ILLINOIS POLLUTION CONTROL BOARD
November 3, 2005

IN THE MATTER OF:	)	
	)	
PROPOSED AMENDMENTS TO	)	R04-25
DISSOLVED OXYGEN STANDARD 35 ILL.	)	(Rulemaking - Water)
ADM. CODE 302.206	)	

HEARING OFFICER ORDER

This order addresses two motions. In one motion, the Illinois Environmental Protection Agency (Agency) asks the hearing officer to require the filing of an additional status report in this rulemaking. In the other motion, a witness requests corrections to the transcript of the August 25, 2005 hearing. As described below, the hearing officer grants both motions.

On October 28, 2005, the Agency filed a status report pursuant to the hearing officer's order of August 30, 2005. In its status report, the Agency states that since the August 25, 2005 hearing, the third hearing in this rulemaking, the Agency has been meeting with the Illinois Department of Natural Resources (DNR). Specifically, the status report explains that the Agency and DNR have been working to "develop a state position concerning Illinois' current dissolved oxygen standard" and discussing "the development of an interim tiered approach for dissolved oxygen." Report at 1.

A stakeholder meeting was held on October 19, 2005, attended by representatives of the Agency, DNR, the United States Environmental Protection Agency, the Illinois Association of Wastewater Agencies (the proponent of this rulemaking), the Illinois Environmental Regulatory Group, Sierra Club, Prairie Rivers Network, Friends of the Chicago River, and Midwest Generation. Another stakeholder meeting is scheduled for November 15, 2005. Report at 1-2. The status report states that the Agency and DNR are "hopeful that in the near future the supplemental assessment activities currently being undertaken will be completed, the results evaluated and a position developed that both Illinois EPA and IDNR can support with confidence." *Id.* at 2.

The Agency asks that the hearing officer require the filing of another status report by November 30, 2005, in which the Agency would "explain the progress to date, the status of stakeholder discussions and possible meetings [and] . . . include if appropriate the suggested dates for a fourth hearing." Report at 2. There has been no response filed to this Agency motion. The hearing officer grants the Agency's motion. Accordingly, the Agency must file a second status report by November 30, 2005. This filing may be made electronically through the Board's Web-based Clerk's Office On-Line (COOL) at www.ipcb.state.il.us. Any filing with the Board must also be served on the hearing officer and on those persons on the Service List.

The second motion ruled upon in this order was filed on September 8, 2005, by a witness who testified at the August 25, 2005 hearing, Dr. Thomas J. Murphy. Dr. Murphy asks that numerous corrections be made to the third hearing's transcript concerning his testimony.

Section 101.604 of the Board's procedural rules (35 Ill. Adm. Code 101.604) allows any witness to "file a motion with the hearing officer to correct the transcript within 21 days after receipt of the transcript in the Clerk's Office." Because the Clerk's Office received the third hearing's transcript on September 6, 2005, Dr. Murphy's motion is timely. No response to Dr. Murphy's motion has been filed.

The hearing officer grants Dr. Murphy's motion. To avoid any potential confusion, the R04-25 docket sheet entry for the August 25, 2005 hearing transcript will reflect that the hearing officer granted Dr. Murphy's motion to correct. For further clarity, the Clerk's Office has been instructed to physically and electronically attach this hearing officer order and Dr. Murphy's motion (with the transcript corrections) to the front of the August 25, 2005 hearing transcript.

IT IS SO ORDERED.

Richard R. McGill, Jr.
Hearing Officer
Illinois Pollution Control Board
100 West Randolph Street, Suite 11-500
Chicago, Illinois 60601
(312) 814-6983 mcgillr@ipcb.state.il.us

8 September 2005

Richard R. McGill
Illinois Pollution Control Board
R04-25 Hearing Officer

Mr. McGill:

I would like to request that the following corrections be made to my testimony. If these corrections need to be directed to another person or office, please let me know.

Thomas J. Murphy, Ph. D.
773-338-3165

Line #	Change
0185-17	~~shared~~ -> chaired
0185-22	~~general~~ -> Journal of
	~~r~~esearch -> Research
0185-24	~~that~~ -> their
0186-18	concentration -> concentrations
0187-4	1986 -> 1996
0187-9	~~microinvertebrates~~ -> macroinvertebrates
0187-11	~~fueled~~ -> field
0188-6	insert 'or' after 'saturation'
0188-17	~~with~~ -> at
0188-20	~~The~~ -> For
0188-21	~~to~~ -> at the
0189-6	~~liability~~ -> reliability
0189-12	~~filing~~ -> fouling
0189-20	[Begin a new paragraph with, "In interpreting …"]
0189-22	[For clarity, drop the 'DO' and the commas]
0189-24	~~when~~ interpreted ~~is~~ -> was interpreted as
0190-7	~~to get the~~ -> with simultaneous
0190-9,10	~~The other … is to~~ -> Was there other quality assurance information to
0190-14	~~latter~~ --> laminar
0190-14,16	~~So the positioning … get very~~ -> So that the relative positioning of the sensor can give very
0190-18	~~outliars~~ -> outliers
0190-19	~~often~~ -> can
	to systems. -> into system functioning.
0190-20	~~there's good reason --~~
0190-22	~~outliars~~ -> outliers
0191-2	deserve~~d~~
0191-17	~~and~~ -> in
0191-22	Insert a comma and the words, 'thermal inputs,' after the word channelization
0191-24	~~effected~~ -> affected
0192-18	~~outliars~~ -> outliers
0192-19	very, very -> very, very, very
0192-20	~~and~~ -> are
	~~are~~ -> and

0192-22	verified -> unverified
0192-23	~~to~~ -> of
0195-7	~~beautification~~ -> eutrophication
0195-10	~~to be a straight~~ -> on atmospheric
0195-24	~~is~~ -> has
0197-20	~~or when there's a — well,~~
0197-21	~~anyway,~~
0197-22	[delete entire line]
0197-24	chemical -> chemical measurements.
0197-24 to 0198-3	[There was a brief exchange with Dr. Garvey that only remnants are present here. The gist of the discussion was that the continuous DO measurements are more useful and desirable, but it is more difficult to get reliable data from them. I think this discussion should be present in the record in some manner. Perhaps replace 0197-24 to 0198-3 with:] There are many advantages to the use of continuous DO measurements. However, it is much more difficult to obtain reliable data from them so one must be much more careful in using data from them.
0199-7	~~in any~~ -> demanding
0201-7	~~you're measuring~~ -> you measure chemically.
0202-1	~~desaturate~~ -> be saturated
0202-7	~~on~~
0202-12	~~give a little saturation~~ -> do a little calculation

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ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)
PROPOSED AMENDMENTS TO DISSOLVED OXYGEN STANDARD 35 ILL. ADM. CODE 302.206,	) No. R04-25) (Rulemaking - Water)

TRANSCRIPT OF THE PROCEEDINGS held in the above entitled cause before Hearing Officer Richard R. McGill, Jr., called by the Illinois Pollution Control Board, pursuant to notice, taken before Julia A. Bauer, CSR, RPR, a notary public within and for the County of Will and State of Illinois, at 160 North LaSalle Street, Suite N505, Chicago, Illinois, on the 25th day of August, A.D., 2005, scheduled to commence at 10:30 a.m., commencing at 10:45 a.m.

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

GARDNER, CARTON & DOUGLAS,
191 North Wacker Drive
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Chicago, Illinois 60606-1698
(312) 569 - 1441
BY: MR. ROY M. HARSCH
Appeared on behalf of IAWA;

ENVIRONMENTAL LAW & POLICY CENTER,
35 East Wacker Drive
Suite 1300
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BY: MR. ALBERT ETTINGER
Appeared on behalf of Prairie Rivers Network and Sierra Club;

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 North Grand Avenue
East P.O. Box 19276
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(217) 782 - 9807
BY: MS. DEBORAH J. WILLIAMS
MS. STEFANIE N. DIERS

Appeared on behalf of the IEPA;

ILLINOIS POLLUTION CONTROL BOARD
100 West Randolph Street
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Chicago, Illinois 60601

MR. RICHARD R. McGILL, JR., Hearing Officer
MS. ANDREA S. MOORE, Board Member
MR. G. TANNER GIRARD, Ph.D., Board Member
MR. THOMAS E. JOHNSON, Board Member
MR. ANAND RAO, Senior Environmental Scientist
MS. ALISA LIU, P.E. Environmental Scientist

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HEARING OFFICER: Good morning. I'd like to welcome you all to this Illinois Pollution Control Board hearing. My name is Richard McGill, and I am the hearing officer in this rule-making proceeding. The rule-making is entitled proposed amendments to dissolved oxygen standard 35 Illinois administrative code 302.206. The docket number for this rule-making is R04-25.

The Board received this rule-making proposal on April 19, 2004 from the Illinois Association of Wastewater Agencies or IAWA. In May 2004, the Board accepted this proposal for hearing. IAWA seeks to amend the board's rule establishing general use water quality standards for dissolved oxygen.

Also present today on behalf of the Board to my immediate left Board member Andrea Moore, the lead Board member for this rule-making. To her left Board member Tanner Girard, and to his left Board member Tom Johnson. To my right are two members of our technical unit. To my immediate right Anand

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Rao, and to his right Alisa Liu.

Would any of the Board members present like to make any statement at this time? I guess my welcome covered it. All right. This is the third hearing in this rule-making, and presently no additional hearings are scheduled. Because it's been a long time since our last hearing, I'm just going to briefly provide some procedural background before we begin testimony.

The Board held the first hearing in this rule-making in June 2004 in Chicago. The second hearing was in August 2004 in Springfield. Those first two hearings were devoted primarily to IAWA's witnesses,

presentation by IAWAs proposals and questions for those IAWA witnesses. At the conclusion of the second hearing, the participants asked me to conduct a status conference call in one month rather than proceed to schedule a third hearing at that time. As requested and after providing notice, I conducted that status conference call in mid-September 2004. As requested by the participants, I continued

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to conduct status conference calls in the same manner on a monthly basis through December 2004.

During each call, the participants would report on the status of the stakeholder discussions, indicated they were not yet prepared to proceed with the third hearing and asked me to conduct another status conference call in a month. During the December call, the participants asked that I require IAWA to file a written status report a month later instead of having another status conference call.

So IAWA filed a report in January 2005, and as IAWA requested, they continued to provide monthly status reports on the progress of stakeholder discussions. IAWA continued to file those status reports through May of 2005, and in its May 31, 2005 status report, IAWA indicated that based on discussions of May 4, 2005 stake holder meeting, it was generally agreed that the rule-making should proceed with the third hearing. So on June 3rd, I issued a hearing

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officer order scheduling today's hearing. It was at the participants request that the Board has allowed the unusual procedural steps of conducting status conferences and receiving written status reports in a rule-making.

To accommodate the participants request and to give stake holders every opportunity to assess additional data and to work through the issues, the Board has kept the rule-making docket open for over a year since the last hearing. The Board hopes to hear today -- expects to hear today from each of the main participants in this rule-making on where they believe the stakeholder discussions currently stand and where they expect the rule-making to go from here.

Today's proceeding will be governed by the board's procedural rules. All information that is relevant and not repetitious or privileged will be admitted into the record.

We've had some discussion -- procedural discussion off the record before we got started today. My original plan would be to begin with the prefiled testimony, as indicated in my June 3rd hearing officer order. We've received prefiled testimony by the August 4 deadline from IAWA, the Department of National Resources or DNR, Friends of the Chicago River and Dr. Thomas Murphy of DePaul University. I learned earlier this morning that the Illinois Environmental Protection Agencies, Toby Frevert, will have testimony to provide today and some of the participants have indicated that they may want Mr. Frevert to give his testimony earlier in the proceedings than my hearing officer order had otherwise contemplated. So we're going to start off with the IAWA as a rule-making component, and then if it makes sense and there's no compelling objection, we may go a little out of order on the prefiled testimony.

Those who did prefile, I would ask that they give a summary of their prefiled testimony to save time as opposed to reading it in its entirety.

After we finish with questions, we will ask anyone else if they would like to testify. We have a sign-up sheet just inside the door to my left for anyone who would like to sign up to testify today, time permitting, we'll allow that. Those who testify will be sworn in and may be asked questions about their testimony, like any witness today. I would have you note that there is an attendance sheet if you would like to sign up to indicate your attendance here today.

I would also ask that for the court reporter transcribing this proceeding, if you could speak up, try to speak slowly and clearly and not talk over one another so we can help produce a clear transcript.

At this point, we'll see how quickly things move along, but if we go into the afternoon, as I suspect we might, we'll take a lunch break at around 1:00 for an hour and start again promptly at 2:00. Are there any questions about the procedures we'll be following today? Seeing not, I would ask that the court reporter please swear in IAWA's witnesses and attorney collectively?

(Witnesses sworn.)

HEARING OFFICER: And now I would ask IAWA's attorney Roy Harsch to begin the

rule-making of proponents presentation.

MR. HARSCH: Thank you very much. My name is Roy Harsch. I'm at the law firm of Gardner, Carton and Douglas, and I've had the honor of representing the Illinois Association of Wastewater Agencies and a number of the rule-makings before the Pollution Control Board, including the present rule-making, which is an extremely important rule-making for IAWA.

I guess by way of background, the hearing officer has gone forward and presented the procedural steps that have occurred since the last hearing in August over a year ago. We do recognize and thank the Board that this has been somewhat of an extraordinary process. I think it's safe to say that the Illinois Association of Wastewater Agencies felt very strongly that, in essence, the stakeholder process and the

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rule-making process itself was somewhat compromised in the second hearing. We felt somewhat blindsided by some events that occurred during that hearing, and we were hopeful that in the time period that would progress after that hearing, that we would be able to work with full participation of all of the various stakeholders, and hopefully develop a position, if not agreement, in a position through the stakeholder process where we would greatly eliminate the areas of controversy between the parties.

At this point in time, I would like to thank all of those people who fully participated in that process. In addition to the attorneys of record from Illinois EPA, we had cooperation and participation from Marcia Willhite, Toby Frevert, Bob Mosher, Paul Terrio, Gregg Good, Roy Smogor and others. They spent countless hours responding to positions and developing information to attempt to move the stakeholder process forward at a time when their resources are diminished, and they had a lot of other

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things on their plate as well. At IDNR, Scott Stuewe led the discussions, Jim Mick, Steve Poll and others, fully participated during that process. Again, we thank them for their input, negotiating, discussing the issues that were raised. From USEPA, we had representatives, Mr. Hammer was there most of the meetings, if not alternatives, from Sierra Club Cindy Skrukud. Prairie Rivers Beth Wentzel.

During that time period, we had

representatives at some of the meetings from the Illinois Environmental Regulatory Group, Farm Bureau, Home Builders, et cetera. There were literally thousands and thousands of hours, if you added them up, attending stakeholder meetings and in private discussions -- follow-up discussions that would occur, for example, between Dr. Garvey and Scott Stuewe, Bob Mosher and IEPA.

IAWA has been a participant in numerous rule-makings and has welcomed the development of the stakeholder process as a means to resolve and move regulatory efforts

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forward in a less confrontational manner. We are very concerned, however, in this proceeding, and frankly, very confused by what seems to be involving this morning.

Based on the state of the proceedings before the Board as of yesterday and this morning, IAWA was very concerned that the stakeholder process in Illinois may be very jeopardized, and in fact, a process that really is not going to lead to resolution of regulatory development proposals before the Board. I've had discussions regarding our concerns with representatives from the Illinois Environmental Regulatory Group, the Illinois Wastewater Operators Association, professional consulting engineering groups, the Illinois Farm Bureau and major statewide environmental organizations. The response from many of those who have been monitoring the proceedings or been an active participant ranges from agreement that the stakeholder process may be in jeopardy to understanding how we may have that belief.

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I guess I failed to mention the Home Builders Association also in that group.

It is my understanding -- first off, we are prepared to present the testimony of Dennis Streicher, further testimony today that's been prefiled, and that of Dr. Jim Garvey, and I have copies of the prefile testimony that I'd like to offer at this point in time as an exhibit, marked for an exhibit, and that exhibit number would be?

HEARING OFFICER: Fourteen.

MR. HARSCH: Fourteen. When we prefiled the testimony, we did not have color copies of Exhibit 3. I have extra copies of those if anyone has a prefiled testimony and needs those, and here are complete sets if anybody needs a copy of Exhibit 14.

Before we proceed, I would like to

recommend, I guess, given what has transpired as the hearing officer has referenced it, it's our understanding that while we had hoped when we filed our status report in May of 2005 that we were at a position where IDNR and IEPA would soon be able to reach

resolution as to a joint state position and response for our rule-making, or at least have a position where IDNR could make a resource agency recommendation to IEPA, and IEPA then would be free to make up its own mind and come forth with the state position. That has not occurred today, but yet, we were told -- I've read Toby Frevert's prefiled testimony, that the agency is very hopeful in continuing to work with IDNR, and it's also my understanding that IDNR may, in fact, not be presenting their witness today. So at this point in time I might suggest that we go out of order rather than presenting my two witnesses first. That way we'll have Mr. Frevert present his small, short statement on behalf of the Illinois EPA, find out what DNR, in fact, claims to do, and that may simplify today's proceedings. We are -- just frankly we're very confused.

HEARING OFFICER: Well, we've got a motion to enter the prefiled testimony with the included attachment pending. I'm just going to hold off on that until we get to

your witnesses.

MR. HARSCH: Fine.

HEARING OFFICER: And just to clarify, Mr. Frevert did not prefile testimony, but has a written statement that he will present this morning as testimony. Is there any objection to proceeding at this point in time with IEPA's presentation, and then -- well, let me just ask that, is there any objection at this point in time to proceeding with IEPA's witness? Seeing no objection, I think it makes sense then, every one seems to think this will make today's proceeding more understandable if we go ahead with Toby Frevert's testimony.

So I would ask that Mr. Frevert of IEPA, if you don't mind coming up so we can hear you and the court reporter can get your testimony more easily. Thank you.

THE WITNESS: Before you swear me in, I just want to let everybody know that I'll do my best to because I don't naturally have a loud voice. So I apologize if you have trouble hearing me.

HEARING OFFICER: Thanks. If you go ahead and swear in Mr. Frevert.

(Witness sworn.)

HEARING OFFICER: Thanks. Go ahead.

MR. FREVERT: Yeah, I'm going to read from a written statement I've developed in recent days to basically bring everybody up to speed on what the agency's position and functions and activities have been. My name is the Toby Frevert. I'm manager of the Division of the Water Pollution Control for the Illinois Environmental Protection Agency. I, as well as some of my staff have participated in previous hearings on this matter, including prior testimony.

The first point I want to cover in this testimony is to reiterate the general perspective I offered at previous hearings. I believe the current dissolved oxygen standard is overly simplistic, outdated and not serving the state well. In that regard, I agree with the Illinois Association of Wastewater Agencies' perspective. The comments of Dave Thomas on behalf of the

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Illinois Department of Natural Resources focus on the variability of streams and their aquatic communities across Illinois. This variability is even more pronounced as you consider lakes, reservoirs, wetlands and other surface water bodies for which the dissolved oxygen standard applies. I agree with Dr. Thomas' perspective that reflection of this variation in oxygen sensitivity should be reflected in the state standard, probably through a classification or grouping system even if it is as simple as a two-tier system. The United States Environmental Protection Agency has been encouraging states to move toward a multiple aquatic life approach to standards as well. Numerous activities are underway to help us evolve in that direction, but a full restructuring of Illinois water quality standards takes considerable time, even if optimistic estimate is several.

The second point I want to make again takes us back to some prior testimony. At a prior hearing, I offered my opinion that

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Illinois' general use dissolved oxygen standards carries more significance than many of our other water quality standards and there is a wide diversity of opinion, perspective and attitude among the various constituencies participating in this proceeding. In an effort to address that

diversity in a more constructive and efficient manner, I suggested that further Board activities be deferred a short time to allow the parties to explore possible areas of mutual support where consensus could be reached and more clearly characterized and articulate their position to the Board on those issues where consensus cannot be reached. I further offered the services of myself and the agency to facilitate those discussions. As history shows, the Board accommodated that recommendation, and I am truly appreciative for that opportunity.

While virtually any and all interested parties were welcome and indeed participated in the various proceedings and discussions that took place during the past

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year, the more active participants were IAWA, the Association of Wastewater Agencies and IDNR, Department of Natural Resources technical staff. Toward the late spring and early summer of this year, I was encouraged that we had accomplished significant progress and partial agreement on most but not all of the critical points of discussion. As we neared the prefiling date established by the hearing officer, those agreements appeared to be in jeopardy and the Illinois Environmental Protection Agency has continued in discussions with various parties through this week. As a result, I was unable to honor the prefiling date.

I'll add something to this written statement here. I'll had drafted prefiling testimony early and decided that it was not appropriate to enter it for the prefiling date. So that's why you didn't receive that. We truly attempted to honor your request.

Lacking agreement among the parties at this stage, I nonetheless do not believe that hope for agreement is lost.

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Therefore, I'm asking for one more opportunity to resolve or at least further reduce points of contention between the various participants. In furtherance of that desire, I am refraining from offering any specific agency recommendation today. I do, however, recommend against abandonment or dismissal of the petition. We collectively know enough to make a significant improvement to Illinois' existing dissolved oxygen standard. We will never reach a condition of perfect understanding of dissolved science to have a perfect standard. That reality is fully acknowledged in section 303(c)(1) of

the Clean Water Act, which requires states to undergo periodic and continuing review and updates to water quality standards.

The Illinois EPA and myself personally are committed to assist the Board in building a complete record to support a proper disposition in this proceeding after the agency has an opportunity to consult further with others. Illinois EPA fully intends to enter additional testimony, data

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and specific recommendation at a later date.

Finally, I would like to thank the Board for the opportunity to submit this statement today.

HEARING OFFICER: Thank you. At this point, I'll open it up for any questions of this witness. I'll -- the Board may have a question or two, but I'll open it up first to the --

MS. WILLIAMS: Mr. Hearing Officer, if you're going to open up questions, can we arrange to sit up at the front table?

HEARING OFFICER: Sure. Let's go off the record for a moment while IEPA's attorneys come up and join their witness.

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

HEARING OFFICER: Again, I would ask if any member of the audience has any questions for IEPA's witness? Seeing none, I'll look up here at the Board members and Board staff present, any questions from any of the Board members?

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BY MR. GIRARD:

Q. Well, I don't mean to put you on the spot, Toby, but --

A. Sure you do.

Q. -- you say there's not agreement among the parties at this stage, but at this stage, can you give us a thumbnail sketch of the areas of disagreement?

A. I can try to do that. Some of the major areas of discussion involved the need and the wisdom of having multiple sets of standards for multiple types and degrees of quality systems or quality waters. A lot of the discussion focused on the national criteria document, which in and of itself is not a perfect document, but may be the most publically aired and the most well discussed guidance there is out there for this matter. A lot of discussion about some of the flexibilities and options available to states in that criteria document was the focus of those discussions. Those are the general terms.

In getting to working through the stakeholders process, I think there was a fair amount of maybe cross education and opportunity to perceive the perspective or the views of the inherent nature of the various participants, and I thought there was movement on all sides towards some kind of a middle grounding understanding ramifications and applications. I still think that's the case, but lacking perhaps 100 percent comfort level at certain points, some of the parties perhaps fell back to the prior positions that maybe aren't fully reflective of what they'd ideally like things to be, but lacking the consensus, people typically pull back. I think a little more time and some of what we actually accomplished, and I personally think we did accomplish something, we can refocus on that and put it in a clear perspective, and I and the rest of the staff and my agency and my leadership believes there is hope to reach some consensus here, and if not all consensus, at least enough that the points we really have to focus hard and fast testimony on may be more clearly identified.

Q. Well, you said you're going to need more time. How much time? You've been at it a year.

A. I anticipated that question. I anticipated that question perhaps the minute I decided and concluded that we as the agency should recommend this is the best course of action for the State of Illinois. In those considerations, I can't give you an exact answer today. I spent many hours thinking about it. I think the reality is it should go faster, and we may be willing to play more of a role in helping keep the Board updated in terms of status calls for whatever. We're still not the proponent in this matter, but I think we've come to the position that the agency obviously has a pretty important role to play. We certainly have volunteered and tried to take the lead in the stakeholders process, and in that capacity, I would think 60 days is all I'm asking for at this point, and I could report to you more later on when and if we should proceed to the next step after that. That's -- I'd love to give you a better answer, Tanner, but I can't.

Q. So what you're expecting to do in 60 days is have more discussions and come back and say here are the areas where we can agree, here are the areas where we cannot agree?

A. That's my hope and intent. In those areas where we can agree, I certainly would bring forth my experts and the substantive testimony to support those areas, and those areas where we can't

agree, I would do the same. We would bring in our data and our experts and help the Board have a better, more complete record. We have done some data analysis and some evaluation and development of our own concepts, and I think it would be more constructive and everybody would be better served if we held that data back at this point in time.

Q. I have no more questions.

BY MR. HEARING OFFICER:

Q. I just wanted to follow-up on that. You're not suggesting that a hearing be scheduled 60 days from now, are you?

A. No, I'm suggesting that 60 days is almost a minimal time to try to have meaningful interaction with multiple groups of people represented by multiple individuals. Even though most of those people have indeed been involved with this and openly participating, and we understand ourselves better than we did a year ago, but still that's a lot of logistics to deal with.

Q. So are you suggesting then a status

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report perhaps would be filed by the agency in roughly two months?

A. I'm willing to commit to that, yes.

Q. A written status report?

A. Yes, which what would that put us at, November 1?

MS. MOORE: Approximately.

BY MR. HEARING OFFICER:

Q. Roughly, yeah?

A. I will offer that, yeah, in the spirit of trying to keep things moving and keep the Board fully knowledgeable and aware of progress or lack thereof.

MR. HARSCH: IAWA proponent would have no objection to that.

HEARING OFFICER: Okay. Would anyone present have an objection to my ordering IEPA to provide a written status report in roughly 60 days from today? Seeing no objection, I'll order that. I'll issue a written hearing officer order that will specify what we're looking for and a specific date, but it will be -- you had mentioned the beginning of November. November 1st is a Tuesday. If we

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could have it in hand, that's a little more than 60 days, from today. So if we did a no mailbox, that's what I'll go ahead and require, and I'll document that in the hearing officer order.

MR. FREVERT: You have my commitment to that, and I'll make one more offer. Is anybody in the room who has not been active in participating in discussion with us and they feel they would like to, I'd certainly

welcome that. We'll meet and discuss people and share perspectives whether it be in a group setting or a one-on-one setting, whatever the preference. It's not our intent to have anybody fell like they're left out of the opportunity to help develop a position.

HEARING OFFICER: Okay. So any other questions for this witness? Seeing none, I would just ask counsel for the agency, did you want to move to have the written statement entered as a hearing exhibit?

MS. DIERS: Yes, I would please.

HEARING OFFICER: Okay. I didn't yet mark IAWA's exhibit yet. So this IEPA

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statement Toby Frevert's testimony will be Exhibit 14. Is there any objection to entering that into the record? Seeing none, that will be hearing Exhibit 14, and I've got a copy of that right here.

MR. FREVERT: Okay.

HEARING OFFICER: Thank you very much.

MR. FREVERT: I'm available if you need anything else during the course of the hearing.

HEARING OFFICER: Thank you. Continuing the trend of going out of order maybe, there seems to be a consensus that it a would make sense to go with the Department of Natural Resources' presentation at this point. Is there any objection to doing that? Seeing none, I'll ask counsel for DNR to come up front and take a seat. If you don't mind, can we go ahead and swear you in because I just have a feeling you're going to be asked some questions, and it may just be easier to do it now. Is that okay?

MR. YONKAUSKI: Okay.

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(Witness sworn.)

MR. YONKAUSKI: Stan Yonkauski, Y-O-N-K-A-U-S-K-I, for Department of Natural Resources. The Department of Natural Resources is not so pessimistic about the future and status of the stakeholder meetings. We've all along felt that the process that was involved in the dissolved oxygen proceedings here where the IAWA and EPA have been extraordinarily useful. They've helped focus our attention on the information that we got, our needs, our interests, even though those may not have been communicated terribly well at some point, and even though those stakeholder meetings have been quite contentious at other points. It's obvious that there are

divergent interests and divergent needs on the parts of the IAWA and its members and the Department of Natural Resources, but we believe that there's been some progress made, and the management of our respective agencies, the Illinois Environmental Protection Agency and their department want

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that progress to continue.

To that end, we support Toby Frevert's statement and encourage the Board to authorize extra time, more time for the stakeholder meetings. We will be a full participant and will be working with them to come up with a coherent -- at least a coherent state approach, as coherent as we can, if not a fully integrated proposal involving the major parties, at least that's the hope and the goal.

That leaves us with the -- what we're going to do today, and we do not -- because of this, because of the interest in additional time and additional need to work with the IEPA, we are not prepared to have Dave Thomas's testimony presented today or entered into the record. As Mr. Harsch pointed out, there's some question about what then is that testimony. We would not consider it to be, at this time at least, the statement, the position of the Illinois Department of Natural Resources. Whether it's appropriate to withdraw that testimony

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at this time, leave to refile at some future hearing or to leave it as testimony that may be withdrawn or realize, if you will, at some future hearing, I'd ask advice of the hearing officer. I'm certain it provides some consternation for the proponent or the proposer of the regulation, the regulatory proposal, and as long as there are going to be future hearings, we wouldn't be adverse to it's withdrawal as long as there are other hearings and other opportunities for presentation of the full position of the department.

HEARING OFFICER: Okay. Well, I think there's a -- I mean, no additional hearing has been scheduled certainly --

MR. YONKAUSKI: That's correct.

HEARING OFFICER: -- at this point in time. We simply have the status report that will be filed November 1st by IEPA.

MR. YONKAUSKI: There is an intention on the EPA's part to present testimony, if not comment on, as Mr. Frevert said in his statement. So that at least hints at the

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potential for their interest in a hearing.
HEARING OFFICER: Certainly a possibility. I would suggest that if this rule-making goes forward, I cannot imagine that there would not be another hearing, but I think you indicated that at this point in time Dr. Thomas's prefile testimony does not represent the position of DNR?
MR. YONKAUSKI: Correct.
HEARING OFFICER: Then I'll leave it up to you. If you want to make a motion to withdraw that testimony with leave to refile it, I can consider that motion. That's up to you. I'll open it up too for any potential objections. Mr. Harsch, go ahead.
MR. HARSCH: I don't have any objection, in fact, would be more than willing to support any motion that DNR might want to make for leave to withdraw for the right to refile, refile it as written testimony in the future. In the event that there's not a hearing and DNR wishes to do so, they could move to file it for inclusion in the record in whatever manner, but I think
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it makes more sense to withdraw it at this point, and we can move forward if there's a future hearing accordingly.
MS. WILLIAMS: Can we talk about practically how that would work?
MR. YONKAUSKI: Please.
HEARING OFFICER: You're asking me to?
MS. WILLIAMS: Yeah. Sorry. I've just never seen this before, so I'd like to understand.
HEARING OFFICER: Well, why don't I continue to survey opinions here.
MR. ETTINGER: I'm Albert Ettinger, E-T-T-I-N-G-E-R. I represent Prairie Rivers Network and Sierra Club. I would suggest that we not simply withdraw it because Mr. Yonkauski has now testified all about this document in the record, and anyone reading the record is going to want to know what the discussion is about. So if it's withdrawn, I would like to offer that it be readmitted as a hearing exhibit with the explanation that it is what it is now, and if DNR doesn't ascribe the same thing to it that
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it did before, then Mr. Yonkauski's testimony describes where it is now, but at least somebody reading this record will not find all of this discussion of a mystery document.
HEARING OFFICER: Any responses to that argument?

MR. HARSCH: That opens up a tremendous area of concern to IAWA. If it's entered into the record, what weight is it going to be given by the Board as an exhibit? As far as we are concerned, prefiled testimony that is not presented shouldn't have any weight. If DNR wants to submit it as a public comment at some point in time in the future, they can do so. The record shows that it does not reflect at this point in time necessarily the view of DNR.

MR. YONKAUSKI: I would be uncomfortable with leaving it as an exhibit. It's either going to be our testimony at some point in the future or not. I'd be uncomfortable leaving it as an exhibit as something then that we have to go and put an asterisk by, like Mark McGuire's home run

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record, something that we would then have to explain ad infinitum. My belief, but it's based on an experience, is that the testimony, if it's not presented, isn't anything. It's just a document that's sitting in a file some place, if you will, until such time as it is tendered and Dr. Thomas stands for cross-examination. I don't anticipate that the product of the 60 days effort between the IEPA and DNR will result in anything like Dr. Thomas's testimony presented in the future. I anticipate that there will be progress made towards something that the stateside can agree to. With that anticipation and hope, I would move that the testimony be withdrawn with leave to file at some future point future hearing.

HEARING OFFICER: Okay. So that's the motion which IAWA I think has indicated they have no opposition to. Mr. Ettinger, you're opposing that? You object to that?

MR. ETTINGER: You know, frankly, you know, it's out there. We've all seen the

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nasty thing. If Dr. Thomas ever comes in and testifies or DNR ever comes in and says something that flatly contradicts that, I'm going to offer it. I may turn around and offer it -- the Board's rules are very liberal as to what they'll accept as a public comment. I can turn around and offer it as something Albert Ettinger got from, low and behold, the Pollution Control Board website. So, you know, if you want to go through the process of physically withdrawing it as a DNR submission so that Prairie Rivers Network -- put it back in as Prairie Rivers Network

submission in a week, fine.
MR. HARSCH: If Albert wants to follow that procedural step, he's free to do so. We'll do a lot further in the stakeholder operation process I'm sure.
MR. ETTINGER: I don't want to spend a lot of time on this. The fact of the matter is it's out there. Whatever horrible effect it's going to have, we've all seen the nasty thing. So we can leave it in the record and not -- we will probably -- since we've all

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seen it, I can tell you it won't go away, but maybe it will go away in the sense that it will never be of any practical necessity because hopefully we'll all come up with an agreement and there will be no need to offer any further exhibits like that or any other thing other than our magnificent agreement, which we'll be producing to the Board.
HEARING OFFICER: IEPA's counsel?
MS. WILLIAMS: I just wanted to say for what it's worth, we agree with Roy and stand that we would like to see this out of the record for the time being.
HEARING OFFICER: Off the record.
(Whereupon, a discussion was had off the record.)
HEARING OFFICER: I'm going to grant DNR's motion to withdraw the prefiled testimony of Dr. Thomas. As DNR's counsel has represented in his testimony, the prefiled testimony does not represent DNR's position anymore. So I think it will be less confusing for all involved to grant that motion to withdraw, and I will also document

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that in the hearing officer order that sets the 60-day status report. That will hopefully help clarify to anyone reading this transcript exactly what has transpired, and hopefully we can avoid any of the confusion that Mr. Ettinger thought may be brought. So with that, the motion is granted, and did you want to continue with any additional testimony at this point?
MR. YONKAUSKI: No, I think 60 days may be barely enough, but as long as it's just a status report in 60 days. We recognize there's a lot of work to get done, and we're looking forward to it.
MR. JOHNSON: Those of us that read this document, are we going to be required to forget it?
MR. YONKAUSKI: Yes or put an imaginary asterisk next to it.
MR. JOHNSON: Okay.

HEARING OFFICER: Are there any questions for Mr. Yonkauski?
MR. HARSCH: Just a statement of thanks.

HEARING OFFICER: Seeing no questions, the Board doesn't have any questions at this point, thank you for your testimony this morning. I think at this point we can veer back on course and continue with IAWA's presentation.
MR. HARSCH: Thank you. I guess a little bit of follow-up. We are heightened by today's events that have occurred and looking forward to working with IEPA and IDNR and other stakeholders at either reaching an agreement or eliminating the issues in presentation to the Board in what will most likely be an additional hearing. We have two witnesses today. I think it's important that we bring the Board up to date with respect to what we believe as proponents have occurred in the year since the last hearing. At this point in time, I'd like to call Dennis Streicher.
HEARING OFFICER: Mr. Streicher, I'll just remind you and the other IAWA witnesses, you've already been sworn in.

BY MR. HARSCH:
Q. Mr. Streicher, will you state your name?
A. My name is Dennis Streicher.
Q. Have you previously testified in this proceeding?
A. I have.
Q. I show you a copy of what was filed with the Board as written testimony. Mr. Streicher, is that an accurate copy --
A. Yes.
Q. Did you prepare this prefile testimony?
A. I did.
Q. Would you please summarize this statement for the record?
A. Okay. Let me again introduce myself, Dennis Streicher. I'm director of water and wastewater with the City of Elmhurst. I'm also president of IAWA, and I've been involved in the stakeholder process from the very beginning. As Roy said earlier, I'd like to thank a number of folks who have really helped out in this whole process, Toby Frevert and all of the IEPA staff, Bob Mosher and Paul Terrio, Gregg Good, as well as the IDNR folks who were at the meetings. Those who attended

the stakeholder meetings were, I think -- as stated earlier, were educated I think in our process and what our goals were and motives were in bringing this petition, and I think really after a lot of work and such, we had more things that we agreed on than we didn't. I've been asked to summarize this, and I'm going to attempt to do that, and excuse me if I'm being a little extemporaneous with this because I am. As things have evolved, you know, I've been having to rewrite and rethink my testimony a couple of times, but in my written testimony, I had, I think, outlined probably three major topics or three major points that I kind of wanted to touch on.

Throughout the last year in talking with folks all over the state many of whom were opposed to this petition or have a sense about it, I'm seeing a perception on a lot of people that this is, and you'll see these words used in testimony as roll back or a lessening of a standard or that sort of perception, and I just want to ask the Board to look at the data and not think of this

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perception. It is just an unfortunate perception, not our goal to roll back or to lessen a standard.

We represent the wastewater agencies across the state. We are -- our constituency is all of the state constituency. Our goal is to do what's right with the water environment, and as like any rule, you want it to be right. You want it to be on target. You want it to be science based, and that's what we're focussing on. Many of these things get to be discussions that are based on, again, perceptions or politics, and we just can't let that get injected into this discussion. I think it needs to be science based. The current standard, as Toby Frevert said earlier, is unworkable. It doesn't suit -- it doesn't serve the state. It doesn't suit the needs of, if I can express the needs of a natural environment, it doesn't express the needs of those rivers and lakes. It's antiquated. It's never been reviewed in some 30 years. It was probably put together at the very beginning quickly without a lot of background and data support.

Over this time, we've gotten that information, and in fact, even over the last year

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these stakeholder meetings has generated a huge amount of interest in a number of agencies, and as Dr. Garvey will testify later, much more technically than I, it's amazing how the Whiles/Garvey report has so accurately predicted what occurs in natural streams. The standard we have today creates violation, and it puts us as an industry, and I hate to use the word industry, but we are a profession that is focussed on water quality, and it puts us in

a place that we need to modify our process and spend money -- spend taxpayer money to achieve a goal that may never in the end be achievable by having incorrect or inappropriate values or goals for the rivers. The DO numbers that we are shooting for today just can't be met many times of the year.

One of the jokes I had or one of the kind of cynical statements I had in the last year is that when you take pristine rivers in Illinois that don't meet the current dissolved oxygen standard, and to fix it what we should do is build a dam and put in aeration devices and take the pristine river and make it an artificial river and add oxygen that way. Of course, that's facetious, but that may be the only way that we can actually

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get some of these rivers to meet the standard. What's wrong here? It's not the river. So we need to meet the standard.

Those perceptions that I mentioned came out in a number of conversations that I had with folks across the state, and I know the Board has received a number of letters and petitions. They're all posted on the website of Fox River people, in particular, who are writing a form letter kind of echoing that perception that we are lowering the standard. As though -- I guess, as though our industry can set a standard of an unrealistic number and somehow turn the dial and get the river to go up to that number. Or conversely, if we set the standard to a different number that may be lower at times of the year, we could turn the dial back down, and somehow or another all this follows. I think what we want is a standard that follows a natural process, not a standard that forces a natural process. It doesn't work that way. But that perception is out there. A lot of these folks have the idea that we are selfserving in this position, that we are attempting to lighten our own expenses or lighten our own load, and that's just not the

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case. Enough on that.

Another point I wanted to talk about was the stakeholder process itself, and I mentioned EPA and DNR. Prairie Rivers was in there. USEPA was there. A number of interested stakeholders, and I was amazed at the breath of interest that we had from across the state. I think there was a genuine desire to get this work through, and there was a lot of time spent to educate those folks on some of the science and some of the motives and goals that IAWA had. I'm not sure that in the end now, considering how things have changed, that we have actually been successful in that.

However, while not being successful in motives and goals, I think everyone sees that the data that have been presented over the

stakeholder meetings and the new studies or the new reports that had been submitted are enlightening everyone greatly, and they can't deny that. They can't deny that new information. What happened during the stakeholder meeting, though, in one way made me a little uncomfortable because -- and I mentioned this in previous testimony, that you don't negotiate facts, and I have a city manager at

Elmhurst who I'm privileged to work for, who is an engineer himself and has used that statement over and over again that you're allowed to have opinions. Everyone is allowed to have an opinion, and everyone's allowed to change their opinion, but don't change the facts. The facts are what they are, and I got myself into occasional feelings of feeling like we weren't getting anywhere with the stakeholder meetings because we found ourselves in a position negotiating facts, of negotiating a river that may be having the old standard and a river that has our new proposed standard. Negotiating times of the year when things happen because we are in our petition proposing that there be seasonal adjustments to the DO -- allow DO in the rivers, and we've got data to support the dates that we've presented. We've got data to support that all of the rivers, at least a very good number, if not all, but a very good number of these rivers, will work and operate very well with our proposed standard, but yet, we got into this business of negotiating. And I felt very uncomfortable with that, and I've said that many times. I just don't want to negotiate the facts.

So in the end if there's compromises, and always there is compromises, I ask the Board to just be aware, compromises are going to be leaving out rivers or including rivers, whatever the case is, you need to just look at the notes, look at the data.

I've been summarizing this, and as I said, I've been extemporaneous, and I'm going through this very quickly, but I'm -- in the end, I'm impressed with our DNR folks, at least those that attended the meetings. I think that they have a genuine interest to do things that are right. Unfortunately, I think that it's the EPA folks who are really going to be on the hot seat when it comes to enforcement and in having a regulation that is workable and that reflects what is going on in the real world. The DNR are great. They have perception of wanting to protect everything, but it's the EPA guys who are going to have to enforce the speed limit, and I think they see the reality in this, and the reality in our petition. So that's a summary. That's what my -- my testimony.

MR. HARSCH: At this point in time,

Mr. Hearing Officer, I'd like to move prefiled written testimony of Dennis Streicher as Exhibit 15.

HEARING OFFICER: Motion to enter Mr. Streicher's prefiled testimony as a hearing exhibit. Any objection to that? Seeing none, I'll go ahead and mark that. I'm sorry.

MR. CHINN: Howard Chinn from the Attorney General's Office.

HEARING OFFICER: Sure.

MR. CHINN: I just have a question. Whether his testimony is verbatim of the prefiled testimony?

HEARING OFFICER: It is not, and correct me if I'm wrong, Mr. Streicher, but you were summarizing and perhaps adding some additional information orally today.

MR. STREICHER: I've been asked to summarize, and I did that as best I could, but I probably did elaborate on some points further than I did in the written testimony.

MR. CHINN: Thank you. When will the transcript be posted?

HEARING OFFICER: Probably the middle of the week of September 5th. That's our -- the standard turn around on transcripts I think is 8 to 10 working days. So it may vary depending on the length of our hearing today, but I would think the week of September 5th.

MR. CHINN: Thank you.

HEARING OFFICER: So that was not an objection to the motion. I see no objection to entering prefiled testimony of Mr. Streicher as a hearing exhibit, and that will be Exhibit 15.

I ask counsel for IAWA, do you want to open it up for questions for this witness, or would you rather have questions posed to the three of you as a panel?

MR. HARSCH: I think it would make sense to do it as a panel. I do have one kind of follow-up question.

BY MR. HARSCH:

Q. Dennis, can you explain for the Board's edification where IAWA is with the process of efforts at moving forward with stream classification regulatory development?

A. Right. IAWA, as I mentioned earlier, is focussed on hopefully developing the best regulations to work with, and this petition that's before you now is maybe a first step in that regard. The IAWA has several months ago authorized a number

of funds, a lot of funds of our own private association funds, to begin the process of reviewing use designation categories in Illinois, and to take a look at what we might do to revise where Illinois is today. IAWA has hired a consultant to this regard. We've gotten a committee together of some very technically competent folks, and we're proceeding with this. We've got a letter out to the a number of stakeholders who participated in this stakeholder meeting and are inviting them to the table to begin that discussion, and we'll be inviting IDNR to work with them. Our intent is that DNR has begun assembling a list of what might be called, I guess, outstanding resource waters, list of a streams that they would like to have identified as having that higher use, and that's fine. That may be one of the categories that we end up.

I think the focus here is that IAWA is moving forward on this in an attempt --

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including everybody in the process, in an attempt to try and maybe make up for some of the past omissions or errors or just get things back on track in terms of identifying the best rivers, the crown jewels, they've been called in Illinois.

MR. HARSCH: At this point in time, I'd like to call Dr. Garvey.

BY MR. HARSCH:

Q. Dr. Garvey, please state your name for the record.

A. Dr. James Garvey.

Q. And, Dr. Garvey, I show you what has been marked as Exhibit 16, which is your prefiled testimony with the inclusion of Exhibit 3, which was not included in the prefiled testimony. Is this a true and accurate copy of the prefiled testimony you prepared?

A. That's correct.

Q. Dr. Garvey, can you extend your possible -- summarize your testimony?

A. Okay. I'm not sure if this is the right way to go as well, but when I'm giving my summary, if you have questions, feel free to ask as I go along. That might make this go a little

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faster, and also I think it will be helpful for people if they have points of question. Again, because this is a summary of my written testimony, I'm not going to go into the same amount of detail. So I want to make sure that people understand what I'm talking about.

Thanks to the Board for hearing me today. I'm Dr. Jim Garvey, and I'm associate professor in the department of zoology at Southern Illinois University of Carbondale. I'm also the associate director of the fisheries and Illinois Aquaculture Center at the same institution. I'm

ecologist by trade primarily in aquatic systems. Most of my work is focussed on fish and fisheries related issues. However, I've worked in many other aspects of aquatic ecology. My primary interest from a research perspective is trying to understand the effects of the physical environment on the organisms that exist within aquatic systems, primarily fish assemblages.

There are generally two approaches to ecology, I would have to say. One of them is to focus primarily on organisms and try to understand why they are in a particular place at a particular

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time. People who do ithiology or any of those sorts of cology sorts of fields have a tendency to focus on these individual case studies, if you will, of particular organisms.

My work is, though I've obviously have been trained with ithiology, my work is generally college. We're looking for general patterns, trying to understand what influences the suite of organisms that exist within a particular system. I think it's very important to note that that's a very different approach and a different way in thinking about ecology and environmental issues.

I got involved in this process about two years ago. IAWA initially approached Dr. Matt Whiles, who's another aquatic ecologist at Southern Illinois University, to generate a report assessing the current dissolved oxygen standards in the state. Matt who primarily works at the invertebrates thought that it would be good to get a fish person involved. So he got me to be involved with this. I'd like to clearly state to the Board and everyone in this room that there were absolutely no expectations placed upon Dr. Whiles or I about what was to go into that report. The only thing

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that we were asked to do was to provide our professional assessment of the current standards in light of the national criteria document that was developed by the USEPA in the '80s and current information that was available to us. All right. Completely independent analysis. There was no influence other than more or less Whiles and I and talking to our colleagues, professional colleagues, when we developed this report.

We concluded that the current standard in Illinois doesn't work. We came up with a modified standard of which the Board is well knowledgeable. Essentially, we came up with a spring standard and a summer or the rest of the year standard. The reason why we had two different standards was we know that the early life history stages of many aquatic organisms appear generally in the springtime, and we wanted to make sure that we had protection for them because we know that they're

more sensitive to hypoxia.
The summer standard was an attempt to reconcile the fact that we know that water at warm temperatures tends to hold lower oxygen, and we also know that communities respire. They actually

breathe. Just like individuals do, well, entire assemblages of microbes and fishes and invertebrates breathe air in the water, and that's going to influence the amount of oxygen that's available to the organisms out there. They're going to respire more during the summer than they do during the wintertime. So our standard was developed to deal with that.
In the second hearing before this Board, I was privy to the analysis of data, continuous DO data, that came from eight Illinois streams, and I provided my analysis of that relative to the proposed standard by IAWA, which more or less came from Garvey and Whiles report, but I also looked at the current Illinois standard, and I found that the IAWA standard tended to find the streams that had a DO problem still found a DO problem. And the IAWA standard found that streams that didn't have a DO problem still fell within not violating that particular standard.
So in other words, the proposed standard worked, whereas, the current Illinois standard often found violations in streams that were otherwise in pretty good shape from the perspective

from the biology, the fish assemblages and active rivers found within these particular systems.
After the second hearing, we obviously wanted to have a series of stakeholder meetings to discuss how we might take the Garvey and Whiles standard and make it more amenable to the various agencies and groups that were interested in this. My general points of contact outside of the stakeholder meetings -- and I did attend most of the stakeholder meetings; in fact, I attended all of them -- was primarily with IEPA with Bob Mosher who I interacted with, and IDNR was Scott Stuewe who is the acting chief of fishery, and we talked a lot about how to develop the standard, and we also agreed to disagree upon particular issues that also came out in the stakeholder meetings.
What I found from my outsider perspective is that the stakeholder meetings were very, very useful. I think they were very -- well, I think everybody came out and had their opinions, and it worked out very well. Some of the things that we developed during that process is we added a 30-day mean, which was suggested I think in the second hearing. The 30-day mean of 5.5 milligrams

per liter, and I think we talked about that during

the second hearing, and I'll talk a little bit about analysis to see whether that works okay for this. We still found that it generated a lot of violations for streams that probably shouldn't have violations.

In addition to the analysis of eight streams or continuous data that was done by USGS, Paul Terrio and his crew, we also got some data from Ohio EPA, Ed Rankin who's a biologist. He used to be Ohio EPA, but now he's with the Center for applied Bioassessment and Biocriteria, provided us with a draft via Ed Hammer, I believe with the USEPA. And in general, his analysis was, again, looking at DO and biotic integrity relationships in the State of Ohio, which is very similar to Illinois.

And I'd have to say that you can break down his analysis into two parts. One, the analysis are looking at the specific species accounts. What species were present as a function of the grab samples of dissolved oxygen that were taken at a particular site. And they found that there was variation among the species in the average DO that was found in on the particular site where

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that particular species resided. Well, that makes sense because some species might be in areas where DO might be elevated for whatever reason. It could be gradient. It could be better water quality from the perspective of less nutrient loading and those sort of things.

What I'd like to point out is that when you're looking at species accounts, as I said before, you can run into a misleading issue of finding or not finding species in particular areas and trying to then assume causality. There's no DO here when that species not here, but when it's low DO that's causing that, but the reality is is that there's another suite of factors that are influencing the presence or absence of that species. Whether that species was there historically, whether that species is affected by the habitat, which is then related to the dissolved oxygen in that particular system, whether that species was extricated by, say, for example, somebody coming in and dumping a toxin in that particular stream. Attributing it to the low DO is probably not the best way to go because you can really run down some particularly misleading paths if you're focusing

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primarily on individual species accounts and trying to relate that to just taking DO. You have to do analysis to try to tease those factors apart.

Also, in the Rankin report, which is a robust analysis, in my opinion, and that analysis was to look at community matrices based on the macroinvertebrates and based on the fish assemblages that were there. So the IBI and the

ICI, and trying to relate that to dissolved oxygen. If you take a look at this report, you'll find that the relationship between dissolved oxygen from grab samples, minimum levels that were found in the grab samples, continuous data, look like someone took a shotgun and shot it at the wall in general. All right. Very little relationship between -- or at least apparent relationship between the dissolved oxygen and the community of matrices. That is one of the exhibits that I --

MR. HARSCH: Exhibit 4 of your prefiled testimony.

DR. GARVEY: Yes, and you know, they look like this (indicating). All right.

MR. HARSCH: You're referring to which page?

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DR. GARVEY: Figure 3 in Exhibit 4, I suppose.

HEARING OFFICER: So this is figure 3 and attachment four to Dr. Garvey's prefiled testimony?

MR. HARSCH: Yes.

HEARING OFFICER: Which will be part of Exhibit 15. So there will be no objection.

MR. RAO: I have a question.

MR. GARVEY: Yes, jump in.

MR. RAO: I saw those kind of plots, and I saw no correlation, but then you also had some box plots left. Could you comment?

DR. GARVEY: That is figure five, and if you take a look here, it has what are called the ICI range and the ICI narrative range, which are just more or less mildly equivalent to the IBI. The higher the score, the more sensitive organisms to habitat quality may be oxygen. We're not really sure exactly what the factors influencing it, but from a biological standpoint, biologists who work in these systems, the streams that look

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good that they think are intact, not affected by humans have a tendency to have a suite of invertebrates assemblages, and that's the reason why they look at that. There does appear to be a trend here. All right. But again, the scatter around the median and the means in these box blocks are huge. So we're not going to put a huge amount of -- but there is a relationship very, very weak of DO. However, it should be noted that even if systems with very high ICI values, very, very high, that on occasion, not a lot, but on occasion, these systems have been found to either veer around 4 milligrams per liter or even below that.

In science, the reality is that we always talk about consensus, and the thing that will kill any theory in science is the one exception, if that happens. In this case, there are a lot of exceptions here. Maybe not a huge number, and there does seem to be a track between DO and probably habitat quality regions of the invertebrates that are in that particular system, but it's really

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hard to, again, assign causality to DO as the major factor that's influencing the organisms that are in that particular system.

So I just want to be careful that when we take field data and we try to make broad statements about it, that we must understand a lot caveats associated with it, and that's why we do have to do specific laboratory experiments. We have to look at the particular tolerances of the organisms and determine DO sensitivity that way, and then extrapolate that to the field through inductive testing. I just want to caution people on that.

So through the stakeholder process, talked a lot with Illinois DNR. They seem to take a pretty -- I think, major role at the outset. Primarily led by Scott Stuewe, Jim Nick. They did come up with a list of streams that is summarized -- well, I guess I can't say it's summarized in Thomas's prefiled testimony, but there is -- and I do believe that there should be some movement, and I think that's already happening, toward

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streams that are the really high ICI streams in that Rankin document that have habitat qualities that probably are related to dissolved oxygen to some extent that we don't really understand that. We need to identify those streams in the state and assign them extra protection. Are we there yet? Well, I think IDNR worked really hard to come up with an initial list of streams, but I still think we're working towards that goal.

Another issue that I think is still, and we thought when we came to this hearing, was a major unresolved issue, was spawning timing issues. When do we implement the spring spawning time or spring standard and summer standard. IAWA regarding Whiles report proposed June 30th as being the cutoff or July 1st being the cutoff between the two times.

I did a series of analysis to look at that. I'm sure I'll get asked a lot of details about this. So I'm probably not

going to go into it right now, but the reality is it seems to hold based on my

analysis of the effect of spawning time in the state. One thing we did talk about during one of the stakeholder meetings, though I never know what happened to that was should there be a north/south split because we know that temperature is a major factor influencing the timing of spawning in fishes. Fish are ectotherms. They heat up with the water. When the temperature and photo period are right, they spawn. In the north, they probably spawn a little later than with that equivalent species in the south. So there might be some cutoff between those two.

And so after my analysis, I suggested that probably the current IAWA proposal of the June 30th, July 1st cutoff for the south probably works, and July 15th would probably be acceptable for the north. That's in my prefiled testimony as well.

So more or less, that is an analysis or I guess a summary of what I was involved in with the last year. Again, I'd like to just reiterate, and I said this in my prefiled testimony as well, that the reality

is is that -- oh, just one other thing that I guess I should point out --

HEARING OFFICER: Can I interrupt you?

DR. GARVEY: Yeah.

HEARING OFFICER: Before you -- we had a question on the north/south issue.

DR. GARVEY: Sure.

MR. RAO: Yeah, in going over your prefiled testimony, we saw one of the recommendations was maybe have the early life state period different for the northern stream and southern stream. Do you have any analysis as to how we identify these streams?

DR. GARVEY: We -- well, one way to look at it is just look at climatology and look at the -- oh, I don't know, the degree days, which would be the amount of cross days that are in a particular part of the state. We talked about I-70 as being a reasonable split. Some people say whether above I-70 below I-70 is different. If you take a look at the climate maps, they actually look like they kind of correspond with each other, that is, cooler north of I-70 and warmer. And

that does correspond with other sort of ecological ways of looking at the species that were present, that sort of thing. So that was the potential split, and you know,

IDNR -- I think Scott Stuewe was the person that suggested that.

MR. RAO: Well, hopefully in the future we'll hear a little bit more.

MR. STREICHER: We haven't checked with IDOT on that.

MR. RAO: Yeah, they're not part of the stakeholder group?

DR. GARVEY: They should be. They're invited.

The only other issue I think that did come up was the issue of spawn timing. Also, we know that there are these tricky species that begin spawning late spring, and then from spring spawn through October, and I know that in the last hearing and the first hearing we went through a lot of this. Again, this is something we're trying to rectify because we know that during the summertime the streams respire, water doesn't

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hold as much oxygen, and yet, there are still species that do very well. Even with the list of streams that DNR came up with that were based on DO sensitive species that are present in those systems, I think 30 segments were found to actually have DO problems. They're actually listed for DO problems.

So how can a DO sensitive species be present in a system with a DO problem? That's hard for me as a biologist and as a scientist to rectify in my head. I won't go any further with that, but that's something we should take into account.

HEARING OFFICER: If I could just ask you a question. I was actually go going to ask Dr. Thomas, but I'm going to ask you instead.

DR. GARVEY: Okay.

HEARING OFFICER: Is the mere presence of those DO sensitive fish the end of the analysis, or do you look at fish abundance?

DR. GARVEY: Well, that's the problem is that in general the presence or absence of the species is a very different factor than

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the actual abundance than the reproductive ability and all those sort of things, and I'll probably just reiterate what I've said time and time again. Most of these analysis are the presence or absence of the species and maybe have some rough high/low abundance thing, but I don't know if that data -- those data are available, to tell you the honest truth, at that level for that kind of analysis.

HEARING OFFICER: Okay.

DR. GARVEY: So finally, what I'd say is you need to take into account the habitat when you're looking at these particular systems because habitat is the important template, and the DO probably comes in as the secondary factor as the organisms that we see in those particular systems, and I'll leave it at that.

BY MR. HARSCH:

Q. Dr. Garvey, let's go through the exhibits and have you briefly explain what they are.

A. Okay.

Q. Attachment one, which you referred to

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in the prefiled testimony as Exhibit 1, what is this document?

A. This is a document that was brought to my attention by some folks in Illinois EPA. This was developed by a Chris Yoder, I believe at Ohio EPA, and more or less, what they found is that originally the state had, I believe, a minimum of 6 milligrams per liter for waters that are considered to be exceptionably warm water habitat, and they did an analysis and found that, more or less, a lot of the streams are going to violate that. They're going to drop below 6 milligrams per liter. So this is analogous to that 6 milligrams per liter for 18 hours a day or 16 hours a day?

Q. Sixteen.

MS. MOORE: Sixteen.

BY DR. GARVEY:

A. Sixteen, I just can't remember. In this state, that the reality of reception waters could get that. And so what this document does is, more or less, look into data that they had, and actually that Rankin document that we'll talk about a little bit, I think probably drills on the same source, and they found that instead of a minimum of

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5 milligrams per liter and a daily average of 6 milligrams per liter is probably more realistic for waters that exceptional habitat. I'm not sure what the distribution of these streams are in the state, and again, this is the to best of my knowledge, so if anybody has read this and found something different, they should let me know. But again, I don't know really the characteristics of the streams that are considered the exceptional water habitats warm water habitats in Ohio. I mean, I don't know if they have the special characteristics in terms of habitat or how they're distributed round state.

BY MR. HARSCH:

Q. What is attachment two that you referred to as exhibit to your prefile testimony?

A. Exhibit 2 is an analysis that I presented during the great continuous two-year data

of DO from eight Illinois streams that Paul Terrio gave to me from USGS. This is the actual report analyzing those data. So this is a more -- they said it was a cleaned up version, but when I looked at data that I had versus the data that presented at the last hearing and the data that they used is

pretty much identical, but more or less, it's just a little bit more detailed analysis of what I presented in the second hearing.

If you want to know what it says, it more or less says that there's a lot of variation among streams in the state in terms of the DO, and Paul did a more specific analysis in the -- that we'll talk about in a few minutes.

Q. What is Exhibit 3 then?

A. That I believe is what we just brought in today, the color copies, right? And this is an analysis of the day that I, again, analyzed when I gave my presentation in the last hearing. This was done by Paul Terrio through USGS. This was not done by me. Okay. So this is, more or less, an independent analysis of what I testified to.

In a nutshell, as far as I can tell and other people again can refute me, it first takes a look at just the Illinois daily minimum of 5 milligrams per liter. It puts the continuous monitoring data into that, then it finds that streams that are in really bad shape in the state have a tendency to violate 5 milligrams per liter a lot. Streams that are more northerly, probably

don't violate it very much, maybe 1 1/2 percent. And then there is, of course, Lusk Creek, which is a difficult stream in the southern part of the state. That's a valuable resource, and the current standard, as I mentioned in the previous hearing, the current standard violates about 23 percent of the time. In other words, if you're going to go out to that particular site, take a DO reading, you're going to say there's a DO problem in that stream. On the other hand, if you take a look at the fish and the invertebrate there, this is a pretty valuable stream. So we've got a problem here. The science doesn't necessarily fit the theory. All right.

So what Paul then did is looked at a couple scenarios. One of them was to -- what he called scenario one here, which states the exception of water, the warm water habitat, Ohio standard. And just tries to fit the daily minimum of 5 milligrams per liter in the seven-day -- actually, he called it the 7-day mean minimum 6. He found that it still violated streams that we think are in pretty good shape quite a lot.

Q. Which streams are you referring to?

A. The North Folk Vermillion, the Middle Fork Vermillion, the Vermillion River, and Lusk Creek, in particular, would be the ones that I'm talking about.

Then there's another analysis that Paul did, and that was scenario two on these sheets, and what he did there was he looked at the IAWA's seasons and the IDNR's seasons, this is when we were sort of haggling about what the seasons should be, and applied a 5/6 standard to the nonsensitive season. Again, based on what Ohio does, and then an even a more stringent standard during what we consider to be the sensitive season, a minimum of 6 milligrams per liter and a 7-day mean of 7.8 milligrams per lighter. And lo and behold, IAWA seasonal designation and the IDNR seasonal designation were about the same. They found that the violations were, you know, 4 percent of the time somewhere.

Finally, we look at the IAWA scenario, which is at 3.5 milligrams per liter and 4-day mean minimum -- or 7-day mean minimum of 4, and a 30-day 5.5 milligram per liter average during nonsensitive seasons, but during sensitive seasons

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one of 5.6. And basically, you can look and you can see that the IAWA proposals, more or less, the number of false violations fall zero for all the streams that we care about, Vermillion -- the Forks of Vermillion, the Vermillion River and Lusk Creek, in particular, are the important ones.

The only one that's a little bit disturbing is the 30-day mean of 5.5 milligrams per liter, again, was found to violate the standard 24 percent of the time, the proposed standard by the IAWA. So this analysis was very helpful. It kind of indicated what I talked about the last hearing. At least my interpretation of it is that it more or less mirrors what I already talked with you about. So do you have any questions about this for my interpretation?

MR. RAO: Can you come up with a written explanation of what he did, or is this just what you got?

DR. GARVEY: Just what I got. Let's just say, during the stakeholder meetings, we were free to interpret the data without the interpretation of various agency folks. All right. And so that's my interpretation, and

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I leave it up to science experts from other groups to look at this.

MS. WILLIAMS: Dr. Garvey, if you don't mind my interrupting, I think the agency would intend at some point that Paul be here for you -- available to ask him questions if we have another hearing and

explain himself of the data, that would be helpful.

MR. RAO: Very helpful.

BY MR. HARSCH:

Q. I will draw your attention to what you refer to as Exhibit 4 attachment 4 to your prefiled testimony. Can you explain what that document is?

A. This is a draft document that was provided by Ed Rankin. Who was formally with the IEPA. He's more or less a fish biologist, but now he's with the Center for Applied Bioassessment and Biocriteria. This is actually, I believe, that previous Ohio EPA document that I showed you by Chris Yoder. This is more or less another analysis that was very similar, but with more data. Again, to get relationships that are scatter plots --

Q. You're referring to which?

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A. I'm referring to figure 3 IBI and ICI values for minimum dissolved oxygen graph data. So it's the same deal. It's really hard to place any strong pattern. If you took a look at the minimum values in figure 4 of that document, again not very often, but some of the streams with really high IBIs did drop a low four on occasion. All right. And again, in these box plots -- you know, it was a rare event, but they did occur. So if EPA biologist just happened to be out taking a grab sample at that time, they would say that system that had a high biotic integrity had low DO and it was in violation. All right. So that was, I guess, the main issue associated with this.

This document also has specific mean DO values, tables and tables, for various species, and we could attribute -- if you take a look at a particular species of the invertebrate or fish here, you could interpret the DO values, the means, as reflecting their DO requirements, but again, I caution that there's also a habitat that formed in here, and it's very difficult without doing the right kind of analysis, more laboratory based experiments, it's really hard to interpret

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these data.

MR. RAO: I have a question on one of the -- that Rankin discussed the difference he found between grab samples and continuous samples.

MR. GARVEY: Yes.

MR. RAO: He said that the continuous samples underestimated the measured DO values compared to grab samples. Is that something that needs to be considered when establishing the standards and how we implement the standards?

MR. GARVEY: My personal opinion, yes. I think grab samples are horribly misleading

if you take them during the day. If you take them during the day of systems that might have a very bad DO problem, you're not going to detect that particular problem unless you have continuous data to show you when the DO stags occur. I've talked with other biologists that have found that sometimes the DO doesn't drop right at mid or very, very early morning and dawn. Sometimes mysteriously the DO actually is lowest at

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midnight. Okay. And so even if we sent our poor biologist out to go take grab sample predawn, it might not be picking the periods of lowest DO. The biologists don't understand why this is occurring, but some of my colleagues found that that occurs. So implementing with continuous data in my opinion is really the way to go with this, and we mention that in our report.

MR. RAO: And is that part of IAWA's proposal, or would that be for the agency when they --

MR. HARSCH: I think we went on at some length at one of these hearings about the appropriateness of how -- whether we were proposing a standard, and then there was a long line of questions about the implementation, and I think Mr. Frevert cautioned that that was really within the agency's purview, and that if we develop the standard, they would be coming forward with the matter that it should be implemented, but we have gone on record as recommending the use of continuous DO monitors, and in fact, I

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think Dennis has testified that a number of IAWA members are in fact installing DO continuous monitoring data recorders and that data is being made available.

MR. RAO: Thank you.

DR. GARVEY: Any other questions about the Rankin document?

BY MR. HARSCH:

Q. No. I draw your attention to Exhibit 5 or attachment 5 to your testimony. Can you explain what this document is?

A. Sure. During the stakeholder process, I obviously was trying to think a little bit more, Scott Stuewe brought up the fact that spawning timing probably differs among fish, primary channel catfish throughout the state. Channel catfish economically important species for both the recreational and commercial standpoint. They're also known to have as early life stages that are relatively sensitive to DO, which is a real curious thing given the fact that it is from the early

summer spawner. So I decided to take a look and try to understand a little bit more about that to try to come up with this north/south split.

More or less, I went back to the literature, and instead of looking at the -- a lot of the time if you take a look at the early ecological test, and actually the most recent ones, they tell you that species spawn on certain months, you know, May through July or something like that. Obviously, May through July for a fish in the southern part of the state and in the northern part of the state are going to be a different experience in terms of temperature. What I did is try to go back to the literature and look to see whether there was information on the actual spawning times in terms of temperature for these species. They were more limited, and a lot of the time the spawning temperature was given an initiation, what temperature was needed to initiate spawning, but not necessarily -- they didn't give the entire range. So with this analysis, I just more or less asked the question, how is temperature in the state as it varies from northern and southern systems, and I took some of the data from Terrio and what I have already showed you, the temperature data, and just looked to see how the temperatures differed between the northern region and the southern region. I

found that there was a pretty significant difference in the amount of the warming that occurred in the springtime, which would then influence more or less when fish would initiate spawning.

From that analysis -- well, you know, it's kind of tough, but what I try to do is take into account the proportion of species in Illinois, and when they should initiate spawning, not go through the entire spawning time, but at least initiate spawning. What I found is that there was a north/south difference that probably by early June in the southern part of the state 95 percent of the species that are in the state, fishes, probably initiate the spawning. They're not finished spawning, but they're starting.

In the northern part of the state, it's probably delayed by maybe 15 days, maybe two weeks, somewhere in that vicinity. That was my justification for that two-week difference between the northern and the southern part of the state. Anyway, so that was more or less the gist of this particular analysis that I did.

Q. Can you explain for the record what Exhibit 6 or attachment 6 is?

A. Does anyone have any questions about this (indicating) exhibit or is this pretty clearly written?

The next exhibit is actually some data from a from Laura Csoboth, who's one of my students. These data are not published yet. These are for a study that we're doing currently in the vicinity of Swan Lake, which is in the Illinois River. For those of you who are not familiar with Swan Lake, it's near the confluence of the Illinois and the Mississippi Rivers just above St. Louis near Grafton and Alton.

Swan lake is pretty close to the center of the state, and it is an area of the Illinois River where we expect it to sort of reflect the median of temperatures and conditions that would occur in terms of the fish. All Laura did this summer -- well, this is from a year ago last summer -- was to quantify the larval fish that were produced in the Illinois River and in Swan Lake, and this analysis is more or less looking at the number of fish that are moving from the river into Swan Lake in -- or from Swan Lake out to the Illinois River. That's out. All right. That's actually not

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that important for you guys to care about. All you should care about are the symbols, not what's coming from the Illinois River, the back water of Swan Lake right now. But I think the important thing to note is that we have spawning that occurs in fishes -- oh, one other thing, the gray line on this figure it is just the discharge. And you can see here that the depth is the depth of the particular water -- depth water that we had, and that corresponds with the amount of discharge. In other words, we had a spring flood that occurred in June, and it lasted through more or less July in 2004, very different than this year.

The point is, is that most of the spawning had occurred in the larval fish component before July 1st. Probably 50 percent of the spawning occurred somewhere between June 1st and July 1st. This, in a way, shows that, like I've tried to argue in my previous testimony and also in some of the exhibits that I've given, that most of the spawning probably occurs prior to that July 1st cutoff date. That's all I'm trying to point out here. There are some stragglers, primarily sur-target, for example, those are the sunfishes

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that keep spawning through July, but you'll find on average that most of the spawning gets done in the Illinois River and Illinois streams by that point. So that kind of indicates my analysis to some extent I believe. Though, I'm sure there's other analysis out there that might show exceptions. I think on average that's probably what occurred, but this year we're finding the same basic pattern. Anyway, I thought I'd provide that data just to show you that we are doing research that helps to define some of

the statements that are made before the Board.
Q. Exhibit 7 or attachment 7, can you explain for the record what that is?
A. That's a figure from Garvey and Stein, which is paper on Transactions of American Fisheries Society, which used to not seem like a long time, but '98 is starting to sound like it is a long time ago. These are from three reservoirs that I worked on in Ohio as a Ph.D. student. I was privy to getting a lot of data on larval fish of timing and spawning, primarily are the most abundant species in Ohio reservoirs, and actually is the same for Illinois reservoirs, and that's gizzard shad and bluegills. And all I'm showing here is basically

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the temporal progress of spawning of these species in the summer in each year for '87 to '94 in three lakes --
THE REPORTER: I didn't hear the lakes. I'm sorry.
DR. GARVEY: Okay. The lakes are Clark Lake, Stonelick Lake and Kokosing Lake.
BY DR. GARVEY:
A. And, anyway, what it's going to show you is, one, that on average a lot of the spawning occurs before July in most of these lakes. Again, this is just more data to support what I've already talked about. There are exceptions and say, for example, in 1991, a lot of spawning occurred after July, and I can tell you that those were sunfish that were spawning at that time, and we know they do that. So there are exceptions, but if I was to take this analysis, and I was to look on average when 50 percent of the spawning occurs for these two very common groups of the fishes in Ohio, it's going to occur before July 1st. That was the only point I'm trying to make from this particular figure, and it is published. It's been peer reviewed. My anonymous colleagues have looked at it and given its

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approval.
HEARING OFFICER: I'm sorry. You said 50 percent occurs by July 1st?
DR. GARVEY: Right. We're going to have to get into the next issue here.
HEARING OFFICER: Which is Exhibit 8?
DR. GARVEY: The analysis of spawning time that I talked about before was only based on the initiation responding. Again, we know that there are species that they'll start their responding in early summer, late spring, but then these little critters will keep spawning and invertebrates will keep making babies, and we really don't know anything much about mussels when they're doing their spawning thing. They're going to keep going through the summer, and a lot of

them will do that.

But we need to figure out a new perspective, and this is called a production based effort. If you're a conservationist and you want to protect every single organism that lives, then you basically create a standard that's not realistic that these

streams or reservoirs can't necessarily provide, but who cares, because you're going to assume that that's going to protect every single individual that's produced. But what we found with most of fishes is that a generality, and there are always exceptions out there, that the fish that respond earliest, i.e., probably for most of the species before that July 1 date, are the ones that are going probably to contribute disproportionally in a large way to the actual populations that are out there. This holds for many different species that are out there.

In other words, it's usually the thinnest -- I can't believe I just said that. That's awful. No, I'm not supposed to say that as a scientist. It's usually the fish that are in the best condition, big fish -- healthy fish are the ones that tend to spawn earliest because they start out in the summertime or the springtime in the best condition. They don't have to eat a lot to reproduce. So they get their spawn off

early. Why is there a benefit to that? Well, the general belief is there's a benefit to that because it ensures that your offspring have the longest time during the summer to grow and bait predators, get lots of food in your body so that you can put on a lot of fat, so that when you approach that first winter of life, you have plenty of preserves to deal with the scarcity, which is low temperature and low productivity of winter. Usually then those fish will come out of that first winter the ones that survive.

There are later spawned counterparts, the ones that respond late in summer, might have a very, very small probability of surviving that first winter, but in general, they don't make it. That will get into the next figure that I'll show you in a minute. That's a generality. There are times when something really weird happens in the spring, and then all of a sudden, usually the fishes that spawn in the middle of the season, then they have some weight to

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the offspring that they produce. But very seldom do those late offspring individuals really ever contribute much to the population. They might a little bit because there must be a reason to why some fishes still like to spawn, but their probability isn't very good during that part of the season, and I can name lots and lots of studies out there that reiterate this. Not that I'd say it's a theory because there are a lot of exceptions that occur, but that's a general rule in a lot of fish ecology.

MR. GIRARD: I have a question. What would be some of the possible advantages for the late breeders?

DR. GARVEY: Let's say, for example, you get off at early -- well, it's actually more complex than these. Dave Knuth who worked really hard in some lakes around Sparta, Illinois, and what he found is that these really robust healthy adults they don't only spawn usually earliest, but they also make a lot of babies late in the season, spawn and spawn and spawn because they're in

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great condition. So they still -- there might be some advantage on occasion through evolutionary time for spawning late. Why is that? Because sometimes something really bad will happen in the spring. What might that be? It could be a cold snap that comes in, freezes out those early spawn individuals. It could be some other unforeseen effect, and then usually the individuals that then spawn later in the season, are usually not the ones that spawn in October because usually sunfish, for example, I'm talking about sunfish, that come out are only about that (indicating) big going into --

HEARING OFFICER: You're indicating about an inch big just for the record.

DR. GARVEY: Oh, for the record, yes. Can you take a picture of this. Probably even less than an inch, but yeah, maybe less than an inch. They just don't make it through that first winter of life. There are, again, exceptions, but very seldom. It's bet hedging, more or less. What's happening is is that you don't want to put

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all your eggs in one basket. On the other hand, there's a tendency to put your eggs -- more of your eggs in the basket earlier than you put your eggs later on in the season. We're still working this out, but that's the next exhibit is this study that I did.

MR. GIRARD: So basically what you're saying is environmental factors can be variable, like climate and other features?

DR. GARVEY: Right. And so what happens is there's actually two life histories -- or actually there's three life histories, but two researchers Kirk Weinmiller and Ken Rose are two people that came up with this, what I'm basing a lot of this on a paper that was written in Canadian Journal of History of Aquatic Sciences in the early '90s. I've kind of influenced my thinking that there are different philosophies to approach this kind of stuff, but I tend to try to think about how the life history of the organisms superimposes the environment that they're in. People disagree with me, but that's how I try to understand

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how the world works.

MR. GIRARD: So if you don't have those late larval or don't allow them to survive, you're reducing the variability of the population?

DR. GARVEY: Yes, what will happen is, this is something that I think anybody who, for example, allows -- say, for example, from fisheries management perspective, what would be the ultimate thing that you would want to do if you are totally protecting it? Shut down the fishery. Don't let anybody fish that species, right? Because you don't want to take any individuals if you want a healthy population there. You can do that, but on the other hand, you've got to find when you're trying to rectify particular factors, how much fishing is allowable, how much do you protect without having a huge negligible affect on that population? The other thing the populations have a tendency to do is that if you have a predation on them, they tend to respond in a compensatory way. They'll put more of their effort in a time -- for

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example, spawning at a time when they're going to have the most benefit.

Anyway, to go back to my earlier point, in the fish world, probably in a lot of the world, there's actually probably at least two major strategies. There's the fish that spawn all at once, do their thing, usually on top of a resource. This typically happens in fish that spawn in early spring. They tend to produce their offspring all at once in a periodic fashion. Those offspring then usually overlap a resource. They go really fast. As long as that resource is

there. So they're basically putting all their eggs in one basket. That tends to happen in spring, as far as I can tell. Again, I can't name any literature on fresh water fishes that really shows this. Then the summer -- the late spring early summer spawners tend to have this protractive thing going on. They just kind of spawn and spawn and spawn, and they're called an opportunistic strategy, and that is your bet hedging strategy where you basically --

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because of the environmental variability out there, you can't predict when your predators are going to be there. You can't predict if there's going to be a cold snap or a flood or a drought. So what you do is you don't spawn all at once. Okay. But still on average the fishes that spawn earliest we found at least in the -- or what I have from literature and my personal experience, that the fish that spawn earlier probably have the highest mean fitness from the perspective -- and when I define fittest meaning that they have the highest probability of surviving to reproduce again and put off another generation. Through time, even though they're still spawning through time, that expected mean fitness declines. Why do they still spawn late in the season? Because every once in a while once every 10 years, 100 years, who knows, something catastrophic is going to happen to those early babies, and then your stock just went up really high, but only for a brief time. So then -- I don't want to get into it. If you look at it from an

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arithmetic standpoint, it's not actually not contributing a huge amount, but that once in a very rare time, obviously it contributes enough that it stays in the population as a strategy. Is that what you --

MR. GIRARD: You answered my question.

DR. GARVEY: That's the best I know, and someone else could testify and say I'm full of it, but that's my best understanding, and I've written a paper on this, and this is the next exhibit --

BY MR. HARSCH:

Q. Eight.

A. Which is called protracted reproduction sunfish --

HEARING OFFICER: This is attachment 8?

DR. GARVEY: This is attachment 8, and you just have the figure from it, but anyway the paper is called protracted reproduction

in sunfish, the --
HEARING OFFICER: Let me just --
DR. GARVEY: It's the wrong one?
HEARING OFFICER: Attachment 8 to your
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prefile testimony is entitled protracted spawning in fishes - implications for proposed dissolved oxygen standards.
DR. GARVEY: Okay. That's what I'm talking about.
HEARING OFFICER: Thank you.
DR. GARVEY: Anyway, the paper is called the temporal dimension in fish recruitment revisited. And this is the paper I published when I was working in Ontario Lakes --
MR. HARSCH: Wait a minute, Jim. I don't think so.
HEARING OFFICER: Off the record.
(Whereupon, a discussion was had off the record.)
MR. HARSCH: We've clarified the attachments.
BY MR. HARSCH:
Q. If I show you what was submitted in your prefiled testimony of exhibit or attachment 8, can you explain what the document entitled protracted spawning in fishes implications for dissolved oxygen standards?
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A. Yes, you're correct and that's actually what I just spent the whole time talking about is more or less that this idea that the early spawn fishes are the ones that contribute disproportionally to the population. There are exceptions I will admit, but it's a -- it's the only way that I can rectify why one fish spawn in a protractive fashion during the summer. Anyway, that does segue into the next exhibit.
Q. I have a question before we segue.
A. Sure.
Q. Those protracted spawners, if I understand what you've testified to in terms of the continuous data that you were provided by representative of the agency in the Ohio data, those fish are spawning at a time when you know that the dissolved oxygen levels are going to be at or near the summer numbers?
A. Yeah, they have to be because we find the communities present there that are considered to be high quality, and yet, we have continuous data to show that the systems do occasionally reach the 3.5-milligram minimum.
Q. So the numbers that you're proposing
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in your opinion are protective of those species that have developed and evolved into the continuous

spawning?
A. To the best of my knowledge.
Q. Would you move on and explain what attachment 9 or Exhibit 9 to your prefiled testimony is?
A. Yes. Sorry about the confusion there. That's just a figure 8 of a paper entitled protracted reproduction in sunfish: The temporal dimension in fish recruitment revisited. It's in the journal called Ecological Applications. It summarizes some work that I did with sunfish in Ontario in a lake called Lake Opinicon. Anyway, all that's shown here in figure 8, part of the earliest -- the size distribution of young sunfish that were produced back in 1999, that was a long time ago, anyway, these were fish that were produced by 21 September in this lake. It's Ontario so by 21 September, we should pretty much assume that all the spawning has stopped. It's getting pretty cold in those systems already. If you take a look -- we're really interested here in this lake frequency distribution. The total length on the X axis is

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just the size of the fish. On the Y axis is proportion frequency. That's just the proportion of fish in the distribution. The thing that we're interested in is everything to the left of the dashed line in each one of the panels. Those are fish that we aged using ear bones, which actually allow us to get the daily age of fish, we extract it from the fish. We determined that those fish were actually from that year. So they're offspring is from that year.

We found in September and October of that year a distribution of fish that range from somewhere between 30 millimeters and just less than probably 48 or 49 millimeters. When we came back in May of the following year, the following spring, we found that most of those young individuals -- because size and age are typically related to each, but the bigger you are the older you are because you've had a longer time to grow during that year. The small, young individuals were absent from distribution. Again, to suggest that only those individuals that were large enough and had enough energy reserves to survive during the winters, they were the ones that made it to the next side, and

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literature has a lot of examples like this, and that was just me trying to make the point again that typically we find that the earliest spawn largest young that are the ones that contribute to the population. Other than that, I don't think I have anymore exhibits, unless Roy found one that I --

MR. HARSCH: At this point, Mr. Hearing officer, I'd like to move for the admission of prefiled testimony of Dr. James

Garvey and the nine attachments there to?
HEARING OFFICER: Motion to enter Dr. Garvey's prefiled testimony and nine attachments and that includes attachment 3, the Paul Terrio USGS data, which was omitted from the prefiled testimony as filed August 4th, I believe.
MR. HARSCH: Right.
HEARING OFFICER: Any objection to entering that as a hearing exhibit? Seeing no objection, I'll mark that as hearing Exhibit 16 and enter it into the record as a hearing exhibit.
At this point, it's about 20 to 1. We might as well start questions for the IAWA witnesses. I imagine we're going to go into the afternoon with that questioning, but at this point, I'll just open it up -- the Board does have some questions in addition to the ones we've asked, but I'll open it up to the audience first. Mr. Ettinger, did you have an a number of questions?
MR. ETTINGER: Well, if somebody has questions who wants to ask them and get out of here, maybe they should do it. I'm going to have more than 15 minutes. I'm not planning to go hours because we're all going to agree on a standard in 60 days.
HEARING OFFICER: Okay. Well, why don't we start Mr. Ettinger's questioning after lunch and open it up to anyone else who might have questions for the IAWA witnesses who may not want to return after lunch. Anyone else have any questions for any of the IAWA witnesses?
If you could state your name and organization for the record.
MR. CHINN: My name is Howard Chinn. I'm an engineer with the Attorney General's Office, and the question I have is, is it a fair statement of IAWA that the current standard is technically feasible and economically practical to comply with?
MR. STREICHER: No, it is not feasible. It is a -- as you may have heard, the diversity of the ecosystem that Dr. Garvey described, with all that diversity out there and that one size fits all dissolved oxygen standard, and we don't think that's feasible. We don't think that accurately reflects what goes on in the rivers that we are tributary to that we are responsible for keeping -- you know, meeting Illinois EPA standards. We don't think that it's feasible.

In terms of economics, I can give you an example just from my own experience at the plant that I operate. There was a desire by Illinois EPA to impose a dissolved oxygen limit in my permit.

MR. HARSCH: You mean a water quality --

MR. STREICHER: A water quality based

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effluent limit for dissolved oxygen. Fortunately, I was able to argue that that shouldn't be in my permit, but if it had been, I would have been forced to extend some dollars to modify the plant to meet that.

In addition to that, the river that I'm on has been as a USEPA published total maximum daily loading report. In that report, dissolved oxygen is identified as an impairment on the river, and the report actually identified proposed improvements at wastewater treatment plants, POTWs, within the basin to comply or to mitigate those DO impairments. I think they had identified some $18 million of proposed costs and other estimates on $40 million plus. If that was imposed just a mitigated dissolved oxygen violation on a standard that we don't think is feasible to begin with, that cost would have been borne by the plants. So it is costly.

Now, having said that, let me say too, if the river has a deal impairment, we are not opposed to addressing that

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impairment, and there are -- some of the rivers and the data that's been presented show that they have impairments regardless of what standard that may be imposed, the existing or imposed one.

We're not here to take rivers off of the list, so to speak. We're here just to establish a correct value to work from and use that number to address the river impairments.

MR. CHINN: Have you conducted any technical feasible study as to what is needed to enable you to come into compliance with an existing DO standard?

MR. HARSCH: Mr. Chinn, I can respond to that.

We're not talking about an effluent limitation.

THE REPORTER: Can you turn towards me?

MR. HARSCH: We're talking about the appropriateness of a water quality standard for general used waters in the State of

Illinois, and you have missed out on two days of hearing. We've had some summary testimony today from Dr. Garvey in the presentation of continuous monitoring data collected by USGS and IEPA that shows that a number of streams in Illinois that are thought of as being pristine streams, like the North Fork, the Middle Fork and the Vermillion River do not currently at all times meet the current --

THE REPORTER: The current what?

MR. HARSCH: Current use of general water quality.

HEARING OFFICER: If you wouldn't mind just spinning around for the court reporter.

THE REPORTER: I'm sorry.

MR. HARSCH: Howard, it's not a question of having a discharge that complies with the standard. It's a question of coming up with the appropriate standard that fits what we expect to see the waters of the State of Illinois exhibit in terms of dissolved oxygen levels and appropriate levels for a standard to be set at.

MR. CHINN: The early comment I thought I heard was that this effluent standard would be based upon the water quality standard.

MR. HARSCH: Yes, Illinois EPA routinely is charged with developing effluent limitations for inclusion in NPDS permits based on complying with water quality standards, and although it's not set forth in any regulation, I think it's clear from the record that Illinois EPA has initiated a policy of including a dissolved oxygen limitation of 6 milligrams per liter to be met 24 hours a day and seven days a week in a number of NPDS permits, and that's what Mr. Streicher testified to regarding the proposed permit limitation in his permit.

MR. CHINN: So am I correct or is this fair to say that it is technically feasible to --

MR. STREICHER: You can meet 6 milligrams per liter 24 hours a day, seven days a week on a system either because of the physical drop or aeration or agitation that occurs in a treatment plant, or you can install a fine bubble diffuser, for example, or other aeration device and produce an effluent outage sewage treatment plant discharge that meets 6 milligrams per liter 24 hours a day, seven days a week at an energy cost and a fossil fuel cost that Mike

Callihan testified at the last hearing, but that doesn't do much if the stream itself that you're discharging into does not meet the current standard of six and five, and that's what we're getting to is what should be the appropriate standard for that stream?

MR. CHINN: So by changing the current dissolved oxygen standard to your proposed standard, will you then be able to have the stream water quality standard met at all times?

MR. HARSCH: No, because I mean the stream itself wouldn't be the factor here. I mean, what the quality of the stream, what the habitat of the stream is.

MR. CHINN: So even -- but this change as a proposed -- your proposed amendment to the standard, it would still be noncompliance in water qualities.

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MR. STREICHER: I think what we believe is if a river is -- already has problems in water quality.

MR. CHINN: Correct.

MR. STREICHER: Our petition isn't going to change or remove a river from those violations. It isn't a significant change to removing these rivers out of imperative state.

MR. CHINN: I think you answered my question. I was just wondering if the Board adopts proposed changes, are we all going to be in compliance with dissolved rivers?

MR. STREICHER: No.

MR. HARSCH: Actually, the data that is included in attachment 3 to Dr. Garvey's testimony shows that with the IEPA proposal there will still be rivers that -- some of the rivers that have continuous data on the IEPA and USGA has collected will not be in compliance with the IAWA proposal. Those rivers have something going on in them that needs to be addressed, habitat modification, you know --

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MR. CHINN: River flows.

MR. HARSCH: That's correct. It is our testimony and our position in this record that the proposal is designed to come up with the appropriate water quality standard so that when we go through the TMDL process, we are looking at an attainable standard when it is required to be protective of the assemblage in that stream and one that had some certainty of being achieved down the road, and we're not dealing with essentially artificial value. That really does not have

a scientific basis, and that's also going to be important in the establishment long-term of the development of nutrient standards in Illinois, and that's in the record. The first two hearings that was presented in some great detail.

MR. CHINN: Yeah, unfortunately, I haven't gone through the record. I just got involved recently. Thank you.

MR. HARSCH: We would be more than happy to meet you and other representatives and have you participate during the

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stakeholder meetings.

MR. CHINN: Thank you.

HEARING OFFICER: Thank you. Any further questions for any of the IAWA's witnesses other than Mr. Ettinger's questioning, which we'll start after lunch, and the Board may have some follow-up questions, anyone else have any questions they'd like to pose at this point in time? Seeing none, we are pretty close to our estimated lunch break. It's about eight or nine minutes until one. Since we forged ahead without any break, I think we'll get an extra eight or nine minutes of lunch time. We'll start again at 2:00. So for now we'll go off the record.

(Whereupon, a break was taken, after which the following proceedings were had.)

HEARING OFFICER: Where we left off before lunch was questioning of IAWA's witnesses. The first thing, though, I've been asked that everybody really try to speak up. Some of the people in the back have been

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straining to hear the testimony. So if you could, when posing questions or responding to them, please try to speak up as best you can.

With that, Albert Ettinger counsel for Sierra Club and Environmental Law and Policy Center and Prairie Rivers Network was going to proceed with questions for IAWA's witnesses. So with that, Mr. Ettinger, -- I'm sorry. Let me just quickly -- was there anyone else who had a question for any of IAWA's witnesses. Mr. Ettinger's questions I sense may go on for a little bit. Does anyone else have any other questions for IAWA's witnesses.

DR. THOMAS: Yeah, I had a question.

HEARING OFFICER: Dr. Thomas from DNR had a question. Would you mind if we --

MR. ETTINGER: Do you want to follow me or do you want to --

MR. THOMAS: I could follow you.
HEARING OFFICER: I think Mr. Ettinger has a number of questions. So he's agreed to yield. Why don't we go ahead and have Dr. Thomas from the Department of Natural

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Resources go ahead and pose your question if you would, sir. Again, I'd ask you would just speak up so the court reporter and other folks can hear you.
DR. THOMAS: I'm David Thomas. I'm chief of the natural history survey. I just wanted to ask Dr. Garvey about one of his exhibits. The Ohio EPA 1996 report.
DR. GARVEY: Okay.
HEARING OFFICER: Do you have a copy in front of you?
DR. GARVEY: Sure do.
DR. THOMAS: I would just ask you to turn to page four. Just look at page four and five. This is under their summary and conclusions so it's -- I should say, it's Roman numeral four -- I'm sorry. Roman numeral five and six.
HEARING OFFICER: Doctor, I'm sorry to interrupt, but just so everybody is following along here, this is Dr. Garvey's prefiled testimony, which is now Exhibit 16, attachment one, the Ohio EPA 1996 report, and I'm sorry, you're at page Roman numeral?

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DR. THOMAS: Five.
HEARING OFFICER: Okay. Thank you.
BY DR. THOMAS:
Q. It's interesting because this document actually tries to justify going to a minimum --
HEARING OFFICER: I'm sorry. If you want to make some comments, and you're absolutely welcome to, I'd prefer to go ahead and swear you in. If you were just going to pose a question, that's fine, and we.
DR. THOMAS: No, I was trying to set up a background for my question.
HEARING OFFICER: If you're interpreting the document, though, I'd just be more comfortable swearing you in, if that's okay.
DR. THOMAS: Sure.
HEARING OFFICER: Go ahead and swear in Dr. Thomas.
(Witness sworn.)
HEARING OFFICER: thank you.
BY DR. THOMAS:
Q. This document actually makes the justification -- well, one, is the designated --

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what they call exceptional warm water habitat, and

this document actually is trying to justify lowering their minimum from 6 milligrams per liter to 5 milligrams per liter. The second to last sentence says -- well, they talk about -- they justify values less than 6. They say, "However, values less than 5 milligrams per liter were either infrequent, did not correlate with fall EWA's use attainment or were measured only under extreme low flow conditions. The results of this analysis tends to support a minimum exceptional warm water habitat dissolved oxygen criteria of less than six, but not less than five," and then if you go to the next page at the very bottom, they say, the adoption of a 6-milligram per liter daily average, a 5-milligram minimum, two-number DO criteria, and then they go on and talk about cold water, but then they finish it is supported by the scientific evidence both field and laboratory examined by this study.

My question to you I guess is, would you -- what would your statement be that whether Illinois has streams that might fall under their classification of exceptional warm water habitat?

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A. I'd say yes.

Q. And do you disagree with their conclusion of reaching a 5-milligram per liter as a minimum for those exceptional warm water habitats?

A. I'd say that it's probably better than it occurred. I would even say that looking at the data that he has compiled -- whoever, I'm assuming it's Chris Yoder. There's still going to be occasional violation, but before the Board and everyone here, how many violations are acceptable, 1 percent, 5 percent. When I talked to Ed Rankin about the basis for this report and what he provided, he said that about 10 percent of the stream, I was assuming segments -- but I might need to be a little careful. I'm not exactly sure about that -- are classified under the warmer water habitat. So there are -- this does not cover all the streams in the state of the ones that are considered to have species that might be DO sensitive or need special habitat. So I agree with you there are streams in the state that need that protection. I was under the understanding that when we were at the stakeholder meeting that were provided to us from DNR, at least, was a first step

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or attempt to identify those particular stream segments and river main stems.

Q. And I think they also say in this document that their exceptional warm water habitat picks up what some biologist would call a cool water species; is that correct?

A. Yeah, I believe so, but -- yeah.

Q. So what they really looked at was a

three-tiered system. They had cold water streams with the trout and very oxygen sensitive. They had a group of just called warm water streams, and then they had the exceptional warm water habitat that included cool water plus what they argued were temperature sensitive warm water species; is that correct?

A. I believe so.

Q. And the only other question that I would ask is -- and I may have misheard you say this, but I thought I heard you say something to the effect that exceptions kill a theory, and I assume this was talking about outliars, but I wasn't sure what you meant by that.

A. Well, I always like to use the example that the Einstein theory of relativity and how it

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was just a theory of light pending across when they actually -- so the point is and none of this -- believe me, everything we're talking about here is not at the level of a theory. A theory being something that's the consensus, accepted idea, but the point is, is that if you -- you can disagree with me on this, but if we have a stream segment and it has a suite of DO sensitive species or what we suggest that they are, and we find that that system violates that DO standard that we have. There's something not right there, and the way science works is, is then we go back to that particular stream segment, and we try to figure out what the limiting factor is because we would have to rule out that DO levels that are currently there must be adequate to that species. There's a lot of other factors that could be involved there, but that's kind of how science works. So yeah, that was kind of -- I don't know if that --

Q. But isn't true for biological data that we tend to see a lot of the scatter in our data?

A. We do, but I think the level of relationships between the DO -- and again,

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scientists can disagree, but the level of variability between DO reading that Rankin provided and the IBIs and ICIs are extreme.

Q. That's true, but I don't know how familiar you are with lake trout, but the fact that they need high DO because they occasionally may move into low or almost anoxic waters doesn't mean -- the fact that you could actually catch them occasionally in very low DO water, doesn't mean that they could survive in the long term in low DO water?

A. Absolutely. Lake trout and a lot of different species that have say, for example, a temperature requirement, and we're talking primarily about cold water species, can't move to the top layer of the water column for a very long period of

time without asphyxiating because there's not enough oxygen. So what they do is they hangout at the cold water layer between what they call the thermoclime or between the hypolimnion and the epilimnion, and they hangout there in cold water. There's not much food there, but they essentially hold their breath, go up to the surface and eat some food, and they go back down and digest at that cold temperature again. There's a lot of the species that are cold water

that I know of doing that, and I don't know, do you know of too many warm water species that actually go out and do that same sort of thing, they forge an environment that a -- I can't think of any off the top of my head.

Q. If the food is there I heard of small mouth bass in Poursen (phonetic) Lake that they were getting at 98 degrees.

A. Yeah.

Q. That's pretty exceptional, and that's my whole point I guess. The fact that you found an oxygen sensitive species below five or at four or down to three, for instance, doesn't necessarily mean that they would do well in a stream that maintains for any length of time?

A. Yeah, but in a stream system -- and again, I -- you know, I don't know you put a degree of which streams fishes can move over a short period of time.

Q. Yeah.

A. It's kind of still assuming that there's some within the region -- in the vicinity and I don't know if it's within that particular stream segment, but the dominating

area for that would be open for that species.

Q. But you do admit that frequency and duration of these lower DOs are very important?

A. Yes, where the spatial heterogneity and the DOs have been very low are a --

HEARING OFFICER: I'm sorry. Just for the court reporter, we're firing out --

DR. GARVEY: I'm sorry.

HEARING OFFICE: -- a lot of real technical, long --

DR. GARVEY: Yeah.

HEARING OFFICER: I'm not sure I heard that one, spatial...

DR. GARVEY: Yeah, spatial heterogneity is also important. It's not just the variability in time. It's also the variability in space whether you got a ripple area where we talked about at the last hearing we would assume that based on physics we should have a little bit higher DO just because of the aeration that occurs there. It would be different in a pool where you get

a lot more biological oxygen demand, water is not moving as much, not reaerating. You know, it might not be the best place for a fish to hang out all the time.

DR. THOMAS: That's all the questions I have. Thank you.

HEARING OFFICER: Thank you, Dr. Thomas. Mr. Ettinger, should we just go ahead and swear you in right now?

MR. ETTINGER: Yeah, I am going to say something.

HEARING OFFICER: Are your colleagues going to be --

MR. ETTINGER: No.

HEARING OFFICER: You can go ahead and swear Mr. Ettinger in.

(Witness sworn.)

MR. ETTINGER: First, at the risk of destroying our spirit of cooperation, I will state on the record, I'm going to be forced to put the offensive Thomas testimony into the record because we filed a comment which says that we agreed with it. So we will be filing an Exhibit A to say what we agree with even if the person who originally submitted it doesn't agree with it anymore.

Okay. With that, I'd like to start with some questions for Mr. Streicher.

BY MR. ETTINGER:

Q. Looking at page seven of your testimony and looking at the prefiled testimony, it says, today many streams are being labeled as DO impaired when they are not in fact impaired.

Do you know of streams that are listed as impaired that are not in fact impaired in Illinois?

A. We had asked for -- I don't know if I have that list here, but we had asked for a list from Illinois PA of the impairments on the streams that were identified by IDNR requesting the existing standard to remain. We looked for the dissolved oxygen and identified a number of those that had listed the DO impairments. Yet, we're being proposed to have the old standard, the existing standard remain.

Q. Is it your understanding that the DNR list of high quality streams was based on the particular statements that were listed?

A. Some were main stems, some were segments. I mean, I think the Fox River was going to change my mind right off the bat because Fox River has identified DO impairments, yet it was -- I also identified by DNR as a river that had, I think, seven of their listed DO sensitive species present,

and such who should have the existing protection remain.
Q. Is it your understanding that a water is listed impaired in Illinois based on a DO rating?
A. It's my understanding that if there's a grab samples -- a grab DO sample that violates the water quality standard, then it could be listed as DO impaired at that point.
Q. Is a water, though, ever listed as impaired --
A. I don't know that.
Q. It'll help the court reporter in clarity if you let me finish my question.
Is a water ever listed as impaired based on the dissolved oxygen data alone?
A. That I don't know.
Q. In fact, aren't waters -- well, I'll just -- have you looked at the IEPA criteria for listing waters as impaired?
A. The 303D list?

Q. The 303D list or the 305B list?
A. I have it.
Q. Don't they, in fact, use macroinvertebrate data and IBI data to determine whether or not water is impaired?
A. Right.
Q. So no water is listed as impaired unless it has either bad bugs or bad fish?
MR. HARSCH: I think he answered the question.
MR. ETTINGER: He's still nodding, though, if you'd like to the nodding on the record.
Now, the fact that the water has flown with low dissolved oxygen, and I'll direct this to Dr. Garvey, the fact that there are spots within a water body like the Fox River, which have low dissolved oxygen levels in them, does not mean that there aren't other areas within the Fox River which could harbor DO sensitive fish.
DR. GARVEY: Right.
MR. ETTINGER: Thank you. In your next sentence here in the testimony you

say --
HEARING OFFICER: I'm sorry. Who is this directed to?
MR. ETTINGER: This is to Mr. Streicher. I just brought in the last question to save some time.

BY MR. ETTINGER:
Q. Looking at page seven of Mr. Streicher's testimony it says, "Many TMDL reports both published and under development are including

unnecessary DO violations adding to the perceived mitigation efforts necessary to restore the rivers." What TMDL reports are you aware of?
BY MR. STREICHER:
A. Well, I referred earlier to the TMDL report that was published for the Salt Creek. I know that also for the TMDL that was published for the east branch of the DuPage River. Those are the two that I know of that I'm dealing with directly myself.
Q. Now, when you say they're listed for violations, are you saying that those waters would not be listed where the standard that's being
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proposed by the IAWA on documents?
A. I haven't done -- I can't say that that would be the case. I know I've seen some data with Salt Creek for continuous DO monitoring that -- for segments of Salt Creek who would not be listed for DO impairments for those segments. I think further downstream there could still and would still probably be problems especially after the impalements above the dams.
Q. Well, we'll just check on that. You are not testifying today that either Salt Creek or the east branch of the DuPage River would be removed from the TMDL list --
A. No, I'm not.
HEARING OFFICER: Let him finish the question and then let him finish the answer. We're going to have a confused transcript otherwise.
MR. ETTINGER: Right.
BY ETTINGER:
Q. So you're not saying that east branch of DuPage or Salt Creek would be removed from the TMDL list if the IAWA standard were adopted?
A. I am not saying that.
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Q. So when you testified earlier that there were estimates that it was $18 or $40 million relating to this DO standard, you don't really know how much of that proposed sewage treatment would be necessary to meet the IAWA standards as opposed to current standards?
A. I do not.
Q. Now let's talk about the 6-milligram per liter effluent limit, and that's -- you know the difference between an effluent and ambient water quality standard; right?
A. Right.
Q. For the members of the audience who might not, could you just briefly tell us that?
A. An effluent limit is a -- is usually identified an NPDS permit. It's an operating limitation that is put upon the wastewater treatment effluent. It must meet that limitation pretty much

24 hours a day. Water quality standard is a goal or a standard set for the river itself. The effluent limit is designed to not impact or impair the river such that it would violate that water quality standard in the river.

Q. So this proceeding is about a water

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quality standard --

A. Right.

Q. -- but your testimony here relates to an effluent limit; correct?

A. Correct.

Q. Right. And your testimony is -- is that in your belief the current water quality standard is causing IEPA to ask for these tighter effluent limits?

A. Say that again. I didn't quite follow that.

Q. Well, I'm trying to -- you're saying somehow that the water -- current water quality standard is causing IEPA to insist on tighter effluent limits on plants like yours?

A. You know, I don't know what IEPA's thoughts are in closing a 6 milligram effluent limit based upon a water quality standard. Again, I'm not sure that my plant effluent which would be sometimes below 6, not much, it could get down to 5.8, is having any great impact upon water quality in Salt Creek. My understanding with those kinds of effluent limits is, again, it doesn't impact stream water quality. There are zones of dilution that

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allow that effluent to mix in the with the water that's in the river and such that is down after that zone, we're not going to violate.

So to answer your question, I'm not sure what EPA is coming up with the 6 milligram limitation, and I argued that when my permit was being discussed.

Q. And you avoided that 6 milligram --

A. Of --

Q. Excuse me. I'm really sorry. I know I'm slow, and you can see where I'm going, but you really have to let me finish anyway.

So you argued based on the existing regulations that the 6-milligram per liter effluent limit was not necessary to meet the current water qualities here --

(Cell phone ringing.)

BY MR. ETTINGER:

Q. -- is that correct?

A. That's correct.

Q. So we don't -- can't really look at your example, your plant, as a reason why we need to change --

(Cell phone ringing.)

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BY MR. ETTINGER:
Q. -- the water quality standard?
A. I think I said at my plant that I was able to negotiate a measurement, but not a limit, but then I think I also said that other plants are being imposed with the limit that they must need. Now, whether they can meet that or not without additional improvements to the plant, I can't tell you.
Q. Your plant -- you discharged in the what water?
A. Salt Creek.
Q. Now, you have some level of dilution; right?
A. Yes.
Q. What's the dilution there in terms between your -- in discharge at your river?
A. My plant average flow is about five. I think the native flow within the stream average flow is about 30 million gallons a day.
Q. Now, you say there are some plants that are being asked to meet this 6-milligram per liter effluent limit; right?
A. Yes.

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Q. Are they, to your knowledge, plants that discharged into low flow streams or streams without much dilution?
A. Some of the plants are, others are not. Some are going to fairly hide dilution, Fox River, others are going into other smaller streams where they would be principle flow in the stream.
Q. Based on your knowledge of permanent writing from having to work with IEPA and IAWA for years, are there a lot of plants in Illinois that are discharging into what are called zero flow streams or low flow streams at the semi --
A. I couldn't give you a number of how many there are. I don't know that in total number. I know there are some.
Q. There are some. Now, those plants they look at their effluent limits as though they have to meet the water quality standards at the end of the pipe, is the term used, right, because they have no dilution?
MR. HARSCH: Albert, who's the they in your question?
MR. ETTINGER: IEPA.

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BY MR. ETTINGER:
Q. The IEPA, when they the effluent limits based on the -- for those plants that have no dilution, do they then have to meet the water quality standard at the end of the year?
A. I believe that's the way they work it.
Q. If we -- if we adopted the IAWA

proposal, would not the sewage treatment plants that were discharging into waters with no dilution still have to meet a 6-milligram effluent limit most of the year -- much of the year?
A. If the Board were to adopt this petition following your only discharge limit for some time of the year, we'd have a 6-milligram, you know, DO water quality standard. So following that logic, they would some time of the year.
Q. By definition, a plant that's discharging where there's no dilution, if they're discharging at 4.9, and the standard is 6, by definition, there's a violation at the end of the pipe; isn't that true?
A. If what you're saying is -- I would suspect, yes.
Q. So a lot of plants will have to meet

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the 6-milligram per liter standard whether or not the IAWA proposal is adopted or not?
A. We're working on water quality standard not effluent limits, but --
Q. But you're the one that brought the affluent limits into the case.
A. Yeah.
Q. You said that you're normally discharging at about 5.8?
A. Our dissolved oxygen?
Q. Yeah.
A. No, I'm measuring it just these last few weeks with an average of 5.8. I also had 8, 7.9. The average is much higher than that, but 5.8 is the low number.
BY MR. ETTINGER:
Q. Now, Dr. Garvey, we had a question first about this Exhibit 3. I believe you testified that Paul Terrio put this data together?
BY DR. GARVEY:
A. (Indicating.)
Q. What's going on. Is this an instantaneous number here or is this their daily average?

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A. I think --
THE REPORTER: I can't hear you.
HEARING OFFICER: Yeah, if you could not cover up your face while you're talking.
DR. GARVEY: You guys need a microphone in here.
THE REPORTER: I know.
HEARING OFFICER: Just for clarity, this is attachment 3 to Exhibit 16 of prefile testimony of Dr. Garvey. Thanks.
BY DR. GARVEY:
A. Yeah, I could check real quickly, but I think it was every 30 minutes.
BY MR. ETTINGER:

Q. And looking at the one here that says, I think, Vermillion River, it's the third one of these charts, dissolved oxygen, and...
MR. HARSCH: Vermillion River near Danville.
MR. ETTINGER: Yeah, I couldn't read it.
BY MR. ETTINGER:
Q. The Vermillion River near Danville?
A. Yeah.

Q. Looking at July -- early July, we see -- what is that represent? You've got a sort of blue blur here that goes off the way from 20 to zero?
A. Showing huge daily fluctuations in dissolved oxygen. If you were to break this down on a daily basis, it would fluctuate from -- well, early July, it would fluctuate from here to zero all the way to 20 milligrams per liter.
I'm speculating here because it's been a while since I've actually looked at the data, but a level with zero probably occurred concrete on 20, which was probably sometime midday during the full sun.
Q. And what would cause it to fluctuate 20 milligrams per liter in a day?
A. I actually, again, haven't looked at the hydrograph in a long time, but I would presume that it probably was a low period, and at height there was enough biological oxygen demand to take all the oxygen that was produced during the day by the primary producers --
(Cell phone ringing.)

BY DR. GARVEY:
A. So anyways, the Vermillion River --
THE REPORTER: I need to move closer.
HEARING OFFICER: Off the record.
(Whereupon, a discussion was had off the record.)
HEARING OFFICER: We left off with Mr. Ettinger's question of what would cause it to fluctuate 20 milligrams in a day, and Dr. Garvey started to answer that when we got cut off. So Dr. Garvey, if you wouldn't mind just restating your answer to that question.
DR. GARVEY: Well, I could answer I don't know for sure, but given the time of the year probably a combination of warm water holding less oxygen, and then there's probably a lot of algae and plants, aquatic plants and that kind of thing, and also the microbes in the water probably influencing it, and like I said before, I hadn't looked hydrograph in a while. So I'm not sure if it

was a low flow period during that time, but certainly that could be important in influencing the oxygen demand in that particular stream region.

BY MR. ETTINGER:

Q. Looking at the fifth page under stream lift, it's under stream list of Dr. Garvey's prefile testimony. Of these -- we have a sentence here which is towards the end of the paragraph called stream list.

A. Okay.

Q. It says, of these, IEPA has noted that about 30 segments within the streams are currently listed for aquatic life use impairment due to low dissolved oxygen.

A. Yes.

Q. Is that what we were talking about before?

A. What do you mean talking about before? I don't understand.

Q. I'm sorry. We discussed earlier, I believe, some DNR streams that were identified by DNR as having --

A. Yes.

Q. -- some dissolved oxygen sensitive species present?

A. Right. Their criteria was -- it was it five for tributary and 7 dissolved oxygen.

MR. STREICHER: No, it was 4 for tributaries and five for means.

BY MR. GARVEY:

A. In other words, those dissolved oxygen sensitive species of the list of which is -- I could give that to you off this (indicating), but it came from -- more or less from the Rankin report, and also -- if I understand right, it also came from just folks thinking that those were sensitive DO species. They were present in segments that were not attaining their aquatic life use designation, and DO was listed as the impairment cause, if I understand correctly, and some of those -- well, several of those segments were the Fox River, Poplar Creek, Sugar Creek, Indian Creek, the Embarrass River, Spring Creek. So there's a list of those 30.

Q. Is it you are understanding that IEPA lists causes for impairments as opposed to potential or possible causes for impairments?

A. I do not know that and the person in the room who might be able to answer that best is Bob Mosher, would probably be able to answer that, not to put him on the spot.

Q. He's not sworn in, and he's not looking.

A. He's nodding his head.

Q. Yeah, he's smiling. Do they look --
A. Wait here. On the top -- Bob's sending me telepathy. It's on the top of the thing. These are the three criterias by which they came up with the list, located in the water --
HEARING OFFICER: I hate interrupting you, but they came up with the list, this is DNR's list?
DR. GARVEY: IEPA's. IEPA, via Bob Mosher and whoever in the minions of IEPA put this thing together at the request of IAWA. Okay?
HEARING OFFICER: Okay.
DR. GARVEY: And this list is generated. This list of 30 stream segments that have the DO sensitive species but are currently not -- yeah --
MR. STREICHER: Not meeting --
DR. GARVEY: Not meeting the --
MR. STREICHER: -- dissolved oxygen --
DR. GARVEY: -- dissolved oxygen --

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MR. STREICHER: -- standard.
DR. GARVEY: Which is --
MR. STREICHER: This is the list I referred to earlier in my answer to Albert on a list that was developed in the stakeholder meeting as a, quote, compromise on rivers that may maintain the old or existing DO standard versus the new proposal.
DR. GARVEY: Yeah, the five six.
HEARING OFFICER: And I had understood that that was the list that DNR was compiling. Are there two different lists here or --
DR. GARVEY: DNR compiled a list of streams on main segments, tributaries and main stems, and then IEPA looked at that list, and said, okay, we're going to look at this, and first, we're going to look and see what discharges are present on these IAWA facts, but also look and see which ones are currently listed as impaired and as in cause. The potential cause is DO, and as I was trying to get to --
HEARING OFFICER: Thank you.

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DR. GARVEY: One, located in the watershed of any for 40 high DO streams. That's 40 streams we're talking about. Two, at which aquatic life use is not fully obtained, i.e., impaired as of April 1st, 2004, and three, in which low dissolved oxygen has been identified as a potential cause of aquatic life use of air. So that was that list of 30 segments.
MR. RAO: Is this part of the record

now, or are you just referring to this?
DR. GARVEY: It's not part of the record.
MR. ETTINGER: Well, he's testifying, so it becomes part of the record by virtue of him saying it, and you're now reading a portion of an IEPA document.
DR. GARVEY: Yeah.
MR. RAO: No, what I was asking was it entailed that -- you know, a list -- a contents of lists that.
DR. GARVEY: Well, it was in Thomas's testimony.
HEARING OFFICER: I guess the question

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is, obviously, the Board would like to see the list, as I understand it.
DR. GARVEY: Yeah.
HEARING OFFICER: DNR did not --
MR. ETTINGER: We'll withdraw it from the record. Keep a copy so you can go ahead and look at that list --
MS. MOORE: You can only look at the list.
MR. ETTINGER: You can only look at it, but you can't use it.
MR. GIRARD: Albert, you said that you're going to reintroduce it because you referred to it in your testimony. So you will have -- that's the question I wanted to ask, will we have a copy of this list?
MR. ETTINGER: May I reintroduce that as Sierra Club exhibit, whatever it is, as the document that we reference -- or that Prairie Rivers references, and it's August 23rd, 2005.
MR. HARSCH: You're introducing it for the limited purpose of clarifying what you're referring to in your prefiled testimony?

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HEARING OFFICER: It's public comment number 81, I think, and that's the Sierra Club and a number of other environmental organizations, their public comments.
MR. ETTINGER: Yes, and so what I'm doing is, I will either through a separate filing or if you would prefer an amended filing of our public comment, I am submitting an Exhibit 1 to that public comment that will consist of what used to be Thomas prefiled testimony.
MR. HARSCH: My question is, is that for the limited purpose of identifying what you referred to in that prefiled comment -- or that public comment?
MR. ETTINGER: This is really getting complicated here.

MR. HARSCH: Yes, it is.
MR. ETTINGER: All I want is for people to see the document, and yes, it's for whatever limited purpose you want, and if some deranged minds go and read it for some other purpose, I guess I just can't stop them.

MS. WILLIAMS: Can I point out -- can I just point out for purposes of the record that counsel for the department is not -- no longer in attendance at the hearing, just for the record. I mean, I don't know whether they would have an opinion one way or the another, but I just want the record to reflect that they're no longer represented.
MS. MOORE: That's right. They left.
HEARING OFFICER: I appreciate you pointing that out. Yeah, their motion to withdraw has been granted, and counsel for DNR is not present currently. At this point in time, though, prefiled testimony of Dave Thomas with it's various attachments is out in the public domain and Mr. Ettinger is suggesting that it will be an attachment to public comment 81. Are you moving to have that entered as a hearing exhibit now, or are you going to file that and serve it as a amended public comment?
MR. ETTINGER: No, actually, as I think of this, this is -- I better introduce it as a hearing exhibit as mentioned by,

since it was referred to by Dr. Garvey, and was earlier mentioned by DNR. I'm moving it as a hearing exhibit, and I'm not offering it for any particular purpose other than for clarifying the record and allowing people to understand what we've been referring to in the course of this. Okay?
HEARING OFFICER: Is there any objection to that?
MR. HARSCH: We're dancing on the head of a pin here. I do find it a little strange that we grant the DNR motion this morning to exclude it, withdraw it, and DNR counsel, who was perhaps in reliance on that, is not in attendance to talk about it.
To the extent it is introduced only to the points of clarification, Mr. Streicher is not introducing it for the -- but providing any technical evidence to support it or solely for identification purposes to clarify what we've been referring to, I guess I don't have any objection.
MR. ETTINGER: Well, actually, now that I think about it, I'm being too nice.

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Dr. Garvey, did you rely on that list in formulating your testimony here?
MR. HARSCH: That's a different than the testimony. That's a different question --
MR. ETTINGER: Well --
MR. HARSCH: -- because the testimony includes a lot of points other than just the list we're talking about.
MR. ETTINGER: Okay. I'm sorry. Can we go off the record?
HEARING OFFICER: Off the record.
(Whereupon, a discussion was had off the record.)
HEARING OFFICER: Mr. Ettinger, if you could just -- it sounds like you're not moving to have --
MR. ETTINGER: Do we have the actual document?
HEARING OFFICER: Excuse me. If I could finish. You're no longer moving to have Dr. Thomas's prefiled testimony entered as a hearing exhibit, would you go ahead and state what the current motion is and what
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motion you'd like to make now?
MR. ETTINGER: Off the record again.
Roy, do you have the -- what Cindy tells me is an IEPA marked up version of the Thomas list, is that what you're proposing we're going to put in here?
MR. HARSCH: No. Are we off the record?
HEARING OFFICER: No, we're on the record.
MR. HARSCH: Mr. Ettinger, I think you're referring to introducing into this record for purposes of clarification given the fact that Dr. Garvey and Mr. Streicher have referred to it, which would be the list of 40 streams or stream segments that DNR has put together, and I believe this is it, right, it's this document (indicating)? This document, which is table two. And we have asked -- as Dr. Garvey testified to, IAWA asked IEPA to identify those segments -- or stream segments that are impaired, and those are two separate lists. One prepared by DNR, and one prepared by IEPA. We have a
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marked-up version of the impaired list that I'll gladly substitute an unmark for the record. They're here if you want to look at them. Do what you want to do in terms of introducing them.
MR. ETTINGER: Well, I would move that

we enter the one that we can enter now into the record at this point, and the one that's marked up, we will agree to enter into the record, but Mr. Harcsh will substitute a clean copy at a later time.

HEARING OFFICER: So we've got two hearing exhibits here, and we've got a witness who has testified to -- I don't want to take things as hearing exhibits unless the witness has testified to it or is here today to testify about it now.

MR. HARSCH: No. These are the documents, Dr. Garvey, that you've referred to in your testimony?

DR. GARVEY: Yes.

HEARING OFFICER: Okay. Thank you.

DR. GARVEY: Which the entire stakeholder group is privy too. They've all

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seen it.

MS. DIERS: Hey Roy, I'm sorry, can we see this list that is marked up that I guess EPA did?

HEARING OFFICER: Off the record for a moment.

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

MR. HARSCH: After conferring with EPA personnel, they do not have the -- they have not have the ability today, apparently, to verify that this is in fact the document that we received from IEPA, and based on that, I can't agree to its introduction. Albert, I don't have any problem with your introducing the list of the 40 stream segments, if you would like to do so, but if IEPA can't verify that that's the document, I can't independently do it. I can't agree to it.

HEARING OFFICER: Assuming this rule-making goes forward, there will almost certainly be another opportunity to get the verified IEPA list into the record at a hearing as a hearing exhibit. So why don't

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we just focus on what we can introduce without objection at this point, and that's the DNR list?

MR. ETTINGER: Which is table two now incorrectly the testimony of David Thomas.

HEARING OFFICER: So this was part of the prefiled testimony --

MR. ETTINGER: This is one part of the prefiled testimony.

HEARING OFFICER: -- that was withdrawn by DNR?

MR. ETTINGER: We're introducing this table two as the DNR list that was circulated

in the stakeholder process.
MR. HARSCH: And I think I asked the question of Dr. Garvey if that was the list you were referring to; correct?
DR. GARVEY: Correct.
HEARING OFFICER: So that would be Exhibit 17. Any objection to entering that as a hearing exhibit? Seeing none, that will be hearing Exhibit 17. Off the record.
(Whereupon, a discussion was had off the record.)

HEARING OFFICER: Back on the record.
MR. ETTINGER: Have you, as part of your study, looked at the effects of dissolved -- low dissolved oxygen levels on microinvertebrates and macroinvertebrates.
DR. GARVEY: Well, we have covered that in our report, but that was Whiles specialty, and he's primarily responsible for that portion of the report.
BY MR. ETTINGER:
Q. And has anyone looked at -- as part of your report, was there testimony on the effect of dissolved oxygen levels on mussels?
A. There was a section on that, and it -- well, it -- yeah.
Q. Go on.
A. No, go ahead.
Q. Did you look at any waters in the northern portion of the state that were not impaired?
A. In -- in -- I guess you need to clarify that in more detail. Look at -- I mean what?
Q. Did you look at -- you looked at Lusk

Creek, for example, and found low DO levels there, and Lusk Creek is not an impaired water. I was asking whether you had done a similar exercise for any high quality streams in Northern Illinois?
A. No, from the perspective of looking at the Terrio analysis, nothing equivalent to Lusk Creek, no.
Q. And actually, the only water you looked at north of I-80 was DuPage or Salt Creek?
A. We looked at Salt and Mayzon. It's up there, isn't it? I'm not sure. My geography is bad. Yeah, Apple River would be real useful in something like that.
Q. Looking at Exhibit 7 of your tables here.
HEARING OFFICER: This is attachment 7 Exhibit 16.
MR. ETTINGER: Attachment 7 regarding testimony, which I believe is Exhibit 16.
HEARING OFFICER: Yes.

BY MR. ETTINGER:
Q. Looking at a number of these boxes in these areas, it appears that at least some years much or most of the reproduction or spawning

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occurred in August; is that not true?
A. July and August. Actually, it more looks like it was July. There's very few here. So I'd say if I had to count the number of the years out of all of them where most of the spawning occurred, probably two. Two out of the multiple years.
Q. Well, let's count those. We got -- looking down the left column, we've got 91 and that's in Clark. Stonelick we've got 88. That's in August; right?
A. I'd say probably about 50 percent of the spawning occurred prior to that.
Q. There is this peek here that seems to be occurring?
A. There is a peek of sunfish that were spawn. That's pretty typical to see if you have two or three spawning species through the season.
Q. Really? And then in 91 in Stonelick, I don't quite understand this chart. It flattens out at the top. Does that mean it went off the chart?
A. Yeah, it's off the chart. That means that it was very high at the time.

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Q. 91?
A. A lot of the variation. Yep, 91.
Q. And then looking at Kokosing in 91, there's like -- there's peeks over in May, and then another peek over in August?
A. One late peek in August. Yeah, I guess it is in September.
Q. That's in September?
A. Yeah. Well, we note, and I've mentioned this in testimony that sunfish spawn potentially through October -- well, through September to early October. That will happen. I'm also saying it's not the majority of the time, and the reality, if you take the average of all these, it would be about 50 percent of the spawning occurs at least before July on average.
Q. Now, are you counting bluegill as a sunfish?
A. Yeah, it's a sunfish. Bluegill is a Lepomis. That's the genus it's in, which is a sunfish. Again, I know that exceptions exist, but we've got to understand that what we're trying to manage is probably more for the average rather than the exception.

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Q. Looking in your -- you had a lot of testimony in other hearings, earlier hearings, about

various recommendations that you and Dr. Whiles made as your original report as to how the standards should be implemented. Is there anything in that earlier testimony that you wanted to revise now or feel is no longer correct?

A. Not off the top of my head.

Q. I take that back. I may have misspoke. Are there any of those early recommendations that you want to take back or think are unwise in light of --

A. In terms of implementation?

Q. Yes.

A. The only thing I can think of is the differential timing spawning due to -- might be a reasonable way of taking into account seasonal differences in spawning.

Q. Would be that July 15th versus July 1st?

A. Yeah.

HEARING OFFICER: Just a reminder, everybody would just please speak up so we can hear in the back.

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MR. ETTINGER: Thank you.

DR. GARVEY: Thank you.

HEARING OFFICER: So Mr. Ettinger has concluded his questions at this point in time?

MR. ETTINGER: Correct.

HEARING OFFICER: Are there any other persons who have questions for IAWA's witnesses?

MR. HARSCH: I have a couple of clarifications.

BY MR. HARSCH:

Q. Dr. Garvey, in reviewing the Ohio data, my understanding is that data -- I want to ask you about 24-hour composites and grab samplings during the day?

A. Yes.

Q. Would those grab samplings during the day tend to miss a lower dissolved oxygen concentration that those streams would have exhibited?

A. Right. It might be actually be on average higher because of what we saw with the Vermillion River, diagonal streams.

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Q. And it's your understanding that those streams -- a number of the streams in Ohio that have been designated as AWR, in fact, don't comply with the standard that Ohio has opted for?

A. I, of course, can't give you the exact number, but there are a few exceptions.

Q. From review the data?

A. Yes.

BY MR. HARSCH:
Q. Mr. Streicher, in your response to the question of Mr. Ettinger regarding what would be the impact of the adoption of the IAWA proposal in terms of the impact on Salt Creek. Isn't Salt Creek -- the data included in Salt Creek in Exhibit 3 of Dr. Garvey's testimony?
A. Yes, I had forgotten that there was some continuous DO monitoring done on Salt Creek in the southern section.
Q. And if the IAWA proposal were to be adopted by the Board, doesn't that data show less violation?
A. It shows fewer dissolved oxygen violations.

Q. And the data that you referred that you were well aware of recent continuous dissolved oxygen sampling performed by the Metropolitan Water Reclamation district in the City of Chicago?
A. Yes, they performed that earlier this summer.
Q. That's all. Thank you.
HEARING OFFICER: Does anyone else present in the audience have any questions for any of the IAWA's witness?
MR. ETTINGER: I just want to clarify the record.
HEARING OFFICER: Go ahead, Mr. Ettinger.
BY MR. ETTINGER:
Q. I'm sorry. You mentioned Metropolitan Water Reclamation District data?
BY MR. STREICHER:
A. Yes.
Q. Is this something that has been published?
A. It has not been published. It was shared with me by one of the district employees, Dick Laney (phonetic).

Q. And it was a study done by the Water Reclamation?
A. It was the results of continuous dissolved oxygen monitoring at two sites on Salt Creek in Cook County, the northern regions of Salt Creek.
Q. Thank you.
MR. RAO: I have a follow-up.
HEARING OFFICER: Were you finished, Mr. Ettinger?
MR. ETTINGER: Yeah.
MR. RAO: Dr. Garvey, page three of your prefiled testimony you state that since the last hearing more data was provided for streams in Illinois. Can you please explain what kind of additional data was provided,

who provided these data and how the data was used in your evaluation? The reason I ask this question is, we keep talking about new stuff in data every few minutes. So I just want to make sure we know what this data involved and where it's coming from, and if possible, at a later date, if you can provide that information into the record?

DR. GARVEY: True enough. More data was provided the streams of the Midwest, which I primarily was talking about the Rankin and the Ohio EPA data. Okay. And when I said primarily from Illinois, you know, I think I was talking primarily about the continuous monitored streams and the reanalysis of that. I think that was a misleading statement in my testimony. Of course, I have in the back of my mind also the data that my students have collected and those sorts of data. I also got a little bit of data from IDNR relative to catfish, spawning, those sorts of things. I think that's primarily what I was talking about.

There's also some data that I don't think is permissible to actually say, but IEPA has provided some snip-its of preliminary data that I've seen in the stakeholder meetings, but I'm not sure if I should talk about that here.

MR. RAO: That's fine. If you provide it later, that should be okay. Thank you.

HEARING OFFICER: Just one follow-up question. On attachment 7 to Dr. Garvey's prefiled testimony on Exhibit 16, Clark Stonelick and Kokosing, are those lakes?

DR. GARVEY: Yes, they're small stream impoundments. I think most of us are probably familiar with this fact, but the reality is, is that very, very few lakes in Illinois or the Midwest, for that matter, are natural. They're all impounded. They live in generally a stream dominating part of the world, and so whenever we talk about lakes, these are mostly manmade structures that we're talking about.

HEARING OFFICER: And there's reference to shad and bluegill. The copy I've got is not in color. I'm not sure.

DR. GARVEY: Yeah, it wasn't a color graph.

HEARING OFFICER: It was?

DR. GARVEY: No, it was not.

HEARING OFFICER: It was not. How do you tell which was --

DR. GARVEY: One is a broken line and

the other one --

HEARING OFFICER: Oh, it is.
DR. GARVEY: It might not have been copied correctly. The broken line I believe is bluegills, and the solid line is shad, but I should take a look at it.
HEARING OFFICER: I think I can see that.
DR. GARVEY: I can tell you right now that Clark Lake, even though I don't have the DO data here, routinely, routinely, went below 4 milligrams per liter in an epilimnion, and we still have communities of gizzard shad and bluegills and other sunfishes in that particular system year after year.
HEARING OFFICER: Thank you.
MR. GIRARD: I have a clarifying question to the attachments. Dr. Garvey, in your testimony what we called Exhibit 16 attachment 3 has all those continuous DO measurements, and all the different stream segments.
DR. GARVEY: Okay.
MR. GIRARD: And I notice at the top

we've got two different data numbers one is an IEPA data number. One is a USGS data number or data set, I guess, but the information, was it just taken with one continuous DO monitoring piece of equipment, or was it that both organizations have their own equipment out there and --
MR. GARVEY: My understanding is that there is one unit, if I understand right, funding primarily came from the joint effort between USGS and IEPA, but IEPA I think maintained a lot of these and put them out, and it was just one unit that was regularly maintained, and I can tell you that that was a substantial amount of person time and cost to keep these things running out there. They also went through a very strict data, like a cleaning exercise to make sure that the data that are presented here they're pretty darn sure that they are the actual values of that particular stream segment. So they went through some process by which they cleaned up the data.
MR. GIRARD: So there's one set of

data, and if you went to the Illinois EPA site or the USGS site, you would find --
DR. GARVEY: It's the same data settings. It's the same data.
MR. GIRARD: Thank you.

MR. HARSCH: For clarification, the photographs in Exhibit 3, you understand to be the photographs from where the sample location was?

DR. GARVEY: Yeah, that was Paul's attempt to give us a better idea about what site because it was very hard to characterize it as a riff or a pool area.

HEARING OFFICER: Just another question on attachment 3. We're all seeing this for the first time today so we certainly have some follow-up questions. Could you just briefly explain what scenario one and two and an then IAWA scenario, and then within that there's IAWA seasons and IDNR seasons; can you explain what means?

DR. GARVEY: Just a little bit of background. This occurred during maybe halfway through a little bit further of the

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stakeholder process, and we asked Paul to provide us with this analysis.

HEARING OFFICER: I'm sorry. Who?

DR. GARVEY: Paul Terrio.

HEARING OFFICER: Thank you.

DR. GARVEY: To help us to make a decision, and at that time, we were talking about potential differences in seasons, and IAWA had one idea about what the seasons were supposed to be, and IDNR was coming up with a different set of seasons. If you can see here, the primary difference is that IAWA seasons was mid-July through February for the nonsensitive season, and the rest would be the sensitive season, and the IDNR season was mid-August for the nonsensitive season through February, and then March through August for the sensitive season. So they were trying to extend that period of time that we expect to see early life history stages full month ahead of what IAWA was proposing. So we were playing around with those scenarios.

The current standard just

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simply -- if I understand correctly what Paul did, current standard, just how many times did one of those 30-minute measurements of DO go below the daily minimum of 5 milligrams per liter. For scenario one it was just, if I understand right, daily minimum of five and then the potential for a 7-day mean minimum of 6 year round, and that just showed the number of days that the DO reading went down below that point, and my understanding is he was trying to mimic the Ohio perception exception of water standard.

HEARING OFFICER: With scenario one?
DR. GARVEY: Scenario one.
With scenario two, if my understanding is right, is that we were tweaking or he was tweaking whether we have an exceptional water -- warm water habitat scenario five and six during the nonsensitive season, and then to make it, I think, equivalent to what we would have for a cold water group of species of six and seven during the sensitive season when the early life history stages are. So that shows the

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number of the violations that would occur there.
The IAWA scenario is what IAWA proposed via the Garvey and Whiles report, which is the nonsensitive season being 3.5-milligram per liter minimum, and we're all familiar with those proposed standards. The only difference between the two is the IDNR with the August 16th, and IAWA had the July 16th analysis.
My analysis that I gave the second hearing very similar to this IAWA scenario one, except for I didn't have a July 16th cutoff. I had a July 1st cutoff for my analysis. So that's the primary difference between what Paul did and what I did, little differences, but not much.
HEARING OFFICER: Very helpful.
MR. GIRARD: I hate to keep beating on this attachment 3, but --
DR. GARVEY: Yeah, it's a very important attachment.
MR. GIRARD: I do have another question on this, and I don't know if you can

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do it, Dr. Garvey, or if you can get the EPA or someone else, but I just wonder, to flesh out the record here, if someone could dig up the other physical information on those sites that probably is somewhere in the report going along with this, but I'm not talking about other, you know, chemical data, but other physical data pertaining to where these DO measurements were made, you know, including something like depth and some of these other physical characteristics of those habitats I think would be very helpful.
DR. GARVEY: Much of it will be in this exhibit that I filed. The report by Gleason and King, which is the Paul Terrio data that was published. So this would provide that information, and then --
HEARING OFFICER: Is that attachment two to Exhibit 16?

DR. GARVEY: Yeah, it's an attachment to my testimony. So reading that would give you a little bit more information about just what the sites look like, what the general characteristics are, and it's pretty good

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detailed, you know, description. So it should give you an idea of what these sites looked like.

MR. GIRARD: Do you have flow rates and probe placement?

DR. GARVEY: They do provide information about the probe placement, and more or less what they wanted to do was make sure that even at base flow or below base flow that the probe was still under water. So it was sufficiently deep, I would say, at that level, if I understand correctly. That was what influenced the probe placement in terms of depth. But these pictures were to give you some idea about what the site looked like, I think, at a relatively high flow and low flow period, so...

HEARING OFFICER: And as Anand Rao just reminded me, I think IEPA mention earlier that Paul Terrio would be provided as a witness assuming we have another hearing at some point?

MS. WILLIAMS: Absolutely.

HEARING OFFICER: So we can follow-up

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with him then as well.

DR. GARVEY: Yeah. IEPA has another continuous monitoring data that has come to bear that I also failed to mention that to you, and it might be wise for them to conduct a similar analysis. I don't think -- I think it was only for 72-hour periods. It wasn't for an entire two-year period, but to do some -- some analyses similar to that. Looking for violations would probably be helpful to the Board as well. So that might be something requested by EPA.

HEARING OFFICER: We'll let IEPA think about whether they'd like to do that. It sounds helpful. Any further questions for any of the IAWA's witnesses? Seeing none, why don't we go off the record.

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

HEARING OFFICER: We're now going to continue with the prefiled testimony. First, is Todd Main the director of Policy and Planning of the Friends of the Chicago River. Will the court reporter go ahead and swear in

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Mr. Main?

(Witness sworn.)

HEARING OFFICER: Thank you for being here today, Mr. Main. Thanks for waiting. It's so late in the afternoon. I have asked you to provide a summary of your prefile testimony, which I understand you're prepared to do, and in fact, you have actually prepared a written summary that you're going to read, a summary of your prefiled testimony that may also include some additional information; is that correct?

MR. MAIN: Yeah, some additional.

HEARING OFFICER: Okay. Why don't you go ahead -- seeing there's no objection to that, I'm going to ask Mr. Main to go ahead and read the prepared statement that he has here.

MR. MAIN: And actually, in the interest of brevity, I'm going to actually make it a very brief summary because we've been here a long time and a lot of things have changed. Good afternoon. I want to thank you for the opportunity today. My name

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is Todd Main. I'm the director of Policy and Planning for the Friends of the Chicago River. For the past 25 years our mission has been to foster the vitality of the Chicago River for the plant, animal and human communities within its watershed. While we're new to this process, we have a long track record, and I'm here today representing the interest of our 2000 members in the Chicago area.

Friends of the River has serious and substantive reservations about this proposal, and we urge the Illinois Pollution Control Board to reject this proposal and making it until further study and establish that the reduction of dissolved oxygen levels will not harm aquatic life in the Illinois surface waters. We're very concerned about the impact that the proposed standards have had on the reproductive cycles particularly the refresh water mussels and late spawning fish, which we've discussed quite a bit today.

For the past three years, the

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Friends of the River and their partnership with Shedd Aquarium has conducted a fresh water mussel survey in the Chicago River. Our survey has documented the presence of mussels in multiple locations in the river. Research has shown that unionid mussels, which have been found in the north branch are specially threatened because they require

host fish for reproduction. Only about 25 percent of the host fish for the mussels in the U.S. have been correctly identified. So it's difficult to predict the impact that human activity has, as clearly the diversity has helped. The fish populations within the river will -- the river system will effect the reproductive success of these mollis species. For example, long-term breeders spawn and fertilize eggs in the late spring, summer and early fall, as we have heard today, producing muriatic leucadia by late fall winter, or the leucadia may not be released until late spring or early summer of the following year. The contrast short-term breeder spawn, fertilize eggs, develop and

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release leucadia from late spring to early fall. It is difficult to accurately determine when low dissolved oxygen levels would be safe because reproduction of the species is sensitive at various different stages.

In order to the protect the current populations and ensure their survival and reproduction, we need to ensure that the Illinois rivers can provide habitats to support their complex and sensitive life cycle. Fresh water mussels are especially vulnerable to habitat disturbance. Of the unionid mussel species native to Illinois, more than half are currently threatened, endangered, extricated or extinct.

The second point that we want to raise is that we think that -- we agree that the current regulatory model has some flaws in it. I think that's a consensus, and I think people agree on that, but we also think that this proposed solution suffers from some of those same kind of things because it also appears to be a one-size-fits-all approach to

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the problem. And we're very concerned about the strategy that we're proposing here, and we think that we need to move more of a tier system approach, very similar to what's been discussed with Ohio model. We're very concerned because in that model there appears to be no opportunity for backsliding of standards.

When streams are shown to be nonattainment, then actions are taken to bring them up to the standard, and so then over time, water bodies will improve in quality, and I think that's the direction we want to be going in. We think that this proposal doesn't do that. In fact, we also

agree that people shouldn't debate the facts. Okay. We can debate opinions, but the facts are the facts, and the fact is that when you lower the dissolved oxygen standard, at the end of the day, you have lowered the dissolved oxygen standard. That's a fact. That's not a debate. And so we would hope that Illinois, given its position in the greater region, would be a leader in adopting

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regulatory models that promote healthier waters over time. Thank you.

HEARING OFFICER: Thank you, Mr. Main. I'll open it up for questions. The Board has a few questions for Mr. Main, but I'll open it up to the audience first. Deborah Williams, counsel for IEPA?

MS. WILLIAMS: I just had one quick area of questioning that I think may -- your testimony at least to me is a little confusing for the Board. Can you just clarify for us -- not all portions of the Chicago River are impacted by the proposal before the Board, are they?

MR. MAIN: True.

MS. WILLIAMS: Can you explain a little bit?

MR. MAIN: The portion of the Chicago River now is going through a UAA process --

HEARING OFFICER: Could you explain what that is?

MR. MAIN: Use attainability analysis to discover -- or to redefine the use

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standards, and so the portion of the Chicago River that we are concerned about that is impacted by this proposal concerns the area of the river that is north of Clark Park where the Skokie and the Middle Branch and West Fork all come together, right in there, and that's actually the area where most of our mussel survey has been done. So that's our reason.

MS. WILLIAMS: Okay. Thank you. I think that clears it up quite a bit.

Well, is it correct that most portions of the Chicago River where they're south of where you're talking about are subject to secondary contact warm quality standards at this time?

MR. MAIM: Well, that's actually what the UAA process will determine. The area that's under the UAA is sort of the north channel -- the north shore channel all the way down through the city and then out past Bubbly Creek.

MS. WILLIAMS: Thank you. That's all I have.

HEARING OFFICER: Any further questions for Mr. Main?

BY MR. HARSCH:

Q. What's your educational background?

A. I have an undergraduate degree in international relations and business from Michigan State.

Q. So you don't have a technical background?

A. I do not have a technical background.

Q. You're not a biologist?

A. No.

Q. You're not an ecologist?

A. I'm not an ecologist.

Q. Have you read the entire record?

A. I think I read most of it.

Q. Can you explain how the adoption of the IAWA proposed dissolved oxygen standard would result in the lowering of the dissolved oxygen level in the north branch of the Chicago River?

A. Well, my understanding is that the proposal is to lower it -- lower the standard in the period of the late summer through February.

Q. How would it physically result in a lower dissolved oxygen level in the river?

A. Well, I think it would lower the standard criteria standard.

Q. And that's different than actually having a physical lowering of dissolved oxygen level in a river?

A. True.

Q. And that's something that Mr. Streicher testified about this morning. In your prepared testimony, you referred to dissolved oxygen levels being dramatically impaired in the Chicago River due to confined sewer overflows, and you attribute lowering, I assume, the standard somehow would impact that. How would a change in the standard impact the application of the current rules requiring substantial work be done on combined sewer overflows?

A. Actually, let me clarify that. We filed the initial comments. We looked at -- we were operating on an understanding that this would effect the entire Chicago River System, and so those comments are directed to the CSO issue. We have changed and taken that out of our summary that we're testifying today.

Q. So that should be excluded from --

A. Right.

HEARING OFFICER: Let me make sure I

understand that there was a statement in the prefiled testimony that --

MR. HARSCH: It would be point 2 on page 2, I understand.

HEARING OFFICER: And it's the -- Mr. Main, it's your testimony now that what, I'm sorry, you're changing that position?

MR. MAIN: Well, the first thing, we used data -- it was all about NWRD data from Bubbly Creek and some other areas that were dramatically effected by the CSOs. That's not subject to this hearing, and so we withdraw those points.

HEARING OFFICER: Thank you.

MR. HARSCH: And point number 4 on page 3, my understanding that the portions of the north channel you're concerned about currently do not make current standard presumed time; is that your testimony?

MR. MAIN: (Indicating.)

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HEARING OFFICER: The answer is yes?

MR. MAIN: Yes.

BY MR. HARSCH:

Q. Despite the fact that the current standard is not being met 50 percent of the time, is it your testimony that the fish species and wildlife have improved dramatically in this stretch?

A. The health of the river has improved dramatically all through the watershed.

Q. I know you're not a scientist, but what level of dissolved oxygen would you expect the north channel of the Chicago River to achieve and what time frame?

A. I don't know that that's our role to give you an answer to that question. Actually, I would defer to the people who have the scientific training and the ability to develop those answers and present their testimony. So we're speaking from a policy perspective and not a scientific perspective.

MR. HARSCH: No further questions.

HEARING OFFICER: Any further questions for Mr. Main? The Board had just a couple questions for you, Mr. Main.

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Mr. Main, you've mentioned in your prefiled testimony and today a fresh water mussel survey on the Chicago River that Shedd Aquarium and the Friends of the Chicago River conducted. Do you know whether those results have been published?

MR. MAIN: The first two years have been published. This is our third year that we -- we just finished in August, and then we'll publish those results, and I would be happy to share those with the Board.

HEARING OFFICER: We would very much appreciate that, and ask you to do that.
MR. MAIN: Sure.
HEARING OFFICER: Thank you. Any other questions for Mr. Main?
MR. HARSCH: Just for clarification, I think we referred to both the north shore channel and the north branch. What specifically are you referring to?
MR. MAIN: The north shore channel is the area of the river south of sort of Evanston that runs along the lake, and the area that I was referring to is sort of the

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confluence of the Skokie and the West Fork and the Middle Fork.
MR. HARSCH: So it's the north branch you're referring to, not the north shore channel?
HEARING OFFICER: I'm sorry. What was Mr. Main's response to that?
MR. MAIN: What we're referring to is -- yeah, the north shore channel runs down that way (indicating), and I guess what I was referring to was the north branch.
MR. HARSCH: And then the dissolved oxygen data that you referenced to meet the current standard 50 percent of the time, and where was that data taken?
A. NWRD data.
Q. From where, north channel, north branch, if you know?
A. I don't have that here with me, but I'd be happy to provide that to you.
Q. And do you know if that data was continuous or --
A. I believe it was continuous, but I'm not sure. I would have to go back and check.

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Q. Do you have that data?
A. Not with me.
Q. Would you provide it to me, please?
A. Sure. Sure.
Q. Thank you very much.
HEARING OFFICER: The Board would certainly like to see that as well, and we can discuss how you can present those. Any further questions for Mr. Main. Seeing none, I thank you very much for participating today, and we will move onto the last of those who prefiled testimony. Dr. Thomas Murphy, professor of chemistry at DePaul University. If we could go ahead and swear in Dr. Murphy, please.
(Witness sworn.)
HEARING OFFICER: Dr. Murphy, are you prepared to provide a summary of your

prefiled testimony?
DR. MURPHY: I made some alterations.
HEARING OFFICER: Well, I think given the proceedings today and all the changes that we've faced --
DR. MURPHY: I don't have it right now.
HEARING OFFICER: Why don't you go ahead and provide the testimony as amended and everyone will be able to ask you questions on that afterwards.
DR. MURPHY: Thank you for the opportunity to make these comments. These comments both summarize and expand upon the written comments I submitted. I'm Thomas J. Murphy, an emeritus professor of chemistry at DePaul University. One of the courses I've taught in recent years was instrumental analysis, a senior level course that dealt with making reliable chemical measurements using instruments. I co-founded the environmental science program at DePaul and shared it for a number of the years, and I've been involved with data quality issues and water quality issues in Illinois for more than 35 years. My research is principally related to the Great Lakes, and I served as editor of the general Great Lakes research for six years.
To support that request to lower the water quality standard for general use waters for water quality standards for DO in general use waters in Illinois, the IAWA justified their request with an assessment document submitted to the Board. This document is based heavily on the USEPA's 1986 national criteria document on dissolved oxygen. While most of the data in these documents are from laboratory studies, both documents admit that these results understate the DO requirements for aquatic organisms in the much more complex natural environment.
The 1986 national criteria document of the EPA gives a number of reasons that DO requirements for aquatic organisms are higher in natural waters than in laboratory studies. Perhaps the most important reason is that oxygen concentration in natural waters are quite variable. They can have significant variation around the mean. DO standards then must include a sufficient safety factor to protect all aquatic species that are native to the rivers from the short-term and long-term low

dissolved oxygen excursions, whether due to natural or anthropogenic causes.

Based on continuously monitored DO concentrations, the Ohio EPA reported in 1986 that the minimum of 5 milligrams per liter of dissolved oxygen was needed to permit DO intolerant species to be maintained in warm waters. Rankin reported on the association between DO and fish and microinvertebrate assemblages in wadeable Ohio streams. Based on a large number of fueled measurements, he found that fish and shellfish species that are intolerant of low DO levels are abundant in rivers where the DO concentration is greater than or equal to 7 milligrams per liter, but they are rare in rivers with an average DO of less than 6 milligrams per liter. The Illinois natural history survey data indicate that there are 25 species of fish in Illinois that are intolerant of low DO levels.

It should be noted that all of the discussion and reports on this topic discuss and report DO levels in milligrams per liter

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rather than percent saturation. While these different measures of dissolved oxygen are related to one another, there is an important difference. The availability of oxygen to organisms depends on its activity - its percent saturation oxygen tension as directly sensed by electrochemical DO probes rather than its concentration in milligrams per liter as determined by chemical measurements. Thus, a given concentration of oxygen will be less available to organisms when the water is colder and more oxygen is required for the water to be saturated. For example, 3.5 milligrams per liter of dissolved oxygen corresponds to 43 percent of saturation at 25 degrees, but only 24 percent of the saturation with 0 degrees. Thus, the IAWA proposal would permit one day DO values below 25 percent saturation during times when the water is at freezing temperatures. The comparison, the oxygen activity to summit of Mt. Everest is 33 percent of the oxygen tension at sea level, one-third higher than the level proposed by the IAWA for cold

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Illinois waters.

A word of caution to the Board from a chemist, all measurements have uncertainty associated with them. When interpreting the results of the chemical analysis, one needs to take their liability into account. In addition, all reported

results are not correct or reliable. Instruments can be out of calibration or not correctly functioning. Continuous DO monitors are particularly susceptible to physical or biologic filing of the membrane or the sensor and other problems, usually leading to low results. Figure one in Rankin supports this suggestion. There are many cases shown where the chemical measurements show a high dissolved oxygen, but the electrochemical probe shows a low dissolved oxygen. There are very few cases where the opposite is true. In interpreting other data from the Rankin report in today's hearing, the presence of DO, dissolved oxygen, intolerant organisms in the presence of low dissolved oxygen when interpreted is proving

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that organisms can thrive at low dissolved oxygen concentrations.

My first response to these Rankin data would be to review the quality assurance data for those dissolved oxygen measurements. Are they reliable? Were there replicates? Was the instrument calibrated to get the chemical measurements?

The other quality issue on stage is to validate these DO measurements. With respect to the in stream measurements of dissolved oxygen, it's well documented that significant DO gradients can be present particularly when the flow is latter. So the positioning of the sensor relative to it can get very different measurements at the same period of time.

I agree that reliable outliars often give significant insight to systems. On the other hand, there's good reason -- there is often good reason not to put great significance on outliars because they may not be reliable for a variety of reasons. Unfortunately, many people put more faith in

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the results of chemical measurements than the data deserved. I suggest that if the DO measurements for these Ohio DNR samples were quality assured that many or most of the outliars due to low DO would not be present.

The IAWA proposal before the Illinois Pollution Control Board is to permit a one-day minimum of 3.5 milligrams per liter dissolved oxygen and a 7 day mean minimum of 4 milligrams per liter from July through February. With respect to aquatic organisms that spawn after June, with its lower dissolved oxygen limits, they make the statement that warm water species that spawn

later during the summer should have adaptations for naturally occurring reductions and dissolved oxygen concentrations expected to occur during the warm months. This statement assumes that the DO levels occurring in Illinois waters during the summer are natural and the deforestation, channelization and the inputs of anthropogenic oxygen demanding waste have not effected these levels. They offer no field,

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laboratory or other scientific data to support this claim.

A revision of the water quality standards of DO for general use waters of Illinois would need to take into account the particulars of the stream in question, including: The seasonal DO requirements of the native aquatic organisms; the short and long term variability of the DO from natural and anthropogenic causes; and any difference in the current temperature regime compared to historic values. The standards should include a sufficient safety factor, and they should be based on the percent saturation of oxygen in the water.

If the Illinois EPA is going to base its water quality standard for dissolved oxygen on the basis of a few outliars, they better be very, very certain that their data and representative are valid. Changes in the DO regulations need to be based on good science, not on verified self-serving assumptions to the Illinois Association of Wastewater Agencies.

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One consequence of this proposal by the IAWA to lower the water quality standards for DO in Illinois waters for eight months of the year could be to permit increased amounts of oxygen demanding substances to be discharged to the rivers of the Illinois. This is clearly contrary to the current national goal of the Clean Water Act that all discharges of pollutants into the navigable waters of the U.S. be eliminated. Have we spent billions of dollars in Illinois in recent years to clean up our rivers only to allow more pollutants to be discharged? I think not, and I urge the Board to reject this proposal from the IAWA. Thank you.

HEARING OFFICER: Thank you, Dr. Murphy. I'll open it up to the audience. Does anyone have any questions for Dr. Murphy? Mr. Frevert from the IAWA?

MR. FREVERT: I recognize I continue

to be sworn in this may not be a question so much as an invitation and comment. Dr. Murphy's an individual -- I've been

involved in water quality standards in the State of Illinois for over 20 years. Dr. Murphy is someone I haven't had the pleasure to work with yet, but to the extent he's obviously invested his time and effort to put together this testimony and come to the hearing today. I suggest if you leave a business card or some contact information, I'd be happy to follow-up and make sure you have an opportunity to participate in some stakeholders meetings. I can assure you there are some points of perspective on how the regulations work and the science that we may have some differences on, and we'll have the opportunity to persuade one another with -- perhaps I could go your way, you could go my way, but putting in as much efforts as you have, I want to make it clear you're certainly invited, and I'll try to help you participate in that.

DR. MURPHY: I appreciate that.

HEARING OFFICER: Any questions for Dr. Murphy?

BY MR. HARSCH:

Q. I have some. I guess I would echo some of what Toby was saying.

Dr. Murphy, I think I'm familiar with your work from -- in the Great Lakes on phosphorus release and uptake, et cetera?

A. Atmospheric input and beautification problems in the past.

Q. And a lot of the work also, I believe, to be a straight transfer. Most of your interest I think you said has been in the Great Lakes?

A. Yes.

Q. You understand -- what's your understanding of whether the standard applies to the Great Lakes?

A. I'm sure it does not, or I don't think it does.

Q. And if I recall, your background is chemistry not biology?

A. Yes.

Q. Your testimony is substantially in part different than the summary you presented. So I may not get this right, but I think you've inferred that the current DO standard is led to market

improvements in water quality. Do you know how many stream segments in Illinois currently do not comply with the water quality standard?

A. No.
HEARING OFFICER: I'm sorry. What was your answer there?
DR. MURPHY: No.
BY MR. HARSCH:
Q. Have you evaluated the report that was put together by USGS and I think is exhibit -- attachment 2 to Exhibit 16?
A. No, I did not.
Q. Have you evaluated -- had a chance to review the work Paul Terrio did, which is attachment 3 to Exhibit 16?
A. No.
Q. You don't hold yourself out as an expert in the study of the biological inter-relationship of water quality in streams, do you?
A. No, I've --
HEARING OFFICER: Did you want to add to that?
DR. MURPHY: Well, I'm a chemist, I

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think my comments related more to the chemistry and to how that chemistry relates to some of the submissions before the Board.
BY MR. HARSCH:
Q. If, as Dr. Garvey has testified to, Paul Terrio and others have rigorously gone through the data -- continuous monitoring data that is included in attachment 2 to Dr. Garvey's testimony and attachment 3 to Dr. Garvey's testimony, which is Exhibit 16, and eliminated the outliars if they had a question over the sampling results, that's in essence what you're suggesting should occur in the Ohio data?
A. I don't know what was done with Ohio. All I have is what is presented, and so I don't know. A lot of those data are old, and quality assurance procedures and requirements have escalated many fold in recent years, and I think there's some hint in the Rankin data that the continuous probe data can, in fact, be low or when there's a -- well, anyway, that there were more problems with the continuous probe data. More problems with the reliability of electrochemical sensors for dissolved oxygen then there are for chemical. Those required

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transanalysts are all in favor of the continuous measurements, which you have to be more careful with.
Q. If, as Dr. Garvey's testified, the IAWA proposal fits the -- what has been found to exist in waters in Illinois that are thought to be relatively unimpacted by mankind development, Middle Fork, the Vermillion and others, for example, how would the Board's adoption of the water quality standard that fits what IEPA's data seems to suggest

is occurring naturally in those streams lead to increased pollutant codings?
A. I mean, that's how -- that would depend on how the regulations are applied, but obviously, if the regulations allow for lower dissolved oxygen concentrations, then that could allow for the oxygen concentrations to become lower.
Q. Are you familiar with Anti Degradation Rules in Illinois, and how those are applied?
A. No, sir.
Q. I have no further questions.
HEARING OFFICER: Any further questions for Dr. Murphy?

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BY MR. STREICHER:
Q. I have some questions. Maybe Roy already asked this, and I might just ask it a different way, but I think towards the end of your testimony as you suggested that a change in the dissolved oxygen standard would allow wastewater plants to discharge more oxygen in any material; is that what you said?
A. No, I said could.
Q. Could. How would it do that?
A. Well, their permit may allow it.
Q. Are you aware that wastewater plants have operating permits that have limits on those? They're not suggesting --
A. Yes, and permits are renewed on a regular basis and rules change, and if DO limits were zero parts per million, then my guess is that permits would reflect these lower limits, and my guess is that that could result in discharge of more oxygen demand in --
Q. So your guess is then that the agency would change the --
A. No, no.
Q. -- BOD discharge?

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A. I'm not guessing, sir. I would think it's a possibility.
HEARING OFFICER: Let him finish his thought.
BY DR. MURPHY:
A. As I said, it's a possibility. It could happen.
BY MR. STREICHER:
Q. And so you think it's possible then that the EPA if they have a different dissolved oxygen standard in this state would then go on and modify other effluent limitations.
A. Yes, yes.
HEARING OFFICER: Any further questions for Dr. Murphy? The Board had just a couple questions.
BY MS. LIU:

Q. Good afternoon, Dr. Murphy.
A. Good afternoon.
Q. You introduced a very interesting concept of mathematical relationships and how dissolved oxygen is measured milligrams per liter and how it relates to percent saturation and certain water temperature.

A. Yes.
Q. And I was wondering if you were aware of any DO standards in perhaps other states that use that as some sort of basis for their standards at all?
A. No. Everybody uses milligrams per liter because that's what you're measuring. It's easy to do, but you have to understand that that's not what's important. That's not what the organisms see. They see percent saturation.
Q. Are you aware of the studies, for instance, that we've heard about today or any other ones you might have read that use that as a parameter to judge the health of --
A. As I remember, the EPA water quality criteria document mentioned it, but then all of the data in there were milligrams per liter.
Q. Is that --
A. The significance is, is that at zero degrees the saturation is about 15 milligrams per liter, 15.6 or something. In the summertime when the water is getting pretty warm, the saturation is under 10 milligrams per liter. So that's a factor of about 50 percent more oxygen

required for the water to desaturate when it's cold. So what I'm saying, the implication in this case is that if the proposal before the Board is 3.5 milligrams per liter, it would permit water to be less than 25 percent saturated. It's my feeling that that would probably stress on the organisms in this water.
Q. Well, what you're saying makes great sense to me. I was just wondering the reason they don't do it that way perhaps is because it is more difficult to measure it in terms of saturation?
A. You just have to give a little saturation and present the data differently.
HEARING OFFICER: Dr. Murphy, you mentioned the EPA water quality criteria document, I believe?
DR. MURPHY: Yes.
HEARING OFFICER: Are you referring to the USEPA national --
DR. MURPHY: Yes, 1986.
HEARING OFFICER: Thank you.
MS. LIU: Thank you very much.
HEARING OFFICER: Anymore questions of Dr. Murphy? Seeing none, before I excuse

these two witnesses, I just want to handle their prefiled testimony as hearing exhibits. You both provided testimony today that testimony has been transcribed and that will appear in the transcript and you can look at at and review for accuracy and let the Board know if anything is inaccurate.

Do you have any document here based on what you were reading from today that you would like to present as a hearing exhibit? You don't have to. I just want to give you that opportunity.

MR. MAIN: I think probably -- what I'd like to do is look at the transcript and then get back to you. Just because given all the things that have gone on today, we've been scribbling all over our prepared testimony.

HEARING OFFICER: Fair enough. And we can discuss the process for that.

MR. MAIN: Sure.

HEARING OFFICER: Do you want to have your prefiled testimony entered as a hearing exhibit, and I'll ask you first -- just let

the record reflect that both witnesses did not want to have entered as a hearing exhibit either of their statements today, but would you like to have -- Mr. Main, would you like to have your prefiled testimony entered as a hearing exhibit?

MR. MAIN: Isn't the prefiled testimony already on the record?

HEARING OFFICER: It's in the Board record, but traditionally, as we've done with most of the other witnesses today, we enter it as a hearing exhibit. With the understanding that you've amended some of your statements that appear in your prefiled testimony.

MR. MAIN: Yes.

HEARING OFFICER: Okay. Why don't we just deal with that motion to enter Mr. Main's prefiled testimony as a hearing exhibit. It would be hearing Exhibit 18.

MR. HARSCH: That's with the striking of comment number 2 on page 2?

MR. MAIN: Yes.

MR. HARSCH: No objection.

HEARING OFFICER: Any objection to that? Seeing none, that will be entered as hearing Exhibit 18. And Dr. Murphy, your prefiled testimony, would you like to have that --

DR. MURPHY: I think so.

HEARING OFFICER: -- entered as a hearing exhibit?
DR. MURPHY: I think so, yeah.
HEARING EXHIBIT: Is there any objection to that? Seeing none, Dr. Murphy's prefiled testimony is hearing Exhibit 19. Thank you both very much for participating here today.
I'll just ask, for the record, is there anyone else who wishes to testify today? Seeing none, and the sign up list doesn't indicate anyone else who wants to testify, I'll just move onto a few procedural items very quickly.
As mentioned earlier today, I'll be putting out a hearing officer order that, among other things, will reflect a November 1st filing deadline for IEPA to

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submit a status report to the Board. The mailbox rule will not apply to that, so we'll need to have that in hand on November 1st. That will be served on -- the agency will have to serve that on everyone on the service list as with any filing with the Board. So if you're on the service list, you'll see that. If you're not on the service list, you can talk to me about getting on the service list.
At this point in time, no additional hearing is scheduled, but that's certainly a possibility. Let's see how things unfold. In the meantime, the Board continues to receive public comments. People may file written public comments with the Board. I just remind you that if you do that, you do need to serve them on those persons on the service list, and if you're interested in any of these filings with the filing itself with the Board can be done electronically through the Board's electronic filing project through the clerk's office on-line system.

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Copies of today's transcript should be available at the Board the week of September 5th. Shortly after that, the transcript will be posted on the Board's website at www.ipcb.state. If anyone has any procedural questions you can contact me at my phone number (312) 814-6983. That's (312) 814-6983 or my e-mail is mcgillr@ipcb.state.il.us. You can come up after the hearing, I've got my card here.
Are there any other matters that need to be addressed at this time?
MR. CHINN: When is the last date that

we can file comments?
HEARING OFFICER: There's no deadline at this point for filing public comments. We have not gone to first notice yet. So at this point, public comments are being received, and we will -- when the time comes, we would make public what that filing deadline is, but there's no deadline at this point.
MR. CHINN: Thank you.
HEARING OFFICER: Any other matters that need to be addressed? Seeing none, I'd like to thank everyone for participating today. This hearing adjourned.
(Whereupon, there were no further proceedings had on this date.)

STATE OF ILLINOIS)
) SS
COUNTY OF WILL)

JULIA A. BAUER, being first duly sworn on oath says that she is a court reporter doing business in the City of Chicago; that she reported in shorthand the proceedings given at the taking of said hearing and that the foregoing is a true and correct transcript of her shorthand notes so taken as aforesaid and contains all the proceedings given at said hearing.

JULIA A. BAUER, CSR
29 South LaSalle Street, Suite 850
Chicago, Illinois 60603
License No.: 084-004543

SUBSCRIBED AND SWORN TO
before me this 6th day
of September, A.D., 2005.

Notary Public