the effluent to 10.5 to 11.5 and providing sufficient air to strip

out the ammonia. The high pH allows the ammonia to be easily released from the solution as a gas. This system has little application in the Midwest due to ice formation in the air stripping equipment. Also, the large lime dosages to raise effluent pH, the capital cost of the air stripping equipment and

lime scale formation on the air stripping equipment make the process costly and unreliable.

Ion exchange involves passing an effluent through an ion-exchange resin. The ammonium ion becomes attached to the resin. Ultimately, the resin becomes saturated with ammonium ion and the resin must be regenerated with a high pH salt solution which removes the ammonium. The regenerant solution contains high levels of ammonia and must be disposed of or treated in some way.

The capital costs of the ion exchange system are very high. The system requires significant maintenance and annual chemical costs are high. The biggest difficulty is disposal of the concentrated regenerant.

Reverse osmosis appears to offer the potential of a viable method of polishing a

nitrified effluent, but there simple is not enough experience in the use of this method for polishing effluents. The chief concern is excessive plugging and/or contamination of the reverse osmosis membranes and the pumping costs associated with the

high pressures needed to force the effluent through the membranes.

Breakpoint chlorination involves adding sufficient chlorine to oxidize the ammonia present in the effluent. The ammonia is chiefly converted to nitrogen gas which is released into the atmosphere during the breakpoint reaction. About ten milligrams per liter of chlorine are required to remove one milligram per liter of ammonia from an effluent.

The breakpoint chlorination process can be readily adapted to chlorination/dechlorination systems routinely used for disinfection at a municipal plant. The process would require adding higher amounts of chlorine than that required for coliform kills and the resulting higher chlorine residual would require larger amounts of dechlorinating chemicals.

The chemical addition equipment of

the existing chlorination/dechlorination system would have to be modified, but the contact chamber for disinfection would not. The contact time for disinfection is about 15 minutes while the

breakpoint reaction occurs in 15 seconds.

The chief drawback with breakpoint chlorination is the production of higher amounts of triholomethanes than that of a disinfection process.

I'd like to depart from my written testimony to give you a piece of information which came about since I prefiled my testimony. As part of my work for the DeKalb Sanitary District, Mr. Mike Zima, who's the executive director of the DeKalb Sanitary District, and I had a conference call with Mr. Al Keller, head of the northern permit section of the Illinois Environmental Protection Agency, and we discussed this option of breakpoint chlorination. To synopsize the conversation, IEPA made it very clear that they would not be inclined to approve breakpoint chlorination for those who wish to use it as a polishing step to remove ammonia in the state of Illinois. He also indicated that he would send us a letter to that affect so I assume

he's quite serious about it. So I just wanted to tell the Board that this is an option, which although indicated in my testimony as being possible

really is not possible in Illinois.

HEARING OFFICER GLENN: Do you have a copy of that letter?

MR. ZENZ: I do not have the letter, he has not sent it yet. The conversation was held last Tuesday so...

HEARING OFFICER GLENN: Would you be willing to give us a copy of the letter when you receive it?

MR. ZENZ: Certainly.

MR. HARSCH: And those concerns were over the tri --

MR. ZENZ: Yes. The main issue for IEPA and, of course, I'm still waiting for the letter to come about, but based on my interpretation of the conversation, the main issue was the last sentence which I stated here with is the triholomethanes would be discharged to the receiving stream. Triholomethanes, of course, do occur with the current system of chlorination/dechlorination used by POTWs for disinfection of their effluents,

but the amounts would be greater using breakpoint chlorination since the chlorine dosages would be

greater and, therefore, they felt that that was a serious problem. I think also there were some minor issues they were concerned that there might be the possibility of just amounts of -- significant amounts of chlorine residual hitting the stream and causing perhaps some problems with fish downstream in case of failure of the dechlorination system. Again, this is inherent as part of the disinfection, but again, the dosages of chlorine would be so much larger so if there was a failure of dechlorination there was a greater risk of potential toxicity downstream due to chlorine residual. That would be my interpretation of their reasons for not approving such a system.

HEARING OFFICER GLENN: Thank you.

MR. ZENZ: Effect of the IAWA petition: A comparison of the USEPA's 1999 update ammonia criterion with the existing 1996 IPCB water quality standards reveals that the use of the 1999 update criterion to develop ammonia nitrogen permit limits would generally yield higher numerical values. This is especially true for plants whose

downstream receiving waters have high pH.

Therefore, the adoption of the IAWA petition would give some relief to those agencies like the DSD and the UCSD who are faced with the very real possibility of spending considerable sums to polish their effluents to levels of ammonia nitrogen less than 1.5 milligrams per liter.

Summary and conclusions:

Because of the inherent variability of biological nitrification treatment systems, it is not possible for some systems to consistently and reliably achieve monthly average ammonia nitrogen permit limits less than 1.5 milligrams per liter year round.

In some cases, existing IPCB water quality standards for un-ionized ammonia have resulted in monthly average effluent limits for ammonia nitrogen lower than 1.5 milligrams per liter.

Physical/chemical ammonia removal systems may have to be employed to meet monthly average ammonia nitrogen permit limits of less than 1.5 milligrams per liter.

There is little experience with

physical/chemical systems used to remove relatively small amounts of ammonia nitrogen from effluents. Some of these systems are relatively costly and/or difficult to operate and/or may have negative environmental impacts.

The enactment of the ammonia nitrogen permit limits based upon water quality criteria standards in the IAWA petition will provide some relief to dischargers now faced with meeting monthly average permit -- ammonia nitrogen permit limits of less than 1.5 milligrams per liter. That concludes my testimony.

HEARING OFFICER GLENN: Thank you, Dr. Zenz.

MR. KISSEL: Dr. Zenz, on page seven of your testimony before -- right after you referenced Table 11.45 you didn't finish the sentence and I just wondered -- it says 2.1 milligrams per liter can and does occur, you intended to say that?

MR. ZENZ: I intended to say that.

MR. KISSEL: Thank you.

HEARING OFFICER GLENN: Thank you, Mr. Kissel. If no one objects, I would like to admit

Dr. Zenz' prefiled testimony as Exhibit 6. Seeing no objections, we will do that and then what I would like to do is hear from the witness, Mr. Bachman and then we will break for lunch after Mr. Bachman's testimony.

(Mr. Bachman was sworn in by the court reporter.)

MR. BACHMAN: My name is Tim Bachman and I am the director of waste treatment operations for the Urbana & Champaign Sanitary District located in Urbana, Illinois. I have served the district in that position since July of 1979. Prior to that, I was employed by the Illinois EPA's division of water pollution control as a field operations section engineer for nine and one-half years. I have a bachelor of science degree in chemical engineering from the University of Illinois and a master of science degree in environmental engineering also from the University of Illinois. I am a registered professional engineer in the state of Illinois and a Class I certified wastewater treatment works operator. As director of waste treatment operations for the district, I manage, direct and supervise the operation of two advanced wastewater treatment facilities, 17.3 MGD and 5.9 MGD, to obtain

efficient and economical operations and attain compliance with state and federal Environmental Protection Agency water pollution regulations. My testimony will discuss the impact of the current ammonia nitrogen standards and the proposed amendments on the Urbana & Champaign Sanitary District.

Background information:

The district operates two treatment facilities. The northeast plant is a 17.3 MGD design average flow facility with a flow treatment scheme consisting of preliminary treatment, primary clarification, secondary treatment with a fixed nozzle trickling filter and the activated sludge process, nitrification towers, tertiary filters and a year-around disinfection exemption.

The southwest plant is a 5.9 MGD facility consisting of preliminary treatment, no primary clarification, activated sludge with chemical phosphorous removal, nitrification towers, tertiary filters and a year-around disinfection exemption. Both plants also provide excess flow facilities consisting of primary clarification and disinfection.

The last major upgrade at each facility occurred between 1978 and 1982 and included the construction of nitrification towers. The towers were originally designed to reduce influent ammonia nitrogen from 15 milligrams per liter to 1.5 milligrams per liter during the summer months and 4.0 milligrams per liter during the winter months. Historically, the towers have had essentially no problems meeting the original design intentions.

Impact of current ammonia nitrogen water quality standards: The Board's current water quality standards enacted in 1996 were incorporated into the district's NPDES permits through the renewal process. The new permits, which became effective November 1st, 2000, included a 36-month compliance schedule in Special Condition No. 16, which acknowledged the possibility of this rulemaking proposal. Attachment one, page 14, of NPDES permit No. IL0031500, is for the district's northeast plant and attachment two, page 13 of NPDES permit No. IL0031526 is for the southwest plant. Interim and final limits if this proposal is not successful are shown in Table 1.

For the northeast plant the

interim April through October monthly average ammonia is 1.5 milligrams per liter and the final is 0.9 milligrams per liter. For November through March the interim monthly average is 2.4 milligrams per liter and the final is 1.0 milligrams per liter. For April through October the daily maximum interim limit is 3.0 milligrams per liter and the final limit is 3.0 milligrams per liter. For November through March the daily maximum interim limit is 4.8 milligrams per liter and the final limit is 4.8 milligrams per liter.

For the southwest plant, the April through October monthly average interim limit is 1.5 milligrams per liter and the final limit is 0.7 milligrams per liter. November through March the interim limit is 1.9 for a monthly average and the final limit is 0.7 for the monthly average. The April through October daily maximum interim limit is 3.0 milligrams per liter. The final limit is 2.2 milligrams per liter. The November through March daily maximum interim is 3.8 milligrams per liter and the final is 3.2 milligrams per liter.

There's a footnote to that table that says using more recent stream data, these

numbers for the monthly average at the southwest plant actually become 0.6 milligrams per liter for both the April through October and November through March time frames, see attachment three.

The low limits are created by a combination of two factors, an extremely high pH, approximately 8.8, in the finished water in the local public water supply and a zero seven-day-ten-year low flows in the receiving streams. Based on data presented in attachments four and five for the southwest plant and discussions with the Illinois EPA, these more stringent limits will require the construction of additional ammonia removal facilities to assure compliance both now and as future growth occurs.

Potential relief provided by IAWA proposal: If the IAWA proposal is adopted, the final limits will be as shown in Table two.

And here I need to make a correction in my prefiled testimony, this is for the November through February numbers for the monthly average at the northeast plant, the 3.35 number needs to be changed to 2.71, that's 3.35 to 2.71 and the southwest plant, the November through

February monthly average needs to be changed from 2.60 milligrams per liter to 2.14 milligrams per liter, that's 2.60 to 2.14.

The reasons for these changes, we used the wrong equations when we were calculating the numbers and thanks to Mr. Mosher from the Illinois EPA who double checked the calculations, he corrected those numbers for us, so we appreciate that.

Reviewing Table 2 then, the northeast plant March through April has a monthly average requirement of 1.23 if this proposal is adopted with a daily maximum of 5.40. November through February, the requirement would be 2.71 with a daily maximum of 6.07.

For the southwest plant if the proposal is adopted, the March through October standard would be 0.96 milligrams per liter for the monthly average with a daily maximum of 3.02. The November through February monthly average would be 2.14 milligrams per liter with a daily maximum of 4.12.

By following the USEPA 1999 update

of ambient water quality criteria for ammonia,

significant relief occurs particularly in the winter months. Referring again to attachments four and five for the southwest plant, these higher limits appear to indicate that existing facilities are adequate both now and into the future to achieve compliance. Therefore, no additional facilities for ammonia removal would need to be constructed at this time.

Long range planning efforts: Since the last major planning effort at the district took place over 20 years ago, the district in 1999 began working on a new 20-year plan to address the following issues: One, the immediate need for additional capacity at the southwest plant; two, biosolids handling improvements; three, equipment that was near the end of its useful life; four, compliance with ammonia nitrogen water quality standards and five, additional needs through the year 2019.

Consoer Townsend Envirodyne Engineers, Incorporated; CTE, of Chicago were retained as consultants to assist the district in

these efforts. A draft of the long range plan was submitted to IEPA for review early in 2001 and one

of the technical issues that has been the subject of ongoing discussions has been how to deal with Special Condition No. 16 of the NPDES permits depending on the outcome of the IAWA proposal.

Resolution of Special Condition No. 16: In the long range plan that has been tentatively approved by the Agency, the district is proposing three projects identified as the 2005 project, the 2010 project and the 2015 project with the dates reflecting the scheduled completion of each project. The 2005 project includes three phases. Phase I is consolidation of all biosolids handling at the district's northeast plant. Phase II is expansion of the southwest plant and Phase III is construction of a third nitrification tower at the southwest plant to assure compliance with the existing standard for ammonia nitrogen if the proposed IAWA amendments are not adopted by the Board. The estimated cost of Phase III as prepared by CTE is $4,181,000. We believe that an additional tower would also be required possibly in the 2010

project at the northeast plant to assure compliance with the existing standard as loading on that plant increases. The estimated cost of the additional

tower at the northeast plant is $7,184,000 based on its relative size compared to the one proposed for the southwest plant. However, if the IAWA proposal is adopted, we do not believe that the third tower will be necessary for most if not all of the 20-year planning period at either plant. The Agency has indicated that they would be receptive to a request to modify the approved facilities plan and drop Phase III from the 2005 project upon Board adoption of the IAWA proposal.

UCSD supports IAWA proposal: Since the existing water quality standards do not consider USEPA's 1999 update of ambient water quality criteria for ammonia, the district feels strongly that it should not be required to spend the estimated $11,365,000 to provide additional ammonia removal facilities to meet a lower limit than required based on the most recent scientific data and Federal guidance available. This unneeded additional cost would result in additional debt

retirement that the district would have to pass on to its users in the form of increased user charges. We, therefore, urge you to adopt the IAWA proposal.

This concludes my prefiled

testimony. I will be supplementing this testimony as needed during the hearing. I would be happy to address any questions.

HEARING OFFICER GLENN: Thank you, Mr. Bachman. If no one objects, I would like to admit Mr. Bachman's testimony -- prefiled testimony as Exhibit No. 7. Seeing no objections, we will admit it as Exhibit 7. I think this is a good breaking point. What I'd like to do is break for 45 minutes. We will resume hearing the testimony then at 1:30 this afternoon here in the room we will start with Mr. Zima and then hear from Mr. Daugherty and then turn it over to the Agency to hear from Mr. Mosher. See you at 1:30.

(Whereupon, after a short lunch break was had, the following proceedings were held accordingly.)

HEARING OFFICER GLENN: It is 1:33 and

we are back from lunch. I would like to call now -- Mr. Zima is here it testify. Could we get you sworn in, please?
(Mr. Zima was sworn in by the court reporter.)
MR. ZIMA: Good afternoon. Thank you

for the opportunity to appear before you. My name is Michael Zima.
Introduction: The Illinois Association of Wastewater Agencies has filed a petition before the Illinois Pollution Control Board. In this petition the Illinois Association of Wastewater Agencies has proposed a change to Parts 302 and 304 of the existing IPCB water quality standards for ammonia. The IAWA petition has been assigned docket No. R02-19 by the IPCB and public hearings on this petition are in progress.
The impetus and genesis for the IAWA petition is the United States Environmental Protection Agency 1999 update of ambient water quality criteria for ammonia which was released in the Federal register on December 22nd, 1999.
In the 1999 update, USEPA took note of the fact that additional information has been gathered since

it published its ambient water quality for ammonia in 1984. Based upon the additional information, USEPA prepared the 1999 update which contained revised freshwater quality criterion for ammonia. The IAWA petition essentially asks the IPCB to enact into Illinois regulation USEPA's 1999 update of

ambient water quality criteria for ammonia. The USEPA has spent considerable effort in issuing the 1999 update and the states are expected to adopt numeric water quality criterion for ammonia based upon the 1999 update. Protective criteria for ammonia are expected to be adopted in all states no later than 2004.

The DeKalb Sanitary District, DSD, was created on July 12th, 1928 and for the past nearly 74 years has provided wastewater collection and treatment and biosolids management for its northern Illinois service area. By 1929, the DSD provided primary and secondary treatment to its entire service area. Since 1929, the DSD has continuously upgraded its treatment facilities. In 1981, the DSD provided second stage biological treatment to remove ammonia nitrogen from its

effluent. Also in 1981, tertiary sand filtration was added which greatly reduced the suspended solids and oxygen demand of the DSDs discharge. In 1984, the DSD constructed a new facility to treat excess flows during peak flow periods. Most recently in 1997, the DSD added a new single stage activated sludge nitrification, ammonia removal, facility to

handle additional flows from its service area. A new headworks was also constructed in 1997 to upgrade the raw sewage pumping and flow measurement capabilities of the DSD's treatment plant.

Since 1981, the DSD has spent nearly 20 million dollars to provide modern wastewater treatment to the nearly 400,000 people in the service area. Today, the DSD provides complete secondary and tertiary treatment and biological nitrification before discharge to the south branch of the Kishwaukee River.

The testimony of the DSD before the IPCB will focus on the discharge permit limits which will be imposed upon the DSD based upon IPCB's existing water quality standards for ammonia nitrogen and the economic impact of these

regulations. Also, the DSD will discuss the permit limits which would be imposed if the IAWA petition were to be enacted and the impact of such enactment on the DSD.

The DSD believes that it is important for the IPCB to understand the economic impact of its existing ammonia nitrogen regulations on publicly owned treatment works and how the IAWA

petition would affect this impact.

The IPCB in December 1996, under R94-1(B), adopted the existing state of Illinois ammonia nitrogen and un-ionized ammonia standards. The IPCB 1996 water quality standards were in response to the development of the USEPA's national criteria document for ammonia in 1984. Because of the release of USEPA's 1999 update, it seems entirely logical for the IPCB to consider a significant change in its 1996 water quality standards for ammonia.

The USEPA's 1999 update of water quality criteria for ammonia was published only after an extensive review of the scientific literature. Upon releasing the 1999 update, USEPA

stated, quote, these criteria reflect the latest scientific knowledge on the effects water pollutants have on the public health and welfare, aquatic life and recreation. The 1999 update contains EPA's most recent freshwater aquatic life criteria for ammonia and supersedes all previous freshwater aquatic life ammonia criteria. The new criteria reflect recent research and data since 1984 and are a revision of several elements in the 1984 criteria, end quote.

The DSD believes that the IAWA has made an honest and scientifically defensible adaptation of the 1999 update to fit the situation here in Illinois. The IAWA has had the petition reviewed by the IEPA and they are in concurrence with it.

The DSD believes that the IAWA petition should be adopted in its present form. The petition accurately reflects the USEPA's 1999 update and, therefore, represents the latest scientific knowledge. We urge the IPCB to enact the IAWA petition.

The existing NPDES permit for the DSD was issued on December 12th, 2000. The IEPA

issued the permit after finalizing its Part 355 procedures for ammonia nitrogen. These IEPA procedure were issued on July 1st, 1999.

For the period of December 2000 through December 2003 the NPDES permit requires the DSD to meet the following ammonia nitrogen limits: For the months April through October DSD's limits will be as such, monthly average of 1.5 and a daily maximum of 3.0 for November through March period, monthly average of 3.6 and a daily maximum

of 7.2. These limits are the same ammonia nitrogen limits that have been in previous NPDES permits for DSD.

Special Condition 16 of DSD's NPDES permit states that by December of 2003, the DSD must meet the following ammonia nitrogen permit limits:

For the period April through October the monthly average is going to be 1.3 with a daily maximum of 3.0 for November through March the monthly average will be 1.2 with a daily maximum of 5.1. All of those being milligrams per liter.

The December 2003 permit limits

are based upon the IPCB water quality standards adopted in 1996 and the Part 355 procedures adopted by the IEPA in 1999. Those NPDES permits which expired after July 1999 contain limits based upon the 1996 IPCB standards and the 1999 IEPA procedures. Those who could not comply with the new limits were given three years to comply. Hence, the DSD now has a December 2003 compliance date in its NPDES permit.

Alternatives to meet the December 2003 permit limits: In order to meet the December

2003 permit limits for ammonia nitrogen, the DSD is considering a variety of alternatives. The DSD has retained Consoer Townsend Envirodyne Engineers, Inc., CTE, to study and select the most cost-effective alternative or alternatives which can meet the December 2003 limit.

Biological nitrification: Almost without exception, POTWs in Illinois remove ammonia from wastewater using biological nitrification. In essence, nitrifying bacteria contained in biological reactors convert the toxic ammonia to non-toxic nitrates before discharge,

but the biological nitrification reaction is somewhat difficult to control and it is often not always possible to consistently achieve levels of ammonia nitrogen below 1.5 milligrams per liter.

In the IPCB hearing on R94-1(B), the IEPA, through Mr. Dean Studer, November 10th, 1994, testified that biological nitrification is capable of consistently achieving a monthly average ammonia nitrogen concentration of 1.5 milligrams per liter from April through October and 4.0 milligrams per liter November through March. It was for this reason that in the R94-1(B), the IPCB decided to

establish the concept of effluent modified waters or EMWs. EMWs are waters downstream from a wastewater treatment plant that, at a minimum, can comply with a summer monthly average of 1.5 milligrams per liter from April through October and a winter monthly average of 4.0 milligrams per liter during November through March. EMWs continue downstream of the facility, the distance that it takes for the chronic ammonia standards to be met.

The DSD must essentially comply with a monthly average ammonia nitrogen permit limit

by December 2003 of 1.2 to 1.3 milligrams per liter year around. The DSD employs biological nitrification and meets its existing NPDES permit limits of 1.5 milligrams per liter April through October and 3.6 milligrams per liter November through March, but the December 2003 limits cannot be consistently met with the biological nitrification systems currently in place.

This non-compliance with the 1996 IPCB standards using biological nitrification is not atypical. In fact, the IEPA stated in testimony on R94-1 that at least 19 facilities in Illinois were at risk of non-compliance if the 1996 IPCB standards

were adopted. The IEPA indicated in its testimony that most of the 19 facilities will have to be redesigned to meet the proposed standards.

Alternatives to reduce ammonia nitrogen in DSD's effluent: DSD's consultant, CTE, is currently considering the following alternatives to reduce effluent ammonia nitrogen in order to comply with its December 2003 permit limits.

Option one, ion exchange; option two, breakpoint chlorination; option three,

improvements in fixed film bioreactors and option four, automatic dissolved oxygen control for the single stage nitrification system.

And I will break from this momentarily and also note that as per discussion last Tuesday with the IEPA, breakpoint chlorination does not appear to be an option which the IEPA would find favorable.

Ion exchange: Ion exchange involves passing a liquid through a column or bed of specific natural or synthetic resin and the exchange of one ion for another. Clinoptilolite is the resin of choice for ammonia nitrogen removal. Ammonia nitrogen concentrations of 0.5 to 1.0 milligrams per

liter are possible with this technology.

The five-million gallon North Tahoe-Truckee wastewater treatment plant has used ion exchange to treat its discharge to Lake Tahoe since the 1970s.

Ion exchange is a workable, but extremely demanding operation. The resin must be frequently acid washed to remove scale formation. About 20 percent of the resin must be replaced per

year. The resin regeneration process presents an extremely corrosive environment dictating special safety concerns. The equipment is also difficult to maintain, repair and replace. Operational care is particularly important in terms of preventing ammonia salt crystallization formation which can contaminate the resins.

For the DSD, the capital cost for ion exchange treatment plant to reduce ammonia nitrogen levels below 1.5 milligrams per liter would cost approximately 20 million dollars and an annual operating cost could exceed $600,000 per year.

Breakpoint chlorination: Breakpoint chlorination involves adding sufficient chlorine to a wastewater to oxidize the ammonia

present. Most of the ammonia nitrogen is converted to nitrogen gas by the reaction with chlorine. It normally takes about ten milligrams per liter of chlorine to remove one milligram per liter of ammonia nitrogen. Dechlorination of the effluent is necessary because of residual chlorine present at the end of the breakpoint reaction.

The most obvious advantage of

breakpoint chlorination is that it involves technology which is normally present at a POTW. Most POTWs practice chlorination/dechlorination for their effluent disinfection process.

For the DSD, its existing chlorination/dechlorination system could be modified to employ breakpoint chlorination. The need for breakpoint chlorination would be present about 50 to 100 days per year when about ten milligrams per liter of chlorine would be added on average to reduce ammonia levels in the DSD's effluent. The capital costs for the modification for the DSD's existing chlorination system would exceed about 400,000 while the annual operating costs would total about 100,000.

The principal disadvantage of

breakpoint chlorination is the formation of chloramines and triholomethanes which are discharged with the effluent. As with any chlorination system, there also are worker safety issues which must be continuously addressed.

Improvements in existing fixed film bioreactors: One of the biological

nitrification systems now employed by DSD is a fixed film biological reactor system for nitrification. It is possible that a change in the influent system for this biological reactor could result in a greater removal of ammonia nitrogen, but there is no guarantee that such a change will produce a lower effluent ammonia concentration. The changes required in the influent structures involve adding new pumps and a new piping system to distribute influent flow more equally to the individual components of the fixed film reactors. This system would only be used periodically, but could improve the biological nitrifying population present in the reactors. The capital cost would be about $50,000 and the operating cost would total more than $10,000.

Automatic dissolved oxygen

control: The DSD is using a single stage activated sludge process to treat a portion of its wastewater flow. This biological nitrification system could possibly be improved by the addition of automated dissolved oxygen control. The system would automatically respond to the changes in the oxygen

demand of the wastewater and this could possibly improve the nitrifying organism population in the activated sludge process. The capital costs for the system would be about $50,000 and the annual operating cost would exceed $40,000.

Screening of alternatives: The DSD's study of ammonia reduction alternatives continues and a final decision has not been reached as to which alternatives will be selected for implementation. The IPCB should bear in mind that the costs presented here are preliminary and are subject to revision as a study of alternatives continues. However, the costs are sufficiently accurate to give a reasonable approximation of the final costs that could be incurred by DSD.

It seems probable that DSD will ultimately decide to implement more than one of the four alternatives presented here. Therefore, the

IPCB should not think that the cost of any single alternative represents the DSD's cost of complying with the 1996 IPCB regulations.

Impact of the IAWA petition: The IAWA petition would result in the following

effluent permit limits for the DSD: For the season March through October the monthly average would be 1.5 milligrams per liter and a daily max would be 6.7 milligrams per liter. November through February, there's a correction here, we had 4.0 in there, the appropriate number is 3.1 for the monthly average, November through February. The daily max for November through February would be 6.7.

Obviously, the IEPA would make the final decision as to the permit limits for the DSD. However, the above permit limits are based upon the stream, south branch of the Kishwaukee, data used by the IEPA to determine the ammonia limits in DSD's existing NPDES permit. Therefore, these above permit limits are a reasonable prediction.

As can be seen, these permit limits are very similar to the permit limits now in effect for DSD's treatment plant. The DSD can meet these permit limits with its existing

biological nitrification systems and would not incur the capital and operating costs outlined above for the four ammonia nitrogen alternatives currently being considered by DSD.

Summary and recommendations:

The DSD believes that the IAWA petition represents a sensible and scientifically based adaption to the state of Illinois of the USEPA's 1999 update of ambient water quality criteria for ammonia. This update represents USEPA's assessment of credible scientific data on the aquatic life toxicity of ammonia. The DSD recommends that the IPCB enact the IAWA petition so that the most scientifically defensible water quality standards can be used to protect aquatic life in the state of Illinois.

The DSD could potentially spend more than 20 million dollars in capital costs and more than 750,000 in annual operating costs to meet the existing IPCB standards for ammonia as finalized in R94-1. If the IAWA petition is enacted, DSD would not be required to expend these funds. The significant installation and annual operating costs associated with the various ammonia reduction

options are by no means inconsequential for the DeKalb Sanitary District or its service population especially in light of the USEPA's 1999 update of

water quality criteria for ammonia and the subsequent IAWA petition.

We are hopeful that the foregoing is of some value to the IPCB's decision process regarding this matter. Again, the DSD recommends the IPCB enact the IAWA petition.

MR. HARSCH: A point of clarification, in your prefiled testimony you referred to 40,000 and I think when you read it you referred to 400,000, page two. What is the service area population?

MR. ZIMA: Forty thousand.

HEARING OFFICER GLENN: Thank you, Mr. Zima. If no one objects, I will admit Mr. Zima's prefiled testimony as Exhibit No. 8. Seeing no objection, I will admit it as Exhibit 8. We're ready for Mr. Daugherty.

(Mr. Daugherty was sworn in by the court reporter.)

MR. DAUGHERTY: Good afternoon. My name is James Daugherty. I'm employed as the district manager by the Thorn Creek Basin Sanitary

District. The district serves 100,000 people in six communities located in southern Cook and

northeastern Will counties, Illinois.
The district's wastewater treatment facility provides tertiary treatment and discharges to Thorn Creek, a tributary of the Little Calumet River.

The Thorn Creek Plant has been producing a nitrified effluent since May of 1977 when a plant addition went on line. I have been the certified operator of the facility since November of 1976, holding an Illinois Environmental Protection Agency Class I wastewater treatment plant operators license.

I have been employed by the Thorn Creek Basin Sanitary District since 1973. My educational background includes a bachelor's and master's degree in environmental engineering from the University of Illinois.

I failed to note in my prefiled testimony that I'm also a licensed professional engineer in the state of Illinois.

I have authored many technical papers and presentations. Two of the papers are especially relevant here. I presented a paper

titled Fundamentals of Nitrification in Activated

Sludge at the 1986 conference of the Illinois Association of Water Pollution Control Operators. In 1987, I authored a paper for the Illinois Association of Sanitary Districts on development of effluent ammonia limits for plants discharging to low flow streams. I am a member of and have held offices in many professional organizations.

My professional involvement with ammonia toxicity and ammonia water quality standards coincides with the state of Illinois' efforts to limit ammonia discharges. In 1972, I was studying under Dr. John Pheffer at the University of Illinois while he was actively involved with the state in the development of the first ammonia water quality standards. My research was directed by Dr. Pheffer and involved evaluating the environmental impacts of a new de-icing compounds that consisted primarily of organic nitrogen compounds. My research evaluated the toxicity of that de-icing compound to the aquatic environment. The results demonstrated that the primary toxic component was ammonia present in the de-icing compound as well as that produced during decomposition of the organic nitrogen

compounds. My research included review of the literature on ammonia toxicity, the same literature being used at that time by the state to propose the first ammonia toxicity standard. When I started with the Thorn Creek Basin Sanitary District in 1973, the district was conducting pilot studies of two processes for nitrification. I was involved in the review of that pilot work and the recommendation to install activated sludge for nitrification. That process was designed, constructed and went on line in 1977.

In addition to my experience operating a nitrification system for 25 years, I also have been involved in regulatory proceedings before the Board concerning ammonia for many years. I testified on behalf of the Illinois Association of Sanitary Districts in the proceeding R88-22, commonly known as the winter ammonia effluent exception. My testimony documented the limits of biological treatment systems to achieve ammonia removals. The data I presented demonstrated that a minimum winter effluent limit of 4.0 milligrams per liter was consistent with the performance of nitrification technology.

I was also active before the Board concerning ammonia effluent and water quality standards in the matter of R94-1, which was the prior rulemaking before the Board for ammonia water quality standards. Again, I presented testimony and comments on behalf of the Illinois Association of Wastewater Agencies. On six different occasions, I presented either testimony or comments before the Board. Part of those comments included suggested amendments to the Agency's proposal which were eventually accepted by the Agency and adopted by the Board.

I welcome this opportunity to again provide information to the Board as it deliberates ammonia water quality standards. I am here on behalf of, not only my own district, but also to represent the Illinois Association of Wastewater Agencies.

Review of current limits: The Illinois Association of Wastewater Agencies supported the current ammonia nitrogen standards as they were being deliberated by the Board under R94-1. IAWA did support those standards as appropriate for adoption based on the fact that they

represented the best peer reviewed understanding of ammonia toxicity available at the time and that the proposal contained floor effluent limits of 1.5 milligrams per liter, summer, and 4.0 milligrams per liter, winter. R94-1 was supported even though the understanding of ammonia toxicity was incomplete. First, the proposed mechanism for ammonia toxicity did not fit all of the data. Secondly, the relatively small amount of cold temperature chronic test data further limited the deviations of accurate limits. This position was stated repeatedly by IAWA before the Board.

For example, quoting from Daugherty, June 14th, 1996, page four, the chronic toxicity database is seriously incomplete. The Agency was unable to find sufficient data to directly calculate a chronic standard for either the summer or winter period. Instead, they were forced to use an acute/chronic ratio. The acute/chronic ratio was developed using data reflective of summer conditions; however, the ratio was also applied to the winter acute data to calculate the proposed winter chronic standard. The number one recommendation in IAWA's first comments and repeated

in subsequent comments was that every effort should be made to produce additional chronic data -- chronic toxicity data so that a more accurate chronic standard could be adopted in the future, end of quote.

In spite of the data limitations, IAWA supported revision of the ammonia standards as presented in R94-1 as the previous standards were based on much older information.

IAWA no longer supports the current ammonia standards for two reasons. First, the regulations have not been implemented as expected when the proposal was presented to the Board. The effluent modified water provision, the key to the effluent floor limits has not been implemented for reasons discussed below. Secondly, the 1999 update of ambient water quality criteria for ammonia contains the most recent peer reviewed science and demonstrates that the assumed mechanism for ammonia toxicity in the current regulations is incorrect as well as the limits themselves.

IAWA understands its key role before the Board in presenting information on treatment technology and current practice. Our

members are in a better position than anyone else to document treatment system performance and treatment system construction, operating and maintenance costs. We provided information on nitrification system performance to both the Agency and the Board in R94-1. Our information and the analysis of that information made it clear that compliance with the current ammonia water quality standards would produce effluent limits below the capabilities of best available treatment technology. Best available treatment technology for ammonia currently consists of biological nitrification. The Agency accepted our analysis and agreed that reasonable treatability limits were 1.5 milligrams per liter in the summer and 4.0 milligrams per liter in the winter. Since compliance with the water quality standard contained in R94-1 would produce effluent limits below those values in low flow streams, the Agency developed the concept of effluent modified waters. The effluent modified water concept was based on the Agency's field experience, which showed repeatedly that there were no indications of ammonia toxicity in low flow streams downstream of facilities that were operating with permit limits of 1.5 milligrams per liter in

the summer and 4.0 milligrams per liter in the winter.

For example, quoting testimony of Robert G. Mosher in R94-1 at page 17.

However, in its many years of conducting facility related stream surveys, the Agency is unaware of ammonia related toxicity problems causing a measurable impact in streams receiving effluents from nitrifying treatment plants meeting 1.5 and 4.0 limits, end of quote.

IAWA understood the effluent modified water provision to be a widely available exception for stream segments below facilities that were discharging with permit limits of 1.5/4.0 milligrams per liter. The Agency's testimony before the Board is consistent with that interpretation. IAWA repeatedly expressed that understanding in comments and testimony before the Board.

Two examples are, quoting from Daugherty, February 23rd, 1997, at page two.

In previous testimony, IAWA has raised a number of implementation issues, which will not be repeated here. The most important concept

the treatability level being defined at 1.5 milligrams per liter ammonia nitrogen, summer, and 4.0 milligrams per liter, winter. The treatability levels are instituted in the Agency's proposal through an effluent modified waters designation.

The second quote, Daugherty, June 14th, 1996, at page three.

IAWA urges adoption of the effluent modified water as proposed by the Agency, amended by IAWA and approved by the USEPA. IAWA has testified that effluent modified waters as proposed and amended by IAWA will result in technologically realistic limits for nitrifying facilities. The structure of EMW was worked out through repeated input from IAWA, the Agency and the USEPA. EMW has been designed to protect the aquatic environment, comply with the Clean Water Act and meet the needs of the wastewater agencies, end of quote.

Following the Board's adoption of R94-1 was the implementation of EMWs. The change of interpretation of EMW was forced on the Agency by USEPA after a threatened lawsuit if they, USEPA,

approved the Board's standards. The implementation of the EMW provision was changed from a

straightforward exception process to a process that now parallels what would be required to obtain an adjusted standard for a stream segment.
The requirements for obtaining an effluent modified water determination are delineated in Section 355.301 of the Agency's implementation rule which states as follows:

> The criteria for designation of an EMW includes two specific provisions: The water body must have the potential to exceed the chronic standard due to a permitted discharge and the elevated chronic ammonia nitrogen concentration will not adversely impact designated uses of the affected stretch of the water body. EMW status shall be designated in the receiving water body if: A, aquatic life is expected to exist in the receiving waters is known to be tolerant of the projected ammonia nitrogen concentrations resulting from the treatment plant effluent in conjunction with the ambient water conditions. The determination of the aquatic community expected to inhabit the receiving

waters shall be consistent with stream morphology, primarily physical features and hydrologic regimes of the water body; B, the receiving stream does not

exceed the acute water quality standard for 35 Illinois Administrative Code 302.212(b) and; C, the discharger demonstrates a reasonable potential to exceed the chronic ammonia nitrogen standard pursuant to Subpart B of this part.

Paragraph (a) of this provision is interpreted as requiring a very detailed analysis of the stream and its aquatic life. The discharger is expected to prove that the higher the ammonia concentrations allowed by the EMW status will not cause any impact on expected aquatic life. This analysis is basically the same as that used in establishing a water quality standard. Putting it another way, this language requires the discharger to prove that the existing water quality standard is incorrect. This interpretation, along with the 1999 USEPA ammonia guidance document, made it obvious to the wastewater community that it made more sense to revise the ammonia regulations statewide than to do it on a stream segment by stream segment basis under

the EMW process. To my knowledge, no one has ever attempted to obtain an effluent modified water designation since the promulgation of Part 355 by the Agency.

Support for R02-19: During my many years of participation in the development of ammonia control regulations, I have always stated support for adoption of water quality standards. Ammonia is a known toxicant in the aquatic environment. I have also stressed the critical importance of using the best available science as the basis for the standards. By best available science, I mean the latest ammonia toxicological research that has been through a peer review, public review and comment.

I have studied the 1999 update of ambient water quality criteria for ammonia as published by the United States Environmental Protection Agency. I believe the proposal presented by the IAWA under this proceeding is an appropriate implementation of the criteria present in that document. Our proposal is a straightforward application of best available science.

I would like to make several points relative to that document. First of all, the document presents ammonia criteria for both warm water and cold water fish species. I believe the Illinois limits should be based solely on the warm

water species. There are no indigenous salmonids in Illinois outside of Lake Michigan. Secondly, it's important to understand that the chronic toxicity values contained in the proposal are 30-day average limits. To date, all chronic limits have been applied as a four-day average limitation. IAWA's proposal is unique in that it proposes three levels of protection; acute, subchronic and chronic levels of protection. This approach allows the chronic limit to be developed to more truly represent long-term exposure of ammonia toxicity impact. A 30-day chronic limit also is more convenient when deriving monthly average NPDES permit limits. With a 30-day chronic limit, it is most appropriate that effluent limits be derived from stream flow, pH and temperature values representing long-term averages. The appropriate pH and temperature would be the 50th percentile values.

The proposal is also innovative in that it contains subchronic limits as a more convenient tool for monitoring and enforcement of stream standards.

The proposed standard is unique in its recognition of the increased sensitivity of early life stages to ammonia. The proposed winter

standard allows higher concentrations of ammonia since early life stages are absent. In the past regulations, March has been included in the winter period. While it is true that almost no early life stages are present during March in most of the state, IAWA agreed to move March from the winter period to the summer period to eliminate the need for site-specific evaluation of the possible presence of early life stages in March.

I believe that the 1999 update of ambient water quality criteria for ammonia represents a significant step forward in the understanding of ammonia toxicity. IAWA's proposal is a straightforward application of the criteria document. It is free of the exceptions, exemptions and special provisions that plaqued previous ammonia standards. Based on my knowledge of Illinois

streams, the proposed standards will result in effluent limits that are within the capabilities of current nitrification technologies in most cases. If there are cases where effluent limits are unachievable, those dischargers would still have recourse to the site-specific ammonia standard proceeding.

I'd like to inject a couple comments not in prefiled testimony. I think it's significant that this is the first ammonia regulation in Illinois that has not contained limiting provisions due to technological limitations. As Mr. Kissel mentioned, the 30-year period that we've had water quality regulation, all of those past regulations have been modified in one way or another due to the limits of treatment technology. This proposal is absent of any of those kind of provisions. That's very significant. It's even more significant when you consider the fact that this proposal is coming from the dischargers in the state of Illinois.

I urge the Board to adopt IAWA's proposed ammonia standard. I am grateful to the

Board for this public forum to provide for the open discussion of new standards. Thank you for considering my comments.

HEARING OFFICER GLENN: Thank you, Mr. Daugherty. Mr. Kissel, did IAWA have anything else it would like to offer in support of its proposal today?

MR. KISSEL: No.

HEARING OFFICER GLENN: Okay. What I'd like to do now is go to the testimony of Robert Mosher from the IEPA. After we hear from Mr. Mosher, the floor will be open for questions of both the IAWA and Mr. Mosher.

MR. KISSEL: I said we didn't have anything to offer at this time, but in case something develops, we may want to add to the record as the proceeding continues.

HEARING OFFICER GLENN: That's fine. Thank you, Mr. Kissel. Mr. Mosher, are you ready to begin?

MR. MOSHER: Yes.

(Mr. Mosher was sworn in by the court reporter.)

MR. MOSHER: My name is Robert Mosher

and I am currently acting manager of the water quality standards section in the division of water pollution control at the Illinois Environmental Protection Agency. I have been with the Illinois EPA in excess of 16 years. Almost all of that time has been spent in my current capacity where my primary responsibility is the development and implementation of water quality standards.

I have a master's degree in

zoology from Eastern Illinois University where I specialized in stream ecology. I submitted prefiled testimony in this proceeding for the Board's review in support of IAWA's proposal. I would like to summarize that testimony for you now.

As part of my duties with the Agency, I served on the committee led by the United States Environmental Protection Agency in the development of its new ammonia criteria which was finalized in 1999. Along with other Illinois EPA staff members, I was also consulted by IAWA during the course of development of these regulations. Face-to-face meetings and telephone conferences were held with IAWA and Illinois EPA offered comments on

several occasions to drafts of these proposed rules. Those comments have been largely incorporated into the proposal you see before you today. The Illinois EPA also forwarded IAWA's proposal to USEPA Region V for its review prior to submittal to the Board. Our review of the final version submitted to the Board on January 17th, 2002, finds that it substantially follows the 1999 national criteria document. Illinois EPA believes that the NCD and this proposal represent the state-of-the-art in

ammonia water quality standards.

In addition to discussing the proposal for amending the ammonia water quality standard, Illinois EPA also held some discussions with IAWA about the types of changes that would be necessary to make the Illinois EPA's implementation rules found in 35 Illinois Administrative Code Part 355 if the Board's ammonia nitrogen regulations are amended as provided in IAWA's proposal. A rough draft was provided to IAWA of how I felt Part 355 would have to be amended if the Board were to adopt the draft of IAWA's proposal that was under discussion at that time and that document was

submitted to the Board by IAWA as an attachment to its regulatory proposal for informational purposes. Some changes have been made to IAWA's proposal since this draft was made and those changes as well as any other changes the Board makes to IAWA's proposal would have to be taken into account in developing final amendments to the Illinois EPA's existing Part 355. Until the Board adopts a change to the current ammonia rules, the Illinois EPA can only speculate on exactly what changes may or may not be necessary to its current rules to implement such a change, but

it is the Illinois EPA's intention to modify its permitting procedures for ammonia nitrogen contained in Part 355 to conform with whatever rules the Board adopts in this proceeding in an expeditious manner.

A vital component of USEPA's new NCD for ammonia is the protection of early life stages of aquatic life. In order to do this, stricter water quality standards are recommended when those life stages are present. The IAWA proposal also recognizes the importance of this goal by setting the summer season conservatively, March through October, in order to protect the vast

majority of Illinois species. Where species exist that would have early life stages present during the November through February period, the new regulations would allow the Illinois EPA to apply protective standards at other times.

Based on IAWA's incorporation of Illinois EPA comments and adherences to the federal criteria in development of its proposal, the Illinois EPA is generally in support of this rulemaking. My prefiled testimony contained minor clarifications of IAWA's statement of reasons as well as some suggestions for corrections or

clarifications to the proposed regulatory language itself. I will not repeat those in detail today, but I will summarize these comments.

My testimony attempted to clarify that although the Board's current ammonia nitrogen water quality standards were based on USEPA's 1984 national criteria document, ambient water quality criteria for ammonia, the Illinois EPA's 1996 proposal to the Board relied on an approach that differed significantly from that in the 1984 NCD. We did not propose the use of a formula as did the

NCD but rather had simple winter and summer numeric values as the standards. We also added new toxicity studies to the existing database which is as USEPA did in developing its 1999 NCD.

In my prefiled testimony, I also suggested some minor changes to the regulatory proposal, including changing the STORET number in 302.212 (b) to reflect the number for total ammonia nitrogen instead of the number for un-ionized ammonia; changing the word exceedance in Section 302.212 (b) to attainment to conform to the wording of Subsection 302.212 (c); clarifying in the regulatory language of Section 302.212 (b) that all

equations in this section result in a standard expressed in a concentration of milligrams per liter; changing the word determined to evaluated in Sections 302.212 (c) two and three to clarify that Subsection (d) is used to evaluate attainment of the standards whereas Subsection (b) determines the value of the standards; changing the phrase quote, at any particular time, unquote, in Section 302.212 (d) to quote, measured at the time of each ammonia sample, unquote, in order to clarify that ammonia,

pH and temperature measurements must be taken simultaneously in order to determine attainment of the water quality standard. The Illinois EPA also suggested a rewording of the second sentence of Section 302.212 (e) for clarity and a few other minor non-substantive changes. I would also like to note for the record that Appendix C containing sample total ammonia water quality standards for various temperatures and pH combinations was missing from IAWA's proposal to the Board.

Although we have pointed out several areas for clarification or minor changes to IAWA's proposal and supporting documentation, the Illinois EPA is in agreement with this rulemaking

proposal and finds it to be consistent with the federal ammonia criteria.

This concludes the summary of my prefiled testimony. I will be happy to address any questions during the hearing regarding these comments and other issues involving the Illinois EPA's role in administering ammonia standards.

HEARING OFFICER GLENN: Thank you, Mr. Mosher. I would like to admit your prefiled

testimony as Exhibit 9 if nobody objects. Ms. Williams, do you have an extra copy of Mr. Mosher's testimony?

MS. WILLIAMS: On his prefiled testimony?

HEARING OFFICER GLENN: Yes.

MS. WILLIAMS: Yes.

HAERING OFFICER GLENN: Seeing no objection, I'll admit his testimony as Exhibit 9.

Okay. At this time we will open -- yes, Mr. Harsch.

MR. HARSCH: I'd like to make a statement. We've had the opportunity to review Mr. Mosher's suggested changes and believe that all the suggested changes appear to be acceptable and

its our intent to -- if the hearing officer would prefer -- the Board would prefer to revise our proposal, submit that revised proposal down to the Agency for review of the wording changes in short order and then file that with the Board in the next week or so, well in advance of the next hearing and serve it to the service list.

HEARING OFFICER GLENN: That would be

most acceptable, yes.

Okay. At this time we will open the floor up to questions of both the IAWA. Anyone that testified here today, if you have a question for them, also for Mr. Mosher from the Agency. Again, I would ask if you have questions to please raise your hand, identify yourself, and tell us who you represent, if anyone and the members of the Board or the Board staff may jump in at some point if they have a question stemming from your question or they might have a few of their own, but we'd like to start with the members of the public in attendance this afternoon. Mr. Ettinger, could you identify yourself.

MR. ETTINGER: Most of my questions are going to be for Mr. Sheehan, Mr. Zenz,

maybe it would be best if they came closer to the court reporter.

HEARING OFFICER GLENN: That would be helpful.

MR. ETTINGER: Actually,I don't have a lot of questions for anyone, but I have a few questions first for Mr. Sheehan and then Mr. Zenz

and -- doctor, sorry, Dr. Sheehan. I understand. Dr. Sheehan and Dr. Zenz.

First of all, on the first page of your testimony you say -- believe that recent information indicates that current ammonia water quality criteria used by Illinois appear to be not protected enough under certain circumstances, they appear to be overly protective under other circumstances. Just in general, can you describe a situation which they're not protective enough?

MR. SHEEHAN: Well, I think that one reason why they would be more protective if the proposal goes through is because of essentially three standards versus the two which would kind of cover all the bases in terms of what you would be concerned about for chronic exposures and then as far as overly protective goes, I just based it on

the values -- if the proposal doesn't go through the values that would be permissible as effluent limits versus those that would be permissible if the proposal goes through, that's what I'm referring to as being overly protective.

MR. ETTINGER: Is there anywhere in

this proposal in terms of the formulas that come out of this proposal in which you would actually wind up with a stricter ammonia standard under the rule than -- under the proposed rule than under the existing rules?

MR. SHEEHAN: I have not done those calculations so I don't know.

MR. ETTINGER: The existing calculations are sort of complex matters involving a pH and temperature and the new calculations also use pH and temperature, is that correct?

MR. SHEEHAN: Yes. Yes.

MR. ETTINGER: Okay. I don't understand page three this joint toxicity theory, Mr. Callahan explains it and you explain it and I'll start off by saying that as a chemist I'm an okay anti-trust lawyer, but what is the theory here that it was -- maybe I'll let you take another crack at

it first. Do you think un-ionized is more important now or less important now?

MR. SHEEHAN: As far as I understand it and consistent with my own beliefs un-ionized ammonia is still considered and always has been

considered the most toxic form of ammonia. Under the joint toxicity theory, ionized ammonia is also toxic but nowhere near as much as un-ionized ammonia on a molecule to molecule basis. So that consequently when you start getting down to low pHs even though there might be a relatively small amount of un-ionized ammonia present that's where you have a lot of ionized ammonia due to the ammonia equilibrium. So low pHs relatively speaking ionized ammonia starts exerting more affects than the total toxicity in solution. High pHs, you've got a greater proportion of un-ionized ammonia, a smaller proportion of ionized ammonia to the point where even though there's a lot of ionized ammonia there it's still not exerting much toxicity because it takes evidently a heck of a lot of ionized ammonia to produce much toxicity. It is a difficult concept to explain without a piece of paper and a graph.

MR. ETTINGER: Well, that's all

right, I'll read that later. What do you mean by you say the 1999 ammonia update took an empirical approach as opposed to this joint toxicity theory?

MR. SHEEHAN: Basically, they did not

try to first propose a hypothesis as to the toxic mechanisms of ammonia solution, they strictly looked at total ammonia, looked at how well that was correlated with toxicity when it was corrected for temperature -- not in all cases were there corrections for temperature and pH, this gets pretty complex too, but basically just made corrections for temperature and pH.

MR. ETTINGER: Is temperature still a factor into the 1999 criteria?

MR. SHEEHAN: It certainly is because, you know, the values will be different, yeah. The criteria will be different.

MR. ETTINGER: And that's because the higher temperature is leading to more un-ionized ammonia in a given amount of --

MR. SHEEHAN: Primarily, yes.

MR. ETTINGER: As I do understand it, though, the 1999 criteria and this proposal have less of an emphasis on temperature than did the

earlier criteria and the current rules, is that correct?

MR. SHEEHAN: Well, I'd like to review

that, it's a pretty complex issue. I can review that for you and come up with an opinion on that, but there's an awful lot to consider to make a judgment call like that.

MR. ETTINGER: Well, let me just ask in general in terms of how these numbers are driven, what is it about this formula that results in looser winter standards than the existing formula?

MR. SHEEHAN: I don't know that it is a formula, there's a larger database, number one, that's being utilized and as I said, it's strictly empirically based, it's based on observations.

MR. ETTINGER: I guess I didn't state that well. As I understand it what your discharge limit is going to come out as a result of this change or under the old rule or the new rule is based on the pH of the water, the temperature of the water and the dilution, is that basically correct?

MR. SHEEHAN: The dilution, that's not what I'm an expert on. That's a discharge effluent question.

MR. ETTINGER: So whether you have a one milligram per liter permit or a three milligram

per liter in a given case is going to depend on temperature, pH and dilution, is that correct?

MR. SHEEHAN: As far as I understand, yes.

MR. ETTINGER: Is there somebody else sitting here I should be asking this question of?

MR. HARSCH: Bob Mosher. If you're talking about converting the water quality standards to an effluent limitation.

MR. ETTINGER: Well, I guess we did see some testimony regarding Dr. Zenz' testimony in which he pointed out that by changing the standards we were going to help a couple of dischargers and we saw in their prefiled testimony how they were going to be helped, Bob do you want to -- am I right or am I wrong? Is there more going on here than pH, temperature and dilution?

MR. MOSHER: Okay. To determine the water quality standard from ammonia you need to know the temperature and the pH of the water that you're dealing with, the river or the stream, lake to determine the permit limit that you would apply to a

discharger, of course, you need to know the ammonia

water quality standard, the temperature and pH of the receiving water and then there are other factors that can influence what a permit limit would be including dilution or mixing zone, including other regulations that deal with permitting such as the Federal anti-backsliding regulation.

MR. ETTINGER: Okay. That's a good distinction and I misspoke. Let's focus on the ambient water quality standard and look at the changes there. What changed here in terms of the ambient water quality standard only has to do then with the pH and the temperature, those are the factors that you're going to be looking at to determine what the ammonia standard will be in a particular water, is that correct?

MR. SHEEHAN: I believe for the -- one of the reasons why it's so complicated, for example, there would be three water quality criteria if the proposed approach is used and for one of those the criteria maximum concentrations, I don't believe temperature is a factor, so it's just pH in that case. Now, for the chronic and subchronic standards or criteria both pH and temperature will be factors

and it's largely in part of the -- I think due to a larger database that's being used and the empirical approach that's being used.

MR. ETTINGER: I guess what I'm wondering is how did the larger -- the larger database affected the number by changing the number that we should use in our formula for either temperature or pH, didn't it?

MR. SHEEHAN: I specifically -- I don't know, but, for example, the database is depending upon, at its simplest, toxicity values were derived from species and then these species values are averaged into values for genera, so, for example, if you had more studies with a given species or more species you could change that toxicity value so that's how changes in database size would affect the outcome of the models that were used to develop the criteria.

MR. ETTINGER: You testified 40 new scientific species with a number of additional species were added to the ammonia toxicity database.

MR. SHEEHAN: What page is that, I'm not sure that's what I said?

MR. ETTINGER: On page five of your

prefiled testimony.

MR. SHEEHAN: Forty new scientific studies, not species.

MR. ETTINGER: I'm sorry. With an additional -- a number of additional number of species were added to the ammonia toxicity database. I may have misspoke. Do you know of what additional species were added?

MR. SHEEHAN: Offhand I couldn't tell you that, no.

MR. ETTINGER: Do you know of any one of them that -- the addition of considering them was particularly important to the conclusion?

MR. SHEEHAN: Let me think. When I say additional species you have to remember there's several datasets that are being developed like for the criterion maximum concentration for the -- for the database used to develop the criterion maximum concentration that's always been fairly large, what we've most added data have been for the chronic toxicity values and I'm trying to think of what species I know of that have been added -- studies with walleyes have been added. I'm trying to think. I'm drawing a blank. I'm sorry. I

wasn't really prepared to testify to defend USEPA's, you know, criteria development. That's what they do.

MR. ETTINGER: Fine. I was trying to figure out what change that drives the new numbers. Do you know whether -- let's talk about another question.

There's some reference here to cold water species versus warm water species, is that a scientific classification that you use as a biologist?

MR. SHEEHAN: In general, yes. Fisheries people will refer to cold water species when you're dealing with freshwater anyway typically they're referring to salmonids.

MR. ETTINGER: Are those the only cold water species?

MR. SHEEHAN: The only cold water species you'd find in the state of Illinois, yes.

MR. ETTINGER: How would you feel of, like, a sculpin?

MR. SHEEHAN: That's considered a cool water species. I know, these are imprecise terms.

MR. ETTINGER: I know they're

imprecise, but they're important in a number of proceedings so if you could just elaborate on, you know, go hot and cold for us and tell us what classifications might be relevant here in terms of looking at water quality standards in the different species that might be present here in Illinois. I gather there's a cold and warm and a kind of cool?

MR. SHEEHAN: Uh-huh. I think that's -- well, I divide them into cool and warm and cool, I'm not sure everybody else does, but I think that what's pertinent here is that for the toxicity tests that have been done and you've looked at databases in that sense cold water species have been considered salmonids and that's what's germane to this issue here, not so much what temperatures they like, for example, and cold water species are generally considered to be what we call cold water steno forms (phonetic), in other words, they don't tolerate elevated temperatures, say, above 20C very well, that's what we typically refer to as a cold water species. Sculpins can tolerate temperatures that are above that, that's why they tend to be considered more warm or cool water species.

MR. ETTINGER: Do you know whether in

the USEPA study they included cool water species?

MR. SHEEHAN: It was not broken down that way as far as I know.

MR. ETTINGER: Okay. So we know -- we took the salmonids out of the study in developing these numbers, is that correct?

MR. SHEEHAN: EPA developed separate numbers for salmonids.

MR. ETTINGER: So then everything else was in the without salmonid category?

MR. SHEEHAN: Correct.

MR. ETTINGER: And we don't know whether that everything else included cool water species or not?

MR. SHEEHAN: Yes, it was inclusive of cool water species because the walleye, the escoids, those are considered cool water species, but they're -- for this application, they're lumped into the non-salmonid species.

MR. ETTINGER: You refer to the harlequin darter a few times and it says unless this species proves to be relatively tolerant to ammonia, it's on page seven, I think it's mentioned somewhere else in your testimony. Are you aware of some

ongoing study that's going to prove this?

MR. SHEEHAN: No.

MR. ETTINGER: Okay. So as of right now you would expect that the -- where discharges to waters where the harlequin darter was present, we would assume that it is sensitive to ammonia?

MR. SHEEHAN: That would be a judgment call that's really not in my court, I don't think, but I would think that would be true.

MR. ETTINGER: Well, I guess opening the question to proponents generally, how do you anticipate that this would work if we don't have any data now on this harlequin darter, would we assume that it's sensitive to ammonia or not?

MR. SHEEHAN: Well, we would -- should I answer? The only way we assume it's insensitive to ammonia would be to have a study to show that. That's my opinion.

MR. ETTINGER: Okay. Going now to page ten, it says the 1999 ammonia update chronic criteria are set by interpolating the single value, the EC20, from a concentration toxicity relationship developed from an entire dataset. I'm familiar with the LC50, but the EC20 I haven't heard of. What is

the EC20?

MR. SHEEHAN: Well, the LC50 is also an interpolated value from a large dataset. The EC20 is similar, but it's different in that EC's values are derived from tests that measure less -- effects that are less harmful than, say, mortality or total incompasitation and if you were to plot, like, the concentration versus response, the LC50 would be 50 percent along that distribution whereas the EC50 would only be 20 percent along that distribution.

MR. ETTINGER: Does EC stand for effect concentration?

MR. SHEEHAN: Yes, it does.

MR. ETTINGER: Is this where 20 percent of the greater show an effect from the concentration?

MR. SHEEHAN: Well, it would actually depend upon the measure you would use. In cases it's where 20 percent show some effect if it's some sort of qualitative effect, it can be, and in many cases it's a 20 percent response, like, a 20 percent change in growth.

24 MR. ETTINGER: I gather you have done

1 some studies of the effect of ammonia on mussels?
2 MR. SHEEHAN: Uh-huh.
3 MR. ETTINGER: Have you done anything
4 since this early cutting age study?
5 MR. SHEEHAN: Not on mussels, no.
6 MR. ETTINGER: Do you know if any --
7 it says our studying was cutting edge research at
8 the time. Has the research advanced since then?
9 MR. SHEEHAN: Well, based on the
10 general lack of publications on this topic dealing
11 with larval mussels, I would say that it's unknown
12 at this point how well it's advanced. There are
13 some studies out there that, as we indicated in our
14 testimony -- as I indicated, have not been peer
15 reviewed publications yet, so that's hard to assess
16 at this point.
17 MR. ETTINGER: I have a few questions
18 for Dr. Zenz.
19 On page four of your testimony and
20 in Mr. Bachman's -- I forgot if it was doctor or
21 Mr. Bachman's and Zima's testimony there's
22 discussion of the DeKalb Sanitary District and

Urbana and Champaign Sanitary District permits. You're actually working on those permits, is that

correct?

MR. ZENZ: Well, Consoer Townsend Envirodyne Engineers is a consulting engineering firm and we are currently -- we have contracts with both the DeKalb Sanitary District and Urbana & Champaign Sanitary Districts, yes, and both of those relationships with both of those sanitary districts the issue of permits has come up.

MR. ETTINGER: In Mr. Bachman's testimony and the Zima testimony there is data presented as to what the standards would -- what the permit limits would be under the current standards and what the permit limits would be under the new standards. What primarily drives the change?

MR. ZENZ: Well, first, you have to understand that the so-called existing standards and their existing permits are permit limits which come from the Illinois Environmental Protection Agency. Okay. I'm trying to make this point. The calculations that were done both by the Urbana & Champaign Sanitary District and DeKalb Sanitary

District made some assumptions and if you really look closely at the testimony I think they both indicate that the ultimate permit limits that would

be derived from whatever Board -- assuming the Board were to adopt this petition the way it is there's a lot of factors as Mr. Mosher has said, there's anti-backsliding issues, there's dilution of the stream and so forth. For the DeKalb Sanitary District the numbers that are contained in Mr. Zima's testimony, I know for a fact because we discussed them, those are strictly taking the IAWA petition assuming no dilution whatsoever which is a reasonable assumption because the seven year -- seven-day-ten-year low flow is zero for the south branch of the Kishwaukee River, but, again, there may be some anti-backsliding issues associated with those particular numbers. For example, you know, it may very well be those numbers could change because of anti-backsliding, but those numbers are just taking the formula that are in the IAWA petition, looking up the pH and temperature appropriate for the season, winter or summer, taking the 50 percentile pH and 75th percentile

temperature to calculate the chronic standard and then for the acute standard as Dr. Sheehan's pointed out only the pH is important for the acute standard, that's the only variable that's part of the acute

standard which is the daily maximum number and taking the 75th percentile for pH, not the 50 percentile, 75th percentile, plugging that number in and just coming out with a number. So it just basically assumes that there is no dilution, it neglects any ant-backsliding provision that might come up or any other issues that should come up.

MR. ETTINGER: Is the Champaign & Urbana Plant a new plant or is that an old plant?

MR. ZENZ: Both plants are existing plants. The one plant, the southwest plant, that has the 0.7 milligrams per liter existing standard in their permit, that plant will be expanded and additional capacity will be provided hopefully by the year 2005. There's talking about construction schedule, Phase I, Phase II, so anyway, that plant will be expanded in 2005.

MR. ETTINGER: About how old are the plants now?

MR. ZENZ: Well, old is a -- in Illinois old is -- you know, these plants go back -- some of the facilities go back to the '20s that are still in operation. The latest, I think, construction at the plant was 1980 and '82.

MR. BACHMAN: 1978 to 1980 was the last expansion.

MR. ZIMA: Mike Zima, DeKalb Sanitary District, we went through an expansion starting in 1996.

MR. ETTINGER: You refer on page five it says biological treatment systems for ammonia removal are notoriously affected by low temperature. Is it possible to heat the tanks or cover them so as to avoid the low temperature?

MR. ZENZ: It's always possible to do anything, of course, the effluent could be heated, the tanks can be covered, to heat the effluent is extremely expensive, the BTUs to raise even a small plant, five, six, seven, would be huge and the cost would be just prohibited. I know of -- I mean, I'm pretty familiar with municipal wastewater treatment in the United States, I've never heard of that being

done or proposed so I just don't think that would be -- it would not be a very cost-effective alternative. It's certainly not an alternative that I have ever looked at or anybody else ever looked at.

MR. ETTINGER: And would covering

tanks work in some circumstances?

MR. ZENZ: Temperature -- you know, typically at a wastewater treatment plant the sewage comes in at a higher temperature than it goes out because it's exposed to the atmosphere, but typically at wastewater treatment plants the difference in temperature between influent and effluent is usually maybe one degree because the tanks are very deep, not really that much surface area considering the entire volume, so the temperature changes through wastewater treatment systems are relatively insignificant, pretty much almost exactly the same temperature of the sewage coming into the plant and the sewage will be in the plant maybe eight to 15 hours as it travels through the plant and by the time it gets to the effluent maybe a one degree decrease or a one degree rise

possibly in the summertime. It goes both ways. Sewage temperatures are generally between 45 degrees Farenheit coldest in the winter and maybe 70 degrees Farenheit warmest in the summer. So it might actually -- on a hot day might increase a little bit, but it's not much.

MR. ETTINGER: So basically you're not

losing much --

MR. ZENZ: No, this is all --

MR. ETTINGER: I've got to finish my question before you answer or else our friend the court reporter doesn't stay our friend.

MR. ZENZ: I'm sorry.

MR. ETTINGER: Basically, you're not losing much heat in the 12 hours when it's in the plant?

MR. ZENZ: No. Most wastewater treatment operations are inground units if you've ever been to a plant you'll see everything is an inground unit so they're naturally insulated so the only temperature loss is through the surface which isn't very grading proportion to the amount of water that's in the tank itself.

MR. ETTINGER: I'm done. We have another member of the public that would like to go ahead next.

HEARING OFFICER GLENN: Please identify yourself for the record.

MS. SKRUKRUD: My name is Cindy Skrukrud, my last name is spelled S-k-r-u-k-r-u-d and I just have some questions about -- actually

about the water quality standards proposal, about 302 and then some questions about Part 355 that arise from my questions about Part 302. I imagine Mr. Mosher's the best person to answer these questions, but I'll leave it open to you.

My first question is about in Section 302.212, Part D, I believe Mr. Mosher testified that he clarified that this section is the section designed to evaluate the attainment of the water quality standard and I wondered if you could elaborate more on that, how it would be implemented and then where in Part 355 can we understand how this section is going to be implemented.

MR. MOSHER: Well, this part is constructed because when you wish to assess

attainment of the chronic water quality standard or the subchronic water quality standard in this new format that's now proposed it means that you have to go to the water body and take several samples and each of those samples is likely to have a different pH and temperature. So if I take a sample on Monday, Tuesday, Wednesday and Thursday, the proposed Board standard say it's an average of the total ammonia concentration with the pH and

temperature factored in. So given that those pHs and temperatures might all be different for those different days, it can't be a simple average that we use to assess attainment. So this is kind of a simple device to allow you to say each of those individual samples could be over or under let's say the chronic water quality standards and by it's degree of being over or under when averaged we can come up with something that truly says yes this is attainment or this is not nonattainment of the standard.

MS. SKRUKRUD: So then as I understand it, each time you take the sample you have to measure ammonia temperature and pH and then do a

calculation based on that?

MR. MOSHER: Right.

MS. SKRUKRUD: You said that the samples will be done in the water -- receiving water body. Where will those samples be taken in relationship to the effluent discharge point?

MR. MOSHER: Well, when we look at attainment of water quality standards, effluents aren't really a factor. By the Board's mixing zone regulation water quality standards have to be met in

all waters, in this case, general use waters outside of mixing zones or zones of initial dilution.

So the answer to your question is as long as you're outside of a zone of initial dilution or mixing zone, you can assess the water for attainment to the standards.

MS. SKRUKRUD: As ammonia can be present in the water and then through various factors dissipate over time will you measure farther downstream than -- also measure farther downstream than just outside of the mixing zone or ZID?

MR. MOSHER: Well, what I meant and maybe I wasn't very clear there, I meant to say that

anywhere and everywhere in streams, rivers, lakes, you can take samples to assess attainment for the ammonia standards, it's only if there's a zone of initial dilution or a mixing zone where those standards do not apply.

MS. SKRUKRUD: Okay. Then my next question is about Subsection E and this is the provision that provides for extending the summer period -- using the summer standard in water bodies where early life stages are present outside of the March through October time period and I wonder how

is this section going to be implemented?

MR. MOSHER: Well, as it stands right now, we're aware of one species that doesn't fit the March through October early life stage period and that is the harlequin darter so when the Agency would write a permit and it was for a water that included the range of that species or, of course, any future information we might get on another species, for instance, we would have to adjust the early life stage sensitive period to fit the harlequin darter or whatever other species we find might have a sensitive life stage outside of March

through October.

I looked into the harlequin darter example since it was made known to us at this stage and that's found in the Embarras River and the Wabash River and both of those rivers would have potential mixing zones available for the dischargers that are now located on those rivers and it wouldn't come into play, we would be able to write permit limits using the mixing zones appropriate for those waters and not run into water quality standards or not run into permit limits that would have an impact on water quality standards that would be harmful to

the harlequin darter.

MS. SKRUKRUD: I didn't see in Part 355, implementation rules, where there was any more detail given to how you would determine this. Is there -- do you feel that this language in Section E is sufficient giving guidance as to how you would make a determination for any given water body, what species are present?

MR. MOSHER: Well, on one hand I think the Board -- the proposed Board regulation at Subpart E is fairly clear and straightforward and

in addition to that, our review of Part 355 to know of any changes that are going to be needed isn't complete yet by any means and that can have something added -- Part 355 could certainly have something added to it to make sure that this issue is clear.

MS. SKRUKRUD: Okay. Thank you.

MR. CALLAHAN: My name is Mike Callahan and I've already been sworn and I'd like to answer a question both of Cynthia and perhaps add a little bit of light to something Albert asked.

Cynthia's reference to the subparagraph is a remanent of the original

regulation we drafted and discussed with the Agency, I referenced that in my testimony. At that time we found the pickerel and the pike to be intermittently distributed in waters of the northern part of the state where their breeding -- timing of their chronology could basically imply the need for protection and then subsequently as well we got down to southern Illinois where some of the more ubiquitously distributed species would begin to spawn earlier in the year because of waters warm

earlier in the southern part of the state than they do in the north. So we originally put that paragraph in as an ability to extend protection in the event that we were to discover that more was warranted, more was needed. I am a little concerned about the minutia of one way or another here. Somewhere we have to act like grown adults and indicate to what we're really after is trying to protect our fish species from ammonia and under those circumstances if we find that there are species that desire more protection it would seem to me it would be very forthright to give the Agency the ability to make that determination when that is realized rather than come back to the Board and go

through the laborious proceedings once against and determining that early life stage should being in January instead of March and that was our intent with that, it wasn't to offer some kind of obstacle or logic and then when I go back to what I hear Albert trying to ask and this was something that bothered me a great deal initially as I looked at the '99 guidance was your question, am I correct in paraphrasing your question, what makes the numbers

different?

MR. ETTINGER: That's a good way to put it.

MR. CALLAHAN: Dr. Sheehan, could you please explain to him as you explained to me the difficulty in transcribing toxicity of the ammonia ion to the un-ionized ion at cold temperatures based upon the unknown toxicity in the incrementally larger concentrations of the ionized form than the un-ionized form?

MR. SHEEHAN: Run that --

MR. CALLAHAN: Do you remember that conversation?

MR. SHEEHAN: You might have to refresh my memory.

MR. CALLAHAN: Well, principally, this was something that Dr. Sheehan and I discussed at great length and I'll try and jog your memory. The fact being that all of the toxicity of ammonia in the '84 guidance was ascribed to the un-ionized molecule but to get substantive levels of un-ionized ammonia at a cold temperature requires a tremendously large amount of ionized ammonia which

by large is considered not to be toxic, but it does have some toxicity and what was attempted in the joint toxicity model, this was advocated in a paper by Ericson, et al., (phonetic), 1981, I believe that particular paper tried to make some kind of multiplier by which we would change the toxicity assigned to the un-ionized portion over temperature gradiance from that it was on the ion, that was not successful. That was why some of the datasets fit and some didn't. Our approach in the '99 document just basically says let's not worry about these mathematical models that we can't create anyway, we will empirically determine that X amount of total ammonia exhibits this affect and we will now worry about whether it's ionized or un-ionized or not. I think that's the difference in the numbers that I

think you were trying to get at. Does that give you some better explanation of it?

MR. ETTINGER: Yes.

HEARING OFFICER GLENN: Thank you. Any further questions?

MR. BUCHNER: My name is Greg Buchner, B-u-c-h-n-e-r, and I want to let everybody know I do

work for the Fox Metro water reclamation district, but in this case the question is just coming from myself for a better understanding, it's a continuation of a line of questions which Cindy started and Mr. Mosher I think you would be the appropriate person to address the question to where she was asking about the application of the water quality standards, where they take affect was indicated it would be outside the mixing zone and would rely upon the simultaneous measurement of pH, temperature and total ammonia, is that correct?

MR. MOSHER: That's correct.

MR. BUCHNER: Would it be safe to say then that even though these water quality standards would apply outside the mixing zone that if samples were taken inside the mixing zone which met that water quality criteria, do you follow where I'm

going with this line of questioning? It would seem like if you're meeting the water quality criteria inside the mixing zone that would be a good thing?

MR. MOSHER: Yes, it would be a good thing and to further explain this there seems to be always this confusion between what is the water

quality standard that the Board is considering adopting here applies to lake, streams, rivers and then the other thing is what is the permit limit going to be and the permit limits are something that are calculated based on the water quality standard and other factors and when we assess compliance with a permit limit, it's always a direct measure of the effluent itself coming out the pipe, it's not a measure of anything either in a mixing zone or downstream so we like to use the word compliance when we're speaking of achieving permit limits, measuring effluents in a pipe and we like to use the word attainment when we talk about meeting Pollution Control Board water quality standards in a stream or a lake.

MR. BUCHNER: I guess to continue with my comment, would it be a reasonable assumption that if you're meeting the water quality standard inside

the mixing zone that you'd probably be meeting the water quality standard outside the mixing zone?

MR. MOSHER: That would be a fair statement and be a correct assumption.

MR. BUCHNER: Thank you for that

clarification.

HEARING OFFICER GLENN: Thank you, Mr. Buchner. Any further questions?

MS. WILLIAMS: I have a couple quick clarifications. I think Mr. Callahan maybe could answer them or I can direct some of them more generally to the -- it's just really two minor things. Mr. Callahan, I think you mentioned it and several of the other IAWA witnesses might also refer to the fact that there are -- well, making the statement that there are no NPDES dischargers into Lake Michigan. Would it be more correct to say that you intended that there were no NPDES dischargers with a significant ammonia discharge going into Lake Michigan?

MR. CALLAHAN: Right. Ammonia released to Lake Michigan is not --

MS. WILLIAMS: Okay. You weren't trying to say generally there's nobody with an NPDES

permit that discharges at all into Lake Michigan.

MR. CALLAHAN: No.

MS. WILLIAMS: I just wanted to clear that point up. There are some NPDES permits that

discharge into Lake Michigan.

MR. RAO: I had a related question. Dr. Callahan, are there any NPDES dischargers into tributaries of Lake Michigan who may have any ammonia concerns?

MR. CALLAHAN: Not that I'm aware of. I don't believe -- Bob can probably speak to that, Mr. Mosher, better than me, I don't believe there are any discharges where ammonia would be -- well, of course, even that, I don't know because this reg doesn't apply to Lake Michigan. This is -- we're not changing that part -- that section of the reg. This is simply for the --

MR. RAO: No. I was just curious, you made the statement and I wanted to find out if there were any discharges to tributaries of Lake Michigan who may --

MR. MOSHER: The way that former tributaries to Lake Michigan have been engineered to now flow away from the lake, we don't -- we have

very few tributaries and they're very minor in nature, very small ravines, and we don't have any significant discharges of ammonia. There was a

temporary discharge of one of the North Shore Sanitary District wastewater treatment plants a few years ago, they had a collapse of the sewer line that forced them to discharge some of their wastewater into Lake Michigan for a short time period and that has now been corrected.

MR. MELAS: Treated effluent?

MR. MOSHER: Treated effluent, yes. So now that that has been corrected there just aren't any municipal wastewater treatment plants that discharge to Lake Michigan.

MS. WILLIAMS: I had just one other point that I was hoping either Mr. Callahan or Mr. Sheehan could clarify for us. I think Albert's question pointed out a little bit of the inconsistency maybe between the description in your testimony, Mr. Callahan, of the 1984 guidance document and I wondered if you could clarify for the record whether the statement that the guidance document assigns no toxicity to un-ionized ammonia, were you referring instead to the Board reg, I guess

that's what I'm trying to -- there's a distinction, I think, between what the 1984 document and what the

Board ended up adopting in terms of toxicity assigned to total ammonia versus --

MR. CALLAHAN: The Board basically took -- or I believe Bob, Mr. Mosher, basically took the tenants of the 1984 document and the joint toxicity model there that we have discussed a little bit and reconfigured that and that relationship such that he came up with a couple of general use water quality standards chronic and acute winter and summer for the state expressed in un-ionized ammonia. So it was an expression -- the parameter was regulated in the un-ionized ammonia form.

MS. WILLIAMS: In the Illinois rules?

MR. CALLAHAN: Right. Right. And this rule that we're advocating will be total ammonia and the uncertainty of the variable toxicity relationship under temperature is ignored that way simply because empirically the relationship is so strong and documentable.

MS. WILLIAMS: I think that answered my question. I had -- the question was -- or the statement that I felt needed some clarifications was

the mechanism employed in the 1984 guidance document

assigned all of the ammonia toxicity to the un-ionized --

MR. CALLAHAN: That was my reference to the joint toxicity model. All of the toxicity was assigned to the un-ionized.

MR. SHEEHAN: Well, in my opinion, it's a little bit ambiguous the way it's presented. I think that the assumption by which the models were developed for the 1984 document was that both ionized ammonia and un-ionized ammonia were toxic and that's why they spent so much time talking about the joint toxicity model. However, in that 1984 document they also said a lot of the datasets don't really fit that model and that's why in 1999 they dropped that model where they tried to assign some of the toxicity to ionized ammonia and just strictly looked at total ammonia and didn't try to explain the hows or whys of why ammonia solutions are toxic, just tried to look at how was toxicity related to the total ammonia and just go with that. That's what I meant by an empirically based model.

Now, I believe the standards were based on un-ionized ammonia corrected for pH and

temperature based on the assumption that ionized ammonia is toxic -- was toxic or is toxic.

MS. WILLIAMS: Thank you. That clears it up for me any way.

HEARING OFFICER GLENN: Thank you, Ms. Williams. Go ahead.

MR. ETTINGER: I just wanted to ask one more question. I just wanted to be clear on this one question which has to do with measuring the pH, is it our understanding that the question of whether the pH of the receiving water will be measured above or below the discharge is going to be handled in the 355 rules?

MR. MOSHER: Well, the Part 355 currently dictates that when a discharger wants to present data to the Agency on the pH of their receiving water that that measurement should be made downstream of the effluent discharge and I don't see that changing because of what the Board may adopt here.

MR. ETTINGER: Thank you.

HEARING OFFICER GLENN: Thank you, Mr. Ettinger. Before we continue, we've been going for a couple of hours now so I'd like to take a

ten-minute break, give the court reporter a chance to rest. We will reconvene in ten minutes, at 3:35, please.

(Whereupon, after a short break was had, the following proceedings were held accordingly.)

HEARING OFFICER GLENN: We are finishing taking questions for this afternoon, does anyone else in the audience have any questions today? Members of the Board?

DR. FLEMAL: Before I actually ask questions, I'd like to extend my personal compliments, I think the compliment is on the part of the Board for the excellent form in which this proposal has been presented to the Board, it's been a joy to work with something where all the documents are so nicely compacted together and thorough.

I'd like to start my questions by looking at some of the actual language that has been proposed and I'd like to call your attention to that. My first question goes to Section 302.212 (b)(2) which is where we have presented to us the standard. Throughout this testimony we've been

talking about the two different periods in which the standard would apply as variously the March to October period or the summer and winter period and I'm wondering whether at least for some clarity to the non-expert in this rule we might consider some terms other than summer or winter for these time periods. Look at it this way, March is half in winter by a dictionary definition and here we're calling March summer. I can just see the headlines in the newspaper, bureaucrats declare winter to be summer and maybe we can avoid the kind of potential headline if we would consider renaming that. I just ask the people here if they might, maybe we can just put in the months, it might read something like during March to October period except as specified in Subsection E, something like that.

MR. HARSCH: Dr. Flemal, would the early life stage present and early life stage absent --

DR. FLEMAL: Why don't you folks put your heads together and see what you would like as probably the -- it seems to me as long as almost everything is March to October and then November to February, it would be just as easy to use the

months, but provide us with your best thoughts on that.

In that same section temperature is referred to, I know among all of us we assume that to be the water temperature, but I wondered if we should actually put that in the rule. I'm not sure, again, how exactly that might be best phrased, maybe something like when water temperature is less than or equal to or maybe it's the temperature of the water in question. I would ask your attention to that terminology.

In Subsection E of this same section, that's the one that's been referred to here a number of times, where again we have the summer winter issue, I noted that when the various people were giving testimony they were oftentimes quite careful to talk about indigenous species, and I want to come back to that in just a moment, but I wonder here in this section whether we shouldn't also talk about indigenous early life stages or life stages of indigenous species, some such language to indicate that that's the target population in question. Again, I would ask that you look at that and see what you would recommend.

If we keep this term early life stages as part of the rule and I understand that the Agency has in fact -- I'm looking at the second sentence -- already suggested some changes, but if those changes ultimately leave the phrase early life stages, I wonder whether we need a definition of that or in fact if we added the term digeneous whether we don't need perhaps even two terms. I can see that perhaps there might be a question on the part of JCAR regarding the definition of those particular terms.

As long as I raised the term indigenous, let me explore a somewhat related aspect which doesn't actually go to language. Again, in the testimonies today we heard several references to salmonid species as not being indigenous to the state of Illinois, but my understanding is that they do occur in spite of the fact that they fail to meet the definition of indigenous, am I correct in that there are waters in the state of Illinois where salmonids are planted and there's a fishery based upon those salmonids?

MR. MOSHER: That's correct. We have testified in several previous hearings that

salmonids are not reproducing populations in any waters in Illinois besides Lake Michigan. They are not stocked, to our knowledge, and we've had some contact with the Illinois Department of Conservation or Department of Natural Resources I should say that the stocking that now occurs is in adult form so they acknowledge that there isn't going to be growth and reproduction of these types of fish so, therefore, we have concluded that it's temperature that is the limiting factors to these things surviving in general use waters.

DR. FLEMAL: Can you imagine a circumstance where we would have these non-indigenous salmonid species which would form the basis of a successful fishery be impacted by ammonia? Would those adult planted fishes have problems with ammonia?

MR. MOSHER: Well, in the locations that I'm aware that they stock these things they're either in ponds where there are no discharges or there's a few streams, I think the Apple River in northwest Illinois is one of those streams and they are not stocking them in areas where we have

ammonia concentration to those things and in here I rely upon the antidegradation rule as it's just been revised that if it comes apparent that some new discharge or expanded discharge is going to be discharging to one of these streams where DNR finds they want to stock adult trout, that we can make decisions using that rule that could say ammonia has to be less from this particular discharge to protect this trout fishery that exists.

DR. FLEMAL: Even though in some sense it's not a natural fishery -- not based on a natural population?

MR MOSHER: Correct. It's certainly a recreational resource and the antideg regulation uses that language.

DR. FLEMAL: The rule that's proposed to us has provisions that allow you some discretion for applying the standards related to whether or not a particular species is present, our friend who's name escapes me now, we mentioned several times, the fellow that may be present in some of the central Illinois and Wabash River streams.

MR. HARSCH: Harlequin darter.

DR. FLEMAL: Yes, thank you for

helping me out on that. Is there some kind of similar provision -- similar in the sense it would allow you discretion that could be built in to protect potential impacts to non-indigenous species fisheries or is that such a remote possibility, unlikely possibility, that isn't worth the investment of that additional money.

DR. SHEEHAN: Can I make a comment? My name is Robert Sheehan, I was sworn in earlier. In Illinois when salmonids are stocked they're generally in streams, they're generally stocked as what we call into put and take fisheries and studies have shown us that about 95 percent of the fish are caught within three days of their being stocked. So the only question is would ammonia kill them. We're not really concerned about them growing because they're not growing perceptibly in three days anyway and I'm absolutely convinced that the proposed water quality criteria would protect rainbow trout, for example, or any other stocked salmonids from mortality. So it's really kind of a

moot point.

DR. FLEMAL: Part of my concern on this issue arises from the fact that the last time

the Board addressed ammonia in water quality we had presentations from Trout Unlimited among others expressing substantial concerns that indigenous or not -- the rule is then proposed -- might have a serious impact on these recreational fisheries and I'm hearing, however, at least so far that same concern at this stage in time probably isn't present.

MR. SHEEHAN: In my opinion, no.

MR. MOSHER: I'd agree --

DR. FLEMAL: You think there's enough protection that if you ever run across a circumstance where such a fishery was threatened that you could write a permit that would remove that threat?

MR. MOSHER: Yes, I believe we could.

MR. RAO: I had a question, I don't know who to address it to, it concerns the proposed language in Section 302.212 (C) (3), attainment of subchronic total ammonia nitrogen standards and I

think Dr. Sheehan, in his prefiled testimony, at page five he mentioned that one of the reasons he believes that the proposed standard is protective is that, you know, the addition of this new water

quality criterion which would protect the aquatic life and he states, I'll just read it from here, the sixth point, another water quality criterion that 1999 ammonia update believes is necessary to protect aquatic life will be established wherein the highest four-day average will not be allowed to exceed 2.5 times the chronic criterion and when I was looking at the proposed language I didn't see the mention of the highest four-day average, basically the proposed language states that the four-day average concentration of total ammonia nitrogen shall not exceed the subchronic criterion. Can you please clarify, you know, what you intended here in this rule? If it's of any help, the national criteria document requires that the subchronic criterion be complied with a highest four-average within the 30-day period you use to average the chronic criterion. That linkage is not proposed in your language.

MS. WILLIAMS: We can look into that and address it in posthearing comments.

MR. RAO: I had one more question regarding the rules and this stems from Dr. Callahan's testimony on page 14.

Dr. Callahan, while you were explaining the use of the 50th percentile pH values and the calculations your testimony at page 14 you state that under no circumstances shall use of the 50th percentile pH values result in standards greater than 1.5 milligrams per liter for early life stage present period or 4.0 milligrams per liter for the early life stage absent period. I didn't see those limitations in the proposed language under Section 304.122 so I just wanted some clarification as to whether such effluent limitations should be included under Part 304?

MS. WILLIAMS: If you want to look at the existing Agency rules, that provision is in the existing Agency rules at 355.203 (a). Is the question whether it should be included in part --

MR. RAO: Yeah, because I think the existing Agency rule is based on the existing Board

rules which had that the effluent modified water requirement which has been deleted, but then effluent limits are not in the Board regulations so I'm not sure whether the Agency has the authority to put those limitations in the Agency regulations. I'm not a lawyer, but I just wanted to bring that

up.

MR. CALLAHAN: You're suggestion would be to consider putting that in 304 rather than in 355.

MR. RAO: Yes.

MR. CALLAHAN: Okay.

MR. RAO: I had some general questions about the proposed statement of reasons for this rule. At page four of the statement of reasons IAWA notes that the River Valley Water Sanitation Commission has adopted ammonia regulations similar to what's being proposed in this rulemaking and I wanted to know if IAWA -- whether you're aware of any other states who are also in the process of adopting the ammonia regulations in the criteria document?

MR. CALLAHAN: Informally, I've heard

that there are discussions in other states and there's consideration as to how to go about it. I believe that we're the first effort that's put together a recommendation for the definition of early life stage present and absent so I think we're the first in Region V doing this, but there are discussions in other states, I'm very much aware of

that, maybe Bob could speak more to that in depth than I.

MR. MOSHER: I know that Wisconsin has an ammonia task force to develop standards and any state that is looking at ammonia water quality standards has to look at the 1999 national criteria document. I think that's fair to say. Minnesota has been somewhat active, although I haven't followed them recently.

MR. HARSCH: I know that as part of the preparation of this at some point before the end of 2001 we were further along in this proposal than anybody else was. I have not checked since.

MR. RAO: I just wanted to know for the record. I think I have one more question. Again, this question stems from Dr. Callahan's

testimony. At page six of your testimony you note that anti-backsliding constraints generally result in previous permit limit beings retained. Could you please explain how the anti-backsliding constraints under thr Clean Water Act apply to the sources affected by this proposal?

MR. CALLAHAN: Well, principally, the point I was trying to make there was that prior to

94-1 we basically operated with 1.5 milligrams per liter as a summer season monthly average standard and 4.0 as a winter standard and those numbers have been in just about every permit of every major discharger across the state. Once a number like that is assigned to a permit if the discharger demonstrates compliance with that number, that number cannot be relaxed without a lengthy procedure, you know, to any substantial extent. What we're finding here -- I use my own plant as an example, with the proposed regulations here I hypothetically would be able to realize higher summer permit limits than I have right now, but I am not in any way anticipating those because we can comply with our existing summer permit numbers, we

have a track history of that compliance so consequently to ask for anything less than that would be subject to the anti-backsliding safe guard. I think that's never been the issue that our association has had with ammonia regulation in state as far as summer standards go or acute standards for that matter either. Our point has always been the chronic winter standard where we've had this misinterpretation of toxicity.

I don't see that there's going to be any relaxation of standards whatsoever as far as summer numbers go.

MR. RAO: Thank you for the clarification.

MR. HARSCH: From a legal standpoint, if -- under the anti-backsliding rules if there was a demonstrated need if a facility had not achieved compliance or was having a demonstrated difficulty of compliance with those numbers, there are provisions under the backsliding rules for those -- those numbers can be relaxed. There are just a number of hoops that you have to go through to modify the permit, but just to change the number

because you want to change the number, that's not provided for.

MR. RAO: That's just what I wanted to get on the record. Thanks.

DR. FLEMAL: I do have one last area that I'd like to explore just a little bit and that's the issue of the number of facilities which may find themselves out of compliance. There were several mentions during the prepared testimonies of the original list in our last ammonia rule of 19

facilities that were threatened out of compliance with the adoption of that rule, I guess my first question is, does anyone know what the faith of those 19 facilities has been in the ensuing years?

MR. MOSHER: Okay. That's a good point to make. Those facilities were non-nitrifying night facilities. They were not the facilities that are represented by the IAWA people here in this room today. Those were plants that were generally located on medium size rivers and they didn't remove much ammonia from their effluent. The new ammonia standards as you adopted them in '96 caused those facilities to go to the nitrification mode to

comply --

DR. FLEMAL: All -- most of them are now nitrifying?

MR. MOSHER: Certainly most of them, I don't know about all of them, but certainly most of them.

DR. FLEMAL: My recollection is a significant number of that 19 was on the Fox River, is this correct?

MR. MOSHER: Right. And there's been just pretty much a complete overhaul of the Fox

River discharges in these five years, six years that have gone by, but we did not at that time think that the nitrifying plants would be impacted by the 1996 rules that were adopted because of the effluent modified water provision. That was supposed to say what they're now doing is okay and as explained earlier, what happened was the Agency was not allowed to proceed with that as we thought we were going to and that made it unavailable -- effluent modified waters were pretty much unavailable to the existing nitrifying plants and here we are today.

MR. HARSCH: If I could further

respond, in one form or another, I represented a number of those municipalities on the Fox River, a good portion of those municipalities on the Fox River are at the present time in the -- somewhere in the plant expansion phase where they are in fact building improvements. I don't think the nitrification facilities are in fact constructed and on line for a good portion of those. So they have not yet achieved compliance with the NPDES permit limits.

DR. FLEMAL: Is there any generality that we can make about how those 19 facilities would

be affected by the --

MR. HARSCH: If you were to enact the rule change before the facilities NPDES permits -- before their treatment facilities came on line, they would be eligible for permit modifications to reflect the revised permit limits -- the revised water quality standards, they had not -- to state it another way, if the Board enacts the revised water quality standards, those dischargers could petition to modify their permits to reflect effluent limitations calculated on the revised water quality

standards. I do not believe they would be subject to any concerns of backsliding because they have yet to achieve compliance with those effluent limits and the Agency would be free to impose permit limitations -- final limitations consistent with the IAWA proposal and it can have --

DR. FLEMAL: I presume that they have been designing towards the current standards, the compliance with the current numbers, have they not? Let me rephrase the question. Are there facilities that have been forced into an over design as a result of the way the history --

MR. HARSCH: There are a number of

facilities because of the permit status and when the permits went up for renewal and where they are in permit appeals, for example, that have yet to -- they are still in the design process, they're not actually -- the designs aren't complete and they're not in construction and their time clocks are ticking in their compliance programs where they're chewing up part of their time waiting for the Board's action on this rulemaking proceeding just as are the two communities that have testified today,

they're facing -- those municipalities would be facing the same -- those municipalities would be facing the same constraints that DeKalb and Champaign/Urbana would be facing and if I'm testifying, maybe you want me to be sworn in.

HEARING OFFICER GLENN: Could we swear you in, please, Mr. Harsch?

(Mr. Harsch was sworn in by the court reporter.)

DR. FLEMAL: Part of the reason for my inquiry here is I'm trying to get my arms around a little bit more what the total cost associated with the current rule versus the proposed rule would be. We've heard from some fairly specific numbers from two facilities, but I take it the 19 facilities of

96 also would have some potential for cost savings if we formulated our ammonia rule as proposed before us as opposed to what we currently have.

MR. CALLAHAN: To the extent that I could give you a quantifiable number, Dr. Flemal, I don't know that I can, but I think you can take perspective of the fact that these numbers as we're proposing them by and large are attainable year around with conventional nitrification wastewater

treatment facility design. The numbers that resulted from the '96 action are going to require some kind of extenuating circumstance as Mr. Bachman and Mr. Zima testified, whether it be reverse osmosis or ion change or whatever else. These numbers basically address the treatability limit of biological nitrification in conventional wastewater treatment plants. So the extent to what you have cost differences in those extraneous processes versus routine cost designs would be the extent of the savings. To quantify that, I cannot do that for you at this time.

DR. FLEMAL: The facilities that where sited as being in questionable compliance mode at various times, have they all been the big ones, one

MGD or greater, is that correct?

MR. MOSHER: Yeah.

DR. FLEMAL: But the large population of actual POTWs is below that in the smaller category. Can we say anything or is there in fact any affect that can be said that might be associated with these smaller facilities that the Board ought to consider.

MR. HARSCH: Just a quick -- I did a list here. The Fox River water reclamation district's west treatment plant is undergoing an expansion. They would -- their design would be affected -- ultimate design for their expanded facility will be affected by this proceeding, their south plant is undergoing design for the addition of nitrification facilities. St. Charles is undergoing some design work for nitrification, Geneva is undergoing design of nitrification facilities that have yet to be built, Batavia is, I think, undergoing construction of nitrification. So that's a good number of the Fox communities from Elgin down to Aurora -- or down at least to Batavia. So that's a good number of the facilities that were part of the --

DR. FLEMAL: You certainly can't assume, though, that adoption of this rule would mean that they'd put in nitrifications, there are other drives for nitrification other than this adoption of the 1999 --

MR. HARSCH: Having participated in that proceeding on behalf -- our firm did on behalf

of those facilities, it greatly impacts the ability of those facilities to employ biological nitrification treatment facilities to meet the required level of nitrification to comply with NPDES permits. They're facing the same problems that other people have testified to today to meet the required number to comply with the projected effluent numbers in the permits. The numbers are just less -- potentially less restrictive under the IAWA number.

MR. MOSHER: I need to add a little. We're talking about a couple of different things. When we assess those 19 -- well, we assessed all 181 major facilities back in '96 and we made that assessment on their existing size of treatment plant and I think Mr. Harsch is kind of adding something to the equation, the fact that those are growing

communities, they want to make their plants bigger so you make the plant bigger, there's more effluent volume, the equation changes and your outcome, you know, to what limits they will have changes. We went through almost a full permit cycle since we had the 1996 change in ammonia water quality standards

and we put in water quality based on ammonia limits that would indeed make plants that were not nitrifying have to switch into a nitrifying mode. Whether those plants already have that capability, some of them did, and they just weren't utilizing it, but now we're talking about making those same plants bigger and that confuses the issue, but a further point, the change between this proposed water quality standard now before you and the one we have is a relatively small difference in that especially that winter chronic standard and it could make a difference in a few of those plants if the numbers came out just right, I suppose, you might make a design difference based on that subtlety, but it's not a major thing that's being changed on that scale. Plants that we thought would have to nitrify have a high likelihood that they'll still have to nitrify.

MR. HARSCH: I agree wholeheartedly with that. Nobody is saying that this proposal will stop any plant from having to nitrify, I'm just saying there are a lot more plants out there because of expansion that are now being subjected to the

same problems with having to meet the wintertime numbers than testified to earlier today than were originally thought to have a problem back in the '94 proceeding.

MR. DAUGHERTY: Can I respond to that too?

HEARING OFFICER GLENN: Certainly.

MR. DAUGHERTY: Jim Daugherty. The reference to these two facilities which are relatively large doesn't mean that this is really restricted to large facilities because the influents limits for most of the plants in Illinois are based on water quality standards, most of the streams have no dilution, both of these facilities discharge to streams where there's basically zero upstream flow during dry conditions which is very common across the state. So the kind permit limits they get could be applied to facilities of any size who have the same conditions and they're downstream of pH and

temperature. So it could -- it is a significant number although we have quite quantified it.

MR. CALLAHAN: If I may, I thought you were bringing up a point, Dr. Flemal, that also is

very important here and we are considering major municipal nitrifying wastewater treatment plants and the extent as to how pervasive the problem is, I don't know at the moment, but there's a great deal of difficulty in attaining compliance with lagoon plants for smaller communities now across the state. So many communities that have for years used some sort of lagoon form of treatment are certainly going to find themselves no longer in compliance with the ammonia standard and I think that may be said for what we do here today or not. I think this may very well contribute to that.

MR. RAO: I just wanted to ask a follow-up to Dr. Flemal's question for Mr. Mosher. Regarding the smaller wastewater treatment plants I believe Dr. Zenz in his testimony mentioned -- I think he said there were, like, over 600 wastewater treatment plants in the state less than one million gallon per day capacity. Does the Agency collect any information about the smaller plants as to what

their compliance status is in terms of ammonia?

MR. MOSHER: Well, yes. Any facility that has ammonia limits is required to submit

monthly reports and we keep track of their compliance.

MR. RAO: So do you have any idea as to what the impact of the existing ammonia regulations have been on the smaller facilities?

MR. MOSHER: Well, there hasn't been a formal study. I can give you just my perception. There hasn't been very many smaller plants that the new '96 ammonia regs forced into nitrifying mode that weren't already nitrifying. Small plants where there is seven Q ten flow in the stream do have a greater proportion of available dilution than a bigger plant so that's one reason for that, but there hasn't been many plants to my knowledge that have been forced into nitrification.

MR. RAO: Thank you.

DR. FLEMAL: One last question. I notice in the 1999 criteria document there's an acknowledgment section and it acknowledges that the draft was written with substantial input and then it lists three people from the state environmental

agencies, one of whom is Bob Mosher of the Illinois Environmental Protection Agency. Bob, would that --

would you be that Bob Mosher?

MR. MOSHER: Yeah, that was me.

DR. FLEMAL: Congratulations. That's a substantial kudos in one's resume to have contributed to something like this. We appreciate having an Illinois voice in this sort of thing.

MR. MOSHER: Thank you.

HEARING OFFICER GLENN: Are there any other questions then this afternoon? Okay. Seeing none, we've got to set a couple deadlines for some things before the next hearing. The next hearing, as I did mention at the beginning of today's hearing, will be held on Tuesday, April 23rd at the Board's hearing room which is located in Springfield -- the Board's hearing room in Springfield, that's Room 403 and the Board office there is located at 600 South Second Street. Prior to that hearing, however, we would like to first -- I spoke with Mr. Harsch over the break and he has told me that he will file the amended proposal with the Board by or on Wednesday, April 3rd, that should give people plenty of time to look at it before the

hearing on the 23rd. He will also serve the service

list.

MR. HARSCH: In light of -- if I could, in light of the suggested questions from Dr. Flemal and Dr. Rao, perhaps we might have another week.

HEARING OFFICER GLENN: Another week would make it difficult for people to prefile testimony. Let's go off the record for just a moment.

(Whereupon, a discussion was had off the record.)

HEARING OFFICER GLENN: Okay. So we will have the amended proposal filed by or on Wednesday, April 3rd. The service list will receive a copy of that proposal. So if you're not on the service list and you want to get a copy of that, please sign up today, there's a sign-up sheet on the table in the back. Also, if you wish to prefile any testimony for the second hearing, the Board asks that you file that by or on April 12th, that's a Friday. If you put it in the mail on that day too, that's sufficient. Prefiled questions as well, if anyone has questions of the IAWA or Mr. Mosher who

testified here today, please prefile those questions on April 12th to allow those people to have sufficient time to gather their thoughts for the hearing on the 23rd.

Just for your information, the Board will file -- or will put on it's web site a copy of today's hearing transcript. We anticipate getting the transcript by Thursday, April 4th. It is my hope that we will have it on the web site very soon thereafter. So please start checking after the fourth and I hope you will see it by Monday the eighth is my hope.

Are there any other matters that need to be addressed at this time? I didn't think so. I want to thank everybody for their attention and participation here today, it was a productive day and a somewhat long one, but thank you very much for coming and contributing. We appreciate your attendance. See you in a month.

(End of proceedings.)

STATE OF ILLINOIS)
) SS.
COUNTY OF C O O K)

I, TERRY A. STRONER, CSR, do hereby state that I am a court reporter doing business in the City of Chicago, County of Cook, and State of Illinois; that I reported by means of machine shorthand the proceedings held in the foregoing cause, and that the foregoing is a true and correct transcript of my shorthand notes so taken as aforesaid.

_____

Terry A. Stroner, CSR

Notary Public, Cook County, Illinois

SUBSCRIBED AND SWORN TO
before me this ___ day
of _____, A.D., 2001.

_____
Notary Public