BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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

Proceedings held on November 2 and 3, 2006, beginning at 1:43 p.m. on November 2, 2006, at the Illinois Pollution Control Board, 1021 North Grand Avenue East, Springfield, Illinois, before Richard R. McGill, Hearing Officer.

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HEARING OFFICER MCGILL: We're going to go on the record now. Good afternoon. I'd like to welcome everyone to this Illinois Pollution Control Board hearing. My name is Richard McGill. I'm the hearing officer for this rulemaking docketed as R04-25 and entitled "Proposed Amendments to Dissolved Oxygen Standard 35 Illinois Administrative Code 302.206." The Board received this rulemaking proposal in April 2004 from the Illinois Association of Wastewater Agencies, or IAWA, which seeks to amend the Board's rule on general use water quality standards for dissolved oxygen.

Also present today on behalf of the Board is Board Member Andrea Moore, the lead board member for this rulemaking; Chairman Tanner Girard; Board Member Thomas Johnson; as well as Anand Rao of the Board's technical unit. Would any of the board members present like to make any remarks at this time?

BOARD MEMBER MOORE: No, thank you.

CHAIRMAN GIRARD: No.

HEARING OFFICER MCGILL: This afternoon and continuing tomorrow at 10 a.m., we are holding the fifth hearing in this rulemaking. No additional hearings are presently scheduled. We'd like to get through as much testimony and cross examination as we can this afternoon,

so we may go a little later to the extent everyone's schedule allows, perhaps to six o'clock if need be or -- we'll just play that by ear.

I should mention that this proceeding is governed by the Board's procedural rules. All information that is relevant and not repetitious or privileged will be admitted into the record. Please note that any questions posed today by the Board are intended solely to develop a clear and complete record for the Board's decision.

The Board received prefiled testimony from the IAWA as well as from Professor Thomas Murphy and the Metropolitan Water Reclamation District of Greater Chicago. We will begin this hearing by continuing where we left off at our fourth hearing last April; that is, with cross examination of the witnesses of the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources. For that we will start off with the prefiled questions filed by the Environmental Law & Policy Center, followed by IAWA's questions and then any other questions anyone else may have for the witnesses of the Agency and DNR.

After that we will proceed with the testimony of those who prefiled for this hearing; specifically, two witnesses for IAWA and Professor Murphy. As Professor

Murphy has a class obligation tomorrow, conferred with the participants and they were good enough to accommodate his scheduling conflict, so once we've completed the cross examination of the Agency and DNR, Professor Murphy will give his testimony and we'll have an opportunity to pose any questions to Professor Murphy. After that we'll proceed with IAWA's witnesses. So all those who have prefiled will be sworn in and subject to cross examination. We expect to hear prefiled testimony tomorrow from the Metropolitan Water Reclamation District. After we finish with questions for the witnesses who prefiled later today, anyone else may testify, time permitting. If you would like to testify and you did not prefile, there's a sign-up sheet at the back of the room. Like all witnesses, those who testify will be sworn in and may be asked questions about their testimony.

For the court reporter transcribing the proceeding today, please speak up and try not to talk over one another so that we can produce a clear transcript. I would also ask that the first time you speak today if you could state your name, your title and the organization you're representing so the court reporter can get that correct into the record. Are there

any questions about the procedures we'll follow today?

MR. ETTINGER: Just one little one. I assume my motion for leave to file prefiled questions was granted?

HEARING OFFICER MCGILL: I was going to take that up next. Have to give people a chance to object to it. So with that, seeing there are no questions other than Mr. Ettinger's about our procedure today, I would ask the court reporter to swear in the witnesses of the Agency and DNR collectively.

(Witnesses sworn.)

HEARING OFFICER MCGILL: Thank you. On October 24, the Environmental Law & Policy Center filed a motion for leave to file prefiled questions along with the questions themselves for Agency and DNR witnesses. Is there any objection to that motion for leave?

MS. WILLIAMS: We have no objection. Is this on? The Agency has no objection, and we -- in fact, we did prepare written responses, which we were planning to read into the record, but we have copies if it would help people to follow along, so --

HEARING OFFICER MCGILL: Great. Yeah, I think that might be helpful. I -- Seeing no --

MR. HARSCH: On behalf of the proponents, we

have no objection.

HEARING OFFICER MCGILL: Okay. Thank you. As there's no objection, I'm going to grant that motion. Mr. Ettinger, the attorney for the Environmental Law & Policy Center, Sierra Club and --

MR. ETTINGER: Prairie Rivers Network.

HEARING OFFICER MCGILL: Prairie Rivers. Sorry. I would ask just to make the transcript a little easier to follow if you would read your questions and then wait for the Agency or DNR response to each one. As counsel for the Agency indicated, there are copies of written responses to the prefiled questions, and --

MS. WILLIAMS: Do you want them?

HEARING OFFICER MCGILL: -- anyone who would like a -- I -- you can -- the Agency is I imagine going to move to have that entered as a hearing exhibit. Same thing with prefiled questions. Let me take each one of those, then. Prefiled questions, is there any objection to entering the prefiled questions as a hearing exhibit? These are the prefiled questions of Environmental Law & Policy Center. Seeing none, we'll make that Hearing Exhibit 29.

There's also a motion to enter as a hearing exhibit the written responses of IEPA and DNR to the

prefiled questions of Environmental Law & Policy Center, Prairie Rivers Network and Sierra Club. Any objection to entering that as a hearing exhibit? Seeing none, I'll grant that motion, and that will be Exhibit 30. Mr. Ettinger, if you would proceed with your questions.

MR. ETTINGER: Yes. I'm Albert Ettinger. I'm here today representing the Environmental Law & Policy Center of the Midwest, Prairie Rivers Network and Sierra Club. Following the grant today of our motion to file prefiled questions, I'm now going to read the questions into the record, if I understand the procedure properly. So the Environmental Law & Policy Center of the Midwest, Prairie Rivers Network and Sierra Club hereby pose the following questions regarding Attachment A to the IEPA/IDNR filing of March 31, 2006, to the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources. Regarding the proposed definition of thermocline in proposed 302.100, "a," what waters have thermoclines?

MR. FREVERT: Is this working now?

HEARING OFFICER MCGILL: You need to speak directly into it or it doesn't --

MR. FREVERT: Can you hear me now?

HEARING OFFICER MCGILL: Yeah.

MR. FREVERT: My name is Toby Frevert. I represent the Illinois Environmental Protection Agency, and I will read our predrafted answers to Albert's questions into the record. His first question, our answer is, waters that have thermoclines are waters that seasonally thermally stratify and in which a maximum rate of temperature change with depth can be determined by measuring temperature at equal depth intervals from the surface to the bottom.

MR. ETTINGER: Question 1b, for any water that has any rate of decrease of temperature with respect to depth, is there not by definition a plane of maximum rate of decrease?

MR. FREVERT: In theory, yes.

MR. ETTINGER: "c," how, as a practical matter, is it expected that the thermocline will be determined? Will temperature measurements be taken? Are there models or formulas that will be used in locating the thermocline?

MR. FREVERT: In practice, Illinois EPA expects that the thermocline will be determined by measuring temperature at equal depth intervals from the surface to the bottom.

MR. ETTINGER: 2, regarding proposed

302.206(a), what is quiescent water?

MR. FREVERT: By quiescent, the Agency intended to describe the state of motion of a water that is still and where there is no or minimal mixing or diffusion at the air/water interface.

MR. ETTINGER: What is an isolated water?

MR. FREVERT: The term "isolated sector" is intended to describe a water body that is separate from the main river or stream flow. It was not intended to refer to the presence of dry areas between the main river and the isolated sector.

MR. ETTINGER: What tests or criteria is it expected will be used to determine if a water is quiescent or isolated?

MR. FREVERT: Visual observations will be used to determine whether a water body is quiescent or isolated from the main flow of the river or stream.

MR. ETTINGER: I'm going to ask the next three questions together. What waters are wetlands under the proposed rule, what waters are sloughs under the proposed rule, and what waters are backwaters under the proposed rule? I'm sorry. And also, what waters are lakes and reservoirs under the proposed rule?

MR. FREVERT: Regarding the single sentence

in the proposed regulatory language that includes the terms wetland, slough and backwater, Illinois EPA intended merely to provide a general description and some common examples of locations at which it is not necessary to achieve the explicit numeric criteria to ensure natural and healthy aquatic life. These types of locations are outside of the main body of a stream or outside of the area above the thermocline in waters that seasonally thermally stratify. Illinois EPA does not expect to be able to specifically identify all such locations on a state-wide basis. In using the terms "lake" and "reservoir," Illinois EPA intends that -- these terms to represent waters in which thermal stratification occurs regularly on a seasonal basis and in which a thermocline can be determined by measuring temperature at equal depth intervals from the surface to the bottom.

MR. ETTINGER: Does IEPA or IDNR have a list of the reservoirs or lakes that are covered by this provision of the proposed rule?

MR. FREVERT: No.

MR. ETTINGER: What standard applies to lakes or reservoirs that are not thermally stratified?

MR. FREVERT: Section 302.206(b) of the

draft recommended language applies to unstratified lakes and reservoirs as Illinois EPA defines them in this context.

MR. ETTINGER: What are the, quote, natural ecological functions, unquote, of lakes and reservoirs below a thermocline?

MR. FREVERT: Transformation and decomposition of organic material and the mineralization of inorganic particles.

MR. ETTINGER: What resident ecological communities are natural below a thermocline in a lake or reservoir?

MR. FREVERT: Benthos consists primarily of midges and worms. Other dipterans may also use this zone but are less common.

MR. ETTINGER: Are, quote, offensive conditions, unquote, a violation of water quality standards under the proposed rule if they occur in, quote, wetlands, sloughs, backwaters or lakes and reservoirs below the thermocline, unquote, or is it intended to modify the application of Section 302.203 as to such water bodies?

MR. FREVERT: Yes, offensive conditions would be a violation of water quality standards under the

proposed rule in these areas. This language is not intended to modify the application of 35 Illinois Administrative Code 302.203.

MR. ETTINGER: 3, regarding 302.206(d)(3), "a," is it anticipated that under this rule that no judgment will be made that a water body is attaining dissolved oxygen standards unless data has been collected sufficient to determine the daily minima?

MR. FREVERT: Speaking in general terms, if a system supports good biological conditions and the DO data that is available provides no indication that there is a dissolved -- depressed oxygen condition, the Agency may make a judgment that the standard is being attained. If, however, there is a sign of oxygen stress upon the biological community, data that suggests that oxygen may drop below the daily minima during the anticipated low concentration period -- typically early morning hours -- or otherwise indicates that the minima may not be achieved, the Agency may make the alternative judgment. If circumstances that -- circumstances require we go beyond a probable judgment and make a definitive determination one way or another, it will indeed require that we have sufficient data to support that conclusion.

MR. ETTINGER: "b," how will compliance with

the proposed standard be determined? With regard to specific discharges? With regard to general assessments?

MR. FREVERT: Compliance determinations will be made by direct measurement of the resource where the standard applies. Compliance of specific discharges will be based upon the enforceable discharge limitations contained with each facility's NPDES permit. If by general assessments the question refers to stream assessments performed pursuant to the Clean Water Act 305(b) requirements, the Agency is assessing the degree of attainment or support of the aquatic use. To the extent that the aquatic community shows signs of impairment, DO measurements will be used to determine whether oxygen stress is a potential cause or contributor to the observed impairment.

MR. ETTINGER: Under this rule, will IEPA require pre-dawn DO monitoring of waters as a condition for obtaining a permit to discharge biological oxygen-demanding pollutants?

MR. FREVERT: Not as a general practice, but potentially in some specific applications if determined to be warranted.

MR. ETTINGER: Under these rules, will IEPA require pre-dawn -- sorry. Oh. Under this rule, will

IEPA require pre-dawn DO monitoring of waters as a condition for obtaining a permit to discharge nutrients?

MR. FREVERT: Not as a general practice.

MR. ETTINGER: How do IEPA and IDNR use the DO standard now in their programs?

MR. FREVERT: The Agency uses the DO standard much the same way we use any other water quality standard. It is a basis for assessments, permitting and water quality certification programs, selection of funding priorities for non-point source cost share programs and of course an enforcement requirement in compliance activities.

MR. CROSS: My name is Joel Cross, and I'm the manager of the Watershed Protection Section at the Illinois Department of Natural Resources. The Department may use the DO standard in carrying out activities such as the investigation into causes of fish kills, DO data collection in lakes and reservoirs and natural resource damage assessments.

MR. ETTINGER: 5, does IEPA intend to use the DO standard in writing NPDES permit limits?

MR. FREVERT: Yes. The DO standard may be used in some applications such as permits that set BOD limits through the exception provisions of 35 Illinois

Administrative Code 304.120 and permits that implement waste load limits identified through a total maximum daily load study. Additional information responsive to these questions can be found in the transcript of the April 26, 2006, hearing in this matter at pages 59 -- 53 through 89.

MR. ETTINGER: That concludes the prefiled questions and answers.

HEARING OFFICER MCGILL: Thank you. Before we proceed with the additional questions, I just wanted to clarify, in the Agency's response to question 3b, the reference to the Clean Water Act section, the written response says Section 303(b). Mr. Frevert indicated 305(b). Which is it?

MR. FREVERT: 305(b).

HEARING OFFICER MCGILL: Thank you. Mr. Ettinger, did you have any further questions?

MR. ETTINGER: Just one right now. In response to question 1c, the response is, "In practice, Illinois EPA expects that the thermocline will be determined by measuring temperature at equal depth intervals from the surface to the bottom." Is it anticipated, then, that there will be a number of different measurements or equal -- I guess I'm not quite

sure what equal applies to here.

MR. SHORT: My name is Matt Short. I'm with the Illinois EPA. I'm a field biologist in the Central Monitoring Unit. On our lake surveys we do top to bottom measurements of the water temperature, dissolved oxygen, pH and conductivity. The way the method is written, we take measurements every two feet, starting at the surface and all the way to the bottom, until two feet off the bottom.

MR. ETTINGER: Thank you.

HEARING OFFICER MCGILL: Any further questions at this time, Mr. Ettinger?

MR. ETTINGER: No.

HEARING OFFICER MCGILL: Thank you. At this point I will ask Mr. Harsch as attorney for the IAWA to please proceed with your questions for the witnesses of the Agency and DNR.

MR. HARSCH: We have no further questions.

HEARING OFFICER MCGILL: Okay. Why don't we go off the record for a moment.

(Off the record.)

HEARING OFFICER MCGILL: Why don't we go back on the record. The Board has some questions based in part on some of the testimony we received from IAWA

but questions that we wanted to pose to the Agency and DNR while we had them collected here as witnesses. In Dr. Garvey's prefiled testimony there is reference to grab DO samples collected from 1994 through 2003 as well as semi-continuous data logging probes from 2004 to 2005. I believe these are Agency and/or DNR samples that are currently Exhibit 22 in this rulemaking. What conclusions -- Has the Agency and DNR analyzed any of that data and arrived at any conclusions in terms of whether it supports the current joint proposal from the agencies?

MR. SMOGOR: My name is Roy Smogor. I am a stream biologist with the Illinois Environmental Protection Agency. I believe we addressed some of that question in Exhibit 22, which was the letter of response to the Illinois Association of Wastewater Agencies, and if I can have a second, I'll review that and try to find you what response that was. We talked about it in response number 3 of Exhibit 22 and noted that for the large majority of the general use sites located on or near a segment selected for the higher level of DO protection, the available grab sample dissolved oxygen data showed little inability to meet the IDNR/IEPA recommended daily minimum acute standard, and that large

majority was 94 percent or more. Does that help?

HEARING OFFICER MCGILL: So that was indicating that the proposed standard was not being met?

MR. SMOGOR: That indicated that there's -- For the most part, the grab data, which is limited -- because it is only grab data -- but for the most part, the large majority of the grab data indicated that the EPA/DNR recommended standards could be met.

HEARING OFFICER MCGILL: Could be met. Okay.

MR. SMOGOR: In terms of the acute portion of the standard.

MR. RAO: In that regard -- this is Anand Rao -- in Dr. Garvey's prefiled testimony, he had made a comment that most of the data, the grab data, were taken during daytime, and it was not surprising that, you know, even in his analysis, it showed that it met the proposed standards. Do you have any comments regarding that statement?

MR. SMOGOR: Yes. I think there may have been some misunderstanding in Dr. Garvey's testimony regarding how we looked at that -- how we looked at the data to come to that conclusion, because when we came to that conclusion, we limited the data, looking at the

portion of the data set that was from 10 a.m. in the morning or earlier, which is -- given the grab data was taken primarily from 6:30 in the morning or later, we limited the grab data to that portion of the early morning to 10 a.m. and we only considered that portion of the data set because that's the portion that is most likely of the available data set to represent the daily minimum.

MR. RAO: But do you think if you had grab data during nighttime, the results would be different than what you have stated in your response?

MR. SMOGOR: Yes, I think they would to some extent. I don't know how much.

MR. RAO: Have you had an opportunity to review Dr. Garvey's prefiled testimony and his analysis of the grab data and the continuous monitoring data?

MR. SMOGOR: Yes.

MR. RAO: Do you have any comments or do you agree with his findings?

MR. SMOGOR: I -- The only overall comment I have is in reviewing that data, to me, I saw no difference between applying -- in terms of asking the question, is there a violation of a DO standard at this location, in terms of answering that question, I saw no

difference between applying the Illinois DNR/EPA recommended standards versus applying the IAWA proposed standards.

MR. RAO: Can you explain what you just stated? I was not able to understand what you're --

MR. SMOGOR: The way I'm looking at it is each of the sets of standards has some multiple components. If any one of those components is not met, then overall the standard is violated. That's how I'm looking at it. If you ask that question, is the DO standard violated at this location -- and if I'm not mistaken, Dr. Garvey had six or so locations -- if you ask that question, the answer to that question is the same whether or not you apply the Illinois EPA recommended standard in total versus applying the IAWA standard in total. Does that help?

MR. RAO: Okay. Yeah.

HEARING OFFICER MCGILL: When you refer to Dr. Garvey's six locations, are you now referring to IAWA data or are you still talking about the Agency's grab and --

MR. SMOGOR: No. I'm sorry. I'm talking about in Dr. Garvey's latest testimony he introduced data from the IAWA continuous monitoring, recent monitoring.

MR. RAO: Actually, yeah, I was referring to -- he also analyzed the continuous or semi-continuous data that you -- the Agency or the DNR provided him, and when he analyzed that, he found that the -- I think the frequency of violations was significantly higher for IEPA/DNR standard as compared to what IAWA --

MS. DIERS: I'm going to -- I'm sorry. Stefanie Diers from Illinois EPA. Could you reference what page you're --

MR. RAO: Yeah, I can tell you. It's Dr. Garvey's testimony on pages 5 and 6.

MS. DIERS: Thank you.

MR. RAO: And also the results are on Exhibit 3. It's an attachment to Dr. Garvey's testimony.

MR. FREVERT: Can I suggest if we're going to have some lengthy discussion of Dr. Garvey's testimony, maybe we should hear Dr. Garvey's testimony before we get into that?

MR. RAO: We can do that, but, you know --

HEARING OFFICER MCGILL: Well, I think right now we've got Agency and DNR witnesses sworn in, and at the moment we're asking questions about Agency and DNR data. I presume everybody's read the prefiled testimony of Dr. Garvey, so I'm not sure that it's inappropriate at

this stage to ask the sworn-in witnesses questions about whether this information supports their proposal.

MR. YONKAUSKI: Maybe they'll withdraw it.

HEARING OFFICER MCGILL: I'm sorry?

MR. YONKAUSKI: Maybe they'll withdraw it.

MR. HARSCH: The Agency is withdrawing? Did I hear you right that you're withdrawing the --

MR. YONKAUSKI: No, no, no, no.

MR. HARSCH: I'm sorry.

MR. SMOGOR: I -- If you're -- Are you referring to Figures 2 and Figure -- Figures 2 and 3?

MR. RAO: Yes.

MR. SMOGOR: Okay. And can you -- may I ask, can you repeat your question about that particular -- any of those particular graphs?

MR. RAO: No. You just stated that whether it's the Agency's proposed standard or IAWA's, there will be violations in these streams.

MR. SMOGOR: And it took -- if I may, to correct that, I was referring to data that are not being addressed in these Figures 2 and 3.

MR. RAO: Yes, so --

MR. SMOGOR: I was referring to data that was addressed later in Dr. Garvey's --

MR. RAO: Yeah.

MR. SMOGOR: -- testimony here. Sorry.

MR. RAO: But now I wanted you to take a look at this and see if there's a significant difference in terms of how these -- the monitoring data that you provided comes out in analysis in terms of the IAWA standard and the Agency's standard.

MR. SMOGOR: Okay. If we look at Figure 3, I can point out maybe some clarifications. In Figure 3, that top line, I'd first like to point out that that left-most point or right around 20 percent in the month of July, about 75 percent of the observations that contribute to that point are from only a single site in the continuous data, so I'd like to point that out. I'd also like to point out that the remainder of that top line I don't think is relevant, because in August and September, for those waters, the DNR/EPA recommended standards are not 5. Actually, they are 4. So those two points that continue that line are not as relevant as that left-most point. In that regard, I don't think that there's much difference between the DNR/EPA standards in terms of applying them and the types of decisions about what's going on in the water, applying the DNR/EPA standards and the IAWA standards, because a lot of that

graph then collapses to the comparison below, especially with consideration that that upper left-most point is largely driven -- that point is largely explainable by what happened at a single site.

MR. RAO: Okay. But do you agree that this monitoring data does show dissolved oxygen levels which are lower than what you proposed for the enhanced streams during -- especially during the early life stages?

MR. SMOGOR: Yes. There's some non-zero occurrence of the proposed standard not being met at at least one site. Or actually, I think it was three sites, if I'm not mistaken.

MR. RAO: Do you see that as a concern in terms of the justification for the enhanced standards? If I can recall right, in the earlier Agency testimony, you had indicated that, you know, comparing to some of the Ohio streams where these sensitive fish existed, the DO levels were significantly higher in the levels that you propose the standard at, and here we are seeing lower DO levels and Dr. Garvey's testimony claims that, you know, there is still diverse aquatic assemblages in those streams.

MS. WILLIAMS: I'm not sure if I understand the question.

MR. RAO: Let me --

HEARING OFFICER MCGILL: Let me -- Can I try?

MR. RAO: Yeah.

HEARING OFFICER MCGILL: One of the main points of the IAWA prefiled testimony seemed to be that the Agency/DNR joint proposal proposed enhanced stream segments of a level I tier standard and that that was based on the types of fish that were found in those Illinois stream segments, and those fish were selected based on Ohio EPA information on finding those same fish species in high DO concentration waters in Ohio. Is that a correct statement? Or maybe you could --

MR. SMOGOR: Can I ask Joel to elaborate on the --

MR. CROSS: Sure, if this is on here. Yeah, that's in part what we started with in identifying DO sensitive fish, was the Ohio report. When we started that process and that step in the overall process, that report, which is referred to in our TSD as Rankin 2004, was provided to us from USEPA. We used that as the starting point and tailored that to fish species that are also living in Illinois but may not be living in Ohio, so we used it as a starting point, but we had a lot of

additional input from DNR fisheries biologists throughout the state that helped modify that basic report from Ohio. The macroinvertebrates and mussel DO sensitive species did not utilize the Ohio report at all. Those were based on other scientific data and information, and how that was done is also explained in the TSD.

HEARING OFFICER MCGILL: Thank you. And I guess one of the points that has been raised is for the stream segments that have been identified for enhanced protection, because these species are present there that are reportedly DO sensitive, why are the DO levels from those segments below the proposed joint agency standard in some of the data or --

MR. FREVERT: The first comment is I'm not sure we know why they're lower, but the fact that they are lower doesn't mean it's a fully protective condition. It's possible that DO sensitive organisms are in place and under some degree of stress, still hanging on to life, where we think a higher standard is appropriate anyway pursuant to the Clean Water Act procedures and the need for the standard to be protective. I don't think we want to set a standard that's on the ragged edge so the slightest little deviation from that standard has the system collapse. So our recommendations do contain the

notion that we want an incrementally higher DO for aquatic communities that we know from the rest of our biological science prefer higher DO conditions. That doesn't mean that every system where those higher organisms can live is at the water quality condition we want or the standards we set, and that's my policy perspective, but you can have the biologists elaborate on that, but I want to make it clear that the fact that we say a standard is warranted doesn't mean it has to be an existing condition. We still know there are places out there in Illinois where the DO and the other water quality isn't what we want, and we want this standard to help us identify those places and focus our attention on improvements.

MR. RAO: Toby, while you are on this point, just to follow up, in those segments where the DO levels are maybe lower than the proposed standards, if these rules are adopted, what will be the implication for those segments? Will they be considered not meeting the standard so they're impaired, or would you explain what, you know, actions would be taken?

MR. FREVERT: If they're not meeting the standard, they're not meeting the standard, and that has a legal consequence. I think the joint recommendation

we've put together with DNR tries to bring in some pragmatism in that we still want to make sure our standards are fully protective. The existing standard is so far out there and overly protective, it's identifying on a wholesale order streams that we need to focus on. This standard ought to pare back that list and help us find those places that really do need the attention. There are streams in Illinois that have DO problems. We think this recommendation will give us the better ability to identify those streams with true DO problems versus the existing large laundry list where there are DO flags going off all over the place.

MR. CROSS: And maybe just to add a little additional information to Toby's response to that question, I think in general there can be a possibility of a wide variety of different factors that account for having DO sensitive species present and still an excursion in the DO standard. A lot of those are going to be driven by site-specific circumstances that are going on at a site, so we can generalize what kind of factors they may include that can account for that and we can speculate which one of those may be at any given site, but one of the things that we have observed and we do have accounts of that occur on a site-specific level

is they tend to seek refuges in other areas of the same stream reach or in other tributaries during those periods of DO excursion and then they'll return when the DO conditions become more favorable. That's one factor that may be involved, why you might see excursions but yet our sampling at any given time may have these DO sensitive species present. We also have to consider other factors as well that may account for that, including the magnitude and duration of the dissolved oxygen excursion. The longer and the deeper the excursion of the DO standard will affect that differently.

So there's a whole range of those types of site-specific types of considerations that may account for that, including where the probe is in comparison to where the biological samples were actually collected, things like that, a few examples. And I guess in terms of this concept of them finding refuge in other areas, we do have a field biologist here from DNR who can testify to firsthand observations in the field of that phenomenon.

MR. PESCITELLI: My name's Steve Pescitelli. I'm a streams biologist with DNR in the northern section of Illinois, and part of my responsibility is the Fox River. These data were taken during 2004 or 2005 when

there was extreme drought situation, there was an intense alga bloom in the Fox River, and in our fall sport fish sampling, we ran across the mouth of the creek and it was extreme high density of fish, primarily large-bodied suckers who are DO sensitive, so there's evidence that they do actually find refuge in these areas where there are higher oxygen. This was the mouth of Big Rock Creek, which is a very high-quality stream. So I think a lot -- and just to add to that, a lot of these violations were from the Fox River from 2005, and that was a fairly unique situation even for the Fox River, which this is admittedly -- and I spend a lot of time on the Fox River -- it's one stream that's kind of in transition to more of an urbanized stream, so keep in mind that we use data going back to 1994 to look at the species that were there, so it's possible this stream is actually in transition, and it's only one of the many streams we selected as for enhanced protection.

HEARING OFFICER MCGILL: Thank you very much. Are there any additional questions for the witnesses of DNR and the Agency?

MR. ETTINGER: Are -- I'm sorry.

HEARING OFFICER MCGILL: Mr. Ettinger?

MR. ETTINGER: Are counsel for DNR or the

Agency going to ask any questions of their witnesses?

MS. WILLIAMS: Not at this point.

MR. ETTINGER: Okay. Well, I had one or two, then. I wanted to follow -- I wanted to let other people have a chance since I filed my prefiled questions. I guess one question I had that I'd like to address to the biologist is the issue of July breeding of certain species and whether they could speak to the question of the importance of the July breeding of some of the species that may be sensitive to temperatures in that month.

MR. PESCITELLI: Yeah, I can address that. In our technical support document we provided the range of breeding times for all host of species that are in Illinois, and Dr. Garvey has evaluated this as well, and it's clear there's a large number of species that spawn following July 1. I'm referring to tables that look like this in our technical support document. I can also refer to a report by Dr. Garvey in December of 2005. It's really an excellent analysis, although it was somewhat biased. He actually compared two northern streams -- the temperature regimes from two northern streams to the temperature regime at two southern streams and compared that to the spawning temperatures of Illinois fish, and

his conclusion -- actually, that -- it is biased because the two northern streams that he chose actually are not typical of northern streams. One is Salt Creek, which is probably the most urbanized stream in Illinois. It doesn't have a normal temperature regime. And the other is -- And the other one is Mazon River, which is one of these direct tribs to the Illinois; because of the geology has very little groundwater flow. It's dominated by surface flow, so it also has a very unusual temperature regime for a northern stream. A lot of our northern streams have a lot of groundwater flow.

But anyway, even given that bias, he found that 50 percent of the taxa may only initiate spawning by late June, so anyway, I think it's clear that there's lots of species that spawn after July 1, and we can debate the percentages, but there are a lot of them. And his other statement was they contribute an insignificant amount to the population because they're kind of the straggler spawners, and actually, I would argue that's not true, because these smaller stream and river fish, the way they're spawning, to avoid high flow, and if you look at the flow records, at least in northern Illinois, there is -- June is a very high flow month and that the enemy of a spawning fish is floods, and that may not be true in

a large river system, but in a small river system it's true, and these big flash floods disrupt the spawning act itself, flush eggs into areas that are not suitable for incubation.

So these fish actually delay spawning until July and August when the flows are more stable. That's their strategy, and for those species, they contribute the largest portion of the population continuing into the future, so there's a whole -- and there's a whole bunch of these species now. They do, as Dr. Garvey said, spread their spawning out, some of them, at least, and the reason for that is to try to hedge against high water flows, not, as he says, to hedge against dissolved oxygen problems later in the season, because we don't see those in a natural stream in August. We don't see dissolved oxygen problems in a natural stream; at least I never have. I have seen them in October and November. There's a lot of leaf matter in the stream and there's no flow, so they're not in a rush to get done before August because there's no DO in August, because there is plenty. So it's kind of a -- I think his analysis based on reservoir fish and large river fish and small streams are a lot different.

HEARING OFFICER MCGILL: I'm sorry. You

referred to a report by Dr. Garvey or a study?

MR. PESCITELLI: Yeah. That's --

HEARING OFFICER MCGILL: I just wasn't sure if that's already in the record, or if it isn't --

MR. PESCITELLI: It's called "Temperature Effects on Spawning Timing of Illinois Fishes," December 12, 2004.

HEARING OFFICER MCGILL: That's a published article?

MS. DIERS: No, it's not. I believe it's in the record.

HEARING OFFICER MCGILL: If the DNR or Agency would make that a hearing exhibit if it's not already in the record. I just -- I didn't recognize it.

MR. HARSCH: I guess I have some follow-up questions. Did the Agency or DNR --

HEARING OFFICER MCGILL: I'm sorry.

MR. HARSCH: Oh, I'm sorry.

HEARING OFFICER MCGILL: I was just wondering if you knew if this particular report was in the record or not.

MR. HARSCH: I think it is.

DR. GARVEY: Yeah, it is.

HEARING OFFICER MCGILL: It is in the

record. Okay. Thank you. Was there more of a response to that last question from -- Okay. Mr. Ettinger, I think you were --

MR. ETTINGER: I guess I didn't have that much more, although I -- this is a kind of difficult thing with a panel here, but -- so what -- if I understood that correctly, there is for a number of Illinois fish in your view a value in spawning and having a late spawn because of the flow conditions that may be present prior to July. Is that -- Does that summarize the situation?

MR. PESCITELLI: Yes.

MR. ETTINGER: Thank you.

HEARING OFFICER MCGILL: We just had a follow-up question.

MR. RAO: I just had questions relating to again Dr. Garvey's prefiled testimony regarding this issue. Have you had a chance to look at his prefiled testimony?

MR. PESCITELLI: From October 4?

MR. RAO: Yes. Yeah.

MR. PESCITELLI: Yes, I have.

MR. RAO: I think on page 3, on the first full paragraph, Dr. Garvey notes that "Evidence is

mounting that the majority of reproduction of aquatic organisms in Illinois either occurs before July 1 or late-spawning organisms have early life stages that are tolerant to low dissolved oxygen concentrations," and he cites to a master's thesis in support of his statement. Have you had a chance to look at the attached thesis?

MR. PESCITELLI: Yes, I have.

MR. RAO: Could you comment on the findings of those?

MR. PESCITELLI: Yeah, I was confused, because I didn't see how that supported his statement, because it was done by collection of larval fish in Illinois River, which is a large floodplain river, and the backwaters of Illinois River in southern Illinois, so I wasn't sure how that supported mounting evidence that the majority of reproduction -- which I'm not sure what he means by reproduction, if that's just the spawning act or development beyond the 30-day larval stage, but I was unclear. And in fact, even in that report, the peak of larval density was June 4 in southern Illinois, so you can extrapolate that with lower temperatures in northern Illinois being close to July 1.

MR. RAO: Okay. Thank you.

HEARING OFFICER MCGILL: Mr. Harsch?

MR. HARSCH: Did the Agency or DNR do any dissolved oxygen sampling this summer?

MR. SHORT: Yes, we did. We -- If you want me to elaborate a little bit, we --

MR. HARSCH: No, just wanted to know if you did it, because --

MR. SHORT: Yes.

MR. HARSCH: And you're aware that IAWA asked for that sampling?

MR. SHORT: Yes.

MR. HARSCH: And you are aware that it was not provided.

MR. SHORT: That's correct.

MR. HARSCH: Does the Agency or DNR have any dissolved oxygen sampling data from the small streams in northern Illinois that they'd care to put into this record that would show that -- the dissolved oxygen levels that the biologists have testified about?

MR. SHORT: We collected some in that area this summer. We still have not compiled it for distribution to anyone.

MR. HARSCH: So the record is devoid of any data that would support the testimony, because I don't think the record has any dissolved oxygen data regarding

the small streams.

HEARING OFFICER MCGILL: Mr. Harsch, why don't you pose that as a question.

BOARD MEMBER JOHNSON: "Is there."

MR. HARSCH: Is there any data in this record, since every -- all the data that we've gotten from DNR and IEPA, we don't believe --

MS. WILLIAMS: Are you asking --

MR. HARSCH: -- any of it applies to the small streams.

MS. WILLIAMS: Are you asking specifically about continuous monitoring data or any kind of data?

MR. HARSCH: Any data.

MR. PESCITELLI: Well, I'm confused, because I didn't testify to a DO level.

MR. HARSCH: You testified that the DO levels were being met; you didn't see any dissolved oxygen -- you can read back the answer, but I believe you testified --

MR. PESCITELLI: No, I testified on spawning times.

MR. HARSCH: I believe you testified that the dissolved oxygen levels were not a problem in July and August.

MR. PESCITELLI: Oh, based on my experience --

MR. HARSCH: Correct.

MR. PESCITELLI: -- of observing fish.

MR. CROSS: And if I could just add a bit of a response to that, as far as the debate about the DO data, I think what we attempted to do with our analysis in our joint recommendations was to look at the aquatic life needs for DO. Whether those DO standards were met or not, there -- we had enough evidence through the biological data that a higher level of protection was needed, and so it's -- you know, we really were focused on what we needed to do with DO in terms of additional protection for that aquatic life, whether it was attainable in current standards or future standards or whatever.

MR. HARSCH: I have a follow-up. This line of testimony, responses to questions today, doesn't change your responses to my questions that were in the transcript of the April 25 hearing at page 92, Joel, when you responded in coming up with the enhanced water proposal, you did not look at any dissolved oxygen data, correct?

MR. CROSS: Correct.

MR. HARSCH: You didn't look at any water temperature data.

MR. CROSS: That's correct.

MR. HARSCH: Nor did you look at any habitat data.

MR. CROSS: That's correct, and there's a reason for that, and we -- I believe at the last hearing, in the transcripts you're referring to, the question was related to whether or not those level I waters that we were recommending were considered cool, and the response was basically no, and an equal response is that they are not least-disturbed waters or high-quality waters either. Now, if that was our objective, we would have used some of that other data, including the habitat data, to determine if they were least-impacted streams or not, but that's not what the level I waters are. They're simply a set of waters where we have biology that requires an incrementally higher DO level.

HEARING OFFICER MCGILL: Any further questions? Okay. I'll just ask if anyone present has any questions for the witnesses of the Agency or DNR. Why don't we go off the record for a moment.

(Off the record.)

HEARING OFFICER MCGILL: Okay. Why don't we

go back on the record. No one has indicated they have any further questions for the witnesses of the Agency and DNR, so I'd like to thank them very much for their participation today. At this point I would ask if Professor Murphy could come up and give his testimony. We'll have a question period and then we'll proceed with the witnesses of IAWA and questions for those two witnesses.

Mr. -- Professor Murphy, if you wouldn't mind coming up and taking a microphone, if we can find a chair for you.

MR. ETTINGER: Could we take, like, a five-minute break to rearrange the furniture here?

HEARING OFFICER MCGILL: Sure. Why don't we go off the record for a moment.

(Brief recess taken.)

HEARING OFFICER MCGILL: Why don't we go back on the record. Would the court reporter please swear in Professor Murphy?

(Witness sworn.)

HEARING OFFICER MCGILL: And, Professor Murphy, would you like to have your prefiled testimony entered as if read and made a hearing exhibit?

PROFESSOR MURPHY: Yes, I would appreciate

that.

HEARING OFFICER MCGILL: For the record, is there any objection to this motion? Seeing none, I grant that motion, and I will mark the prefiled testimony of Professor Murphy as Hearing Exhibit 31. That's now been entered as if read, so, Professor Murphy, if you wanted to provide additional testimony, you may do so now.

PROFESSOR MURPHY: Yeah, I appreciate that. I would just like to make some comments on some of the other prefiled testimony. First, on the prefiled testimony of Mr. Kollias from the Metropolitan Water Reclamation District, he indicates that, speaking to the USEPA 1986 criteria document where it talks about the International Joint Commission, reviewed DO criteria for the Great Lakes, the Commission concluded that a simple criterion based on dissolved oxygen concentration was preferable to one based on percent saturation and was scientifically sound because the rate of oxygen transfer across fish gills is directly dependent on the mean concentration in oxygen partial pressure across the gill and this is directly proportional to dissolved oxygen concentration.

While I agree with that, I think it's actually the reverse, the dissolved oxygen concentration is

proportional to the partial pressure, but that is true in any specific temperature, and the problem is that if you take a fixed dissolved oxygen concentration at different temperatures, then that's no longer true. For instance, 5 milligrams per liter of oxygen at 30 degrees would be 67 percent saturated, and at 0 degrees it's 34 percent saturated, so the oxygen transfer rate would differ by a factor of 2.

Secondly, Mr. Kollias makes a statement that "Using dissolved oxygen saturation by itself could result in situations in 100 percent DO saturation at high temperatures with concentrations that are still harmful to fish and invertebrates." This is not a believable statement. 100 percent saturation is the maximum concentration of oxygen in equilibrium with the air, the oxygen content of the air, and this has been true throughout all history. This incredulous statement is just another example of the misguided reliance -- of the effects of a misguided reliance in milligrams per liter and how this distorts reality with respect to dissolved oxygen and its availability to organisms.

Mr. Kollias also states that "In low temperatures, dissolved oxygen saturation could be very low, yet waters could still have sufficient

concentrations of DO and be nonlimiting to the aquatic ecosystem." Well, he presents no evidence for that. He doesn't say what low and high means. It's just a statement about low temperatures.

He states later on, "In addition to these points, dissolved oxygen concentration must be utilized in the standard because it is possible to control DO concentration through management practices by supplemental aeration and other mechanical means," and he continues, "It's much more difficult to control oxygen tension," 100 percent saturation, "and oxygen saturation can be extremely variable." Again, this is not a believable statement. At any specific temperature there is an -- the proportionality -- the proportional variability in milligrams per liter of dissolved oxygen is the same as the proportional variability in the percent saturation of dissolved oxygen to more than 14 significant figures. It's a one-to-one relationship. If one is variable, the other one is exactly as variable.

And finally, he quotes Davis. Davis (1975) states that "It must be emphasized that fish require both the correct oxygen tension -- pressure -- gradient to move oxygen into the blood and sufficient oxygen concentration -- amount per volume of water breathed --

to fulfill the requirements of metabolism." I agree, and that's the point I've been trying to make over these past hearings. I'm pleased that Mr. Kollias and the Metropolitan Water District of Greater Chicago agree with my position. Thank you, Mr. Kollias.

Secondly, a comment on proposed setting -- the method for setting standards that Dr. Garvey has presented. Dr. Garvey indicates that the Board should use Liebig's Law as a minimum to set the water quality standards for dissolved oxygen in general use waters in Illinois. The assumption is that the species that are observed in a situation are only those that could or would be present. The question is, why are the conditions which are now observed have existed in the past and have already caused the decline and extravasation of indigenous aquatic organisms? Secondly, different organisms have a wide range of environmental requirements, and some of them or many of them have requirements that we might not yet exactly know.

In addition, all water quality measurements have uncertainty attached to them. Thus, a good science-based water quality standard could include some safety factor to give robust protection to the indigenous aquatic organisms. A standard based solely on the law of the

minimum would not provide such protection. For example, if the Illinois EPA were setting an ambient standard for human exposure to a toxic substance, say mercury or PCPs, would Mr. Frevert sent his investigative troops out to sample the cities and towns and hamlets of Illinois to find that location in the state with the highest concentration of the toxin of interest where people still survived and make that concentration the ambient standard for the state? I hope not. That would put the enforcement people out of business, because everybody would be below the standard. I urge the Board not to base the rulemaking on the application of Liebig's Law of the Minimum. Thank you very much.

HEARING OFFICER MCGILL: Thank you, Professor Murphy. Are there any questions for the witness?

MR. ETTINGER: I have one.

HEARING OFFICER MCGILL: Mr. Ettinger?

MR. ETTINGER: Yes. Dr. Murphy, as I understand it, what your testimony is is that we're wrong to just focus on milligrams per liter of dissolved oxygen; we should also be looking at percent saturation.

PROFESSOR MURPHY: Yes.

MR. ETTINGER: How would you propose that

the standard be modified to take into account this percent saturation factor that you're looking at?

PROFESSOR MURPHY: Well, one of the problems with the proposed standard is both of the time periods overlap those cold months of the year and warm months of the year, two six-month time periods, so what I would propose is that during the cold months of the year, perhaps December through March, that the standard be based on percent saturation and a -- Davis in his proposed standards, his standard for level B organisms proposes a 47 percent saturation for the lower temperatures. For a temperature range of 0 to 10 degrees, this would turn out -- this would work out to about 6 milligrams per liter, and if we add a little bit for -- provide some protection, maybe -- so I would propose a standard of 6 and a half milligrams per liter for the cold months of the year.

MR. ETTINGER: So as I understand it, this is -- because of the way the chemistry works, this is just a matter of math, and we could -- if we wanted to state -- continue to state our standard in a milligrams per liter, we could do so, but we'd have to use 6.5 for the cold winter months rather than the current milligram per liter figures.

PROFESSOR MURPHY: Yes, and that's -- there's no magic here; that these continuous oxygen sensors, what they actually sense is the percent saturation, and they go through a procedure of downgrading the data where you lose the temperature information and then convert it to these milligrams per liter, which you then -- which is not what the fish experience, so going with the data that's frequently collected would be a more direct way of doing it.

MR. ETTINGER: Okay. So that would lead to a 6 or a 6.5 for January, February and March as opposed to what the IAWA proposal is and the Agency proposal.

PROFESSOR MURPHY: And the 6.5 is 47 percent saturation at 5 degrees centigrade.

MR. ETTINGER: Thank you.

MS. WILLIAMS: Can I ask just for the record, when you were saying 0 to 10 degrees, are we talking Celsius or Fahrenheit?

PROFESSOR MURPHY: Yes.

MS. WILLIAMS: Celsius.

PROFESSOR MURPHY: There's not much water at 0 degrees Fahrenheit.

MS. WILLIAMS: And when you recommended the number, were you talking about a minimum or some type of

average?

PROFESSOR MURPHY: Minimum. I might point out that in -- with Mr. Kollias' testimony, he provided a number of DO measurements, and even the infamous Bubbly Creek would meet that standard -- or met the standard in December '05 and January '06. If Bubbly Creek can meet the standard, there's hope for the rest of the rivers in the state.

MR. ETTINGER: I'm sorry. My friend here has pointed out that December is also part of winter, a concept I had forgotten, so I should clarify whether you would want your higher standard or -- to apply for December as well as January, February or March, or just January, February and March.

PROFESSOR MURPHY: Well, my proposal would be that for waters below 10 degrees, the standard has been met, whether those occur in July or whenever.

MR. ETTINGER: If it occurs in July, we're in trouble for other reasons. Thank you.

HEARING OFFICER MCGILL: So, Professor Murphy, your suggestion would be based on water temperature, not any particular month of the calendar year.

PROFESSOR MURPHY: My recommendation to the

Board I guess would be on water temperature.

HEARING OFFICER MCGILL: Are there any further questions for Professor Murphy?

MS. WILLIAMS: The Agency doesn't have any other questions. Thank you.

HEARING OFFICER MCGILL: Thank you. Seeing none, I would like to thank Professor Murphy for appearing today to testify and answer questions. Thank you.

PROFESSOR MURPHY: Thank you.

HEARING OFFICER MCGILL: Let's go off the record for a moment.

(Brief recess taken.)

HEARING OFFICER MCGILL: We're going to go back on the record, and just before we turn to IAWA's witnesses, I just want to remind the Agency and DNR witnesses that they're sworn in. We have one follow-up question if it's okay. You're indicating no, but I'll ask it anyway.

MR. YONKAUSKI: Who's it from?

HEARING OFFICER MCGILL: From our technical unit, after conferring.

MS. WILLIAMS: We tried to convince them that the technical staff's not supposed to ask questions,

so -- for our people, so --

HEARING OFFICER MCGILL: Good luck with that.

MR. RAO: I think this question is for Mr. Frevert, more of a policy type question. Dr. Murphy recommended that the Board adopt a standard based on percent saturation of oxygen, and this witness provided some testimony regarding, you know, some practical observations that it may not be a good idea. We wanted to hear from the Agency, who will be implementing these standards, as to what their thoughts are on the practicality of implementing these standards and if there are any financial implications also.

MR. FREVERT: I'm sure there would be, and quite frankly, I haven't analyzed that in a lot of detail yet, nor do I anticipate I would. Concentration-based standards are the predominant approach most states rely on. I recognize the merit and the chemistry of what he's talking about, but from my experience and what my biologists tell me that the absolute concentrations of oxygen have a pretty good correlation and relationship to what we feel is necessary to protect the organisms. A percent saturation approach may accomplish the same thing, but our program activities are -- have not been

developed around that approach. There would obviously be some impact and ramification that I'm not well enough versed on to quantify for you, but there would be some disruption. Even beyond whether or not technically it's the best way to go, there are some programatic concerns I would have.

MR. ETTINGER: If I could just follow up on that.

HEARING OFFICER MCGILL: Go ahead.

MR. ETTINGER: Do you agree that there's more or less a mathematical relationship between the percent saturation and the DO concentration?

MR. FREVERT: Yeah, I agree with that.

MR. ETTINGER: Would there be any difficulty, then, if we wanted to follow Dr. Murphy's approach of continuing to state the standard in a milligram per liter term but taking into account his saturation effect by requiring a higher milligram per liter when the water was very cold?

MR. FREVERT: I don't know that there would or would not be an impact, but I'm not convinced under the colder water that the needs of the organisms are necessarily correlated. Typically we have winter ice cover situations periodically in small ponds and

sometimes you get winter fish kills from oxygen depletion under ice cover. My experience and recollection over the years in those circumstances, the DO that resulted in those fish kills and those upsets were quite a bit below that 6 and a half figure he referenced, so I'm not sure that relates actually to the environmental end points we're trying to achieve.

MR. ETTINGER: Okay. Well, I don't want to go on too much on this, except I would say that probably, though, because of the low temperature under that ice, we are probably talking about a higher concentration than you would expect otherwise, right?

MR. FREVERT: I don't think so. The temperatures are low but there's -- particularly in some of those shallower lagoons and things, there are still other biological functions taking place that are consuming oxygen.

MR. ETTINGER: So you're actually seeing numbers below 3 in those ponds?

MR. FREVERT: In those places where there are fish kills. Again, you've got an ice cover, so there's not any oxygen transfer across that air/water interface, so other chemical and biological processes taking place in that lagoon or pond, while they may be

reduced under lower temperatures, they're not stalled out altogether, so there is organic breakdown taking place.

HEARING OFFICER MCGILL: Thank you very much. With that, would the court reporter -- we're going to turn now to the IAWA's testimony, and I would ask the court reporter to please swear in the IAWA's witnesses and attorney collectively.

(Witnesses sworn.)

HEARING OFFICER MCGILL: Thank you. And now IAWA's counsel, Mr. Harsch, if you would begin the rulemaking proponent's presentation.

MR. HARSCH: Sure. Roy Harsch, Gardner, Carton & Douglas, attorney for Illinois Association of Wastewater Agencies. At this point in time I'd like to call Dennis Streicher. And, Dennis, if I show you a copy of your prefiled testimony, is that the testimony that you prepared?

MR. STREICHER: That is it.

MR. HARSCH: I would move that the prefiled testimony of Dennis Streicher be accepted into evidence as Exhibit 32.

HEARING OFFICER MCGILL: Is there any objection to the motion to have entered as if read and made a hearing exhibit the prefiled testimony of Dennis

Streicher?

MR. HARSCH: I'm moving it for exhibit. Mr. Streicher is going to read the testimony.

HEARING OFFICER MCGILL: Okay. There were no attachments to his prefiled testimony, as I recall.

MR. HARSCH: The prefiled testimony itself has been subject to questions. That's why I'd like to have it read into the record.

HEARING OFFICER MCGILL: Yeah. It would be Exhibit 32, as I understand the motion.

MR. HARSCH: Yes.

HEARING OFFICER MCGILL: But typically the prefiled testimony is also considered read into the record as if read, but if he's going to read it, we can simply make it a hearing exhibit. Any objections to making that prefiled testimony Hearing Exhibit 32?

MS. WILLIAMS: No.

HEARING OFFICER MCGILL: Seeing none, I grant that motion.

MR. HARSCH: And, Mr. Streicher, it's your desire to read your testimony today?

MR. STREICHER: Yes, it is.

MR. HARSCH: Will you please commence and present your written testimony?

MR. STREICHER: Thank you. I'd also like to thank the Illinois Pollution Control Board again for hearing my testimony. My name is Dennis Streicher. I'm director of water and wastewater with the City of Elmhurst, Illinois. I've been employed by the City of Elmhurst since 1972. For the last 20 years I've managed the wastewater plant, public water supply and the stormwater system in Elmhurst. I hold an Illinois EPA Class I operator's license and Illinois EPA Class A potable water operator's license. I'm representing the Illinois Association of Wastewater Agencies, IAWA. Our member water pollution control agencies represent over 70 percent of the people in Illinois. I was the president of IAWA from 2004 to 2005.

The IAWA began the process to update and fix the Illinois dissolved oxygen -- DO -- standard over five years ago. I believe at this point we have convinced almost everyone that indeed it does need fixing. At the first hearing in this proceeding, Toby Frevert said that this might be the most important of recent decisions the Board will be making. At the second hearing held in Springfield, Bob Mosher of Illinois EPA -- IEPA -- described the existing dissolved oxygen standard as broken.

In his testimony at the last hearing, Roy Smogor said that IEPA believes -- and I quote -- "The current dissolved oxygen standard for Illinois general use waters is too simplistic. The current standard inadequately accounts for the varied dissolved oxygen requirements of aquatic life in Illinois waters. Moreover, the current standard does not account for how dissolved oxygen concentrations vary across a broad range of natural aquatic conditions in Illinois," end quote. As an alternative, Mr. Smogor represented the Illinois Department of Natural Resources -- IDNR -- and IEPA recommendation for revisions to the standard, the joint IDNR/IEPA proposal.

It does seem that we've convinced most everyone that the existing dissolved oxygen standard is broken and indeed does not represent the complex dissolved oxygen patterns that occur in healthy river systems and that it needs to be modified. It has taken a long time and considerable effort and expense on IAWA's part to get to this realization.

IAWA members knew five years ago that the dissolved oxygen standard was incorrect. We had worked with the existing rule and knew that it is unattainable, even in those Illinois waters that are among the least

impacted by human activities. Our goal was to design a DO regulation that met a few crucial criteria: That it represents accurately what is expected in the least-impaired waters in the state; that the design of the rule be both enforceable by IEPA and be protective of all life stages of all the vertebrate and invertebrate life found in the surface waters of Illinois; and that it have the fundamental strength of being based in good science.

We met with folks in the IEPA to discuss our planned effort. We commissioned Dr. Whiles and Dr. Garvey to search the literature and draw from their own knowledge and experience to craft the best standard possible. They were careful to adhere to the United States Environmental Protection Agency -- USEPA -- 1986 national criteria document and have been in contact with the author of that document and solicited comments from him. They spent over two years at this effort and in April 2004 published "An Assessment of National and Illinois Dissolved Oxygen Water Quality Criteria." Even when still in draft form, IAWA circulated copies of the study to IEPA, citizen groups such as Sierra Club and Environmental Law & Policy Center, the IDNR and others. This was an effort to reach out to interested parties and

seek comments. We received none. We filed our petition on April 14, 2004, and were promptly criticized for not first having stakeholder discussions.

After the first hearing on June 29 of 2004, we initiated the requested stakeholder discussions. I was hoping then that we could begin serious and directed discussions to defend our position and present the data supporting the IAWA petition. I'm sorry to say that looking back on it that during the first year of stakeholder meetings, our efforts were not taken very seriously by some of the folks at the table. The initial opposition was from the IDNR Natural History Survey -- the NHS -- and the environmental groups. There were others in IDNR who supported the needed revision and some others who were opposed as well. I think that as time went on and those folks continued to attend the meetings, they gradually were convinced that the IAWA proposal was sound. Unfortunately, they were ultimately unable to convince their counterparts in their respective agencies. The stakeholder discussions really led us nowhere. Not everyone was yet convinced that the standard needed fixing.

As the second hearing transcript clearly shows, all who had been involved to date were totally surprised

by the participation of the representative from the Lieutenant Governor's office and the letter and testimony of Dr. Thomas from NHS. Neither had participated in the stakeholder group meeting held the morning of the hearing. IAWA had also recently spent several hours meeting with Mr. Miller with Dr. Garvey on the phone to explain IAWA's position at his request.

At the third hearing, after numerous stakeholders meetings were again -- we were again surprised by continuing opposition from NHS in testimony filed by Dr. Thomas, which was subsequently withdrawn by IDNR. There clearly was continuing disagreement between the IDNR and IEPA on this petition. The different positions taken by IEPA and IDNR and fueled by apparent disagreements between divisions within IDNR have taken a long time to resolve.

At the last hearing we saw that there was some resolution to those disagreements. I'd like to compliment both EPA and DNR for the enormous effort they have put into this matter. Individuals within both agencies have worked extremely hard. There has been a huge commitment of staff time devoted to working out the differences between those two important state agencies. I don't believe that was a very easy process.

It was apparent early on that there are slightly different perspectives between the two agencies. The IDNR has said that protection of Illinois natural resources is their responsibility. I appreciate that position and support it. They should focus on protecting natural systems, enhancing habitats and ensuring that the resources of the state are there for everyone, present and the future. The IEPA, on the other hand, have a slightly different mandate. Historically IEPA has developed and proposed the regulations that are both protective of the environment and are attainable by the regulated community. It would obviously be pointless to develop a rule that no one can meet. This is, I think, the source of the different perspectives between the two agencies. They aren't opposed to each other, but they have approached this petition from slightly different viewpoints. IDNR wants to be as protective as possible while IEPA needs to be -- needs an enforceable and attainable rule that is as protective as necessary. The DO standard which is finally adopted in this proceeding should be a sound dissolved oxygen regulation that will be used in the development of use stream classifications. It will be utilized by IEPA in classifying streams as to attainment or impairment. It will be used in the

development of TMDLs and the basis for future nutrient rulemaking. It will also be used in other decisions by other agencies.

I pointed out in my introduction that I manage both the wastewater utility and the public water supply in my community. The source of the different perspectives regarding regulations between the IDNR and IEPA is reminiscent of what I've seen in potable water regulations. The Safe Drinking Water Act has two sets of numbers for many contaminants found in drinking water. There are maximum contaminant levels that set regulatory limits that are enforceable and there are maximum contaminant level goals. The goals are where we'd like to be but can't get there yet because either the technology doesn't exist or the costs far outweigh the benefits. This analogy is not precisely correct, but I think it illustrates a bit of what I've seen over the last year or more. IDNR would like to have in place regulatory goals that are as protective as possible while IEPA needs to have regulations that can be reasonably attained and enforced.

As explained to me by both IEPA Director Doug Scott and IDNR Deputy Director Leslie Sgro, the Governor's office directed the two agencies to find some

common ground and not present positions at odds in this proceeding. Eventually staff were assembled who could address the IAWA petition seriously and a new round of meetings were scheduled while they worked out what is now the joint IDNR/IEPA proposal. I wouldn't describe these meetings as being stakeholder meetings. The group was larger than ideal for this sort of discussion. We weren't usually apprised of what the data would be presented before attending the meetings, and I'm sorry to say that in my opinion, we were not given the opportunity to have meaningful input. The actual discussions seemed very limited. What we did see from those meetings, however, was a morphing of the NHS position from total opposition to a general acceptance of the IAWA proposal and with limited agreement on the DO numbers and dates for the different DO concentrations.

That morphing culminated in the submittal of the joint IDNR/IEPA proposal filed with the Board at the last hearing. It has some of the basic design features of the original IAWA proposal. The two agencies have proposed a seasonal DO standard. They agree with the IAWA concept of averaging the DO measurements. There is an understanding that there is an absolute minima and there is an average low that can be tolerated by the organisms

in the rivers. I think that the basic design of the IAWA proposal and many of the numbers were finally being accepted as being mostly on target by the agencies. I'm sorry to say, however, that there were some other things thrown in the joint IDNR/IEPA proposal that IAWA cannot accept. We believe that these should be rejected by the Board for the reasons I will discuss.

The added feature I'm most concerned about are the concepts of an enhanced dissolved oxygen concentration for selected river segments. I suspect the idea for selecting particular river segments for a different standard may have come from the first round of stakeholder meetings. During a stakeholder discussion, when it seems as though all of the participants are at an impasse, it has been my experience that suggesting some new concepts or new ideas might help stimulate discussion and get the participants over the impasse. During one of those impasses early on in the stakeholder process, IAWA suggested that there might be rivers in Illinois that would be deserving of a DO standard that was different than the rest of the state. Since we couldn't agree on all the details of the IAWA petition, IAWA proposed to retain the existing standard for some list of waters until work could be completed that would identify how to

appropriately classify those waters and determine what standard should be adopted for those waters. We felt that we could introduce the goal that IAWA would eventually like to see the surface waters in Illinois categorized by attainable uses. This would in an appropriate method to assign water bodies to appropriate categories and would include different DO standards assigned to each category. IAWA and those attending the meeting understood that arriving at just what those standards would be is a very complex process. No agreement on this suggestion was reached.

Since those initial shareholder meetings, IAWA, again at its expense, has begun to move forward to develop what we hope will be a regulatory proposal to replace the present one-size-fits-all water quality standard approach with tiered use criteria and appropriate standards.

The IAWA effort includes participation of various stakeholders, including IDNR, IEPA, USEPA and various environmental groups. We have formed a tiered use committee and retained a consultant to begin the process. This committee has already started to identify what the various appropriate categories should be in Illinois based on existing and attainable uses. After this first

step, we will develop what the various water quality standards, including dissolved oxygen concentrations, should be for each category.

At the September 2006 IAWA annual conference, Toby Frevert spoke and provided an IEPA update. During his presentation he was asked about the tiered use effort. His response was that it's a difficult process that will take a long time. He asked that IAWA stay involved and do what it can to assist the IEPA as we work out this important addition to Illinois environmental policy and regulations.

This is indeed a complex process, and we expect this to be a long and laborious effort. Yet in their testimony at the last hearing, the joint IAWA/IEPA -- I'm sorry -- IDNR/IEPA proposal, the IDNR and IEPA are suggesting we move to a two-tiered dissolved oxygen standard now. The agencies recommended to the Board that the current dissolved oxygen standard be replaced with two levels of standards, each level applying to one of two sets of Illinois waters. One is a general use standard, which fairly closely follows the IAWA proposal, and the other is a higher-level standard that would apply to a subset of waters that were identified in the testimony.

As I said, all of this is very complex. There is much to be learned about all of these relationships. The tiered use work underway by IAWA with participation from DNR and EPA is the correct approach to resolving and addressing these complexities. Recently the IEPA circulated a white paper suggesting biological criteria as a useful tool to identify different categories. That will possibly be the best approach to take. It is used in other states and seems to be a reasonable approach to establish use categories.

Establishing a variety of specific numeric standards for constituents such as DO without adequate data to support them is recreating a flawed and unworkable standard. I'd like to caution the Board to be very careful about adopting an arbitrary tiered use or what is called a higher level of waters in Illinois. The dissolved oxygen standard we are attempting to repair was established over 30 years ago. That standard was put in place in what seems to have been a very arbitrary way. We do know that it was arrived at quickly and it was arrived at without there being a great deal of data to support it. We came here to fix a standard that most everyone now agrees is broken. Let's not replace it with another standard that has no data to support it either.

If the Board were to proceed establishing two tiers of dissolved oxygen standards, it could be setting itself up for future work load when each of the suggested river segments are analyzed and found to not need the suggested 6.25 milligram per liter dissolved oxygen concentration. How the agencies arrived at identifying the segments for the added protection seems arbitrary, extremely arbitrary. Features such as a bridge or some other geographical identifier are used to delineate the individual river segments. The joint IEPA/IDNR proposal has not been subject to any ground truthing of the proposed segments. No continuous dissolved oxygen measurements have ever been performed to show the suggested 6.25 milligram per liter concentration is either realistic or attainable in the proposed enhanced segments. As a result, neither EPA nor DNR has presented any in this record to support their proposal.

Trying to minimize the apparent impact of the joint proposal, IEPA points out that only 8 percent of the total length of Illinois stream miles would be included for the enhanced protection. I ask the Board to look closely at the testimony and the documentation submitted to support establishing the proposed segments. The 8 percent is spread out across the state in a very

widely dispersed sort of pattern; a piece here, a piece there. There is no continuity. These designations should be by basin or at least by sub-basin. Increasingly the data are showing that habitat should be the characteristic determining which waters receive the designation.

Also at the IAWA annual conference we again heard from Dr. Mark David. He is one of the principal investigators working on an Illinois Department of Agriculture project investigating the sources and effects of nutrients in Illinois waters. Specifically he's working with the Illinois Council For Food and Agriculture Research, C-FAR. While that effort is not yet complete, Dr. David was willing to state that his findings show that the greatest influence on biological diversity in Illinois waters is habitat. Diverse and intact habitats result in the greatest diversity of fish and macroinvertebrate communities.

Again, I caution the Board to be very careful about adopting this beginning of a tiered use system without there being appropriate effort put into identifying the correct numbers, the correct stream use categories and the stream segments that are appropriate for each category. The process begun by the Illinois

Association of Wastewater Agencies for identifying tiered use is the correct process to follow. With continued IEPA and IDNR and other stakeholder cooperation, I'm confident we can come to develop in Illinois a detailed and defendable attainable use system and correctly identify the appropriate categories for the surface waters of Illinois.

The suggested 6.25 milligram per liter enhanced dissolved oxygen standard is just as wrong and is just as broken as the existing standard. In other words, the 6.25 milligram per liter average is an unattainable number even in the least-impaired river systems. At the last hearing, IAWA suggested that either IEPA or IDNR repeat the earlier DO continuous sampling effort this summer. It is our understanding they have not done so, nor have they made available any of their 2006 sampling effort.

At the last hearing I explained that IAWA would attempt to gather some additional data. Some IAWA members over the past several months have at their own expense and effort installed continuous dissolved oxygen recorders in various river segments across Illinois. Some of these segments are -- Some of these are segments identified by IDNR and IEPA as deserving of the enhanced

dissolved oxygen standard. Dr. Garvey will review the data that was collected later during his testimony. As he will testify, the 6.25 milligram per liter value was not always achieved. This is not surprising, because that was shown over a year ago when IEPA collected continuous DO measurements on eight selected rivers in Illinois. Some of the rivers chosen were among those least impaired in Illinois. The data showed that they did not meet the current 5 milligram per liter for 16 hours and 6 milligram per liter for 8 hours, let alone the suggested 6.25 milligram per liter standard.

My questions and a question the Board should ask is how can these river segments support the diversity of fish the IDNR suggests are DO intolerant and the protection of require a 6.25 milligram per liter average DO standard yet are found in river segments that in fact have been shown do not achieve a 6.25 milligrams per liter average? Why is it we see lower DO levels yet still find the river supports a diverse population of so-called DO intolerant fish and other aquatic organisms? And finally, where are the data to support the agencies' position? Are we just finding a compromise that is not supported by any science? Dr. Garvey and Dr. David in separate studies have said that habitat is key to species

diversity.

At a meeting in Springfield last January, I met with IEPA staff and talked with them about what was then their draft IEPA/IDNR proposal. I was surprised to see the 6.25 milligram per liter concentration being suggested and asked where it came from. I was immediately told that it was a compromise. I was told that the two agencies, IEPA and IDNR, could not decide on the final concentration for the proposed enhanced river segments and that the IEPA attorneys suggested that the 6.25 milligram per liter value be agreed upon as a middle point. This is not the way to develop an appropriate regulation. It is probably how the current DO standard was developed, with no data to support it and no documentation of where it came from. I'm hoping we're not going to adopt another standard that starts out to be broken immediately after being implemented.

As I said earlier, the goal of the IAWA petition is that Illinois have a dissolved oxygen standard, A, that represents accurately what is expected in the least-impaired waters in the state; B, that the design of the standard be both enforceable by the Agency and be protective of all life stages of all the vertebrate and invertebrate species found in the surface waters of

Illinois; C, and that it have the fundamental strength of being based in good science. I don't believe that the proposed alternative joint IDNR/IEPA proposal achieves those goals.

We have seen over the past two years a focused effort to collect additional dissolved oxygen data throughout Illinois. This proceeding has generated reams of dissolved oxygen data. I ask the Board to look again at the numerous exhibits and the amazing amount of data filed, the overwhelming bulk of which supports the IAWA petition. Yet still there are questions and doubt about what a protective DO concentration should be. Why would the two agencies now propose a tiered approach? I would suggest the reason could be found by looking at that fundamental difference in the agencies' viewpoint of the goal of a regulation. The proposed alternative agency standard is a compromise that helps IDNR be more protective than is necessary, sort of setting a goal for the surface waters of Illinois to meet, but the data show they won't. There was no ground truthing to prove the enhanced waterways meet or ever will meet the proposed standard.

The second part of the joint IDNR/IEPA proposal to which IAWA strongly objects is the arbitrary inclusion

of July in the cool weather months, which would be subject to the more stringent DO limits. This clearly is another attempt to set a goal to protect early life stages. The entire data set presented and discussed in this proceeding shows that DO levels throughout Illinois in July routinely fall below that found in the cooler months. July is a hot month with resulting increases in water temperature and lower DO saturation. Acceptance of the IDNR/IEPA position on this issue means the establishment of a DO limitation that is currently not being attained, is generally not attainable and one which will lead to expenditures of public funds to attempt to meet an unattainable goal.

While IAWA is strongly opposed to the enhanced waters proposal and the inclusion of July in the cool water period, IAWA is in agreement with a portion of Toby Frevert's testimony at the last hearing. Mr. Frevert asked that the Board consider incorporation of a narrative provision supplementing the numeric provisions of the standard to assure environmentally acceptable conditions are provided throughout the full spectrum of general use waters. IEPA and IDNR have recommended and IAWA supports that the general use waters at all locations maintain sufficient dissolved oxygen

concentrations to prevent offensive conditions as required in Section 302.203 of the Illinois Administrative Code. I quote here, "Quiescent and isolated sectors of general use waters including wetlands, sloughs, backwaters and lakes and reservoirs below the thermocline shall be maintained at sufficient dissolved oxygen concentrations to support their natural ecological functions in resident aquatic communities," closed quote. Also, previously we have agreed that the inclusion of a 30-day average be part of the regulation, bringing it more in alignment with the USEPA 1986 national criteria document.

In conclusion, the proposal that a two-tiered system be put in place is premature and unwarranted by the data. Dr. Whiles and Dr. Garvey's report stands the test of these past two and a half years of data collection and should be adopted by the Board with the two modifications suggested. Along with those two additions, I am urging the Board to adopt the IAWA petition as filed; that from March 1 through June 30 the state-wide standard be a one-day minimum of 5 milligrams per liter with a seven-day mean of 6 milligrams per liter and that the remainder of the year, from July 1 through February 28 or 29, that the one-day minimum be 3.5

milligrams per liter with seven-day mean minimum of 4.0 milligrams per liter. As will be explained by Dr. Garvey, the data clearly show that the proposed July 30 date for the seasonal change in acceptable DO levels throughout Illinois is clearly not appropriate and should not be adopted as part of this petition.

Thank you.

MR. HARSCH: Mr. Streicher, did you work with a number of IAWA members in their data-gathering efforts this summer?

MR. STREICHER: Yes, I did.

MR. HARSCH: I show you a document; first page is Fox Metro. Could you explain what this is?

MR. STREICHER: These are statements that we circulated to the agencies to certify that the data that they collected was collected according to a particular methodology and that it was in fact the data that they collected.

MR. HARSCH: And it also provided the locations where the data was collected?

MR. STREICHER: Yes, it did. It provided those locations in which -- and various streams in which they placed continuous dissolved oxygen meters.

MR. HARSCH: And those communities -- or

those agencies would be Fox Metro Water Reclamation District, Naperville, Greater Peoria Sanitary District, City of Plainfield, or Village of Plainfield, the Rock River Water Reclamation District and the Wheaton Sanitary District.

MR. STREICHER: That's correct.

MR. HARSCH: Did these agencies provide the data that they collected to Dr. Garvey?

MR. STREICHER: They provided it to both myself and Dr. Garvey.

MR. HARSCH: And you've asked Dr. Garvey then to prepare that data in an electronic format?

MR. STREICHER: I did.

MR. HARSCH: At this point, Mr. Hearing Officer, I'd like to mark as Exhibit --

HEARING OFFICER MCGILL: 33.

MR. HARSCH: -- 33 the compilation of statements from the various agencies that provided the data that Mr. Streicher's identified.

HEARING OFFICER MCGILL: Is there any objection to having that --

MS. WILLIAMS: Are there copies?

HEARING OFFICER MCGILL: -- entered as a hearing exhibit?

MR. HARSCH: Yes, there are copies up here, and --

MS. WILLIAMS: I don't think we've seen it, so I'd like the opportunity --

HEARING OFFICER MCGILL: Okay. Sure. Why don't you take a look at that, and I'll just --

MR. HARSCH: While we're marking that, I would like to mark as Exhibit 34 -- the disk that Dr. Garvey has prepared as Exhibit 34.

HEARING OFFICER MCGILL: And that -- if you could just describe that compact disk.

MR. HARSCH: It's a compact disk and it's marked IAWA '06.

HEARING OFFICER MCGILL: It sets forth the data referred to in Dr. Garvey's prefiled testimony?

MR. HARSCH: Yes, and that Mr. Streicher has just identified he asked Dr. Garvey to compile.

HEARING OFFICER MCGILL: Okay. So the --

MR. HARSCH: At this point I'd move the introduction of Exhibits 33 and 34, and as I said, we have copies up here of the disk and the statements from the various agencies.

MR. ETTINGER: I'm sorry. What was 33?

MR. HARSCH: The statement.

MR. ETTINGER: And this basically just authenticates the DO data that's in the Garvey report.

MR. STREICHER: Yes.

MR. ETTINGER: And 34 is the disk?

MR. HARSCH: Yes.

MR. ETTINGER: Okay.

HEARING OFFICER MCGILL: There's a motion to have entered as a hearing exhibit the various certifications from the water reclamation districts about the sampling. Any objection to that motion?

MR. ETTINGER: No.

HEARING OFFICER MCGILL: The Agency have any objection?

MS. WILLIAMS: No, I don't think we have any objection.

HEARING OFFICER MCGILL: So seeing no objection, that motion's granted, and that will be Exhibit 33. Then there's a motion to have entered as a hearing exhibit the IAWA compact disk of sampling data from '06.

MS. WILLIAMS: Did Mr. Harsch say there were copies of that as well?

HEARING OFFICER MCGILL: Of the disk?

MR. HARSCH: There are plenty up here.

HEARING OFFICER MCGILL: There are copies. Any objection to that motion? Seeing none, I'll grant that motion, and that will be Hearing Exhibit 34. Mr. Harsch, if you wanted to continue with your witnesses.

MR. HARSCH: At this point I'd like to go through Dr. Garvey's testimony and then have both witnesses stand for questioning, if acceptable.

HEARING OFFICER MCGILL: Yes.

MR. HARSCH: Dr. Garvey, I'm showing you a copy of your prefiled testimony -- [inaudible]

THE REPORTER: Excuse me. I can't hear you. You'll have to speak up, please.

MR. HARSCH: I'm showing you a copy of your prefiled testimony. Is this a document you prepared --

HEARING OFFICER MCGILL: I'm sorry, Mr. Harsch. If you could just move closer to the microphone.

MR. HARSCH: Dr. Garvey, I'm showing you what -- the prefiled -- copy of the prefiled testimony and all of the exhibits. Is this the document that you prepared and asked me to file?

DR. GARVEY: Yes.

MR. HARSCH: Mr. Hearing Officer, I would

like to mark this as Exhibit 35 and move it for introduction.

HEARING OFFICER MCGILL: Any objection to that motion? Seeing none, the prefiled testimony of Dr. Garvey is entered as Exhibit 35.

DR. GARVEY: I'd like to read this if possible.

MR. ETTINGER: May I just ask a preliminary question on Exhibit 35? At least the way I printed it off the Web, the IPCB Web site, the -- it didn't appear like these studies came out in the right order. Did you guys correct that? I just wanted to make sure.

MR. HARSCH: We also got -- You did get -- although they were late, and I apologize -- written copies.

MR. ETTINGER: And that was stapled together properly?

MR. HARSCH: I believe it was.

MR. ETTINGER: I don't know who did the other one. I was just making sure that I had the pages together right.

MR. HARSCH: I believe they were in the written one.

MR. ETTINGER: They were in the written one.

Okay.

MS. WILLIAMS: Are you talking about the Dr. David stuff?

MR. ETTINGER: Yeah. There's one --

MS. WILLIAMS: I noticed that too. It seemed to be out of order.

MR. RAO: Yeah, we had the same problem.

MR. ETTINGER: Okay. I just wanted to make sure I wasn't -- before I --

MR. HARSCH: Well, shall we go through 35 and you put it in correct order, then?

MR. ETTINGER: Well, if you're offering the thing that was mailed and you know that's in correct order, I'm willing to accept your word for it.

HEARING OFFICER MCGILL: You're talking about the order of the exhibits?

MR. ETTINGER: Yeah. There's one Mark -- I think it's -- I think I've got it sorted out right, but there's a page in the Mark David exhibits. The whole thing isn't --

MR. HARSCH: Let's take a break, if we could, and --

HEARING OFFICER MCGILL: Yeah, why don't we go off the record.

(Off the record.)

HEARING OFFICER MCGILL: Let's go back on the record, and we left off clarifying the order of the attachments or exhibits to Dr. Garvey's prefiled testimony.

MR. HARSCH: If you look what is marked as Exhibit 2, "Controls on chlorophyll-a in nutrient-rich agricultural streams," that single page should go after the document that is Galley Proof JEQ q05-0433 and be the introduction of Exhibit 2.

MR. ETTINGER: So is "Timing of Riverine Export" then Exhibit 1?

DR. GARVEY: No. That's Exhibit 2 in the --

MR. ETTINGER: All the David studies are Exhibit 2?

DR. GARVEY: The three David studies are in that Exhibit 2, which is now Exhibit thirty --

MR. ETTINGER: Yeah. It's part of -- It's Exhibit 2 to Exhibit thirty -- whatever it is.

HEARING OFFICER MCGILL: Okay. So there's a motion to have the prefiled testimony of Dr. Garvey entered as a hearing exhibit, and I can't recall if I ruled on that motion or not. Is there any objection to that motion?

MS. WILLIAMS: No objection.

HEARING OFFICER MCGILL: Seeing none, I'll grant the motion. The prefiled testimony of Dr. Garvey is now Hearing Exhibit 35.

MR. HARSCH: Dr. Garvey, would you proceed?

DR. GARVEY: I thank the Illinois Pollution Control Board for allowing me to present my testimony. My name is Dr. James E. Garvey, associate professor of zoology and associate director of the Fisheries Illinois Aquaculture Center at the Southern Illinois University Carbondale, SIUC. I also hold several other appointments, such as chair of the American Fisheries Society -- AFS -- Farm Bill Advisory Task Force, executive officer of the Illinois chapter of the AFS, member of the U.S. Army Corps of Engineers Environmental Management Program Project Sequencing Team and north central representative of the Early Life History Section of the AFS.

As you know, I am an aquatic ecologist with an active research program that revolves around environmental and human-induced factors influencing the abundance and distribution of fishes in lakes and rivers. I have published well over 40 publications that are widely cited in the discipline of fisheries, aquatic

ecology and general ecology. I also have an active graduate training program. My graduate students often join natural resource agencies such as the Illinois EPA, the U.S. Fish and Wildlife Service and the Missouri Department of Conservation.

My participation in this process began over two years ago when the Illinois Association of Wastewater Agencies, IAWA, asked Dr. Matt Whiles and me to evaluate the current dissolved oxygen standard in Illinois. After an extensive literature review, we generated a report that stated that the current standard is too simplistic for the diverse waters of Illinois. We supported many of the recommendations that were developed in the USEPA national criteria document -- NCD -- for dissolved oxygen.

"Review." Over the course of two years, much data collection, literature review and discourse among the stakeholders have occurred. I have attended all the stakeholder meetings and hearings before the Board; I have had the opportunity to review all the technical information and data presented in this rulemaking process thanks to the cooperation of the stakeholders. The end result of this process is that the recommendations that Dr. Whiles and I set forth largely have been supported.

I have appeared before the Board on several occasions to present my findings. Recall, we recommended that a two-season standard be adopted throughout the state.

During March through June, when the majority of early life stages of many fishes and other aquatic organisms are produced, we recommended a standard dissolved oxygen concentration be met that provides sufficient oxygen to support the metabolic needs of eggs and larvae. During this time of year, streams are typically flowing, primary productivity is accelerating but not peaking, and temperatures are cool to moderate. Thus, high dissolved oxygen concentrations are expected to be available to young aquatic organisms. This expectation has been well supported by my findings described in previous testimony. The literature and growing state-wide oxygen data set demonstrate that for warm-water low gradient systems common in Illinois, concentrations should not decline below 5 milligrams per liter and weekly averages should not decline below 6 milligrams per liter. We also suggested a 30-day running average of 5.5 milligrams per liter, which has little biological support in my view but is recommended in the NCD.

As temperatures increase during summer, increased

biological activity and water's reduced oxygen capacity should reduce dissolved oxygen concentrations, particularly during night. Evidence is mounting that the majority of reproduction of aquatic organisms in Illinois either occurs before July 1 -- see Csoboth 2006 thesis, SIUC; Exhibit 1 -- or late-spawning organisms have early life stages that are tolerant to low dissolved oxygen concentrations; for example, freshwater mussels. Thus, we recommended that during July through February Illinois adopt a daily acute minimum of 3.5 milligrams per liter and a seven-day average of daily minima of 4 milligrams per liter. In previous testimony before the Board I have demonstrated that streams that meet these dissolved oxygen conditions appear to contain diverse, robust biological assemblages. Those that do not are typically impaired.

During the past year, the Illinois Department of Natural Resources -- IDNR -- and the Illinois Environmental Protection Agency -- IEPA -- have proposed an alternative two-tiered oxygen standard for the state and have expended much energy to develop it. The general use tier is very similar to the IAWA state-wide recommendation with slightly higher concentrations. Also, the criteria for early life stages are extended

through July. In addition, the agencies recommended an enhanced oxygen tier for streams that contain fishes and invertebrates that were found by the Ohio Environmental Protection Agency to occur in Ohio waters with high average oxygen concentrations.

My concern about this approach is that the selection of streams based solely on associations between aquatic organisms and average oxygen concentrations ignores other potential causal factors such as habitat quality, gradient and temperature. Thus, coining these organisms as oxygen sensitive and then using them to select enhanced tier waters may be completely spurious. Only through experiments that establish causality between oxygen tolerance and fish life processes can tolerance be assessed. Again, these issues have been addressed in previous testimony when I described the research by Smalle and Rabeni published in the Transactions of the American Fisheries Society. Recall, these investigators used a combination of lab assays and surveys to develop an index of oxygen sensitivity in Missouri streams.

"Overview of Testimony." I present results that continue to support the recommendations in the Garvey and Whiles report. First I review the results of recent peer-reviewed papers that show that dissolved oxygen

concentrations in Illinois streams are difficult to predict and largely influenced by characteristics of stream habitat and morphology. I then explore the implications of the two-tier oxygen standard for Illinois using data that were collected both by the IDNR and IEPA as well as data that were collected by IAWA members. In my view, the most compelling results derive from stream segments slated for enhanced dissolved oxygen protection by the proposed IDNR/IEPA two-tier approach.

As I analyzed these data, it became apparent that many of these segments likely violate both the IDNR/IEPA and perhaps the IAWA proposed standards, even though enhanced oxygen taxa are present in streams. Further, daily discharge -- in other words, volume of water moving per second through the stream -- explained as much as 50 percent of the variation in daily median and minimum dissolved oxygen concentrations in several of these systems. Thus, the physical characteristics of streams interacting with flow largely drove much of the oxygen dynamics. In my view, this further complicates any attempts to fit a single standard to any stream in the state and renews the urgent need to develop tiered habitat-based criteria that incorporate how discharge affects aquatic communities and water quality.

"Literature Review." Several papers that were presented by Mark -- Dr. Mark David and colleagues at the University of Illinois Urbana-Champaign through support by the C-FAR program recently have been published; Exhibit 2. Although the general expectation was for dissolved oxygen dynamics in their research streams in Illinois to be affected by nutrient loading, they found that stream physical characteristics, primarily basin shape and its propensity to hold organic matter and intercept light, were more important in influencing oxygen concentrations. As I've argued throughout this process and in the original IAWA-sponsored report, these results indicate that stream physical characteristics trump water quality and need to be the primary focus of standard development.

"Analysis of Historical Grab Data and 2004-2005 Continuous Data." Illinois DNR/EPA provided me with grab dissolved oxygen data collected during 1994 through 2003 in streams that have fully met their aquatic use designation. In addition, they provided data from 2004 and 2005 collected with semi-continuous data logging probes in streams that have been tapped for inclusion in the enhanced oxygen tier. I sent the results I present below to Mr. Matt Short and Mr. Joel Cross for their

review. As of the date I am drafting this testimony, they have not responded. The grab data demonstrate that median dissolved oxygen concentration declines during June through August relative to other months; Exhibit 3. Concentrations did decline below a benchmark of 5 milligrams per liter during the summer months, although rarely. Given that these grabs were typically taken during the day, it is not surprising that relatively low dissolved oxygen concentrations were not frequently encountered.

Continuous data demonstrated that dissolved oxygen in enhanced segments more frequently declined below 5 milligrams per liter and occasionally below 3.5 milligrams per liter; Exhibit 3. These low concentrations, which often exceeded both the IAWA and DNR/EPA proposed standards, typically occurred during the night through dawn. Interestingly, these enhanced-tier segments more frequently -- up to 20 percent of observations -- exceeded the DNR/EPA minimum of 5 milligrams per liter during July than the IAWA's proposed standard of 3.5 milligrams per liter during that month; Exhibit 3. The streams that contained oxygen sensitive species failed to meet the standards set for them by the IDNR/EPA proposal.

On 24 April, 2006, Mr. Toby Frevert sent a letter to Mr. Dennis Streicher including several disclaimers about the above data set. He indicated that the grab data were a worst-case scenario, including only data collected during the morning hours. On the contrary, the data set I received from the agencies and recently sent back to them for confirmation included grab data that were collected during morning through afternoon. In fact, the median collection time was 11:00 hours, with times as late as 17:00 hours; Exhibit 3. Thus, it appears to me that the data represent the range of daily conditions that affect oxygen concentrations. Time of day was positively related to DO concentration in this data set but explained less than 1 percent of the variation. Although the continuous data show that the enhanced streams cannot meet the IDNR/IEPA expected standard, Mr. Frevert noted that these data included results from 2005 when a drought gripped much of the state. Because these results were collected under extreme conditions, he argued that they should be discounted. I respectfully disagree.

Few laws exist in the tangled and complex discipline of ecology. However, one of the most commonly agreed tenets in our discipline is Liebig's Law of the

Minimum, taught in every general ecology course, including my own at SIUC. Liebig aptly noted that the distribution of all living organisms will not be dictated by the average conditions, but rather the availability of the most limited condition. This condition does not always have to be limiting, but only when organisms are experiencing some critical period such as reproduction or growth. The condition could be an occasionally limited nutrient, or in our case, oxygen. In other words, the occasional worst-case scenario which limits the oxygen available to the local fauna will determine the species composition and abundance present at all times. Only by identifying the limiting conditions -- in other words, the acute minimum oxygen concentration -- can we determine what should be present through time. The extreme drought conditions in the enhanced streams likely provided the worst-case scenario and thereby insight into what that acute minimum should be to support a diverse aquatic assemblage. The proposed minimum standard of 3.5 milligrams per liter was rarely exceeded in these streams -- Exhibit 3 -- and likely is near the extreme lower limit.

"Illinois Water Survey Data." Illinois DNR via Ms. Ann Holtrop provided me with grab dissolved oxygen

data from various studies compiled through the Illinois State Water Survey. These data extend from the early '70s through the 1990s. After reviewing the reports from which these data were collected -- see Exhibit 4 -- it was clear that the 20,101 individual observations that I analyzed were collected in many ways. Even given this caveat, I thought it might be interesting to determine whether average dissolved oxygen concentrations improved in Illinois surface waters through time as nutrient loading abated during the past 30 years as a function of the Clean Water Act. I was rather surprised to find that no real pattern occurred through the decades, with concentrations varying widely among sites and years for which data were available. As per the results emerging from Dr. David's laboratory as well as the results I will present below, it appears that oxygen concentrations in streams are likely influenced by habitat and its interactions with many other factors, of which nutrient loading is but one component.

"IAWA 2005 and 2006 Semi-continuous Monitoring." Several IAWA members have installed semi-continuous dissolved oxygen loggers -- 15- to 60-minute intervals depending on the source -- in streams that are in segments slated for enhanced tier standards by the

agencies. Segments for which I have received data are on the Fox, DuPage, Kickapoo, Rock and Vermilion Rivers; Exhibit 5, 24,575 individual observations. With the exception of the Fox River where the data derive from 2005, the remainder of the data derived from summer 2006. I also procured USGS daily monitoring data for discharge from gauging stations near the river segments to test the hypothesis that discharge drives much of the variation in dissolved oxygen concentrations in low-gradient Illinois streams. The IAWA members who have collected the data have reviewed these summary results.

Dynamics of dissolved oxygen vary widely among the enhanced tier stream segments -- Exhibit 5 -- from daily concentrations varying widely in the Fox River to less so in the Vermilion River. Both median and minimum daily dissolved oxygen concentrations typically declined as the summer progressed in the Fox, DuPage and Kickapoo Rivers, but not the others; Exhibit 5. Probably the most compelling result is the linear or log-linear relationship between daily discharge and median and minimum daily dissolved oxygen concentrations in the streams; Exhibit 5. In 2005 for the Fox River, dissolved oxygen concentrations declined sharply with declining daily discharge; Exhibit 5. Conversely, in the other

streams during 2006, dissolved oxygen concentrations were either unrelated to discharge or negatively related; Exhibit 5. I could speculate broadly about the underlying mechanisms, including flow-related biomechanical oxygen demand, hypoxic groundwater intrusion and changes in water quality due to run-off. Regardless of the underlying causes, given that discharge can explain up to 50 percent of the variation in dissolved oxygen concentrations during both severe drought -- 2005 -- and non-drought years, this issue needs to be incorporated into standard development and interpretation.

I applied both the enhanced tier standard and the proposed IAWA standard to the semi-continuous data. Typically, both standards demonstrate that several of the stream segments, including those in the DuPage, Fox and Kickapoo Rivers, failed to meet the season-dependent acute minima, even given the proposed enhanced status of these systems; Exhibit 6. This is not surprising given that some portions of the DuPage and Fox Rivers are currently listed with low dissolved oxygen as a probable cause for impairment; see map in Exhibit 5. However, the Rock River, which is listed as impaired due to low oxygen, did not fail to meet any of the minimum criteria;

Exhibit 6.

Seven-day means ending in July for IAWA and August for IDNR/IEPA proposals were generally insensitive; Exhibit 6. Interestingly, the IAWA proposed seven-day minimum standard of 4 milligrams per liter, which applies during July through February, generated more violations than the DNR/EPA seven-day mean minimum of 4.5 milligrams per liter, which starts in August; Exhibit 6. Although I did not expect this to occur, apparently applying the mean-minimum criterion during July as per the IAWA proposal is more sensitive. Because the daily variation in dissolved oxygen concentrations differs more than the daily average -- i.e., it is the variation, not the mean that is sensitive -- it appears that the mean-minimum criterion is more sensitive to frequently -- frequent declines in oxygen during the summer. In my view, it appears that many of these systems, particularly the Fox River, fail to provide adequate oxygen for aquatic life during part of the summer. This causes me to question the linkage between the aquatic assemblages used to select the sites for enhanced status and oxygen needs of the resident organisms.

"Summary." One of the major conclusions of the

Garvey and Whiles report was that we have much to learn about associations between aquatic organisms and spatial and temporal heterogeneity in dissolved oxygen concentrations of surface waters in the U.S. Since that report was completed, I have had the privilege of exploring this issue in depth and receiving some unprecedented -- and fun -- data sets. As Liebig stated generally for all ecology, it is clear that oxygen can become a limiting dissolved gas for aquatic organisms and, below some threshold concentration, we should expect to see deleterious effects and reductions in species composition and abundance. To this date, all the data I have reviewed suggest that a threshold does exist and that it occurs during the summer when concentrations are less than or equal to 3 milligrams per liter as stated in the NCD and the Garvey and Whiles report. If a stream remains consistently above this level -- i.e., never violates a 3.5 milligrams per liter minimum -- oxygen is no longer limiting for life and some other factor then limits organisms, probably habitat. All of the stream data and the literature -- see Dr. David's research -- support this view.

I favor scrapping dissolved oxygen as a standard altogether. Although under extreme conditions it can

become limiting -- for example, in the Gulf of Mexico hypoxic zone -- variable or low concentrations are largely a symptom of habitat problems and interactions with other factors such as chemical and biological pollutants, and, as this testimony suggests, discharge. However, given that this is not currently a possibility, it appears that the set of standards proposed in the Garvey and Whiles report stand the test of the data and should be adopted in the interim. I do urge the stakeholders to move rapidly toward a habitat-based tier designation where oxygen is but one of a suite of physical and chemical parameters used to diagnose root causes and develop sound solutions.

MR. HARSCH: Dr. Garvey, have you had an opportunity to review additional data since you prepared your prefiled testimony?

DR. GARVEY: Yes, I have.

MR. HARSCH: And would you like to present some additional comments regarding that data?

DR. GARVEY: Yes, I have, and it's included in another document that I'd like to read.

MR. HARSCH: And this document is entitled "Analysis of Dissolved Oxygen Patterns: Comparisons among Fox River Enhanced Reach, DuPage River and Salt

Creek 2006"?

DR. GARVEY: Yes, it is.

MR. HARSCH: Mr. Hearing Officer, I'd like to mark this as Exhibit 36 and move its introduction, and we have multiple copies up here.

MR. ETTINGER: Off the record, I wasn't aware of this one, so can I just grab --

HEARING OFFICER MCGILL: Why don't we go off the record.

(Off the record.)

HEARING OFFICER MCGILL: We'll go back on the record now, please, and, Mr. Harsch, you were going to add to your description of the document you're moving to have entered as a hearing exhibit?

MR. HARSCH: Yes. Before you rule on the motion, perhaps if Dr. Garvey could describe what the document is and its generation, it would be helpful.

HEARING OFFICER MCGILL: Sure. Thanks.

DR. GARVEY: This document is -- well, first of all, I apologize for springing this on everyone. We received the last of the data that is summarized in this document last week, late last week, and so more or less I was curiously analyzing it over the last few days, so that's the reason why you're just seeing it now. It's

data that were continuously monitored and -- by the Fox Metropolitan Reclamation District for 2006 and also by the DuPage River/Salt Creek Workgroup, and so more or less it's nothing surprising. It's just additional data to more or less support some of the comments that I've made in my written testimony.

MR. HARSCH: And while the document refers to Fox Metropolitan Reclamation District, it's actually the Fox Metro Water Reclamation District, and we have a representative from this group here.

MS. WILLIAMS: Will he be here tomorrow? Will the representative be here tomorrow?

MR. HARSCH: Yes, Greg will be here tomorrow.

DR. GARVEY: Okay. I'll proceed in reading it if it's --

MR. HARSCH: At this point in time I'd move its introduction.

HEARING OFFICER MCGILL: Any response to the motion?

MS. WILLIAMS: I guess I just feel that we're a little prejudiced if we're not going to be able to cross examine Mr. Garvey on this information tomorrow after we've had a chance to review it, and I don't really

know why we're getting it now, but obviously it could be entered as a public comment or something anyway, so I don't know which -- that it makes much point in objecting to its admission, but I just want to say on the record I feel a little prejudiced about being able to cross examine on it at this point.

HEARING OFFICER MCGILL: Well, and we haven't ruled out additional hearings at this point either, so something to keep in mind. There are all kinds of potential options. But you -- as you probably know, before this hearing adjourns tomorrow, we'll certainly be talking about things like the possibility of any more hearings or having a -- setting a prefirst notice public comment deadline, those sorts of issues. So any other response to the motion?

MR. ETTINGER: Can I inquire why the -- There's no Rock River data in this one; is that correct? Or did I not -- Or am I missing something?

DR. GARVEY: This is only for the Fox. The reality is that we received the Fox Metro data for 2005 but not 2006, and so they provided that to us, so it's just an augment or a complement --

MR. ETTINGER: Well, a lot of this says it's on Salt Creek or DuPage, or am I looking at this --

DR. GARVEY: Also there's data from the Salt Creek and DuPage which I received from the DuPage River/Salt Creek Workgroup.

MR. ETTINGER: Okay. So it's just -- So we just don't have the Rock River that we had before.

DR. GARVEY: That's because we already -- we've already covered the Rock River in the --

MR. ETTINGER: Oh, that's in this?

DR. GARVEY: -- written testimony, yeah.

MR. ETTINGER: Okay.

HEARING OFFICER MCGILL: Okay. Seeing no objection, I will grant the motion to have this document entered as Hearing Exhibit 36. And, Dr. Garvey, under the threat of an additional hearing, but did I overhear correctly that you could possibly be available tomorrow for cross examination?

DR. GARVEY: Yes.

HEARING OFFICER MCGILL: Thank you.

MR. HARSCH: You will deprive the students in Southern Illinois University of his presence in class.

HEARING OFFICER MCGILL: They can start their weekend earlier. If you want to go ahead, then, and give your --

MS. WILLIAMS: Can we ask one more question

real quick about the exhibit? Is the -- Exhibit 34, the disk, does that include the data that's been reviewed for this new paper here too?

DR. GARVEY: Yes.

MS. WILLIAMS: Okay. Thanks.

HEARING OFFICER MCGILL: Thank you. Excellent clarification. Go ahead, Dr. Garvey.

DR. GARVEY: Again, thank you to the Board and everyone for listening to this testimony. This document is complementary to my written testimony and data analysis tendered during the November 2 hearing before the Illinois Pollution Control Board. I received continuous monitoring data from the Fox Metro Reclamation District for 2006 to compare to the data collected by this agency during 2005. I also received continuous monitoring data for summer 2006 from the DuPage River/Salt Creek Workgroup that is developing a water quality model for these rivers.

For the Fox River, I received data for three sites. As I note in my written testimony, these three sites reside in a reach slated for enhanced dissolved oxygen -- DO -- status by the IDNR/IEPA proposal. The other data are for reaches near enhanced reaches but not within them; see red points on Figure 1 of this document

for sites. For the East Branch DuPage River, five areas were monitored semi-continuously; bridges at Army Trail Road, Hidden Lake, Hobson Road, Butterfield Road, St. Charles Road. For Salt Creek, sites were at Butterfield Road, Fullersburg Woods and York Road. Figure 1 shows these sites in red. The green sites are areas described in my written testimony. The stream reaches highlighted in blue are those with proposed enhanced DO status. All analyses are similar to those for the data described in my previous testimony.

"Summary of Results," first bullet. As with my previous analysis of continuous data, discharge in 2006 explained a portion of the variation in dissolved oxygen concentrations in many of the river reaches, although the strength of the relationship was weaker than that during the 2005 drought.

Two, low discharge typically constrained variation in dissolved oxygen concentrations, keeping them at relatively low levels.

Three, the proposed enhanced-tier Fox River sites typically fared worse in meeting both the IDNR/IEPA criteria and the IAWA proposed criteria than the non-enhanced reaches in Salt Creek and the DuPage River.

Four, as in the previous analysis summarized in

my written testimony, the greatest disparity between the performance of the IDNR/IEPA and IAWA proposed standards occurred during July, with the IDNR/IEPA standard identifying up to ten times more violations than the IAWA proposal.

Five, some reaches were clearly impaired with dissolved oxygen concentrations extending far below 3 milligrams per liter; for example, DuPage, St. Charles Road, Salt Creek, Fullersburg Road. These problems typically occurred before July and were identified similarly by both proposed standards.

And lastly, some congruence occurred in daily dissolved oxygen concentrations between years across the three Fox River sites. This suggests that dissolved oxygen concentrations in river reaches are somewhat predictable among years, even given annual variation in climate; for example, drought versus non-drought. This supports the hypothesis that organisms within streams are likely able to anticipate -- and I qualify this through selection of life history strategies, reproductive allocation, etc. -- seasonal changes in oxygen availability. Whether each site has a specific discharge-dependent oxygen fingerprint, which also depends on habitat characteristics, water quality, etc.,

has yet to be determined.

"Daily Variation in Dissolved Oxygen Concentrations." Similar to 2005, the Fox River sites exhibited some of the highest daily variation in dissolved oxygen concentrations among the stream reaches studied, Figures 2 through 5 of this document. For the DuPage and Salt, dissolved oxygen concentrations varied less within days. However, dissolved oxygen concentrations occasionally would drop below the average at these sites. I further examined the data and determined that several of these outliers, particularly the low consistent readings in the Salt-Fullersburg during June, were likely due to probe problems or fouling. I excluded these results. Other low values were typically associated with low discharge at night; see Figure 3. The pattern in Figure 3 was for all the sites and observations collected in 2006, restricted to July, a time when low values were common. This pattern clearly illustrates the need to collect data during the early morning to capture the lowest concentrations; Figure 6.

"Seasonal Variation in Dissolved Oxygen Concentrations." As in 2005, both median and minimum dissolved oxygen concentrations typically declined during

spring through summer, then increased by fall; Figures 9 through 14. Similar to daily values, the greatest variation among dates in dissolved oxygen concentrations occurred in the Fox River sites.

"Discharge Effects." Although discharge occasionally declined to 2005 levels, the impact of discharge on dissolved oxygen concentrations was less pronounced in these stream reaches, most notably the Fox; Figure 15 through 17. In the Fox River, conventional linear regression again demonstrated that dissolved oxygen declined with decreasing discharge. I used an additional analysis to explore how variation in the pattern of oxygen changed with discharge. The two-dimensional Kolmogorov-Smirnov test, the 2DKS test, is useful for identifying when a driving variable, such as discharge, constrains its response variable -- for example, oxygen -- and when that constraint is released. This is compared against a random expectation generated from the data. The test results are included on each figure; Figures 15 through 25. The 2DKS p-value can be interpreted as the number of randomly generated patterns that were different than the actual discharge-oxygen relationship. The gray line on these figures depicts the discharge value that had the greatest constraint on

oxygen concentrations. For example, for each of the three Fox River sites, discharge below 100 cubic feet per second typically constrained the variation in dissolved oxygen below 6 milligrams per liter. As I noted in my written testimony about the other data, the effect of increasing discharge on dissolved oxygen concentration is not always positive; for example, see Salt Creek, Figure 18; DuPage, St. Charles in Figure 25.

"Standard Performance." For the minimum proposed standards for both the IDNR/IEPA and IAWA proposals, the Fox River enhanced sites performed poorly during 2006 in July and August; Table 1. On average, across all sites, the two proposed standards fared similarly except for July, where the IDNR/IEPA proposed standard generated 11 percent violations among sites, whereas the IAWA standard generated 1 percent; Table 1.

Both proposed standards found violations of the seven-day mean criterion, although the IAWA standard found 1 percent and the IDNR/IEPA standard found 6 percent, with about twice as many sites and dates generating at least one violation of the IDNR/IEPA standard; Table 2. The Fox River enhanced sites met this criterion for both standards.

The IDNR/IEPA seven-day mean-minimum standard

found 22 percent violations of observations, of which the Fox River in August was largely responsible; Table 3. The IAWA standard also detected low values in the Fox River, although it was less likely to generate violations for other dates and sites, 17 percent for IAWA versus 46 percent for IDNR/IEPA. Neither standard detected many violations of their respective 30-day criteria; Table 4.

"Congruence Among Years." For organisms to become adapted to their environment, natural selection must favor traits that anticipate predictable environmental conditions. For example, deciduous trees anticipate the onset of winter by losing their leaves in the fall in this sense. As I have testified earlier, fishes and other organisms that reside in low-gradient warm-water streams should have traits including reproductive schedules that are related to oxygen, if oxygen fluctuations within streams are somewhat predictable among years. I chose the most conservative analytical path and regressed daily averages and medians for the Fox River in 2005, an extreme drought year, and 2006, a less extreme year. This analysis showed a relationship between daily values in each year -- Figure 26 of this document -- suggesting that seasonal changes in oxygen are predictable and may select for life

histories that anticipate summer oxygen sags. I was quite frankly surprised by this result. Daily values should be quite sensitive to many extraneous factors that vary within a given day; for example, discharge, cloud cover, temperature, rain. Thus, I would expect coarser running averages that obscure daily variation to be related -- for example, monthly averages -- but not finer-scale ones.

That's it.

MR. HARSCH: Dr. Garvey, does this additional data change any of your conclusions in your written testimony?

DR. GARVEY: No, it does not.

HEARING OFFICER MCGILL: Mr. Harsch, did you have anything else you'd like to present before we proceed with questions for --

MR. HARSCH: I have a few additional questions.

HEARING OFFICER MCGILL: Okay. Go ahead.

MR. HARSCH: Dr. Garvey, it's been a long time since you first testified in this proceeding. Can you provide a little more elaboration about your involvement with the Illinois chapter of American Fisheries?

DR. GARVEY: Yeah. I was elected as a member of the executive committee and I'll be the president -- president-elect right now. I'll be the president next year.

MR. HARSCH: And can you do the same for the American Fisheries Society?

DR. GARVEY: Yeah. For the American Fisheries Society, I served in several capacities. One of those is I'm on the advisory committee for the Farm Bill Advisory Committee, which is -- I'm the chair of that committee. Basically what that is is to look at the farm bill and its potential impact on aquatic resources in the country and their potential impacts on fishery resources, so obviously dissolved oxygen or responses to non-point pollution and point pollution are certainly things that we're going to be looking at associated with that.

I'm also a member of the Early Life History Section of the American Fisheries Society. I'm actually the north central representative. The Early Life History Section actually is interested in more or less research in early life history stages of fishes, and as a representative of the north central part of this group, I'm responsible for contacting other experts and asking

them questions and reporting back to the Society about issues associated with early life history dynamics in fishes.

MR. HARSCH: In addition to Illinois, what are other areas included in the north central?

DR. GARVEY: Oh, let's see. We've got Illinois, Indiana. Ohio would be part of that, Michigan, Wisconsin. Several different states.

MR. HARSCH: And how were you chosen for this position?

DR. GARVEY: My peers that were in the Early Life History Section more or less targeted me and asked me to do it, and I couldn't say no.

MR. HARSCH: So is it fair to say they recognized you as an expert in this area and asked you to serve?

DR. GARVEY: Yes, Roy.

MR. HARSCH: I had to ask.

HEARING OFFICER MCGILL: I'm sorry. Just for the record, could you explain what the farm bill is or just identify that?

DR. GARVEY: Farm bill?

HEARING OFFICER MCGILL: What's the farm bill?

DR. GARVEY: The farm bill's mighty big, and it's a federal legislation that's associated with more or less any activities of agriculture. There tends to be a lot of money that's distributed for actual environmental issues associated with agricultural impacts in the country. Currently most of those go toward wildlife-related issues, but one of the major functions of my chairmanship of this committee with American Fisheries Society is to teach not only the general public but also the fisheries professionals that agricultural practices and other practices associated with agriculture have direct impacts on aquatic and fisheries resources throughout the country.

HEARING OFFICER MCGILL: Thank you.

MR. HARSCH: Dr. Garvey, you previously had testified that in your opinion, one could not develop a DO relationship for organisms from the Rankin work that was prepared in Ohio; is that correct?

DR. GARVEY: It is my opinion that the only way, as I noted in my written testimony, to really develop a sound relationship between physiological constraints associated with low dissolved oxygen and the organism is by actually doing laboratory studies and actually doing experimentation. Simply going out in the

field and looking at correlations between the presence of an organism and its average environmental conditions, oxygen being one of them, it is impossible to tease apart because more or less the environment is so incredibly complex.

MR. HARSCH: And you were present at the last hearing where Joel Cross testified and then essentially verified that testimony again today that the IEPA and IDNR have not looked at dissolved oxygen data, temperature data or habitat data in developing their enhanced DO proposal.

DR. GARVEY: That is my understanding.

MR. HARSCH: Do you have an opinion as to whether or not there is any scientific basis to support the joint IDNR/IEPA proposal that's been put forth before the Board?

DR. GARVEY: Well, I think portions of it are based on the NCD and some of the recommendations that were placed in the Whiles and Garvey report, so there's probably some biological basis to some of those issues. The enhanced tier criteria, again, I can't support that based on my belief that you need to have strong laboratory-derived physiological-based data associated with oxygen tolerance in fishes and other aquatic

organisms, and it probably also needs to incorporate -- and I said this before the Board before -- the effects of flow, because you can't look at just oxygen tolerance. You have to look at the interaction between oxygen tolerance and the flow of water across the respiratory surface of these organisms.

MR. HARSCH: No further questions.

HEARING OFFICER MCGILL: Thank you. Why don't we go off the record for just a moment. Why don't we take a five-minute break and then we can at least start questions for these witnesses.

(Brief recess taken.)

HEARING OFFICER MCGILL: Why don't we go back on the record. We're going to start the questioning now of IAWA's witnesses. Mr. Harsch, counsel for the proponent, had a few additional questions for these witnesses, and then we will open it up for questions.

MR. HARSCH: Actually, during the break I was reminded that I hadn't given Dr. Garvey the opportunity to respond to some of the criticisms of his prefiled testimony.

Dr. Garvey, would you like to respond to any of the points that were made?

DR. GARVEY: One of the major issues that

we've been bantering about is the issue of early life history stages, when they're present and trying to determine -- it's quite -- it's actually quite difficult to do -- determine when we should have the more protective standard versus the less protective standard, if that's how you want to define it or whatever. Of course the month of July comes in, and that's -- we've tried very hard to rectify that, and that's the reason why in my testimony, my written testimony, I mention the Csoboth thesis, because she did a tremendous amount of work on the Illinois River and associated backwater to try and determine when the majority of larval fishes were produced. Steve mentioned that that was in the southern part of the state. I don't know if around -- among the I-70 in the Alton/Grafton area is the middle -- the southern part of the state, but it takes us about three hours to get up there, so I don't know. It's more central part of the state, so that's one thing.

The other issue is the temperature data that I used to try and bracket the dates by which we should expect to see the majority of fish spawning be completed within the state, and this was a time when we were in the stakeholder process when we were trying to determine whether we should have a latitude-dependent set of

standards or times associated with standards. The data that I used were the only data available for continuous monitoring of the temperature, and so that was the Mazon and the Salt, I believe, so it wasn't that I just pick and choose the data that I had. It was just the data that were available to me, so if they were a little bit off relative to what temperatures you would expect in that part of the state, the northern part of the state, if I had other data, I would have used that. So those were my qualifying statements.

BOARD MEMBER JOHNSON: Dr. Garvey, with respect to your first point, Dr. Murphy suggested that those be based upon water temperature rather than trying to delineate what particular months are warm and which are not. What do you think of that suggestion?

DR. GARVEY: I think ideally, in an ideal world, that would certainly be a more useful way of characterizing oxygen. Obviously oxygen is highly -- oxygen concentration in the water, oxygen saturation, partial pressure, all those sorts of things are dependent on temperature, and so I think in an ideal world, yeah, using percent saturation as a function of temperature would probably be a better way of going about doing things. The main problem is that the majority of data

that are collected by agencies and available in the literature are in concentration. For whatever reason, a decision was made early on to go and use milligrams per liter as the gold standard, and more or less that's what's been developed in protocols. I just don't see any way of getting around it.

The second thing -- this is something I'm not an expert on, so I'm just sort of -- I'm just going to speculate on -- is that, you know, most of the organisms we're talking about are poikilotherms, which means that their body temperatures vary with that of the environment, so their temperatures are very similar to that, so the rates by which oxygen would go across particular membranes of the respiratory surface in these animals, I don't know -- this is something I would have to think really hard about, whether it's really as temperature-dependent as we might think it is, because the body temperature of the organism is very similar to that of the water, so I'm not sure percent saturation is going to give us any more information than oxygen concentration. But again, that's pure speculation. I'd have to think about that a little bit more.

Roy is also trying to point out the fact that the reality associated with smaller streams -- and that was

another thing that was brought up as a criticism, that all of the information that we've talked about up to this point has been associated with sort of mid-order streams or larger. I would love to have good data for first-order head-water streams in terms of how dissolved oxygen concentrations varies in these systems and how early life history of organisms are structured within these particular small systems. I think most of us would agree that probably the main thing that happens in small head-water streams or small first-order streams is that they get buried under silt or they're kind of really negatively affected in their habitat. That's probably the first thing we should be focusing on. But, yeah, it would be great if we had that kind of oxygen data, temperature data for those systems to really begin to develop standards for those systems as well, but that data, as far as I know, do not exist.

HEARING OFFICER MCGILL: Mr. Harsch, you're finished?

MR. HARSCH: I'm finished. I'm trying not to testify.

HEARING OFFICER MCGILL: So far so good. We'll open it up to questions now. Counsel for DNR and the Agency -- DNR and IEPA, rather -- do you have any

questions you'd like to pose to these witnesses?

MS. WILLIAMS: I think we'd like to hear what the other questions are to see if we have any questions.

HEARING OFFICER MCGILL: Okay. Mr. Ettinger, do you have any questions?

MR. ETTINGER: Yes. Traditionally I'm the one who goes forward unprepared, so --

MR. YONKAUSKI: And we all thank you for that.

MR. ETTINGER: So I'm going to plunge in and see what I can learn. I've got a lot of clarifying questions here and other things here. Also I'd like to say primarily I appreciate Mr. Harsch's willingness to suspend his testimony. I'm also going to only address my questions to Dr. Garvey for the time being, because I'd like if possible to get him out of here tonight, so all of my questions are addressed to Dr. Garvey now.

Turning now to page 3 of your prefiled testimony, you state, quote, "Evidence is mounting that the majority of reproduction of aquatic organisms in Illinois either occurs before July 1 or late-spawning organisms have early life stages that are tolerant to low dissolved oxygen concentrations." My first question is, what

evidence do you have that is mounting in addition to this -- I'm sorry -- Csoboth --

DR. GARVEY: Csoboth, yeah.

MR. ETTINGER: -- Csoboth study?

DR. GARVEY: Well, in previous hearings and previous testimony I presented data from other studies, including my own, that have shown that on average -- actually more than on average; actually quite frequently -- most species of fishes in systems that I've worked in do spawn before July 1 and that that's typically what you see. There are other species that do spawn in the summer as well, but if you take a look at the majority of our fish production -- is what I'm focusing on, is primarily fish -- it does occur prior to July 1, at least in the central part of the state, that latitude.

MR. ETTINGER: Have you studied any water north of Grafton?

DR. GARVEY: The reality is is that there's very little data that are available past that point. That's -- That was the issue that we brought up in the first hearing, and it continues to --

MR. ETTINGER: I gather the answer to my question is no.

DR. GARVEY: That would be the answer, yes.

MR. ETTINGER: Thank you. Regarding freshwater mussels, are there studies regarding freshwater mussels that are in the record?

DR. GARVEY: Yeah. Actually, this is fresh off the press, and again, this is something that I didn't even -- I probably should have included in the exhibit. In the North American Benthological Society's national meeting, which occurs every year -- this one was in Anchorage, Alaska, in 2006, this spring -- Brianna Kaiser and her advisor -- I think it's Mark Barnhart -- I'm not exactly sure -- presented a talk called "The Effects of Hypoxia on Brood Survival in the Freshwater Mussel" -- and I'm going to butcher this -- "Venustaconcha Ellipsiformis," and what they did is -- if you guys want, this is actually on the Web so you can take a look at it, or I can provide this if you want. They looked at the survival of glochidia, the larvae, so these are the larval mussels that typically live in a brood pouch until an adult fish or a fish comes up to the mussel, and then they spit their glochidia into the mouth of the fish and then they attach to the gills.

They looked at the survival of these glochidia both in the brood pouch of the adult mussels but also in

the sediment as well, and what they found is that in the acute exposures, glochidia could survive DO concentrations as low as 0.5 milligrams per liter, okay, in this particular species, and in chronic exposures they really couldn't kill them until they dropped the DO below 2.6 milligrams per liter. As far as I know, to the best of my knowledge, this is the first time that anyone has looked at early life history survival of glochidia, of mussels, as a function of oxygen concentrations. This would make sense in a lot of ways because young mussels have to drop off the fish eventually and settle, and obviously they're going to drop in some sediment, and typically the sediment's not going to be the best oxygen environment, so you would expect that -- the glochidia of mussels to be fairly tolerant to low DO, and that's sort of ferreted out by this research. I doubt if it's in the peer review literature yet.

MR. ETTINGER: Are you aware of any other studies regarding mussels and dissolved oxygen concentrations?

DR. GARVEY: There are other studies looking at adult mussels, and we've talked about that in previous testimony in hearings, so really nothing new has come up since then, but most of the research, again, has shown

that typically the ability for adult mussels to regulate oxygen is dependent on the kind of habitat you'd expect them to be in, so if they're in a more riffle-like habitat with fast-flowing water, then they tend to be less DO tolerant or less tolerant to low DO, and if they're in more sedimentary or areas of quiescent flow or whatever you want to call it, they tend to be more tolerant of low DO. And I can cite the paper. I have it in front of me somewhere, but --

MR. ETTINGER: Sure. Okay. Excuse me. In some cases I'm trying to actually quicken the testimony by asking questions that might otherwise seem impertinent, but you ask -- say, for example, "The dissolved oxygen concentrations in Illinois streams are difficult to predict and largely influenced by characteristics of stream habitat and morphology." How --

DR. GARVEY: Right.

MR. ETTINGER: How is that relevant to what the dissolved oxygen standards should be?

DR. GARVEY: This is largely associated with the research that Mark David has done for the U of I, and it suggests that things like the propensity for streams to hold on to organic matter -- for example, you know,

corn husks and things like that -- and for those to settle out in the water and sit in the stream is going to greatly have an influence on the amount of oxygen demand. Those are things that can be better predictors of oxygen dynamics.

MR. ETTINGER: I understand that. We're going to ask a few other questions like this, but my question is, does it make a difference what is causing the low or high dissolved oxygen level as to what the standard should be? To put it another way, if it turned out that the major cause of dissolved oxygen variations was the operation of sewage treatment plants, would that dictate to you as a biologist any different dissolved oxygen standard than if it were mainly stream morphology?

DR. GARVEY: No. I mean, it doesn't matter to me.

MR. ETTINGER: Thank you. In terms of looking at dissolved oxygen levels in these 8 percent of the streams which IDNR and IEPA have proposed have this enhanced dissolved oxygen level, have you looked at data for any of the waters other than the Fox River?

DR. GARVEY: Yeah. Basically the written testimony focuses on enhanced reaches. All of those -- In the written testimony, all of those stream reaches

that had continuous data collected by IAWA members was in enhanced reaches.

MR. ETTINGER: So all of this data on dissolved oxygen levels is in enhanced reaches?

DR. GARVEY: Okay. They're telling me Wheaton DuPage is not a part of it. It's been a while since I've looked at it. So it would be more the other systems as far as I understand, yes, but maybe I'll look at my map.

MR. ETTINGER: So just to be clear and so -- which are the data for waters which were chosen for enhanced DO levels by DNR and EPA and which were not in your mind?

DR. GARVEY: I'm just talking about the IAWA continuous monitoring data. I'm not talking necessarily about the IDNR/IEPA data. However, it was told by me that all of the data that I received from IDNR and IEPA did reside in the enhanced regions, and Dennis is going to respond for me here because I don't know what I'm talking about.

MR. STREICHER: Just to answer that, the Wheaton Sanitary District is on the west branch of the DuPage area that wasn't an enhanced segment, and the Salt Creek/DuPage River data that was submitted in that late

paper is not on any enhanced segments, but the -- all of the other IAWA are on enhanced segments, the main stem of the DuPage, Rock River.

MR. ETTINGER: And the Rock River was in the enhanced segment too.

MR. STREICHER: Yes.

MR. ETTINGER: It says, "Daily discharge" -- this is on page 4 of your prefiled testimony. It says, "Daily discharge -- i.e., volume of water moving per second through the stream -- explained as much as 50 percent of the variation of daily minimum" -- I'm sorry -- "daily median and minimum dissolved oxygen concentrations in several of these systems." What do you mean by that?

DR. GARVEY: That means that when you run a linear regression on the data, so what you're doing is you're regressing discharge that comes from the USGS gauging station. It's either -- typically either determined -- well, the gauges either determine -- they call it grading curves, which relate water level to the amount of water that's moving through the stream at any given time. That's going to be the discharge data. What I did is just looked at the average daily discharge for that particular -- for the gauging station that was

closest to that particular stream reach that I was focusing on.

Anyway, you regress that, so you put that on the X axis against what's the Y, which is one of your DO values, median or minimum in this case, and if the two perfectly agree with each other, then that would explain 100 percent of the variance. In other words, if for every change in discharge the change in dissolved oxygen changes perfectly with that, then it would be 100 percent variation explained. What this is saying is that 50 percent of the variation, which is an awful lot of variation in the data set, is actually explained, so that means that with each change in discharge, there's a 50 percent I guess agreement in terms of the change in the dissolved oxygen concentration.

MR. ETTINGER: So we're talking about the derivative. We're not talking about the absolute, because obviously the rivers have different discharge levels, so I couldn't look at, say, the Rock River discharge and the Fox River discharge and predict anything about their relative dissolved oxygen --

DR. GARVEY: Absolutely not. It is totally site dependent, and it turns out that if you look at each site, you know, it varies from site to site.

MR. RAO: Just for the clarification, the analysis that you did are shown in Exhibit 5?

DR. GARVEY: Yeah.

MR. RAO: Where you have the plots?

DR. GARVEY: Yes, that's correct. The discharge data are in Exhibit 5, yes, right.

MR. ETTINGER: Okay. You state at the end of this page, page 4, "In my view, this further complicates" -- I'm sorry. I should read the sentence above that. "Thus, the physical characteristics of streams interacting with flow largely drove much of the oxygen dynamics. In my view, this further complicates any attempts to fit a single standard to any stream in the state and renews the urgent need to develop tiered habitat-based criteria that incorporate how discharge affects aquatic communities and water quality." What did you mean by that?

DR. GARVEY: I mean that more or less, in my opinion, if you are going to understand oxygen dynamics, we're going to have to have a very good understanding of the physical template of that particular stream and how it interacts with all the other stuff that comes into it to really make a prediction about oxygen, and you have to develop more or less a model for oxygen, and it's based

on all these factors for each particular stream site.

MR. ETTINGER: Is it your understanding that the IAWA proposal is a tiered habitat-based criteria that incorporates how different discharge affects aquatic communities and water quality?

DR. GARVEY: The IAWA proposal --

MR. ETTINGER: Yes.

DR. GARVEY: -- does not incorporate discharge, but it's based largely on the expectations for the organisms that are present in those particular streams, not on discharge.

MR. ETTINGER: So you're not saying that the IAWA proposal does this. You're saying this is necessary for the future?

DR. GARVEY: Yes.

MR. ETTINGER: Again, page 5, you discuss some studies by -- that were -- Mark David was involved in. He was one of several authors in a number of them, but -- you would agree with that, right?

DR. GARVEY: That's correct.

MR. ETTINGER: But we'll call them all David studies because he's commonly --

DR. GARVEY: He was the person in charge.

MR. ETTINGER: Okay. It says, "Although the

general expectation was for dissolved oxygen dynamics in their research streams in Illinois to be affected by nutrient loading, they found that stream physical characteristics, primarily basin shape and its propensity to hold organic matter and intercept light, were more important in influencing dissolved" -- I'm sorry -- "in influencing oxygen concentrations." To cut short a long series of questions, my question is, so what? Does it have an effect on the biology of how organisms are affected by dissolved oxygen whether this statement is true or not?

DR. GARVEY: No.

MR. ETTINGER: No. So if hypothetically it was nutrients that were driving the dissolved oxygen problem, that wouldn't cause you to change your opinion as to what the dissolved oxygen standard would be.

DR. GARVEY: Nope.

MR. ETTINGER: Okay. Here is a sentence I am simply going to have to ask you what it means. This is on page 6, the third sentence. I'm going to try and read it. "Interestingly, these enhanced-tier segments more frequently" -- paren -- "up to 20 percent of observations" -- closed paren -- "exceeded the DNR/EPA minimum of 5 milligrams per liter during July than the

IAWA proposed standard of 3.5 milligrams per liter during that month." What does that mean?

DR. GARVEY: Just a minute. I'm reading this over one more time just to be 100 percent sure. Okay. When I'm saying exceedances, what I'm talking about is violations. In other words, when I say exceedances, I am actually going lower than that particular standard, and I actually get that from Bob Mosher, but that's another long story. So what I'm saying is that take a look at the DNR/EPA minimum of 5 milligrams per liter which has been proposed for July through their proposal; that these -- that standard particularly picked up to 20 percent of the time, depending where you're looking at, dissolved oxygen going lower than that particular concentration, and that happened a lot more -- and I can't -- unless I go back and look at Exhibit 3 more closely, I can't tell you what the difference is. That means that the DNR/EPA standard found violations far more frequently than the IAWA proposed one.

MR. ETTINGER: Well, perhaps I was thrown by the word "interesting." You would kind of surmise a standard of 5 to be violated more than 3.5, wouldn't you?

DR. GARVEY: Excuse me? Can you say that

again?

MR. ETTINGER: You would expect a standard of 5 to be violated more than 3.5, so perhaps I was thrown by the word "interestingly."

DR. GARVEY: If it never went below 5, then it wouldn't go below 3.5, so neither one -- I mean, both standards would show the same thing.

MR. ETTINGER: Got you. Have you done any biological studies or are you familiar with any biological studies done of the Fox River subsequent to the 2005 drought?

DR. GARVEY: No. I don't think anyone's done any work in there in terms of publishing and/or putting it into -- I mean, I don't know if there's been monitoring, but --

MR. ETTINGER: Do you know whether in fact the biota in the Fox River suffered any short-term or lasting effects as a result of the 2005 drought?

DR. GARVEY: No, I do not.

MR. ETTINGER: So you don't really know whether Liebig's Law is applicable to the Fox River for this period.

DR. GARVEY: Well, it's a law for ecology for a reason, because it's generally applicable to all --

let me make a qualification.

MR. ETTINGER: Well, I'm sorry. I misstated that question. We don't really know whether in fact the Fox River wasn't injured by the conditions present in 2005.

DR. GARVEY: Mostly like it was to the extent that it has an effect on the organisms that are out there, but, you know, that's within the norm of what that particular system experiences through time.

MR. ETTINGER: Correct. So Mr. Frevert's statement, however, that the Fox River data of 2005 was during a drought period is of some interest unless we know that there was no damage done to the river by the drought.

DR. GARVEY: Can you restate that question, or was that a question or was that a statement?

MR. ETTINGER: Well, it's not really a statement. It was a question. Let me try and -- It wasn't very articulately worded. The implication -- Mr. Frevert gave you data and said that it might be of less significance than it would be otherwise because it was taken during a drought period.

DR. GARVEY: Right.

MR. ETTINGER: Your answer is no, it doesn't

matter, because we should look at the worst possible conditions and see what effect that has on the system.

DR. GARVEY: Correct.

MR. ETTINGER: I'm asking, without knowing what effect those conditions had on the system since we don't have any data on the Rock River since the drought -- I'm sorry -- the Fox River since the drought, is your statement warranted?

DR. GARVEY: Well, again, as Liebig's Law states -- and this is a very different issue than developing a standard associated with a toxin, all right? I think that's something that a lot of people need to understand. With a toxin, obviously you're dealing with something that's associated with human activities, and so you don't want to increase the concentration of that toxin to a point where it's going to have a deleterious effect and get close to that deleterious effect on the organisms that are out there. Oxygen is a naturally occurring substance, like nitrogen, phosphorous, sunlight, air, you know, all those sorts of things, and so through time it varies. We know that from the data that we have. And so again, the presence of the organisms that are out there isn't associated with the 2005 drought and associated with the drought that

occurred years before or -- it's a representation of the conditions, the extreme conditions that occur even occasionally through time. That's the basis of much of modern community ecology, is looking at disturbances and how they affect the organisms that are there. So I don't really need to look at the 2005 data and tell you whether the organisms had an impact or not, because the organisms that are present in a particular system are representative of the factors that influenced it through more or less ecological time.

MR. ETTINGER: Do you get up to Kane County much?

DR. GARVEY: No, I do not.

MR. ETTINGER: Are you aware of the level of development and increases of discharges in the Fox River over the last 20 years?

DR. GARVEY: No.

MR. ETTINGER: Do you know whether there were any long-term effects on the Fox River of any of those changes?

DR. GARVEY: Sure, there were, but then that should be placed into a status that's based on those factors and --

MR. ETTINGER: Do you know whether any of --

any species have been permanently lost from the Fox River as a result of the 2005 drought?

DR. GARVEY: Of course not.

MR. ETTINGER: Last sentence here in page 7, "Even given this caveat, I thought it might be interesting to determine whether average dissolved oxygen concentrations" -- quote -- "improved" -- unquote -- "in Illinois surface waters through time as nutrient loading abated during the past 30 years as a function of the Clean Water Act." Is it your understanding that the Clean Water Act controls nutrient discharges?

DR. GARVEY: It controls the level of phosphorous that's being placed into water bodies throughout the country. That's one of the reasons why the Great Lakes has increased in water quality.

MR. ETTINGER: Is it your understanding that Illinois wastewater treatment plants routinely have nutrient limits?

DR. GARVEY: I honestly -- I mean, yes, I know that they do have limits.

MR. ETTINGER: Is it your understanding that the Clean Water Act applies to agriculture?

DR. GARVEY: Clean Water Act does not apply to agriculture. It applies to point discharges.

MR. ETTINGER: What is your understanding of the principal source of nutrients in the waters of --

DR. GARVEY: Right now --

MR. ETTINGER: I'm sorry. Let me finish the question or she will have problems with both of us. What is your understanding of the principal sources of nutrients into Illinois waters?

DR. GARVEY: Right now, it's -- as far as I understand, primarily nitrogen is coming out of the farm fields.

MR. ETTINGER: And is that regulated by the Clean Water Act?

DR. GARVEY: Absolutely not.

MR. ETTINGER: Do you know whether nitrogen has gone up or down over the last 30 years?

DR. GARVEY: It's certainly gone up.

MR. ETTINGER: So is there any validity in this statement at all here?

DR. GARVEY: Yes, there is, because the reality is that the major limiting nutrient in most fresh waters is phosphorous. It's not nitrogen.

MR. ETTINGER: What studies do you have that phosphorous levels have reduced -- been reduced over the last 30 years?

DR. GARVEY: Well, I'm just assuming that, I guess.

MR. ETTINGER: I guess you are. Would it surprise you that Mark David has studied phosphorous loadings in Illinois waters in a paper that was put out in 2000 and looked at nutrient levels?

DR. GARVEY: I haven't read that paper, no.

MR. ETTINGER: Okay. Thank you. Again, you say that discharge drives much of the variation in dissolved oxygen concentrations in low-gradient Illinois streams. Is that true of all streams?

DR. GARVEY: No, actually, I don't know whether that's the case or not.

MR. ETTINGER: Perhaps I should read the whole sentence, then. "I also procured USGS daily monitoring data for discharge from gauging stations near the river segments to test the hypothesis that the discharge drives much of the variation of dissolved oxygen concentrations in low-gradient streams," and you don't know whether -- how that came out.

DR. GARVEY: Excuse me? That's -- That was the whole basis of the analysis.

MR. ETTINGER: Okay. What did you conclude with regard to the extent to which discharge drives

dissolved oxygen limits?

DR. GARVEY: Up to 50 percent of the variation in oxygen in the streams, at least starting that particular year, was affected by discharge.

MR. ETTINGER: Is that true of all streams?

DR. GARVEY: It's true of typically low-gradient streams in Illinois, but you know what science is. It's standardizations.

MR. ETTINGER: Now, that's the average and the minimum, right?

DR. GARVEY: The median and the minimum DO concentrations, sure.

MR. ETTINGER: Okay. Well, it certainly doesn't dictate the maximum.

DR. GARVEY: The reason I don't give a maximum is because maximum's also dictated a lot by productivity and sunlight, and so I use median as a measure of central tendency.

MR. ETTINGER: Yeah. In fact, let's look at some of these charts that you've given from the Fox River in Ashland or Kickapoo or Fox at Aurora. Let's look at -- I'm sorry. This whole thing's not paginated, but we've got some numbers from the Fox that are Oswego --

HEARING OFFICER MCGILL: I'm sorry.

Mr. Ettinger, this is in the prefiled testimony?

MR. ETTINGER: It is, and I'm sorry. Is there some way to identify the pages within the exhibits of your prefiled --

DR. GARVEY: You can identify it as figure number, which is on the bottom.

MR. ETTINGER: Okay. Figure 3.

DR. GARVEY: In Exhibit --

MR. SMOGOR: There's numerous Figure 3s.

MR. ETTINGER: It's Exhibit -- Figure 3 to Exhibit 4, I'm told.

DR. GARVEY: No, it's Exhibit 5, Albert.

MR. ETTINGER: I'm sorry. Exhibit 5. I didn't get little tabbies or anything on mine. I'm sorry. Looking at those numbers, just -- have you found -- have we all found where we are yet?

DR. GARVEY: So it'd be Figure 3 of Exhibit 5 if I understand you correct, Albert. Yeah, that's it.

MR. ETTINGER: Yeah, I think that's right. I just picked this one at random. All right. Just looking at any of these numbers, you'd agree that there's a lot of variation going on here between the maximum and the minimum?

DR. GARVEY: Yes, sir.

MR. ETTINGER: You would not claim that that was due to differences in discharge, would you?

DR. GARVEY: That's due to diurnal differences and basically sunlight and primary productivity, probably.

MR. ETTINGER: And so the swings we're seeing are relating essentially to -- what were you saying -- dial productivity?

DR. GARVEY: Diurnal changes. Basically, sunlight shines on the stream, the primary producers are starting to produce oxygen, and then they basically become supersaturated within the water, and that's why after June typically you see dissolved oxygen concentrations increase dramatically.

MR. ETTINGER: Is there any relationship between the extent of the diurnal swings and discharge that you found?

DR. GARVEY: Well, the analysis that I did -- because I was looking at measures of central tendency for the median at least -- it more or less took out the maximum -- the effects of the maximum and the minimum values during the day. In other words, what it did is it more or less masked any effects of photosynthesis on a daily basis and looked primarily at

discharge. And I can do another analysis where I look at both those things, but basically what you find is that on a daily basis, yeah, oxygen was greatly affected by the amount of sunlight that there was in a particular system.

MR. ETTINGER: And that's because of algal growth, or rather vegetative growth in the water?

DR. GARVEY: Yeah, primarily.

MR. ETTINGER: Did you do any study that looked at the extent to which the flow of water was made up of sewage discharge versus dissolved oxygen levels?

DR. GARVEY: No, I did not. I don't know if that would be possible with what I had, the information I had.

MR. ETTINGER: Were you aware of how sewage discharge varies with flow in the river?

DR. GARVEY: Slightly familiar with it, I'm sure. The more discharge -- If I understand right, overflow occurs during periods of high --

MR. ETTINGER: Well, would it be surprising to you to learn that as the flow of the river falls that a larger amount of it is sewage --

DR. GARVEY: Sewage, yeah.

HEARING OFFICER MCGILL: If you could -- You're talking over each other.

MR. ETTINGER: I'm sorry. One of us --

HEARING OFFICER MCGILL: Let Mr. Ettinger finish the question.

MR. ETTINGER: Yes. I realize --

DR. GARVEY: You say it and I'll say yes.

MR. ETTINGER: I understand I'm sort of slow and plodding and you can see where I'm going, but you still have to let me do it anyway. I know it's irritating, but I have a lot of trouble with that dealing with more intelligent people. So you would see that if the flow in the river is lower that a larger proportion of the water in it is likely to be sewage discharge.

DR. GARVEY: Yes.

MR. ETTINGER: Says here in the last -- on page 9 it says, "Regardless of the underlying causes, given that discharge can explain up to 50 percent of the variation in dissolved oxygen concentrations during both severe drought and non-drought years, this issue needs to be incorporated into standard development and interpretation." How would you do that?

DR. GARVEY: I don't know, but it needs to be done.

MR. ETTINGER: And I assume you're not claiming that the IAWA proposal has done that.

DR. GARVEY: No, it does not.

MR. ETTINGER: Okay. Here it says -- I'm still on page 9 -- "Typically, both standards demonstrate that several of the stream segments, including those in the DuPage, Fox and Kickapoo Rivers, failed to meet the season-dependent acute minima, even given the proposed enhanced status of these systems." Is it your understanding that these violations you've found of those waters are all in segments that were identified for enhancement -- enhanced protection by IEPA and IDNR?

MR. HARSCH: However, we corrected the --

DR. GARVEY: The Wheaton DuPage.

MR. ETTINGER: Okay. So it's --

MR. STREICHER: Well, the DuPage, we'd have to take a look, because Naperville is discharging into DuPage, and that wasn't --

HEARING OFFICER MCGILL: I'm sorry. Mr. Ettinger, what document are you referring to?

MR. ETTINGER: I'm now back -- I'm back on his main testimony.

HEARING OFFICER MCGILL: Okay. So you're in the prefiled testimony.

MR. ETTINGER: I'm sorry. I'm back on page 9 of the prefiled testimony.

HEARING OFFICER MCGILL: And was there a -- Mr. Harsch, was there a correction to the prefiled testimony?

MR. STREICHER: I just wanted to correct him maybe, because we're using DuPage in two different places. The Wheaton Sanitary District is on the west branch of DuPage, and that was included in some of the data that's not an enhanced segment. The City of Naperville discharges -- as well as Plainfield discharges to the main stem of the DuPage River, which is an enhanced segment. So maybe we need to tease out -- when we say DuPage, it likely is talking about that main stem portion.

MR. ETTINGER: Okay. I'm not going to go on this any more, but if there is a clarification to be made later, perhaps IAWA can make it in some subsequent filing. Then here in the next sentence it says, "However, the Rock River, which is listed as impaired due to low oxygen, did not fail to meet any of the minimum criteria."

DR. GARVEY: That's my understanding.

MR. ETTINGER: What do you mean, listed? Is that the 305(b) list that you're referring to, I guess is my question?

DR. GARVEY: Yeah, that's -- 303(d), yeah.

MR. ETTINGER: Okay. Again, here I'm -- in the next paragraph, "Interestingly, the IAWA proposed seven-day minimum standard of 4 milligram per liter, which applies during July through February, generated more violations than the IDNR/IEPA seven-day mean minimum of 7.5 milligrams per liter, which starts in August." 4.5. I'm sorry. "4.5 milligram per liter, which starts in August." Again, now, could you explain that?

DR. GARVEY: What that means is that I was looking at more or less these two standards, which I expected both a mean minima, and actually, originally I thought 4 milligrams per liter would be less able to pick up particular problems in terms of DO, but when I ran the analysis on the data, what I found is that it actually identified more problems as a mean-minimum criteria in terms of finding just violations. Whether that means that the dissolved oxygen concentration went below that mean minimum of 4 milligrams per liter over seven days than the seven-day mean minimum of 4.5 milligrams per liter that IDNR/IEPA suggested which was -- started in August. I don't know if that was any clearer than the sentence.

MR. ETTINGER: Okay.

MR. RAO: Dr. Garvey, I have a clarification on that --

DR. GARVEY: Sure.

MR. RAO: -- point. When you made this comparison between the two standards, did you apply those standards for the same period of the data that you had -- like, the IDNR standard you said starts from August and yours is from July, so did you compare it by applying the 4.5 from July itself?

DR. GARVEY: No, I did not. What I did is I applied the standards as they were written associated with the time periods, and that was more or less to look at the impact of that July we call it transitional period and see how the two standards work either including July or excluding July. In this case it's including July for the mean minimum for IAWA but excluding the mean minimum for IDNR/IEPA until August. Does that clarify that? So it is kind of comparing apples to oranges in a lot of ways.

MR. RAO: Okay.

DR. GARVEY: I mean, Dennis makes a good point. What it's doing is it's showing that the IAWA proposal is actually more sensitive in a sense, so -- and that was the point I was trying to make.

MR. RAO: Okay.

HEARING OFFICER MCGILL: Did you apply the DNR/IEPA July standard to the data?

DR. GARVEY: Yes, I did, and that would have been -- that would be a minimum of 5 milligrams per liter and it was less sensitive -- I need to go back and check, but I'm pretty sure it was less sensitive in picking up the problems than the 4.5 seven-day mean, so -- but I would need to check that.

HEARING OFFICER MCGILL: Maybe that could be clarified in a public comment.

MR. ETTINGER: There are some -- going back I guess to -- we decided this was Exhibit 5 -- Exhibit 5, I got Figure 2; I got Fox River Aurora. We see numbers for dissolved oxygen, which unless I'm seeing incorrectly, seem to go down almost to 0. Is that a correct reading of that chart?

DR. GARVEY: Aurora? Yeah. In July and June, yeah, we had very low concentrations. Oh, in 2005.

MR. ETTINGER: Is it safe to say that the fish weren't present wherever that meter was at that time?

DR. GARVEY: Yeah, probably. Either that or they were dead.

MR. ETTINGER: They were either dead or they weren't present there.

DR. GARVEY: Probably moved out of the area. I agree with previous testimony by Steve that the reality is is that I've seen also that fish will move out of areas when dissolved oxygen concentrations decline as long as the area is still contiguous with an area that has higher dissolved oxygen concentrations.

MR. ETTINGER: So it -- if someone were to come here today and say, "Gee, there are good fish in the Fox River but the Fox River has zero dissolved oxygen in it at some time; therefore we could set the dissolved oxygen standard at zero," you would disagree with them.

DR. GARVEY: I would disagree with that because there are sites, say for example in the third panel down, that you see that dissolved oxygen didn't decline nearly as much as it did the other areas, which means there are more refugees on that particular system.

MR. ETTINGER: So they probably swam out of that place.

DR. GARVEY: Hopefully.

MR. ETTINGER: Yeah. So can you -- never mind. It says, "Dynamics" -- I'm sorry. I'm on page 8. "Dynamics of dissolved oxygen vary widely among the

enhanced tier stream segments from daily concentrations varying widely in the Fox River to less so in the Vermilion River. Both median and minimum daily dissolved oxygen concentrations typically declined as the summer progressed in the Fox, DuPage and Kickapoo Rivers, but not the others." Do you have any understanding of why that may be?

DR. GARVEY: Happened again in the data that I just presented in 2006, so the information that I just added to my written testimony. Honestly, I can't answer that question. I don't know why.

MR. ETTINGER: And then finally, you would -- I think that time has come for those who have hung back to ask their questions now.

MS. WILLIAMS: I think -- You know, my technical staff told me they probably won't have thoroughly reviewed what Dr. Garvey brought by tomorrow morning either, so I could probably ask two or three questions of him today and then we could be done with him rather than having him come back in the morning just for that purpose.

HEARING OFFICER MCGILL: We have some questions as well, and depending when we wrap up tonight will dictate that.

MS. WILLIAMS: Okay.

HEARING OFFICER MCGILL: Did you have a couple questions you'd like to pose now?

MS. WILLIAMS: Whichever you prefer. I can get them done now pretty quickly. It's just two or three.

HEARING OFFICER MCGILL: Sure. Go ahead.

MS. WILLIAMS: Dr. Garvey, I think Roy tried to bring out in your testimony your role with the Illinois chapter of the American Fisheries. You're the new president; is that --

DR. GARVEY: Not yet. Next year I will be. I'm president-elect right now.

MS. WILLIAMS: And it's correct, isn't it, that they submitted a public comment in this proceeding?

DR. GARVEY: Yes, they did.

MS. WILLIAMS: And isn't it true that that comment supported a date of at least July 31 for the sensitive life stage period?

DR. GARVEY: At that point in time, yes. However, they have not been briefed on the data that have been produced over the last two years, nor have they probably had an opportunity to review Mark David's results as well, and so if -- obviously I can't speak for

the Society and I don't know what they'd say, but it would be good for the executive committee of the American Fisheries Society in Illinois and the expanded executive committee to look and review the additional information that's been presented over the last couple years and then present it to the general membership and see what kind of opinions are out there.

MS. WILLIAMS: Maybe during the public comment period they'd want to --

DR. GARVEY: I think it would be very important for them to do that.

MS. WILLIAMS: Do you agree with USEPA's conclusion in the national criteria document to group small-mouth bass with the salmonids in terms of sensitivity?

DR. GARVEY: As I've testified at previous hearings, I have trouble with the small-mouth bass for a variety of reasons. One is its distribution in warm water systems. We identify them in the southern part of the state as well as the northern part of the state. They're widely distributed and seem to have broader thermal tolerance than we expected. They also happened to be found in reservoirs in the state that obviously have much higher thermal temperatures than you might

expect a small-mouth bass to reside in, so that's a tough species to sort of --

MS. WILLIAMS: So you disagree with what they did?

DR. GARVEY: I'd say that I'm skeptical about it.

MS. WILLIAMS: And you've looked at the list of sensitive fishes that EPA and DNR submitted in the technical support document?

DR. GARVEY: Yes, I have.

MS. WILLIAMS: Do you believe that any of those fishes at all that we've listed are more sensitive to low DO than large-mouth bass or channel catfish?

DR. GARVEY: I think it's difficult for me to answer that question without having data that are direct from a laboratory situation.

MS. WILLIAMS: And I think in your testimony you referenced a paper by Smale and Rabeni?

DR. GARVEY: Yes.

MS. WILLIAMS: And they have done lab tests, correct?

DR. GARVEY: Yes.

MS. WILLIAMS: Isn't it correct that in those studies, seven of nine species were found to be at

least as sensitive as small-mouth bass?

DR. GARVEY: Yeah. I'd have to go back and look, but, yeah, I think that's right.

MS. WILLIAMS: Do you know just off -- from your consultation with Dennis and his members, are you familiar with whether the data that was included I guess in Exhibit 34 and their letters in Exhibit 33 -- did these folks follow the protocols that you recommended in the Garvey and Whiles report for sampling?

DR. GARVEY: I think they followed what worked best for them, which was placing them on bridges and, you know, doing what everyone else does. In terms of putting them three-quarters of the way down or two-thirds of the way down -- I don't remember exactly what we said -- no, I don't think that they did that.

MS. WILLIAMS: I think that's all that the Agency has at this time.

HEARING OFFICER MCGILL: We had just a few follow-up questions that I think will go pretty quickly. Do you want to start?

MR. RAO: Okay. I think some of our questions Mr. Ettinger has been gracious enough to ask for us, so we'll try to -- at page 2 of your testimony you refer to low-gradient systems, and I think that

phrase has been referred in other places also, so just for the purposes of the record, can you please explain, you know, what low-gradient systems mean and how they're important in terms of dissolved oxygen dynamics?

DR. GARVEY: Yeah. Gosh, I do use that a lot, and, you know, when you typically think about that and if you were to ask me right now -- you just did -- what that is in terms of discharge, I honestly can't tell you. It would probably be more associated with the slope of a particular stream, but, yeah, I'm -- I would have to go back and tell you exactly what I mean by that.

MR. RAO: If you address that in your comments, that'll be good.

DR. GARVEY: Yeah, I'll do that.

HEARING OFFICER MCGILL: This is -- On page 3 of your prefiled testimony there's a reference to the Csoboth thesis and you've referred to it throughout the day. What review has that thesis undergone?

DR. GARVEY: Both -- There were two papers that were generated from them. Both of them are currently in the review process. One of them was submitted to the Transactions of the American Fisheries Society. We have not heard back on that one yet. The other one has been submitted to the Canadian Journal of

Fisheries and Aquatic Sciences, and we're still waiting to hear on that one. So, you know, there's no guarantees how the peer review process works, but it has been looked at by -- she's defended -- successfully defended her thesis, so it passed the muster of the committee, which is -- was comprised of a limnologist, Dr. Frank Wilhelm, and I believe Dr. Eric Schauber, who's a population biologist in our department. So it has had some peer review.

HEARING OFFICER MCGILL: Thank you.

MR. RAO: And when you refer to the thesis, are you referring to the discussion of the larval abundance on page 17 of the thesis?

DR. GARVEY: I believe so.

MR. RAO: And Figure 4 at page 65? Were those, you know, some of the relevant information that you are trying to support your position on?

DR. GARVEY: Yes, I believe. I would have to check.

MR. RAO: Can you please check and explain a little bit more about how those findings support your position?

DR. GARVEY: I'll be happy to do so.

HEARING OFFICER MCGILL: And the primary

support is for the issue of the month of July and whether it's a sensitive stage month or not; is that correct?

DR. GARVEY: Right. Yes, correct.

HEARING OFFICER MCGILL: Thank you.

DR. GARVEY: And it is page 74, Figure 13, which includes both the backwater lake and the Illinois River. What it shows is that the Illinois River in 2004 and 2005 produced larvae a little bit later than the backwater, and we attribute that largely to differences in probably warming, the two water bodies. The backwater warmed faster than the river. That's the reason why we saw a big difference.

MR. RAO: Earlier in IAWA's testimony at the previous hearing, there was, if I can recall right, a July 15 date proposed as something that would be acceptable to IAWA. Is that correct?

DR. GARVEY: I'll have Dennis cover that one.

MR. STREICHER: Again, during the stakeholder process I mentioned in my testimony, there was a number of different iterations of things that were thrown out there when we got into an impasse, and July 15 was one of the potential compromise dates that was discussed, along with other things, and as I said also,

the stakeholder process essentially broke down. I didn't see there being any value to any of the discussions that we had.

MR. RAO: So that data's got nothing to do with Dr. Garvey's recommendation.

DR. GARVEY: (Shakes head back and forth.)

MR. RAO: Okay.

DR. GARVEY: No, that's not currently incorporated in my testimony. And I'd like to apologize and make one correction. The committee members on Laura's thesis were Dr. Frank Wilhelm, as I mentioned. It wasn't Eric Schauber, but it was Dr. Matt Whiles, the coauthor of the report.

HEARING OFFICER MCGILL: This page 6 of your prefiled testimony, Dr. Garvey, you state that the grab DO data that you got from the DNR and EPA from 1994 to 2003, you said in streams that have fully met their aquatic use designation. What is aquatic use designation and -- having been met?

DR. GARVEY: I meant this by streams that were not listed in the 305(b) process.

HEARING OFFICER MCGILL: Thank you. Dr. Garvey, pages 9 and 10 of your prefiled testimony, there's a sentence where you state, "In my view, it

appears that many of these streams, particularly the Fox River, fail to provide adequate oxygen for aquatic life during part of the summer." Could you just explain that statement or what -- and what you mean by adequate?

DR. GARVEY: What I mean is that it went far below that 3.5 milligram per liter and even below -- I think Albert pointed that out, even the 3 milligram per liter point, and so in my opinion, whatever organisms were there were either severely stressed or in trouble unless there was some refuge that they could move to, contiguous habitat or something like that, which means that in that vicinity of that particular reach, there needed to be an area of dissolved oxygen that at least on an average probably had higher than 4 milligrams per liter over seven days.

HEARING OFFICER MCGILL: Thank you. In your conclusion, after you indicate that -- scrapping the DO standard as a current possibility, you suggest that the -- I take it that when you say Garvey and Whiles report, I take it you mean the IAWA proposal should be adopted in the interim.

DR. GARVEY: Correct.

HEARING OFFICER MCGILL: And by interim, I take it you mean that at some point you'd like to see a

habitat-based tier designation adopted?

DR. GARVEY: That is correct. That is my dream.

HEARING OFFICER MCGILL: Is there some standard in lieu of dissolved oxygen that you would favor having in the interim before that dream comes true?

DR. GARVEY: That's a good question, and honestly, I -- like I said, at this point I think we're stuck with some sort of dissolved oxygen standard until we can get to a more appropriate habitat-based tier use designation, and we're just not there yet.

HEARING OFFICER MCGILL: Just two real quick -- two very quick questions. In the sensitive season, the IAWA proposal calls for a, quote, seven-day mean while the Agency/DNR proposal calls for a daily mean averaged over seven days. Are there any differences between those two concepts?

DR. GARVEY: This is going to be awful, but Dennis was just talking to me and I missed part of it. I'm sorry.

HEARING OFFICER MCGILL: Oh, I can repeat that. I've always wanted to say have the court reporter repeat that, but I can do it. IAWA calls for a seven-day mean in its proposal but the Agency/DNR proposal calls

for -- let me make sure I'm reading it right. The IAWA proposal for the sensitive season calls for a seven-day mean of 6, okay, and the IEPA refers to a daily mean averaged over seven days of 4. I'm not interested in the numbers as much as the differences, if any, between the seven-day mean and the daily mean averaged over seven days.

DR. GARVEY: I apologize. That's the same thing.

HEARING OFFICER MCGILL: Same thing.

DR. GARVEY: I'm sure that they're calculated similar, the same way.

HEARING OFFICER MCGILL: Okay. And I -- And for the less sensitive season, the same question. Is there any difference between a daily minimum averaged over seven days versus a seven-day mean minimum?

DR. GARVEY: No, not to my understanding.

HEARING OFFICER MCGILL: And in terms of areas of agreement between IAWA and the DNR/Agency proposal, there's the narrative standard, the 30-day averaging. The DNR/IEPA proposal also has a subsection (d) called "Assessing Attainment of Dissolved Oxygen Mean and Minimum Values," and it's got four subsections. I don't know if you're familiar with that provision, but is

the IAWA comfortable with that particular subsection, proposed subsection, 302.206?

DR. GARVEY: I'll give that to Dennis to --

HEARING OFFICER MCGILL: We can -- Mr. Streicher's going to be here tomorrow. We can -- I wasn't sure if that was something that wanted to get your input on before you left today. Okay. I didn't have any further questions. Anybody -- Are there any additional questions?

CHAIRMAN GIRARD: I just have a quick one, Dr. Garvey. Earlier today in your testimony you referenced a paper that I think you said was delivered at a conference that dealt with glochidia survival in relation to DO concentrations. When you submit your comments, could you please submit a copy of that paper?

DR. GARVEY: Most certainly, and in fact, I have a copy of it if you'd just like to have it right now.

CHAIRMAN GIRARD: That would probably be better.

HEARING OFFICER MCGILL: It'll cut down on your mailing expenses. Public comments have to go to the service list, so --

DR. GARVEY: Here it is if you want to --

it's just an abstract, and the reality is -- again, I'll qualify that until it's actually in the peer review literature, it's still just an abstract, so that's something you need to take into consideration when you look at this.

HEARING OFFICER MCGILL: Mr. Harsch, are you --

MR. HARSCH: Be happy to produce it as an exhibit. 37?

HEARING OFFICER MCGILL: 37. And could -- if I could just get a copy of that. What is it entitled?

DR. GARVEY: It's called "The Effect of Hypoxia on Brood Survival in the Freshwater Mussel," and then you can see the scientific name.

HEARING OFFICER MCGILL: Thank you. Is there any objection to entering that document as Hearing Exhibit 37?

MS. WILLIAMS: I don't have an objection, but I know sometimes the hearing exhibits don't get put up on the Web. Is there some way we can make sure that copies are provided tomorrow?

MR. HARSCH: That's our only copy.

HEARING OFFICER MCGILL: We can xerox --

MR. HARSCH: It's your building.

MS. WILLIAMS: I can bring copies if you want to let me have it, but I think that's --

MR. HARSCH: That would be great. I would like a copy personally.

HEARING OFFICER MCGILL: Yeah, we'll have some copies made and I'll bring them tomorrow morning.

MR. HARSCH: Thank you.

BOARD MEMBER MOORE: Excuse me. I just have one question. This information that you submitted from Fox Metro where they collected on the proposed enhanced stream segments, if I understood correctly, 8 percent of the state's streams would be included in that enhanced stream segment area. I'm interested -- I think you had eight people that collected, if I counted that right, and I'm not sure those were all actually on enhanced stream, but somewhere around there. How many of your members would be affected by the enhanced stream sections versus what the proposal of the IAWA has? How many additional members?

MR. STREICHER: That's a good question. I don't know.

MR. HARSCH: That's a great question, because we tried to get the data from the Agency people to address that issue as to the exact locations so we

could compare it to the location of discharge, and it proved to be an almost monumentally difficult task. They have to know where they are. They have to figure out where those enhanced segments start and stop.

MR. STREICHER: I don't have the exact answer to that, but --

BOARD MEMBER MOORE: Do you have an approximate?

MR. STREICHER: Well, let me -- I -- we passed out at one of our technical meetings a detailed list of the latitude/longitude locations where the enhanced segments were proposed, and we asked members to check their outfalls and determine whether or not they were in those segments and get back to me. Those eight that did are the only ones that responded. We then asked them if they would participate in this collecting of DO, which they did, so --

BOARD MEMBER MOORE: Which we're very appreciative of that.

MR. STREICHER: And let me say too that the Kickapoo -- probably more on the Kickapoo responded than are listed here. I think the Bloomington-Normal is on Kickapoo, the new plant, but Peoria did the work on Kickapoo and there's a proposed plant there, so they

don't actually have a plant on that site, but they are planning or thinking of, you know, siting one there eventually, so they wanted to take a look at the river.

BOARD MEMBER MOORE: But the issue that I'm looking to understand is the difference between what -- the proposal. Are those people going to be affected by that also?

MR. STREICHER: Yes.

BOARD MEMBER MOORE: And so they're affected one way or the other.

MR. HARSCH: Absolutely.

MR. STREICHER: Yeah.

MR. RAO: A follow-up to Miss Moore's question. This is to the Agency. Do you have any information regarding how many POTWs may be affected by enhanced stream sections?

MR. FREVERT: A couple points I want to make here. Number one is I don't know off the top of my head how many permitted discharges in the state, whether they're POTWs or some other kind, are tributary to these waters that are identified for enhanced DO protection, but irrespective of what that number is, I think it's a leap of faith to assume that they're necessarily automatically affected, and again, we're setting a

standard to protect what we think the aquatic community needs, not for the convenience of any particular source. If there are problems with sources, we'll have to deal with them, and there's a whole litany of regulatory and administrative processes to deal with that, but I'm really concerned when you jump to the conclusion that if we identify a stream as needing a particular better water chemistry than another stream it automatically leads to an effect, detrimental or otherwise, to a permitted source.

You know, most of the -- particularly the large systems in the state of Illinois have incredibly high-quality technology in their treatment plants and they put out a good effluent product, and I personally believe that the vast majority of them are not having a detrimental effect on their receiving streams from a DO perspective and I don't anticipate us going into a need for a wholesale modification of those permits to crank down their limits. There may be some -- Quite frankly, whether it's an enhanced or the basic level, that's true. The other thing we need to point out is what we're recommending is indeed a relaxation of the minimum from the current standard, so to the effect that those facilities have a problem meeting the DO in the stream

under our recommendation, they have it today under the existing standard.

MR. HARSCH: From a policy standpoint, the IAWA would agree with that. IAWA did not propose this rulemaking in order to lower the dissolved oxygen water quality standards so its members could better meet it, but it was to develop an appropriate scientifically-based dissolved oxygen water quality standard that would form the basis for all of the programs that Toby's agency administers, so it is difficult to identify those specific POTW point source discharges. You also have stormwater discharges; you've got industrial discharges. There are a whole host of discharge permits on the data that the Agency did try to provide us. It's a monumental task to try to answer your question.

MR. ETTINGER: Excuse me. I had a limited number of follow-up questions for Dr. Garvey. I'd like to get them out tonight. It sounds like we're debating some policy issues, which we should debate, but could I just ask my questions so that Dr. Garvey's students aren't deprived of their professor tomorrow?

HEARING OFFICER MCGILL: Sure. Go ahead.

MR. ETTINGER: Unless there are other questions of that nature. I didn't mean to cut that off.

I just didn't want to -- if possible, I wanted to make sure we finished Dr. Garvey tonight.

Okay. I have just a limited number of questions that were follow-up. Ms. Williams asked you regarding the Fishery Society and how -- things that might cause them to change their opinion, and you mentioned, among other things, the David studies. Is there anything in the David studies that speaks to the question of when larval fish are present in waters?

DR. GARVEY: I think that what it might do is give them more insight into what the limits to oxygen capacity in the streams of Illinois are, and that might give them some insight into what necessarily -- what oxygen levels are available or should be available in natural systems throughout the state. That was very -- well, I'm tired, but yes.

MR. ETTINGER: You understand Dr. David studied a couple of streams in east central Illinois.

DR. GARVEY: That is true, and there are other studies out there.

MR. ETTINGER: Okay. The Board's technical staff asked a question -- and they understood your answer, but I'm not as smart as they are -- regarding the larval study, and you said -- I think it's page -- what

exactly are the pages of this that you believe support your statement regarding the larvae present?

DR. GARVEY: The pages of --

MR. ETTINGER: Of when they are present in the --

DR. GARVEY: The Csoboth thesis you're talking about?

MR. ETTINGER: Yes.

DR. GARVEY: Laura's thesis, if you look at page 74 of her thesis --

MR. ETTINGER: Page 74.

DR. GARVEY: Of the thesis, which is Exhibit -- 2? 1? It depicts the Illinois River at Swan Lake, where she did her larval fish tows and worked very hard to get these data in 2004 and 2005, and she did tows both in the Illinois River and in the associated backwater Swan Lake, and she basically quantified the complete density of larvae from a volumetric standpoint, number per cubic meter. What she found is that in both systems over both years, the majority of larvae -- and I'd say probably over 90 percent of them -- were produced prior to the July 1, so the eggs and larvae were present in these systems before July even kicked in.

MR. ETTINGER: I'm not her advisor, but

is -- I've got the right thing here, page 74 with this chart?

DR. GARVEY: Yes, sir.

MR. ETTINGER: Is it labeled larval here somewhere, or is that in the text?

DR. GARVEY: It's implied from the thesis itself. It doesn't say larval fish on it, but that's larval fish density.

MR. ETTINGER: Well, perhaps one of her advisors would make that suggestion, that she have that word in the study. Is this broken down by species in any way or is this just larval fish?

DR. GARVEY: Well, it's total larval fish density, but during 2004 she found a very different assemblage of larval fish that were produced during that year than in 2005, and that was probably due to characteristics of river discharge that affected the spawning activity of the various adults. So it's everything from -- I forget how many taxa, but it was a large number. It's in -- I know it's getting late, but I want to give you the table where she has all the --

MR. ETTINGER: Well, my question is just this isn't broken down by species at all, so for all we know, all of one species was done in March and all of

another species did all of its work in July.

DR. GARVEY: That's a possibility, largely driven by a few taxa, but if you look at Table 1, page 51 of her thesis, that includes all the different families of fishes that were present, so it's not just dominated by one or two taxa. We're talking about, you know, most of the common species that are found in Illinois.

MR. ETTINGER: Right. Okay. Well --

DR. GARVEY: Common species, not the rare ones.

MR. ETTINGER: But we just don't know how it's broken down at all.

DR. GARVEY: No. I don't have a template.

MR. ETTINGER: Okay. Are you aware of any studies that say that adult mussels are more sensitive to low dissolved oxygen levels than glochidia?

DR. GARVEY: This abstract that I just submitted as an exhibit was talking about adult versus glochidia, and it does suggest that the adults, depending on what species you're looking at, are more sensitive; at least some species are.

MR. ETTINGER: I'm done. Thank you.

HEARING OFFICER MCGILL: Mr. Ettinger, earlier you had referred to a David study from --

MR. ETTINGER: I'm sorry. All the Mark David papers that we were referring to.

HEARING OFFICER MCGILL: Right. You had one I thought from --

MR. ETTINGER: Oh, yes.

HEARING OFFICER MCGILL: -- 2000 that's I take it not part of the prefiled testimony.

MR. ETTINGER: It's not. I was going to -- I didn't really have any particular -- and since he hadn't indicated that it had figured in his testimony, I wasn't going to offer it to Professor Garvey now.

HEARING OFFICER MCGILL: I just wanted to double-check with you.

MR. ETTINGER: I will certainly offer it if people would like to see it now. I don't know what exhibit we're up to.

HEARING OFFICER MCGILL: It would be 38.

MR. ETTINGER: Okay. Well, I mean --

HEARING OFFICER MCGILL: What is it entitled?

MR. ETTINGER: It's got a catchy title. "Anthropogenic Inputs of Nitrogen and Phosphorous and Riverine Export for Illinois, USA."

HEARING OFFICER MCGILL: Any objection to

entering this as a hearing exhibit? Seeing none, we'll make that Exhibit 38. Any further questions for Dr. Garvey?

MR. HARSCH: Just one follow-up. Dr. Garvey, there was a question asked by Ms. Williams regarding the letter that is in the board record from the Illinois Association -- chapter of American Fisheries. That was a letter generated by the executive committee?

DR. GARVEY: Well, the executive committee and the expanded executive committee, which, you know, consists of several ad hoc committees that were produced through time, yeah.

MR. HARSCH: And that composition of that committee changes over time?

DR. GARVEY: Yes, it does, as, you know, people matriculate through the process, and then eventually they're let go.

MR. HARSCH: And you're on that committee right now.

DR. GARVEY: Yeah, I am.

MR. HARSCH: And you'd be expected to probably support your testimony today?

DR. GARVEY: Yeah. Ann is the secretary/treasurer, so I'd have to put her on the spot

too. It's usually comprised -- The executive committee is four members, usually comprised of two agency folks and two academic folks, if that's right. Is that right, Ann? That's typically the way we try to do it, so it's kind of a balance between two different perspectives.

MR. ETTINGER: You are being paid a fee to be here today, aren't you?

DR. GARVEY: I am.

HEARING OFFICER MCGILL: Any further questions for Dr. Garvey?

MR. YONKAUSKI: Were you on the executive committee in 2004?

DR. GARVEY: No, I was not, but they elected me right after that.

HEARING OFFICER MCGILL: Any further questions for this witness?

MR. ETTINGER: Does the American Fishery Society have any rules against -- regarding conflicts of interest of people voting on matters in which they're receiving a fee to testify?

DR. GARVEY: I don't know. Maybe, maybe not. I can abstain from the vote.

MR. ETTINGER: I guess we'll find out.

DR. GARVEY: There's also -- if that's a

conflict of interest -- but agency personnel who are making particular decisions being on that committee as well. There's only so many fisheries professionals in the state.

HEARING OFFICER MCGILL: And with that, any --

MR. STREICHER: If I could respond to your earlier question on the four subset items that you mentioned if IAWA were comfortable with.

HEARING OFFICER MCGILL: Yes.

MR. STREICHER: We would -- We have no problem with those four --

HEARING OFFICER MCGILL: The subsection (d)?

MR. STREICHER: Yes, just as a follow-up.

HEARING OFFICER MCGILL: Thank you. Seeing no further questions for Dr. Garvey, I'll just remind everyone that we're continuing the hearing tomorrow morning at 10 a.m., and please keep in mind potential prefirst notice public comment filing deadline dates, which we'll talk about tomorrow and hopefully establish, and I thank everyone for participating today.

(On November 2, at 6:21 p.m. the hearing was suspended, and after such recess the following proceedings were had on November

3, commencing at 10:07 a.m.)

HEARING OFFICER MCGILL: Let's go on the record. Good morning. I'd like to welcome everyone to this Illinois Pollution Control Board hearing. My name's Richard McGill. I'm the hearing officer for this proceeding, a rulemaking entitled "Proposed Amendments to Dissolved Oxygen Standard, 35 Illinois Administrative Code 302.206." The board docket number for this rulemaking is RO4-25. The IAWA, the rulemaking proponent, is seeking to amend the Board's rule on general use water quality standards for dissolved oxygen.

Also present today on behalf of the Board is Board Member Andrea Moore, the lead board member for this rulemaking; Chairman Tanner Girard; Board Member Thomas Johnson, as well as Anand Rao of the Board's technical unit. This morning we are continuing the fifth hearing that started yesterday afternoon. I'll remind those witnesses who were sworn in yesterday that you're still under oath. At this point I'd ask if any of the board members present would like to make any remarks.

BOARD MEMBER MOORE: Thank you. I just wanted to thank everyone for your patience, because we -- the Board recognizes that this hearing has gone on for a good length of time and everyone has made a very strong

commitment in all the departments, and all of you from the IAWA have also really been very good at participating. I also wanted to remind everyone, even though I know we know it, the Board is charged with a slightly different role than everyone else, and we -- our main purpose here is to establish a good record that we can refer to in order that we might make a decision, and so sometimes our questions might seem redundant to you or you might wonder where they're coming from, but as we review the record and see areas where we have developed questions, that's why you'll see us sometimes asking questions throughout the hearing, and I just thought it might be helpful. We have -- We're charged with the economically reasonable technically feasible charge in the statute, and so you definitely have to get to those issues. So with that, I wanted to thank everyone, and just let's hope that this is our last day.

HEARING OFFICER MCGILL: Thank you, Member Moore. I'll remind everyone that this proceeding is governed by the Board's procedural rules, so all information that is relevant and not repetitious or privileged will be admitted into the record. Echoing Member Moore's sentiments, I just remind everyone that the questions posed today by the Board are intended

solely to develop a clear and complete record for when we have to write up our decision.

The Board received prefiled testimony from IAWA, Professor Thomas Murphy and the Metropolitan Water Reclamation District. You heard yesterday from Professor Murphy, from the IAWA, and today's proceeding is continuing where we left off yesterday; that is, with cross examination of IAWA. After that we will proceed with the prefiled testimony of the Metropolitan Water Reclamation District of Greater Chicago. After we finish with questions for all of those who prefiled, anyone else may testify. There is a sign-up sheet for those persons at the back of the room. Like all witnesses, those who testify will be sworn in and may be asked questions about their testimony.

For the court reporter, I'd like to remind everyone to please speak up and don't talk too quickly. Try not to talk over one another, and please, if this is your first time speaking today, identify yourself by name, title and organization. Any questions about our procedures today? Seeing none, I'll just remind everyone that at the end of today's hearing we will take up the issue of establishing a prefirst notice public comment filing deadline.

Right now I'd like to continue with questions for the IAWA's witnesses. The Board has a few questions. I'll just open it up to the floor, see if anyone present has any questions for IAWA at this point.

MR. ETTINGER: I have one.

HEARING OFFICER MCGILL: Mr. Ettinger, if you could just identify yourself for the record.

MR. ETTINGER: Yes. I'm Albert Ettinger. I'm counsel for Sierra Club, Prairie Rivers Network and the Environmental Law & Policy Center. On page 8 of your prefiled testimony, Mr. Streicher, you discuss IAWA efforts to establish a tiered use committee, and then I'll quote, "This committee has already started to identify what the appropriate category should be in Illinois based on existing and attainable uses. After this first step, we will determine what the various water quality standards, including dissolved oxygen concentrations, should be for each category." I take it by that, then, that it's anticipated that eventually there will be a number of different dissolved oxygen standards applicable to different waters across the state, or how do you anticipate that will work?

MR. STREICHER: Okay. My name is Dennis Streicher. I'm representing IAWA. The tiered use

committee that the Association has formed was intended to review what is existing in other states and what might be appropriate and useful in Illinois. We don't want to reinvent the wheel on this. We just want to try and look at what would be the best approach. That task or that effort is now finished with the first stage. We've hired a consultant. We have six tasks that we have shared results with the agencies, both EPA and IDNR.

Our next effort now will be to try and identify what of all those categories would be useful in Illinois and then again, as I say in the testimony, what water quality standards may be applicable in each of those categories. I can't answer that there will be a numerous -- or a number of different DO standards throughout the state. I don't -- We haven't gotten that far yet, but I anticipate if it's like other states, there will be. Ohio is a state in question here that we look at fairly closely, and they do have a number of different categories, and each of the categories has different DO standards in it, attainable DO concentrations.

MR. HARSCH: Roy Harsch. I'm also on that committee for IAWA. We also are looking at the white paper that IEPA has provided us with and the guidance

that we've obtained from USEPA that they've put out for doing this work as well, so we're essentially taking the white paper and the USEPA guidance and melding that into the first work that has been done by the consultants for IAWA.

HEARING OFFICER MCGILL: If I could just interject a question here, we were going to ask for a copy of the white paper, if that's okay with the Agency.

MS. WILLIAMS: Oh, yeah.

HEARING OFFICER MCGILL: And, Mr. Harsch, you mentioned USEPA guidance. Is that particularly voluminous?

MR. HARSCH: Yes.

HEARING OFFICER MCGILL: Okay. Well, if you could just cite to it in public comment or -- it's just something that the Board would be interested in for background.

MR. HARSCH: It would be -- If you want it for background purposes, I would be more than happy to forward it or Ed could forward it in electronic format, but it is very voluminous.

HEARING OFFICER MCGILL: That's fine. What I would contemplate doing, if you don't have -- I know you don't have the USEPA guidance here. If the white

paper's not here, I'll just reserve a hearing exhibit. If you'd simply submit one copy to the Board, it wouldn't have to be something that is served on the entire service list.

MR. HARSCH: Would you like it hard copy or would you actually like it electronically? It's almost easier to do it electronically.

MR. RAO: Mr. Harsch, would the USEPA guidance -- if it's available on their Web site, you know, a citation would be good enough.

HEARING OFFICER MCGILL: You could just cite to it in the public comment.

MR. HARSCH: Sure, I'd be happy to.

HEARING OFFICER MCGILL: In terms of the white paper --

MR. FREVERT: Yeah, I want to comment on this, that we developed the white paper to help focus our perspective on how to look at revisiting aquatic life uses in the state of Illinois. That paper has been distributed only in a limited fashion, yet we're assembling a large distribution list, and hopefully this week we'll have that out to broader member stakeholders, and we can certainly get it to you as well.

HEARING OFFICER MCGILL: Okay. If there's

no objection, I'll just reserve Hearing Exhibit 39 for the white -- Agency white paper.

MS. WILLIAMS: I don't have an objection. I just -- I was going to wait until MWRD's testimony to bring up a concern that I have related to the clarity of the record, which is we have a voluminous amount of information already in the record, and issues regarding designated use rulemakings and use attainability rulemakings in Chicago waterways serve to mess up the record in this proceeding by getting too much information in the record that's not related. Obviously, if the Board thinks they need this information, we'll provide it. I have no objection to reserving Exhibit 39, but I do have some concerns about going off into areas that are a distraction from the simple water quality standard update that we're working on -- simple as it is -- today. So I wanted to make sure I made that point.

HEARING OFFICER MCGILL: Well, since it was specifically raised and discussed in prefiled testimony for this hearing, we'll try not to let it distract us too much, but I think it would be helpful background. So we'll reserve Exhibit 39 for the Agency white paper, and again, we'll just -- a single hard copy of that filed with the clerk would be sufficient, or you can even just

attach it to public comment. Thank you.

Mr. Ettinger, did you have further questions?

MR. ETTINGER: No.

HEARING OFFICER MCGILL: Are there -- Mr. Streicher or Mr. Harsch, could you tell us who was on the tiered use committee you referred to in Mr. Streicher's prefiled testimony?

MR. STREICHER: I can't tell you everybody because it's a very large group now, and we just had a kind of another round of sign-ups for our association, and I was happy to see a number of folks signed up for that. It's chaired right now by Nick Menninga, who is the assistant manager of Downers Grove Sanitary District. Lou Kollias with the Water Reclamation District is on that committee; myself and Roy. There are a number of consultants who have gotten onto the committee as well, understanding that this is a kind of a leading edge, I think, educational opportunity for them. Who else?

MR. HARSCH: From IAWA -- we could provide you with -- the IAWA has a committee sign-up procedure that we do annually, and we can provide you with a list of agencies and municipalities that are members. At the stakeholder meetings there have been a number of the folks from the various environmental groups in the state,

a number of representatives of IDNR from fisheries and the surveys. USEPA was -- has been in attendance and --

HEARING OFFICER MCGILL: That's the main thing we were interested in, is if there's -- the testimony indicated that there's interaction with DNR, the Agency and USEPA.

MR. STREICHER: Yes.

HEARING OFFICER MCGILL: They're not actually on the committee, I take it, but --

MR. STREICHER: They're not actually on the committee per se, but they have attended many committee meetings to date. We've invited them, and our goal was to include them as much as possible from the very start, understanding that this is a very complex and long process and we needed to have everybody on it.

HEARING OFFICER MCGILL: Thank you. I just have one more question. In the IEPA/DNR proposal there's a definition of "thermocline." Does IAWA agree with that definition?

MR. STREICHER: Yes.

HEARING OFFICER MCGILL: Thank you. Are there any other questions for IAWA at this point?

MS. WILLIAMS: I still have a few questions, if that's okay.

HEARING OFFICER MCGILL: Go ahead.

MS. WILLIAMS: I'd just like to clarify a few points from your prefiled testimony. Dennis, on page 5 you say, "The DO standard which is finally adopted in this proceeding should be a sound dissolved oxygen regulation that will be used in the development of stream use classifications." To me that seems backwards. Aren't -- Wouldn't you agree that standards are adopted to protect a designated use; that the use comes first?

MR. STREICHER: I would agree, and it probably does seem a little backwards. In fact, after we got ourselves into this long two-and-a-half-year effort, there's been more than one time we stood back and said, we should have started with stream use to begin with anyway, and as I mentioned earlier, five years ago we began the effort because I don't think we really thought stream use or use attainability analyses were really on the horizon for us in Illinois. I'm happy to say in the last five years I think that whole thing has changed, but unfortunately we got this ball rolling first, you know, so we need to finish this, I think.

MS. WILLIAMS: So when you say on page 11 that the Board should wait for your proposal on tiered uses, you're not asking that your proposal in this case

be withdrawn or delayed or --

MR. STREICHER: No.

MS. WILLIAMS: At the bottom of that page -- paragraph on page 5 that we were reading from, you stated that the DO standard will be used in other decisions by other agencies. Can you just explain what you meant by that?

MR. STREICHER: By other agencies. I think I was referring to both agencies here, DNR and EPA.

MS. WILLIAMS: So not other agencies beyond the two here today?

MR. STREICHER: I don't think so.

MS. WILLIAMS: Thanks. You have some testimony, I believe, that your organization had recommended at one point the possibility of retaining the existing standard for a list of waters. Would you want to see the Board retain the existing standard for the list that's been provided in Appendix D?

MR. STREICHER: No. I -- When I said that, it was really referring to the stakeholder discussions as part of that process of trying to get us past the point that maybe was, you know, causing some impasse in that discussion, and it was thought of at the time that indeed we do have waters in Illinois that are prime

less-impacted waters. I'm confident that the IAWA proposal as written can protect those waters as well, but, you know, as part of that discussion we looked at there being a retaining of the old standard.

MS. WILLIAMS: And you're not planning to propose a list --

MR. STREICHER: No.

MS. WILLIAMS: -- of these waters. I just want to clarify another point. When you talk about least-impacted waters, could you at least say that you're not talking about the waters that were -- where the data was obtained by your members that was submitted with Mr. Garvey's work? Do you consider any of those to be least-impacted waters?

MR. STREICHER: The recent IAWA? You know, I would think that there may be one or two. Kickapoo, I think, was some place -- one place where we had some DO measurements. I think it was my understanding that Kickapoo is one of those least-impacted --

MS. WILLIAMS: But you wouldn't consider the others to be in that group.

MR. STREICHER: No.

MS. WILLIAMS: In particular, I guess my interest is in Salt Creek, DuPage River.

MR. STREICHER: Those are not least-impacted.

MS. WILLIAMS: Fox River. Those are all heavily impacted, correct?

MR. STREICHER: We included those as kind of a comparison between more urbanized and probably heavily impacted river, comparing those to the enhanced segments that were proposed.

MS. WILLIAMS: Thank you. On page 11, I think it is --

MR. STREICHER: Yeah. Plus data was available on those rivers, so --

MS. WILLIAMS: You say -- Near the top it says, "These designations should be by basin or at least by sub-basin," when you're referring to separating out least-impacted streams. Did you mean this as an alternative to selecting individual water bodies or segments?

MR. STREICHER: I meant that as an alternative to the -- what appears to me to be pretty arbitrary segments that are widely dispersed over the state.

MS. WILLIAMS: So, Dennis, is it your testimony the State should have selected all the streams

in a sub-basin where a site was identified having a meaningful amount of DO sensitive species?

MR. STREICHER: I think when the data is reviewed and when we can do this use designation, when we can do the analysis and collect the data that we need, I'm hoping that we'll be able to identify entire sub-basins at least that size for protection, not just pieces.

MS. WILLIAMS: But had we done that in this case, that would have led to a lot more water bodies, correct?

MR. STREICHER: It could have. I don't know.

MS. WILLIAMS: Wasn't the possibility of using a basin-wide approach discussed in the stakeholder groups? Did you advocate for that approach then?

MR. STREICHER: When we talked about there being the old standard retained, I think we were looking at individual river basins.

MS. WILLIAMS: You spent a significant -- I thought significant amount of time talking about the 6.25 milligram per liter seven-day mean from March through July, and I guess I'll -- I try not to take personal offense at your reference to the Agency attorney saying

it was not arbitrary. Wasn't it explained to you at the time that that was a mathematical midpoint between the cold water and the warm water numbers?

MR. STREICHER: Yeah, and that it was just an average.

MS. WILLIAMS: You also raised some questions about that number not being attainable, and without getting into too much detail about the data, I just -- I guess I'd just like for you to clarify for all of us where you feel attainability fits into the Board's decision in this matter in what we're considering. I think it would help everybody.

MR. STREICHER: Well, I think it's not attainable. I think the data that we've developed to date is -- again, as I said in the testimony, a great bulk of the data supports the Whiles-Garvey numbers and that the 6.25 is not attainable more often than the Whiles-Garvey is, the 6.0, and that just putting a number out there that may be a DO goal would be nice if we got there, but it just isn't going to happen in a -- in our Illinois rivers. I think that's what the Whiles-Garvey report shows. This is -- It's just -- We're setting ourselves -- We're setting the bar too high. We're setting the bar at a point that is just merely going to

make more violations.

MS. WILLIAMS: Would you disagree that if that's what's necessary to protect aquatic life, that's what the Board's obligated to do?

MR. STREICHER: Well, we disagree that that's what's necessary to protect aquatic life.

MS. WILLIAMS: I think that helps explain it a little better. On page 14 you called a decision of EPA and DNR to include July in the sensitive stage period to be arbitrary, and I think actually you used the word "arbitrary," like, four times in the testimony, and most people might not take the word the same way that an administrative law attorney does, but -- so I just wanted to ask you a little bit about that. You don't mean to suggest that there's no data to suggest that there are fish that spawn in July, do you?

MR. STREICHER: Well, we've been trying to get some data from the Agency on that and we haven't, so, I mean --

MS. WILLIAMS: What type of data are you saying?

MR. STREICHER: Well, the spawning data I think that Dr. Garvey had referred to in his own studies I think were the ones that we were referring to, but that

there isn't as much data as we'd like to see.

MS. WILLIAMS: From who?

MR. STREICHER: From the agencies.

MS. WILLIAMS: The EPA or from either one?

MR. STREICHER: DNR.

MS. WILLIAMS: DNR? Isn't it true that our TSD shows that there's spawning that occurs even well past July 31?

MR. STREICHER: I think Dr. Garvey would probably be the better person to ask on this, but I think he testified to that.

MS. WILLIAMS: Also in that discussion you call the inclusion of July in the cool weather months a problem, and I was just a little confused by this term, "cool weather," for describing the period of March through July, so for the period -- or from March through June, anyway, June, July. So for August through February it's not cooler. Is it hot or cold?

MR. STREICHER: Perhaps my testimony was a little confusing there. We're looking at July as a warm water -- as a warm month and one in which the spawning has largely ended or that production phase has ended.

MS. WILLIAMS: But it's really about spawning and early life stages, right, not about the

temperature at this point?

MR. STREICHER: Right.

MS. WILLIAMS: Okay. Thank you. I think that's all I have. Can I maybe talk for a minute to my client to make sure that --

HEARING OFFICER MCGILL: Sure. Why don't we go off the record.

MR. RAO: I have a follow-up.

HEARING OFFICER MCGILL: Let's stay on the record.

MR. ETTINGER: I have one follow-up too, but --

MR. RAO: Mr. Streicher, this goes back to your testimony on page 8 regarding the tiered use committee. Your testimony seems to indicate that you are just in the beginning phases of this project to come up with use designations, and are you following the USEPA's guidelines for use attainability analysis in coming up with these designations? Is that one of the objectives?

MR. STREICHER: Yes. The committee's been in place for over a year. Mr. Dick Lanyon was our chairman initially, and he's had a change in his job category, so we kind of stalled there for a short time until we got a new chairman on board, but, you know, we

are following USEPA criteria, and that was the direction given to the consultant.

MR. RAO: And is this, you know, procedure a fairly involved process?

MR. STREICHER: I believe it is a very involved process.

MR. RAO: So can we assume that any results from this study will take a few years at a minimum or maybe --

MR. STREICHER: I think it's very likely to take a few years. There's going to be a long stakeholder process involved as well.

MR. RAO: So before the Board sees any changes, it may be, like, five to ten years from now or --

MR. STREICHER: I wouldn't say ten years, but approaching five might be -- Roy's reminding me the committee has a goal of two years to be able to come to some final design for this, but again, I believe the stakeholder process is going to be very involved.

MR. RAO: Thank you.

HEARING OFFICER MCGILL: Two years from when?

MR. HARSCH: 2008.

MR. STREICHER: Yeah.

HEARING OFFICER MCGILL: Thank you. Mr. Ettinger?

MR. ETTINGER: I just had one question. You said the Agency had not supplied any information on spawning times. I was just wondering, have you seen the agency technical report?

MR. STREICHER: I have seen that, and --

MR. ETTINGER: And you don't consider that information on spawning times?

MR. STREICHER: Well, it is information. We're looking for more. I think, like any time, we're looking for more data, and again, Dr. Garvey would be a better person to --

MR. HARSCH: If you have a specific question, we'd be more than happy to have Dr. Garvey address it in writing.

MR. ETTINGER: Well, Dr. Garvey did address it through his study of the lake in Grafton.

HEARING OFFICER MCGILL: Any further questions for this witness? I just wanted to ask, is there any aspect of the IAWA proposal that IAWA considers more stringent or less stringent than the current standard?

MR. STREICHER: Well, if I understand your question --

HEARING OFFICER MCGILL: It wasn't very well worded.

MR. STREICHER: Is there a concern on any of the members that this may be a more difficult standard to meet or is that a -- or is it a loosening of the standard? Is that what you're saying?

HEARING OFFICER MCGILL: I guess I'm just trying to get a sense that there was discussion late yesterday -- there was testimony that the proposals that are before the Board now, that they are not -- I'm paraphrasing -- not as stringent as the current board standard, the existing standard, and I just wondered what IAWA's take was on its own proposal and also your opinion on the Agency/DNR proposal.

MR. STREICHER: Well, I can only speak to what I've -- in my own discussions with some of the -- with our members and, you know, what they've said to me about this, and they are very much, of course, on board with our approach. I mean, everybody -- we have this very unified position on it, but also unified understanding that if a river is impaired for dissolved oxygen, something needs to be done about it. I'm trying

to avoid that responsibility in any way. What we want to see is the, however, regulation that is sound and based in science and something that -- you know, that is defendable. Having said that, if we just made a DO standard of 7 everywhere, you know, that would be tough to meet for anybody. I don't know if that answers your question, but it's -- we understood that when the Whiles-Garvey report came out, we didn't know what it was going to be before it came out, and we understood that when it came out that this is what we're going to have to go with regardless of what it was, because that was the science.

HEARING OFFICER MCGILL: I guess part of the concern was perhaps what IAWA would characterize as undue violations under the current standard. Is it your sense, then, that the IAWA proposal would lead to less violations than the current DO standard?

MR. STREICHER: If it led to less, I think the violations that existed would be real violations, a real violation of a water quality need, so I guess if it did lead to less, it may -- I don't know, but those that remained would be I think truly a violation of what is the river -- what the river needed.

HEARING OFFICER MCGILL: Thank you.

MR. HARSCH: Can I -- since I'm sworn in --

HEARING OFFICER MCGILL: Yes.

MR. HARSCH: There appears to be -- I think Dr. Garvey hit on this. There appears to be some mathematical evidence that some of these mean-minima averages may in fact become more problems than just the single minimum, so that approach -- and it's in both -- to some extent in both proposals, IEPA's, DNR's and ours -- it may -- in some instances it may actually find some problems where we haven't seen them before just because it's another approach to analyze the data. I think Dr. Garvey hit upon that briefly yesterday, and we seem to be seeing some of that, so if it uncovers a problem, it uncovers a -- if the Board enacts either version, we will be looking at dissolved oxygen levels differently in Illinois and determining where there are or where there are not violations, and as Dennis points out, it was IAWA's goal that we develop a dissolved oxygen water quality standard, have it adopted by the Board, that really reflects the necessary -- something that's attainable in Illinois and something that's necessary to protect aquatic life.

HEARING OFFICER MCGILL: So the -- it's the IAWA's position that its proposal would be more

representative -- would lead to more representative data of actual conditions in the streams?

MR. STREICHER: Correct. That would be a good way of putting it. It's much more representative. As Dr. Garvey said yesterday, DO is not a toxin. It's something that is dynamic in the environment. That is -- You know, we -- the averaging aspect of this is something that's important, something that we -- are in both regulations.

HEARING OFFICER MCGILL: Thank you.

MR. ETTINGER: I guess just clarifying, and just looking at numbers -- I'm not talking about biology now -- the IAWA proposal is less stringent in every respect. There's no respect in which somebody could have violated the IAWA proposal and not violate the existing standard; is that correct?

MR. STREICHER: Well, I think the existing standard being a one-time, one-measurement standard, if you went out there and measured 4.9 at any time, that could be considered a violation. If you go out and measure a 4.9 at one time under the IAWA, it may not be a violation because it is a continuous, you know, averaging value, so --

MR. ETTINGER: I -- My question is really

quite simple-minded. I'm just asking, is the IAWA less stringent across the board than the current standard?

MR. HARSCH: No.

MR. STREICHER: I don't think so.

MR. ETTINGER: No? Okay. In what respect? That's what I wanted to clear now. In what circumstance could you have a violation of the proposed IAWA standard and not have a violation of the current standard?

MR. HARSCH: It's -- Albert, I think the issue really is when you are -- from a purely mathematical sense that may be correct.

MR. ETTINGER: That's all I'm asking. I'm not -- I'm just trying to see what we're proposing here. Now, as I understand the Agency proposal, the only place in which it is more stringent than the current standard is as to the 6.25 as to these enhanced waters; is that correct?

MR. STREICHER: And the months.

MR. ETTINGER: I'm sorry. No, I'm comparing it to the current standard.

MR. STREICHER: Oh, I'm sorry. Yes.

MR. ETTINGER: The current standard doesn't differentiate as to months, does it?

MR. STREICHER: I'm sorry. I misunderstood

you.

MR. ETTINGER: So the only way in which the Agency proposal is more stringent than the current standard has to do with the 6.25 seven-day mean as to certain months in enhanced waters.

MR. STREICHER: Correct.

MR. ETTINGER: Thank you.

HEARING OFFICER MCGILL: Could the Agency answer that question as well? I -- Mr. Ettinger's question?

MR. FREVERT: Yeah, I think there's certainly -- we are proposing adding seven-day averages and thirty-day averages that don't exist at the present time, and I would think theoretically you might have a real flat DO profile where you were 5.1 all the time, so you didn't violate the absolute minimum of 5 but you violated the seven-day or thirty-day value. Kind of theoretical, but it's a possibility.

MR. ETTINGER: Can I just read the current standard? I think it says that dissolved oxygen shall not be less than 6.0 milligrams per liter during at least 16 hours of any 24-hour period, nor less than 5 milligrams per liter at any time. So doesn't that take into account the averaging concept, or am I confused? I

just -- I want to make clear too we're just talking math now. We're not talking biology.

MR. FREVERT: When you look at that 16-hour requirement every day, maybe I've misspoken, and physically it may not be possible for the math to work out so you met that 6.0 but you still stayed below 6.25 as the average.

MR. ETTINGER: Okay.

HEARING OFFICER MCGILL: So is that that the 6.25 could be more stringent than the current standard?

MR. FREVERT: Again, I don't know how probable it is, but I think it's theoretically possible.

MR. ETTINGER: It's theoretically possible that you would have a seven-day mean that was below 6.25 but was above 6.

MR. FREVERT: Right.

MR. ETTINGER: So --

HEARING OFFICER MCGILL: That was a question, and Mr. Frevert affirmed that, agreed with that.

MR. FREVERT: That's correct.

HEARING OFFICER MCGILL: I just wanted to make sure the transcript's clear. Okay. Thank you.

MR. ETTINGER: Yes. I'm sorry.

MR. HARSCH: If I could respond briefly, it isn't just a mathematical number, though. What we are looking at, and I think it's -- has been recognized throughout the hearings, is that we do need to look at continuous data. We need to look at something other than grab samples taken when the IEPA and DNR investigators are out in a stream and they happen to be there at ten o'clock in the morning or two o'clock in the afternoon, so we are looking at a different approach to monitoring for DO and determining whether there are exceedances in the stream, and that's why the use of continuous data recorders are -- so many continuous data recorders have been pushed and talked about at some length in this proceeding. So it really is a different approach. It isn't simply just math.

MR. ETTINGER: Well, I don't want to get in a debate, except to ask you, we've talked about these various implementation methods over the thing, but that's not part of your proposal, is it? If the Board adopts your proposal, they're just adopting these numbers, aren't they?

MR. HARSCH: The Agency has testified at length that it will be developing -- in response to your questions at earlier hearings, it will be developing

implementation procedures.

MR. ETTINGER: Okay. I'm just --

MS. WILLIAMS: I object. I don't think that's an accurate characterization of our testimony at all, Roy.

MR. HARSCH: That was covered in the second hearing. Toby went on for a long time about that.

HEARING OFFICER MCGILL: Go ahead, Mr. Frevert.

MR. FREVERT: Perhaps I can clarify this. Irrespective of what happens in this proposal, the science and the abilities to do field monitoring for dissolved oxygen are improved and given us abilities that we didn't have in the past, and we indeed are moving that way toward more automated and more continuous data collection irrelevant or irrespective of what this proceeding produces as a standard.

HEARING OFFICER MCGILL: Let me just -- actually, it's an opportune moment there to ask this question, and the District's going to be testifying about it later, but in the prefiled testimony of Louis Kollias with the Water Reclamation District, he pointedly asks that the final rule address a number of sampling and methodology questions that he has. Has the Agency had --

Agency and DNR had a chance to review that and do you have any response to his request that those concerns --

MS. WILLIAMS: Can we try and do it a different -- I'm sorry to interrupt. Go ahead. I just want to ask if maybe we could try and do it a little differently. Maybe our discussion of MWRD's testimony might elicit some of that. We'd be happy then afterwards to continue the panel concept rather than just blindly trying to -- is that a reasonable request?

HEARING OFFICER MCGILL: Yeah. The subject was just raised, so it didn't seem too blind, so if that's your preference, I think we can do that. Just a reminder, then, that the Agency and IAWA witnesses stick around, please.

Any other questions for the IAWA's witness? Okay. Why don't we go off the record for a moment.

(Brief recess taken.)

HEARING OFFICER MCGILL: Why don't we go back on the record. Before we begin the District's testimony, we have one last question. Ms. Williams, one of the questions you posed earlier, you refer to a meaningful amount of DO sensitive species, and in designating the enhanced stream segments, that actually -- we were wondering, is there information in

the record as to how those enhanced stream segments were selected other than the reference to the presence of DO sensitive species? This is a question --

MS. WILLIAMS: Would DNR like to respond to this?

MR. YONKAUSKI: Sure.

HEARING OFFICER MCGILL: Presence in what sense? What criteria?

MR. CROSS: Yeah, we make reference to how those thresholds do establish a meaningful number of DO sensitive species at any given site in our TSD, and that discussion in the TSD is specifically beginning I believe on page 34 and 35 and 36, and on page 36 of that TSD, which I believe is Exhibit 23, there's a Table 5 that identifies specifically those threshold values for each biological measure used to determine a meaningful amount of sensitive organisms. So it's Table 5 on page 36 of Exhibit 23.

HEARING OFFICER MCGILL: Thank you very much. Okay. We're ready to address now the testimony of the Metropolitan Water Reclamation District of Greater Chicago. I'd ask the court reporter to swear in the District's witnesses collectively.

(Witnesses sworn.)

HEARING OFFICER MCGILL: First item, on October 5, 2006, the District filed a motion for leave to file prefiled testimony of Richard Lanyon along with his prefiled testimony. Is there any objection to that motion for leave?

MS. WILLIAMS: No.

HEARING OFFICER MCGILL: Seeing none, I grant that motion. Ms. Conway, for the District, if you'd like to take over at this point.

MS. CONWAY: Yeah. I'm Margaret Conway for the Metropolitan Water Reclamation District. I'm a senior assistant attorney, and we are here today to present the prefiled testimony of our general superintendent, Richard Lanyon, as well as our director of research and development, Louis Kollias. We would ask that the prefiled testimony be marked as exhibits to this proceeding.

HEARING OFFICER MCGILL: The prefiled testimony of Richard Lanyon, that would become Exhibit 40. Is there any objection to that motion? Seeing none, the motion's granted. As to the prefiled testimony of Louis Kollias, is there any objection to entering that as Hearing Exhibit 41? Seeing none, that motion's granted as well.

MS. CONWAY: And I will then turn the microphone over to Richard Lanyon.

MR. LANYON: Thank you. My voice is a little weak, so I'll -- bear with me. I appreciate the opportunity to present this testimony for the Illinois Pollution Control Board. My name is Richard Lanyon. In June of 2006 I was appointed general superintendent of the Metropolitan Water Reclamation District of Greater Chicago. I am submitting the following testimony on behalf of the District in support of the subject proposed amendments to the dissolved oxygen standards for general use waters in Illinois. Prior to June 2006 I was the director of research and development for the District for seven years and previously testified in this proceeding in that capacity. I have been employed by the District since 1963.

As general superintendent, I am responsible for the day-to-day operations of the District, a special purpose unit of local government with 2100 employees and an annual budget of one billion dollars. The District is responsible for wastewater treatment for an 860-square-mile area in Cook County serving a population of five million and a commercial and industrial wastewater load of an equivalent population of five

million. The District also operates the 78-mile-long Chicago waterway system to provide an outlet for treated effluent and to properly drain the metropolitan area of excess stormwater. We are also responsible for stormwater management planning, regulation and maintenance for all of Cook County.

I received both bachelor's and master's of civil engineering degrees from the University of Illinois at Urbana-Champaign. I have received the American Society of Civil Engineers National Government Civil Engineer of the Year Award in 1999 and Distinguished Alumnus of the Department of Civil and Environmental Engineering at UIUC in 2003. I'm also a past president of the Illinois section of the American Society of Civil Engineers and have been involved in a variety of technical activities for ASCE, for the Water Environment Federation, the Illinois Association of Wastewater Agencies, the U.S. Geological Survey and the National Association of Clean Water Agencies.

Mr. Louis Kollias, the District's director of research and development, will also provide testimony in this proceeding focusing on the water quality impact of the proposed rule. My testimony will focus on the impact in the context of the District's budget and capital

improvement program and involvement in the use attainability analysis studies of the Chicago area waterways and the lower Des Plaines River.

The District previously submitted comments in support of the proposed amendments to Illinois -- 35 Illinois Administrative Code 302.206. This testimony is being submitted to address certain other comments and testimony that has been filed and in support of the District's prior comments.

As mentioned in my earlier testimony, the District is a principal participant in the UAA studies being conducted by the Illinois Environmental Protection Agency for the Chicago area waterways and the lower Des Plaines River. These studies include approximately 90 miles of waterways designated as secondary contact and general use. Those designated as general use include 4 miles of the North Shore Channel and 1.6 miles of the Chicago River. The remainder of the Chicago area waterways and lower Des Plaines River is designated as secondary contact. The UAA studies have demonstrated that based on water quality monitoring data from many sources, the Chicago area waterways and the lower Des Plaines River are meeting most general use water quality standards at most locations for most of the time except

for bacteria and dissolved oxygen. There is no bacterial standard for the secondary contact use designation, and effluents discharge into these waters are not required to be disinfected. In addition, all segments of the Chicago area waterways and the lower Des Plaines River, including the general use reaches, are impacted by occasional combined sewer and stormwater overflows containing bacterial contamination and oxygen-demanding substances.

Certain reaches of the Chicago area waterways have deficient dissolved oxygen concentrations during periods of warm weather and low flows. As part of the Chicago area waterways UAA study, the District and -- at the request of the IEPA has performed technical investigations of feasible technology to address the dissolved oxygen deficiencies. Various feasible technologies could cost from 200 to 360 million on a present worth basis to correct the dissolved oxygen deficiencies during warm weather. Completion of the District's tunnel and reservoir plan, expected by the year 2019, will address the temporary deficiencies in dissolved oxygen concentrations caused by wet weather by capturing, storing and treating most combined sewer overflows. However, tunnel and reservoir plan completion alone will not address dry weather, low flow conditions.

More thorough study of the complicated waterways system and the technologies and cost to achieve compliance with DO standards is needed. The District has recently begun further studies, employing the resources of the Department of Civil and Environmental Engineering at -- and the National Center for Supercomputer Applications at the University of Illinois in Urbana-Champaign and the U.S. Geological Survey's Illinois Water Science Center, also in Urbana. This work will involve a complete bathymetric survey, additional flow measurement stations and development of a three-dimension hydraulic model using the U.S. Environmental Protection Agency's environmental fluid dynamics code. This research effort will be funded by the District at a cost of approximately $900,000.

Approximately 70 percent of the annual flow leaving the Chicago area waterways at Lockport consists of treated water reclamation plant effluent. Effluent typically has high DO concentrations in the range of 5 to 7 milligrams during dry weather. I'm sorry. 5 to 7 milligrams per liter during dry weather. Effluent also contains biological oxygen demand and suspended solids at concentrations less than 5 milligrams per liter. Therefore, the oxygen-demanding substances in the

effluent easily consume the available oxygen in the effluent, making it difficult for effluent alone to provide sufficient oxygen to maintain compliance with the dissolved oxygen water quality standard.

It is for this reason that the District finds it necessary to provide supplemental aeration in waterways downstream of effluent outfalls to meet the applicable standard. Supplemental aeration is necessary because the slow-moving water is incapable of sufficient natural reaeration to maintain compliance with the standard. However, supplemental aeration is not currently available throughout the Chicago area waterways and the lower Des Plaines River. It is probable that additional supplemental aeration will have to be provided when a new dissolved oxygen standard is adopted.

The UAA study for the lower Des Plaines River has been completed and the current recommendation is for the lower Des Plaines River in the Brandon Road Pool to meet a minimum dissolved oxygen concentration of 4 milligrams per liter and the general use standard for the Dresden Island Pool. The UAA study for the Chicago area waterways is not complete, but the draft report recommends that certain aquatic life use designations be adopted and that for these uses, the general use water

quality standards be adopted with some minor modifications. The two proposed aquatic life use designations do not contemplate fish reproduction due to the limited habitat in these waterways. Therefore, when the proposed rulemaking for the Chicago area waterways comes before the Illinois Pollution Control Board, it will have to include some other water quality standard than is being proposed by either the IAWA or the Illinois EPA and Illinois Department of Natural Resources for general use waters. I would like to emphasize that a considerable amount of detailed data and study was necessary to establish these two proposed aquatic life use designations. This is not a simple task.

As will be shown in the testimony of Mr. Kollias, most of the monitoring locations in the Chicago area waterways will not be able to meet the general use standard for dissolved oxygen as proposed by the IEPA and IDNR. Only one location can meet the proposed IEPA/IDNR standard, and this is in the Chicago River at Clark Street. Ironically, this is one location in the most limited aquatic use designation recommended in the draft UAA study report. This segment of the Chicago River has high water quality because it contains water brought in from Lake Michigan. However, it is a straight channel,

250 to 300 feet wide, 20 to 25 -- 20 to 26 feet deep with vertical walls of concrete or steel, a sandy substrate channel bottom, numerous thermal discharges from the cooling systems of high-rise buildings and a high volume of boat traffic during warm weather months. It is devoid of any suitable habitat for the reproduction of fish.

With respect to the eventual need for additional capacity for supplemental aeration to meet the DO standards that result from the UAA studies, the District will have to add these facilities to its capital improvement program. Currently, our capital resources are committed for infrastructure replacement and rehabilitation through the year 2016 at the rate of approximately 150 million dollars per year. Our ability to raise funds for capital improvement through bonding and to retire the debt through ad valorem taxes is governed by state statute. The Pollution Control Board will have to take this into consideration when adopting standards requiring the District to expend capital funds for infrastructure to comply with the standard.

In conclusion, I would just like to state that the District supports the IAWA proposal for the change in the dissolved oxygen standard, and we also caution the Board that a separate approach to establishing tiered use

designations be pursued and supported by good science. Thank you very much.

HEARING OFFICER MCGILL: Mr. Kollias, you may proceed.

MR. KOLLIAS: I appreciate this opportunity to present this testimony before the Illinois Pollution Control Board. My name is Louis Kollias. I am the director of research and development, R&D, for the Metropolitan Water Reclamation District of Greater Chicago, "District." I am submitting the following testimony on behalf of the District in support of the subject proposed amendments to the dissolved oxygen standards for general use waters in Illinois. I prefiled the testimony on October 2, 2006.

I have been the director of R&D since June of 2006. Prior to that I had been assistant chief engineer in the District's R&D Department since January of 2003. As director of R&D, I supervise the District's R&D Department, which has a staff of 317. I have been employed by the District since 1977.

I hold a bachelor of science degree in civil engineering from the Illinois Institute of Technology. I am a licensed professional engineer in the state of Illinois and a board certified environmental engineer in

the American Academy of Environmental Engineers. I am also currently the president of the Illinois Water Environment Association.

My responsibilities as the District's director of R&D include but are not limited to the following: Control of commercial and industrial waste discharges to the District's sewers and the waterways via the sewage and waste control ordinance; recovery of certain district operating, maintenance and replacement costs via administration of the user charge ordinance; providing analytical laboratory support for the control of commercial and industrial waste and for control of treatment and other operations; monitoring the water quality of Lake Michigan, Chicago area waterways and the Illinois Waterway; and conducting basic and applied research on new wastewater and sludge treatment processes.

The District previously submitted comments in support of the proposed amendments to 35 Illinois Administrative Code 302.206. This testimony is being submitted to address certain other testimony that has been filed and to provide information concerning continuous dissolved oxygen -- DO -- monitoring and how such monitoring results in Chicago area waterways would

have complied with the proposed standards.

The District appreciates the opportunity to express its views on the pending rulemaking for a DO water quality standard. We will address three areas: One, comment on the testimony of Thomas J. Murphy; two, complexity and cost of conducting the District's continuous DO monitoring program; three, compliance with proposed DO standards in Chicago area waterways. I request that my detailed comments on these three areas be placed in the record of these proceedings and that I be allowed to summarize these comments now at this hearing.

HEARING OFFICER MCGILL: That's fine. Go ahead.

MR. KOLLIAS: My summary follows. "Comment on the Testimony of Thomas J. Murphy." The testimony of Dr. Thomas J. Murphy is very critical of the USEPA 1986 national criteria document, which is a foundation and guideline from which data and research have been used to substantiate the proposed amendment. A DO standard based on DO concentration in milligrams per liter is practical, easily understandable and scientifically defensible. The vast majority of monitoring data and data in the scientific literature relating to dissolved oxygen effects on fish communities are based on DO concentration

in milligrams per liter. DO concentration must be utilized in the standard because it is possible to control DO concentration through management practices by supplemental aeration and other mechanical means. It is much more difficult to control oxygen tension, and oxygen saturation can be extremely variable. Dr. Murphy does not make a convincing case for the use of dissolved oxygen saturation rather than dissolved oxygen concentration as the state standard.

"Comments on Dissolved Oxygen Monitoring Technical and Cost Issues." In order to obtain quality DO data, a DO monitoring station must be located at a point that is representative of the waterway DO throughout the station's cross-section. Many physical features such as mixing zones for wastewater treatment plant outfalls, tributary confluences, CSO outfalls, in-stream structures that disrupt flow, oxygen-consuming sediment deposits, variability of phytoplankton oxygen production and thermal discharges can influence DO uniformity at a waterway monitoring station.

The District currently maintains 32 monitoring stations in Chicago area waterways in its continuous DO monitoring program. A total of 78 monitors are available for use at these 32 stations. This includes two monitors

per station for weekly retrieval and deployment and the remainder available to substitute for monitors being serviced or repaired and for those that fail the QA/QC procedures prior to deployment. Each monitor equipped with a DO-specific conductivity and water temperature probe costs approximately $4200. Total cost for the 78 monitors purchased for the monitoring program was $327,600. Total cost to install DO monitoring equipment at 32 DO monitoring stations which monitor approximately 225 river miles in District's waterways was $139,638. Total annual program cost at these 32 stations during 2005 was $679,805.

"Comments on Compliance of Chicago Air Waterways with Proposed DO Standards." Summaries of continuous dissolved oxygen measurements at 12 shallow-draft reaches of Chicago area general use waters are presented in Exhibits 1A and 1B. During the period August 2005 through February 2006, eight of the twelve shallow-water stations were in 100 percent compliance with the proposed DO standards. During the period March 2006 through July 2006, two of the twelve shallow-water stations were in 100 percent compliance with the proposed DO standards. Summaries of the dissolved oxygen measurements at 20 deep-draft reaches of Chicago area waterways are

presented in Exhibits 2A and 2B. During the period August 2005 through February 2006, five of the twenty deep-water stations were in 100 percent compliance with the proposed DO standards. During the period March 2006 through July 2006, one of the twenty deep-water stations were in 100 percent compliance with the proposed DO standards.

"Comments on Calculation of the Seven-day Average Daily Minimum or Daily Mean." It was unclear as to what method to use to calculate both the seven-day daily minima during the August through February period and the seven-day daily mean for the March through July period. Results were calculated for one month during each period using a running average method and a weekly calendar day method. For purposes of comparison of the two methods, these results are shown in Exhibits 3A and 3B for the shallow-draft stations during September 2005 and in Exhibits 4A and 4B for the deep-draft stations during July 2006.

Both the running average method and the calendar week method gave very similar results for calculating a seven-day daily minimum or seven-day daily mean DO value. However, for consistency, one or the other method should be recommended if the standards are accepted by the

Illinois Pollution Control Board. The same clarification should be made to determine the 30-day average of daily means for the August through February period.

The District supports the promulgation of a scientifically sound standard with clearly outlined requirements for compliance verification. However, before adopting any proposal, there must be a reasonable chance that compliance will occur. It is suggested that the Board give consideration to the following for urban streams: A waiver provision should be allowed for urban-impacted and CSO-impacted streams for time for further study of the affordability and feasibility of technology that must be installed for these streams to come into compliance. A separate wet weather standard applicable to the time following stormwater runoff needs to be investigated that would allow reduced DO levels for a limited period.

In closing, several areas have been identified where the IDNR/IEPA proposal requires clarification and scientific justification. The District supports a promulgation of a scientifically sound standard with clearly outlined requirements for compliance verification. The standard must acknowledge and address the unique nature of urban waterways and provide

flexibility to accommodate the anthropogenic factors that impact DO and aquatic ecology in these systems. Thank you for this opportunity.

HEARING OFFICER MCGILL: Thank you. We'll open it up for questions for the District's witnesses. Does anyone have any questions for these witnesses?

MR. ETTINGER: Oh, sure.

MS. WILLIAMS: You can go first.

HEARING OFFICER MCGILL: Mr. Ettinger. If you would please use the microphone.

MR. ETTINGER: Oh, yeah, yeah, microphone. The -- I have some questions first about Mr. Lanyon's testimony. On the third page of your three -- third page of your prefiled testimony, we have a paragraph here that starts, "Approximately 70 percent," then the next sentence says, "Effluent typically has high DO concentrations in the range of 5 to 7 milligrams per liter during dry weather." You don't mean to imply that those are high DO concentrations, or is that the high for the day, or what do you mean in that sentence?

MR. LANYON: Well, these are just the typical ranges of dissolved oxygen concentrations in effluent during dry weather periods.

MR. ETTINGER: Well, I'm confused by the use

of the word "high." Does that mean that that's the highest it gets, is 5 to 7, or is that -- what does the high do there?

MR. LANYON: That -- Yes, that's the highest it gets.

HEARING OFFICER MCGILL: Mr. Lanyon, if you could get a little closer to the microphone.

MR. LANYON: Oh, I'm sorry. That's the highest --

HEARING OFFICER MCGILL: We're having a hard time hearing you. Thanks.

MR. ETTINGER: Okay. And that's just because that's the nature of effluent?

MR. LANYON: Yes.

MR. ETTINGER: Okay. And then it says, "Effluent also contains biological oxygen demand and suspended solids at concentrations less than 5 milligrams per liter." That is -- That's correct?

MR. LANYON: That's what it says, yes, that's correct.

MR. ETTINGER: And is that what causes the DO to get below 5 liter?

MR. LANYON: That plus the combination of slow-moving water that cannot reaerate itself.

MR. ETTINGER: So you're testifying, then, that at least under some circumstances, discharges of BOD at a level of 5 milligrams per liter can cause dissolved oxygen concentration violations.

MR. LANYON: Well, I said -- I used the word "deficiencies." I don't know that it's a violation or not because I haven't presented any testimony as to the actual numbers we find downstream.

MR. ETTINGER: Okay. I correct -- stand corrected. But you are saying that discharges of BOD at 5 milligrams per liter or less can cause dissolved oxygen concentrations to fall below 5.

MR. LANYON: That's the nature of the science, yes.

MR. ETTINGER: Then the next sentences say, "Therefore, the oxygen-demanding substances in the effluent easily consume the available oxygen in the effluent." What do you mean by easily? How far --

MR. LANYON: Well, there's a demand for the oxygen, and the chemical reaction uses up the oxygen.

MR. ETTINGER: Much of it?

MR. LANYON: Well, if not all of it, a portion of it.

MR. ETTINGER: Okay. You speak about

dissolved oxygen levels at various places in this report. Is the District aware of any continuous monitoring at the I-55 bridge below Joliet?

MR. LANYON: Are we aware of it?

MR. ETTINGER: Yes.

MR. LANYON: I believe that somebody's monitoring there, yes.

MR. ETTINGER: Are you aware of any effect of -- on dissolved oxygen levels of the operation of the Midwest Generation plants at Will County or Joliet?

MR. LANYON: I am not aware of -- I have not made any studies of these operations.

MR. ETTINGER: Thank you. On the top of page 4 there's a sentence here saying, "It is probable that additional supplemental aeration will have to be provided when a new DO standard is adopted."

MR. LANYON: Yes.

MR. ETTINGER: What are you referring to there?

MR. LANYON: Well, as you're well aware, part of the UAA study is to come up with new standards for the Chicago area waterways, and we know those standards will have to meet them, and if it's necessary to build supplemental -- additional supplemental aeration

stations to do so, we will.

MR. ETTINGER: Okay. Just to be clear, though, for this purpose, or for purposes of this proceeding, when you say new DO standard, you're not talking about this DO standard proceeding. You're talking about another DO proceeding that you're anticipating as coming out of the UAA studies.

MR. LANYON: That is correct.

MR. ETTINGER: Now, you mention here a draft of a proposed DO concentration of 4.0 milligrams per liter and the general use standard in the Dresden Island Pool. Where are those numbers coming from?

MR. LANYON: That comes from the report prepared by the IEPA's consultant for the UAA study for the lower Des Plaines River.

MR. ETTINGER: Again, we're talking about proposed DO studies that are coming out of the use attainability analysis.

MR. LANYON: That is correct.

MR. ETTINGER: Will the numbers coming out of the use attainability analysis be driven by the number that comes out of this proceeding?

MR. LANYON: Possibly. That remains to be seen.

MR. ETTINGER: But at least it's entirely possible that the use attainability analysis numbers will be different than the numbers coming out of this proceeding.

MR. LANYON: That could be. That could happen.

MR. ETTINGER: In fact, in the last sentence of this, you say, "Therefore, when the proposed rulemaking for the CAWs comes before the Illinois Pollution Control Board, it will have to include some other water quality standard than is being proposed by either the IAWA or the IEPA/Illinois Department of Natural Resources for general use waters."

MR. LANYON: Is that a question?

MR. ETTINGER: Yes, that is a question. So in fact, you don't want the standard that comes out of this proceeding to be applied to those waters.

MR. LANYON: It may be difficult to meet that standard if that's applied. However, it's my understanding as part of the UAA study that there will be a different set of standards proposed.

MR. ETTINGER: So is this proceeding relevant to the numbers that the Water Reclamation District is going to have to meet as a result of the UAA

study?

MR. LANYON: I'm sorry. Are you asking if this proceeding is relevant to that?

MR. ETTINGER: This proceeding we're in here today is not going to be setting your numbers, is it?

MR. LANYON: Well, I think it is, because it is sort of an example of what we'll be going through for these other -- in future proceedings to set standards for the Chicago area waterways.

MR. ETTINGER: Okay. So it's relevant as some sort of model, but you're not -- you do not believe that these numbers should be applied to your system and you don't expect them to be.

MR. LANYON: Well, at the present time, none of the waterways in the Chicago area are on the enhanced list, so the proposal by the IEPA and the DNR would not be operative in our area.

MR. ETTINGER: I think it's safe to say that the Chicago River is not going to go on the enhanced list.

HEARING OFFICER MCGILL: If I could just clarify that, there are some general use waterways within the District's water system?

MR. LANYON: That is correct. Most of the

waterways are general use, talking about all of the tributary steams to the deep-draft waterways, Des Plaines River, Salt Creek, etc. These are all general use waters.

HEARING OFFICER MCGILL: And is it your understanding, then, that they would become subject to any new DO general use standard that were to come out of this proceeding?

MR. LANYON: Those waterways would, yes.

MR. ETTINGER: The waterways that are being affected by the UAA you believe will be subject to dissolved oxygen standards that come out of the UAAs, not out of this proceeding.

MR. LANYON: That's correct.

MR. RAO: I think Mr. McGill was referring to the Chicago area waterways where in your testimony on page 2 you noted that there's a stretch of 4 miles of the North Shore Channel and 1.6 miles of the Chicago River which are general use and not secondary contact. Am I right on those --

MR. LANYON: That's correct.

MR. RAO: And will those be subject to the proposed DO standards or will they be subject to the standard that comes out of the UAA?

MR. LANYON: Well, without some proceeding with respect to the UAA, if nothing else changes, they may be subject to the standard that comes out of this proceeding.

MR. RAO: Thank you for the clarification.

MR. ETTINGER: A portion of the Dresden Island Pool is now general use water; is that correct?

MR. LANYON: That's correct.

HEARING OFFICER MCGILL: Mr. Ettinger, did you have any further questions?

MR. ETTINGER: Yes. Should we now -- Should I now ask my questions of Mr. Kollias or --

HEARING OFFICER MCGILL: Yeah. They're answering questions as a --

MR. ETTINGER: As a team? Okay. Mr. Kollias, in a sentence in your prefiled testimony, you state, "Using DO saturation by itself could result in situations of 100 percent DO saturation at high temperatures with concentrations that are still harmful to fish and invertebrates." Under what circumstance could you have a 100 percent DO saturation that was harmful to fish?

MR. KOLLIAS: That was provided by our staff biologist, and that is where I got that statement.

MR. ETTINGER: Do you know how hot the water has to be for a 100 percent DO saturation to be a low dissolved oxygen concentration?

MR. KOLLIAS: What temperature, you said?

MR. ETTINGER: Yeah. What temperature would the water have to be for 100 percent saturation level to be below 5.0 milligrams per liter?

MR. KOLLIAS: I don't know that offhand.

MR. ETTINGER: In the next sentence you say, "DO concentration must be utilized in the standard because it is possible to control DO concentration through management practices by supplemental aeration and other mechanical means." If we wrote the future DO standard taking into account saturation levels by simply requiring a higher milligram per liter during certain months, say, retaining the current standard for January or other cold weather months, would that affect your ability to utilize management practices to meet the standard?

MR. KOLLIAS: As long as we have a milligram per liter standard to go by.

MR. ETTINGER: You'd be okay.

MR. KOLLIAS: (Nods head up and down.)

MS. CONWAY: You have to say yes.

MR. KOLLIAS: Yes. I'm sorry.

HEARING OFFICER MCGILL: You have to make sure you answer orally.

MR. ETTINGER: On page 8 of the prefiled testimony, there's, "The following comments should also be considered by the Pollution Control Board prior to promulgation of the final rule." Say, "The draft rule as it is currently written does not specify a minimum frequency of monitoring requirement for either the sensitive period or the non-sensitive period. The final rule should address this." What do you mean, first of all, by the draft rule?

MR. KOLLIAS: The draft rule as it's proposed.

MR. ETTINGER: By the IAWA or by the Agency?

MR. KOLLIAS: By the Agency.

MR. ETTINGER: Is it your understanding that the IAWA rule has a provision for continuous monitoring or specifying frequency of monitoring?

MR. KOLLIAS: No.

MR. ETTINGER: Is it your position that this board -- well, I guess the language states for itself. The final rule should contain provisions specifying minimum frequency of monitoring?

MR. KOLLIAS: Yes.

MR. ETTINGER: So you don't agree with either of the proposals as they're currently written.

MR. KOLLIAS: We need monitoring to determine compliance with the standard.

MR. ETTINGER: "The draft rule as currently written does not specify or offer guidance as to how many sample points must be maintained to ensure compliance; the final rule should address that." It's your position, then, that all of the current petitions in front of us need work in order to specify things that they don't now contain.

MR. KOLLIAS: Yes.

MR. ETTINGER: That's all my questions.

HEARING OFFICER MCGILL: Any further questions for the District's witnesses?

MS. WILLIAMS: I have just a couple, and I think Albert might have hit on this issue. At the end of your testimony, Mr. Lanyon, you stated, you know, you are here in support of IAWA's proposal, so if the word "proposal" is used in the testimony, in the absence of a modifier to whose proposal it should be, do we assume that you're referring to IAWA's proposal or the Agency's proposal?

MR. LANYON: I'm referring to the IAWA proposal.

MS. WILLIAMS: Okay. Thank you. On page 2 of your testimony, Mr. Lanyon, you make a statement that, towards the bottom, "The CAWs and" -- "The Chicago waterways and the lower Des Plaines River are meeting most general use water quality standards at most locations for most of the time except for bacteria and dissolved oxygen." You're not trying to testify here today that the lower Des Plaines River and the CAWs are meeting all the temperature standards most of the time?

MR. LANYON: Could you repeat that one?

MS. WILLIAMS: With regard to the general use standards that are being met in those waterways, you're not trying to testify today that temperature is part of the most standards that are met most of the time, are you?

MR. LANYON: I don't believe we reviewed the temperature data.

MS. WILLIAMS: That's fine. So you're not trying to testify one way or another about that.

MR. LANYON: No.

MS. WILLIAMS: So there might be some other parameters that -- besides bacteria and DO that might be

an issue in that waterway?

MR. LANYON: Well, in the UAA studies we were looking at metals and oxygen-demanding substances.

MS. WILLIAMS: And you understand -- I mean, I'm not trying to get into too much detail because I don't think it's relevant, but I'm concerned about getting testimony on the record about things that I believe were problems in part of that setting. For example, metals, I think there was some issues with copper, and you're not trying to thoroughly assess the parameters that are in compliance in that waterway by that statement, are you?

MR. LANYON: Well, no, but I think my statement about most of the time in most locations for most parameters was enough wiggle room.

MS. WILLIAMS: I will give you that. Mr. Kollias, when you suggested that the proposals should -- at least for the EPA/DNR proposal it should specify whether the averaging is to be a running average, I think, or a calendar average, would you have an objection if the Agency was recommending a running average?

MR. KOLLIAS: No.

MS. WILLIAMS: And when you calculated the

running averages, did you wrap those averages around each month or did you cut them off at the end of a month? Do you understand the question? I'm not sure I'm saying it clearly.

MR. KOLLIAS: Yes, I do, but I didn't have the raw data before me, so I can't --

MS. WILLIAMS: Okay. So you're not sure.

MR. KOLLIAS: Right.

MS. WILLIAMS: I also think that, Mr. Lanyon, when you were being questioned by Mr. Ettinger you referred to the Des Plaines River as being a general use waterway, and I just want to clarify for the record, you're not talking about the portion of the lower Des Plaines that is the subject of the UAA? That's secondary contact, correct?

MR. LANYON: That's correct, secondary contact.

MS. WILLIAMS: Thank you. That's all I wanted to clear up. That's all I have at this time.

HEARING OFFICER MCGILL: Thank you. Any further questions for the District's witnesses? Mr. Harsch, any questions?

MR. HARSCH: No.

HEARING OFFICER MCGILL: I just wanted to

clarify, the -- I believe it was Mr. Lanyon's testimony earlier there are no district waterways that would be subject to any of the enhanced tier standards proposed by the Agency. Is that correct?

MR. LANYON: That's my understanding.

HEARING OFFICER MCGILL: Mr. Kollias, the sample results that you present in your prefiled testimony, did you compare those results with either the IAWA proposal or the current board standard?

MR. KOLLIAS: No. Just what's stated in the testimony.

HEARING OFFICER MCGILL: Okay. Thank you. And, Mr. Lanyon, toward the end of your prefiled testimony you talk about capital resource commitments of the District and the ability to raise funds and state that the Board will have to take this in consideration when adopting standards requiring the District to expend capital funds for infrastructure to comply with the standard. Are you referring there to the future rulemaking based on the UAA studies or are you referring to this rulemaking?

MR. LANYON: It would apply to either situation.

HEARING OFFICER MCGILL: Would the District

face those expenses under the current DO standard or similar expenses if the DO standard did not change?

MR. LANYON: Well, since we're involved in the UAA studies, there have been no demand by the Agency that we meet the current standards, and as I pointed out, at some times we don't meet the current standard.

HEARING OFFICER MCGILL: Do you know if those sorts of capital expenditures would be required if the IAWA proposal were adopted?

MR. LANYON: I -- Well, yes, that would accept the -- that would apply to the segments of our waterways that are presently general use, and all I'm suggesting there is that you have to give us some time to come into compliance in terms of, you know, designing and constructing facilities and doing this within what we're now allowed to do in terms of statutory authority for tax levies.

HEARING OFFICER MCGILL: When you say take it into account, is that something that you would expect to see in rule language or are you just referring to the Agency's enforcement discretion or --

MR. LANYON: It could be enforcement discretion. It could be a waiver. We would come back and ask for time to do this. I mean, you know --

HEARING OFFICER MCGILL: That's --

MR. LANYON: Or it could be built into an implementation plan as part of the rulemaking.

HEARING OFFICER MCGILL: That's actually related to a couple of points that Mr. Kollias made, and maybe I could just ask about those now. He suggested that the -- this is page 8 and 9 of his prefiled testimony. He asked the Board to consider two items; one, for urban-impacted and CSO-impacted streams, a waiver provision should be allowed for time for further study of the affordability and feasibility of technology that must be installed for these streams to come into compliance, and then also a separate wet weather standard applicable to the time following stormwater runoff that would allow reduced DO levels for a limited period needs to be investigated. Those two concepts along with the item we were just talking about from your testimony, has the District considered whether its concerns could be addressed by an adjusted standard or site-specific regulation under the Environmental Protection Act for a variance, for example?

MR. LANYON: Well, we could pursue either of those options. I'm --

HEARING OFFICER MCGILL: Okay. I just

wondered if existing regulatory relief mechanisms might be adequate as opposed to the suggestions here, which seem to call for rule language building in specific types of waivers or variances.

MR. LANYON: If there was some understanding of our ability to obtain that relief, that would not be a problem, using those existing remedies.

MR. RAO: And as a follow-up to Mr. McGill's question, these two items that you have requested that the Board give consideration, are those -- you know, are you asking those issues to be addressed only in terms of how this rule may affect the District or in general for the state-wide regulations?

MR. LANYON: Well, we're addressing our concerns in the Chicago area. There may be other concerns downstate, but I'm not addressing that.

MR. RAO: Okay.

HEARING OFFICER MCGILL: Any further questions for these witnesses? Okay. If you wouldn't mind just sticking around, we had a few questions related to your testimony that we wanted to pose to DNR and the Agency, and maybe I could just pick up with Ms. Williams' last question. Mr. Kollias at page 8 had referred to the running average method and calendar week method for

calculating seven-day daily minimum or seven-day daily mean DO value, calling for one method to be recommended, and then the same question or same -- they call for the same clarification to be made in the rule for the thirty-day average. Do you know if you had any thoughts on that, whether that might be a -- whether that should be addressed in this board rulemaking, and if so, how?

MR. SHORT: In regard to calculating the seven-day means, one, we don't necessarily think it needs to be in the rule. Our preference would be for just a seven-day running average. One of the issues with the continuous monitoring which this would deal with is that setting it by calendar week might make it difficult for some of our monitoring structure. We can get to a site on a Wednesday and put the monitor out for seven days. That wouldn't exactly fall in what people typically would think of as a calendar week, so we would prefer just a straight seven-day running average. Does that --

MR. FREVERT: I want to follow up on that. Beyond administrative ease or any practicality, I think we're trying to establish a standard that is protecting the organisms in the biological community out there, and they don't know a Saturday or a Sunday. If they're exposed to this stressful condition for seven days, it

doesn't matter whether it goes from one particular period to another. It's a continuous time frame. I think that's why the rationale is the running average is the way to look at it.

HEARING OFFICER MCGILL: I'm sorry. If you could just identify yourself for the court reporter.

MR. SHORT: Oh, I'm sorry.

HEARING OFFICER MCGILL: We missed you there. Thanks.

MR. SHORT: I apologize. I identified myself yesterday. Matt Short with the Illinois EPA.

HEARING OFFICER MCGILL: Thank you. So the Agency's sense was that the rule should not include specification of running average method but you -- that's what you'd look for or you'd prefer?

MS. WILLIAMS: That's what I heard.

MR. FREVERT: Yeah. Again, I think it's -- if that condition exists for seven days and it's below that average, our methodology and our biological conclusion is it constitutes an unacceptable level of stress, so a running average, in my mind, makes sense.

HEARING OFFICER MCGILL: Okay. And the District had also asked that the final rule address minimum frequency of monitoring and number of sampling

points. The Agency's thoughts on those issues?

MR. FREVERT: Number of sampling points, wherever the standard applies is where it applies. It can be one; it can be more than one. The point is, I believe, if the condition is exceeded or not met in a location that's designated to support that use, you can make a legal conclusion or a programatic conclusion and you don't have to duplicate it in multiple places.

In terms of number of samples, I think that varies a lot depending on the actual dynamics of the system and how much variation there is in the oxygen profile from minute to minute and hour to hour over the course of a day or a week, so I think it's impossible to even -- even if you desire to make the needs of administrative ease to specify a specific number of samples, it is going to achieve the level of statistical representatives that is necessary to draw the conclusion the seven-day period really did average this value. I don't think you can magically say that's X or Y samples. In terms of a minimum, yeah, to determine the absolute daily minimum, I think we need a minimum of one sample. To determine a period average, I think we need in excess of one sample. I can't go beyond that at this point.

HEARING OFFICER MCGILL: There was some

dispute earlier as to what you may have said about potential agency rules. Is there anything you wanted to add on that, agency rules addressing issues like implementation, sampling, methodologies, etc.?

MR. FREVERT: I -- Sure, I'd be happy to fill in. I don't anticipate any agency rules on that. We certainly establish our own field practices and field methodology, and we may identify some guidelines there for applications in certain types of circumstances, but that -- again, that's our field methods and manuals. That's not a regulation or an agency rule.

HEARING OFFICER MCGILL: Thank you. I saw that we did have one person sign up for -- who did not prefile who was interested in testifying, so at this point we'll give one last opportunity for questions to any of these witnesses present. Okay. Seeing none, why don't we go off the record for one moment, please.

(Off the record.)

HEARING OFFICER MCGILL: Okay. Why don't we go back on the record. Chairman Girard has a follow-up question which he will ask now, and then we'll move on with the final witness.

CHAIRMAN GIRARD: I just have a general implementation question. It probably can go to

Mr. Frevert, let him decide who can answer it, or maybe he can, but if -- let's just say that -- speculate if the Board does change the dissolved oxygen general water quality standard at some point in the future, just let's say January 1, 2008, it takes effect, how would that impact your implementation in terms of rewriting NPDES permits as they come up in relation to things like permit conditions, things of that sort?

MR. FREVERT: In those instances, if we have a special condition that would require stream monitoring for the specific purposes of trying to assess attainment of the standard of the stream, there would be the obvious need to go back and look at those special conditions and see if we have to modify them and change the monitoring regime or frequency or things of that nature. Beyond that, we would use the standard -- as I said, if somebody applied for it in terms of a lagoon exemption, we'd relax their BOD limits from 10 to 30 or from 20 to 30, and in that regard we would use a new standard as the end point in that predicting model, but beyond that, I don't see many specific ramifications on the way we operate our NPDES permitting program.

CHAIRMAN GIRARD: Would you need to rework any permits that are currently in place before they come

up for renewal?

MR. FREVERT: I don't believe so. As a matter of practice we don't routinely do that, but our permits do have boilerplate language in them, does have a reopener clause, so if necessary, we could do that.

CHAIRMAN GIRARD: Thank you.

HEARING OFFICER MCGILL: Thank you. Any other questions?

MR. ETTINGER: I just had a couple just to follow up on Mr. Girard's questions.

HEARING OFFICER MCGILL: Sure. If you could just use the microphone, please.

MR. ETTINGER: Oh, I'm sorry. How many Illinois permits have ambient stream monitoring as a requirement or a condition?

MR. FREVERT: A small number. I don't know.

MR. ETTINGER: 1 percent? 10 percent?

MR. FREVERT: I would guess less than 1 percent.

MR. ETTINGER: And the reason that the change in the standard is unlikely to change in any NPDES permit limits is because now IEPA uses a deoxygenating waste rule that describes 10 milligrams per liter CBOD or 20 milligrams per liter CBOD in all of its NPDES permits;

is that correct?

MR. FREVERT: Lacking the word all, I would agree with you. In the vast majority of them, that's correct.

MR. ETTINGER: Thank you.

HEARING OFFICER MCGILL: Thank you. Any further questions? Seeing none, we have another witness. I'd ask the court reporter to swear in the witness, please.

(Witness sworn.)

HEARING OFFICER MCGILL: If you could state your name, title and organization, please, and then proceed with your testimony.

MS. SKRUKRUD: Okay. My name is Cindy Skrukrud. I work as a clean water advocate for the Illinois chapter of the Sierra Club, and I have just a brief statement based on Sierra Club's participation in this proceeding to date.

We agree with the IAWA that Illinois' current DO standard is very simple. The proposal to revive the Illinois -- revise the Illinois standard has brought to light the complexity of determining the best standard for a state which encompasses the Shawnee Forest to the Rock River basin. Like everyone here, of course we wish we

had more data available to us, but we have been pleased with how the Illinois EPA and Illinois Department of Natural Resources have engaged their scientists in the development of their proposed standard. This includes involving the many field biologists who are the ones who know Illinois waters from north to south, including large rivers and small streams. Thus, we support the Agency's proposal.

The joint agency prefiled testimony of April 3, 2006, contains a technical support document, Exhibit 23, that spells out the research and analysis that supports the State's recommendation regarding the proposed narrative standard, regarding stream segments containing aquatic life that met the threshold for higher DO standards and their research into the spawning periods of Illinois fish and DO requirements of different life stages. However, we have been convinced by Dr. Murphy's concerns that a revised standard must ensure sufficient dissolved oxygen for aquatic life during low temperatures. While it will likely not have any practical impact, we support a revision to the State's proposal to require a higher minimum DO level in the months of December to March. We believe a minimum level of 6.5 milligrams per liter would be appropriate.

Regarding the Agency's definitions of quiescent water, reservoirs, etc., we have concerns regarding their future application but believe the rules are capable of being implemented in a manner that will protect Illinois aquatic life. This proceeding has also shown the need for more research, including more continuous DO monitoring and a better understanding of the impact of nutrients and other man-made factors on dissolved oxygen levels in our rivers and streams and the impact of those DO levels -- the impact those DO levels have on aquatic life in all parts of the state. Thank you.

HEARING OFFICER MCGILL: Thank you. Any questions for the witness?

MS. WILLIAMS: I just wanted to sort of flesh out the record a little bit. Cindy, could you explain to the Board why you feel your recommendation for the cold weather number would have little practical effect?

MS. SKRUKRUD: Well, as -- I think as -- from the limited look at -- that we've done at what the DO levels are in streams during those cold months, believe that as Dr. Murphy testified yesterday, even a place like Bubbly Creek is able to meet a 6 and a half milligram per liter DO level during winter months.

HEARING OFFICER MCGILL: I just had a question on where -- you said a 6.5 milligrams per liter from December through March inclusive, and you're suggesting that as an amendment to the DNR/Agency proposal?

MS. SKRUKRUD: Yes.

HEARING OFFICER MCGILL: And would that then apply in both the tier I and tier II?

MS. SKRUKRUD: Let me just look at -- yes.

HEARING OFFICER MCGILL: And I'm sorry. That 6.5 milligrams per liter, it's still a dissolved oxygen concentration?

MR. SKRUKRUD: Yes.

HEARING OFFICER MCGILL: It's not the percent saturation?

MS. SKRUKRUD: No. I mean, basically, that proposal takes into account the need to make sure that the oxygen partial -- that we have an oxygen partial pressure gradient at all temperatures that allows for a proper gas exchange between the water and the organism, and to achieve approximately the same saturation level that we get at when you have a DO level of 3.5 milligrams per liter in August, to achieve that in water temperatures near freezing, you would have to have a DO

concentration of around 6.5 milligrams per liter.

HEARING OFFICER MCGILL: And is that 6.5 at any time?

MS. SKRUKRUD: Yes.

HEARING OFFICER MCGILL: Thank you.

MS. SKRUKRUD: Thank you.

HEARING OFFICER MCGILL: Just one more clarifying question. The 6.5 for those months, would that apply in addition to all of the other standards that are set forth in the DNR/Agency proposal?

MS. SKRUKRUD: Yes.

HEARING OFFICER MCGILL: Except presumably it would trump the --

MS. SKRUKRUD: Yeah. Except for the ones it would trump, yeah.

HEARING OFFICER MCGILL: Okay. Thank you. Any further questions for this witness? Mr. Harsch?

MR. HARSCH: Roy Harsch on behalf of IAWA. Do you have any data that supports that all the streams in the state approach the temperatures that Dr. Murphy was testifying about during those months of December through March?

MS. SKRUKRUD: That all streams get down towards freezing during winter months?

MR. HARSCH: Yes.

MS. SKRUKRUD: No, I haven't made a study of which streams do not get near freezing during winter months.

MR. HARSCH: No further questions.

HEARING OFFICER MCGILL: Any further questions for the witness? Seeing none, I'd like to thank you for testifying.

MS. SKRUKRUD: Thank you.

HEARING OFFICER MCGILL: And I would like to -- before we wrap up with a few procedural items, I'd like to applaud everyone's efforts in this rulemaking. It's very much appreciated. Just to make sure, is there anyone else who wishes to testify today? Seeing no one, why don't we go off the record for a moment.

(Off the record.)

HEARING OFFICER MCGILL: Okay. Why don't we go back on the record. We just had a conversation off the record to discuss a prefirst notice public comment filing deadline, so to ensure that your public comment is considered by the Board in any first notice decision, I'm setting a prefirst notice public comment filing deadline of December 20. That's a Wednesday. We can say mailbox rule, so you just have to get it in the mail that day, or

obviously you can electronically file, but make sure you get it postmarked by the 20th. Anyone may file written public comments in this rulemaking with the Clerk of the Board from now until at least 45 days after any first notice proposal is published in the Illinois Register. Filing with the Board, whether made in paper or electronically on Clerk's Office On-Line, or COOL, must also be served in hard copy on the Hearing Officer and on those persons on the service list. The RO4-25 service list is updated from time to time and is available on the Board's Web site. Copies of this hearing transcript should be available at the Board by -- and posted on our Web site by November 17.

Does anyone have any questions about any procedural items at this point? Feel free to contact me if anything comes up. Are there any other matters that need to be addressed at this time? Seeing none, I again would like to thank everyone for their participation yesterday and today and throughout this rulemaking proceeding, and this hearing is adjourned. Thank you.

(Hearing adjourned at 12:21 p.m. on November 3, 2006.)

STATE OF ILLINOIS)
) SS
COUNTY OF BOND)

I, KAREN WAUGH, a Notary Public and Certified Shorthand Reporter in and for the County of Bond, State of Illinois, DO HEREBY CERTIFY that I was present at Illinois Pollution Control Board, Springfield, Illinois, on November 2 and 3, 2006, and did record the aforesaid Hearing; that same was taken down in shorthand by me and afterwards transcribed, and that the above and foregoing is a true and correct transcript of said Hearing.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my Notarial Seal this 13th day of November, 2006.

_____

Notary Public--CSR

#084-003688