ORIGINAL

ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
WATER QUALITY STANDARDS AND	)	R08-09
EFFLUENT LIMITATIONS FOR THE	)	(Rulemaking-
CHICAGO AREA WATERWAY SYSTEM	)	Water
AND THE LOWER DES PLAINES	)	
RIVER: PROPOSED AMENDMENTS	)	
TO 35 Ill. Adm. Code Parts 301,	)	
302, 303 and 304	)	

REPORT OF THE PROCEEDINGS held in the above entitled cause before Hearing Officer Marie Tipsord, called by the Illinois Pollution Control Board, taken by Steven Brickey, CSR, for the State of Illinois, 100 West Randolph, Chicago, Illinois, on the 15th day of April, 2009, commencing at the hour of 9:00 a.m.

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MS. TIPSORD: Good morning everyone. Let's go on the record. My name is Marie Tipsord and I've been appointed by the Board to serve as hearing officer in this proceeding entitled Water Quality Standards and Effluent Limitations For The Chicago Area Waterway System and Lower Des Plaines River. These are proposed amendments to 35 Ill. Adm. code 301, 302, 303 and 304. This is docket number R08-9.

With me today to my immediate right is acting chairman G. Tanner Girard, the presiding Board Member. To his right is Dr. Shundar Lin. To Dr. Lin's right is Andrea Moore and to her right is Board Member, Gary Blankenship. To my far left is Board Member, Thomas Johnson. To my immediate left is Anand Rao and to his left, Alisa Liu, from the technical unit. Also today Brian Lamble, our extern for this semester -- one of our two externs this semester is with us today in the audience.

We spoke a little bit off the record about the hearing schedules for May 5th and 6th and, in particular, with moving Alan Mammoser's testimony to a public comment. At this

point in time, the plan is that Marilyn Yates will begin on the 5th and if time permits Thomas Bamonte and Margaret Frisbie will testify and then it will be James Huff and if time does not permit to get to William Van Bonn today, he will testify on May 6th.

We are continuing to hear testimony from members of the public and today the purpose is to hear the testimony from two or three witnesses. Those witnesses are Marc Gorelick -- am I pronouncing that correctly?

MR. GORELICK: Yes.

MS. TIPSORD: And Peter Orris and they will be heard from as a panel and then if time permits, William Van Bonn. The testimony will be marked as an exhibit and entered as if read. After marking the pre-filed testimony as an exhibit, we will then proceed to the questions for the testifier and we will start with the Metropolitan Water Reclamation District of Greater Chicago and then the IEPA.

Anyone may ask a follow-up question and you need not wait until your turn to ask questions. I do ask that you raise your hand,

wait for me to knowledge you. After I have acknowledged you, please state your name and who you represent before you begin your questions. Please speak one at a time. If you are speaking over each other, the court reporter will not be able to get your questions on the record. Please note that any question asked by a Board Member or staff are intended to help build a complete record for the Board's decision and not to express any preconceived notion or bias. At this time, Dr. Girard.

MR. GIRARD: Good morning. On behalf of the Board, I welcome everyone to hearing day 25 in this rulemaking. Thank you for the extensive time and effort everyone has invested in this rulemaking that will help the Board build a record for decisions. We look forward to your testimony and questions today.

MS. TIPSORD: And with that, is there anything else? Ms. Alexander, would you -- do you want to swear your witnesses in or do you have an opening statement?

MS. ALEXANDER: We don't have an opening statement. I'm going to present their

testimony for --

MS. TIPSORD: Okay. Let's swear in the witnesses then.

WHEREUPON:

DR. PETER ORRIS & DR. MARC GORELICK

called as witnesses herein, having been first duly sworn, deposeth and saith as follows:

MS. ALEXANDER: I would like to have marked as an exhibit the testimony of Dr, Gorelick and the testimony of Dr. Orris pre-filed in this proceeding and copies.

MS. TIPSORD: We just need one to mark as an exhibit. If there's no objections, I will mark the pre-filed testimony of Dr. Gorelick as Exhibit 233 and the pre-filed testimony of Dr. Orris as 234. Seeing no objection, they're marked.

And all the pre-filed includes all the attachments to their testimony. And with that, I think we're ready to proceed to questions and we'll start with the District.

MR. ANDES: Thank you. We'll start with the questions for Dr. Orris. On page one of your testimony, it states "no single epidemiologic

study, no matter how well designed and executed, no matter what the ultimate result, is sufficient basis to refuse to address water borne pathogens in the CAWS." Would you recommend that regulators make the decision without the benefit of epidemiologic studies?

MR. ORRIS: Certainly not.

MR. ANDES: So what do they need in order to make a decision?

MR. ORRIS: Well, first of all, thank you very much for inviting me today. I appreciate this opportunity and thank you for your service on this Board. These are very important issues that you are coping with and often outside of the public limelight so I appreciate that. For those of us in the academic field in environmental health, we are very happy that those of you are serving in this way and making these decisions.

Having said that, what do I think you need to take into account when you are arriving at regulatory decisions in this specific matter? Certainly, epidemiologic studies are helpful and these studies should help as one piece of evidence guiding your approach to understanding

what risks and benefits there are from your decisions. The problem with epidemiologic studies as you know, as with any science, is they try to approximate the world around us and try to educate us as to what are the risks and benefits in the world around us, but they are limited because they are based on people and they are looking at the world around us. We are not able to look epidemiologically at controlled studies in which people are placed in certain environments and one can control those environments entirely.

Having said that, even the best epidemiologic studies have -- always have problems in their ability to identify actual events and actual relationships that are really there. And that's characterized, in general, by an assessment of the power of that study. The power of the study means how likely is it when we look at a study and when this study looks at a problem and looks for a relationship how likely it is given the design of the study and the size of the study that we will actually see a relationship if it is there. Otherwise, called how large is a false negative or whatever and by convention and with

respect to this quite excellent study that Dr. Dorevitch is projecting, the standard that we set is based on our preconceived, at priority judgments that we hope that the power will be 80 percent.

In other words, if there's a real relationship, we will see it 80 percent of the time and we will miss it 20 percent of the time. By definition, this is not as stringent as we place on the reverse side and that is in the study if there's a relationship how likely is it that we are going to see it erroneously? We'll see the relationship, but, in fact, it will be due to something else. That's the sensitivity of that study and we set that standard higher on the basis that we understand that epidemiologic studies help us identify relationships and help us less in ruling out relationships that may well exist.

So, for one, epidemiologic studies in and of themselves are limited by the science of that and this study, while excellent, is limited by those same things. In addition, this study, and epidemiologic studies in general, look at rather large homogeneous populations so

that if you have subpopulations at particular risk in this study design, you will lose their risk within the overall grouping here and this study talks about adults. It talks about population in general. It does not discuss the subsections of small children, young children, who may be using these waterways in more depth or more --

MR. ANDES: Are you aware of any way in which they're excluding those people?

MR. ORRIS: No, they are included but the problem is when you put them in with the 9,000 you're looking at you lose that particular aspect when you don't look particularly at that group. And the problem with looking at that group, as you know, is you get smaller and smaller populations and, therefore, your power to see a real relationship in a smaller population is much more difficult. So that's the second aspect of this particular study that is problematic. It doesn't mean it's a bad study. It's an excellent study. We support that study. We support this further review. It may demonstrate despite those problems, things we need to look at with respect to those waterways and what ought to be done about

it, but it is only one piece of the overall puzzle.

And, unfortunately, you have quite a high threshold here. You have one of the oldest known associations between the environment and disease and that is the ingestion of pathogens from water. We have known since antiquity that the injection of pathogens from water causes disease. We have known for many years that one of the most important public health initiatives, one of the most important public health preventive measures taken in the last 100, 200 years is the disinfection of water when it comes into contact with human beings in a variety of ways.

Having said that, then we also have a standard adopted throughout the country and much of the world that says that these waterways ought to be disinfected and that recreational waterways of this sort ought to be disinfected. And, finally, we have what looked to me to be a very balanced recommendation from the IEPA on it also.

So to overturn all of that weight, if you will, you need to have considerable

evidence. You need to have evidence that this known risk is for some reason not going to be applicable in these particular waterways. And that's a high standard and one epidemiologic study no matter how well adjusted cannot meet that standard. You must put together the weight of evidence here. Thank you.

MS. TIPSORD: Excuse me, Mr. Andes. I would just like to point out for the record that Dr. Dorevitch's testimony was entered as Exhibit 100 for those of you who might want to look back and are looking at the transcript.

MR. ANDES: You're aware, Dr. Orris, that current EPA bacterial criteria are based on one epidemiological study, correct?

MR. ORRIS: I'm aware in your questioning that there is an EPA regulation based on an epidemiologic study that discusses how to titrate the issue of clean water. It doesn't discuss whether or not to use this appropriate preventive measure.

MR. ANDES: Are you saying the 1986 criteria are not based on one epidemiological study and we've provided an exhibit with the

bacteria criteria document and are you saying that that's not based on one study?

MR. ORRIS: No, I don't think that's what I said.

MR. ANDES: Okay. Are you aware that the CHEER study, the UIC study, which you have now -- and is an excellent study -- measures water quality in more ways than the study used for the EPA criteria?

MR. ORRIS: The CHEER study looks at the question of symptoms which is the most appropriate way of looking, but there are great limitations in that. It uses a number of other methodologies which are state of the art in respect to that. As to what the 1986 EPA regulation was entirely based upon, I can't say.

MR. ANDES: I was also going to ask some other questions. In terms of the fact that you always see reports of stool samples unlike the EPA criteria study. It quantifies water exposure and for this water body, correct? 9,000 participants for this water body as opposed to a national scale study?

MR. ORRIS: Yes.

MR. ANDES: Okay. You're aware -- are you aware that NRDC has signed a settlement agreement with EPA concerning the Beach Act criteria which specifically requires EPA to conduct epidemiological studies to be used in developing water quality criteria?

MR. ORRIS: Of course. Having read it, and I'm not an expert in all these aspects of water control here. It looks quite complete to me. It has epidemiologic studies. It looks at subpopulations. It does monitoring. It does a whole wrath of -- or they commit themselves to a whole wrath of investigations that are most appropriate for this problem.

MR. ANDES: And you're aware that in this record in addition to the epidemiologic study which has been discussed in Dr. Dorevitch's testimony and will be available early next year there has been risk assessment information and other information provided to the Board all which I imagine you think should be considered in considering the totality of the information?

MR. ORRIS: Certainly.

MR. ANDES: Okay. As to this

particular water body and particularly the secondary contact recreation that we're talking about here, are you aware of any studies published that discuss how much water people swallow during those types of activities?

MR. ORRIS: There's a lot of -- in what I still consider to be minimal epidemiologic information about recreational water use there is in the introduction discussions about how the water is used, how much people may be ingesting in the process. There's not quantification. Obviously, if you're wind surfing on the St. Lawrence River, one of the studies we're all aware of, to have a wind surfer quantify how much they're ingesting in that process is somewhat difficult on a whole variety of levels. Though, we do know now from that study that there is a correlation between that and indications that they are exposed to bacteria and other pathogens from that process.

MR. ANDES: And would you think that the contacts made during wind surfing may be different than the contacts made during some of the activities that take place on the CAWS which

do not include wind surfing?

MR. ORRIS: Well, you had that strange word in there "some". Obviously, some could be different. If you're saying all, if you're saying are there activities that may be frequently done in the waterways that may parallel the amount of exposure as wind surfing or as the rowing, kayaking and other studies, I would say absolutely there will be activities on these waterways that will parallel some of these other studies that should inform us or rather these other studies should be part of our consideration or part of the Board's consideration when they look at this.

MR. ANDES: In fact, the CHEER study is specifically looking at the exposures that people are undergoing on the CAWS system, correct?

MR. ORRIS: Yes, absolutely.

MR. GORELICK: If I might add. There are -- I'm aware of no studies that have looked at the amount of water that's ingested during secondary contact recreation such as boating. There are studies that have looked at how much water is swallowed during swimming, some

good data, that shows a substantial amount of water is ingested and quite a bit more by children than adults, which raises the question of children as a particularly susceptible subgroup, which I'm sure we'll get to.

But to get to your point, it is very likely that different activities will, in fact, have different levels of risk which is one of the issues with the CHEER study that all activities are being looked at together in this power calculation. There are 9,000 subjects for all activities combined. If some of those activities are riskier than others, there will be less power to determine whether or not, for example, kayaking is different from powerboating or fishing and that's another concern about that.

MR. ANDES: And that will depend -- and it will depend partly on the results of the study?

MR. GORELICK: Correct.

MR. ANDES: The larger the subgroup among those 9,000 that do those particular activities, the more confident we'll be of the results.

MR. GORELICK: Correct. And the smaller the subgroup, the less confident.

MR. ANDES: Okay.

MR. ORRIS: But you need to understand that a positive result of the study means that the power is not as relevant as it was for a negative study. A positive result means that despite the fact that it was perhaps less likely you were going to see the relationship, you saw it and it's there. And then only the false positive is of significance.

MR. ANDES: Yes. Thank you. On -- Dr. Orris, on page two of your testimony you state regarding the precautionary principal. That a community should not hesitate to install a traffic light on a street corner because an epidemiological study indicated that only one child in the neighborhood was likely to die at the corner each decade if every one obeyed the speed limit. This reality is reflected in the proposed regulations of IEPA. Let me explore that analogy. Would you recommend that if the Department of Public Works had information suggesting that a child might die at every intersection unless a

traffic light was installed we should install traffic lights at every intersection?

MR. ORRIS: Having read your questions in depth on this question of street lights is not extraordinarily relevant within the river, at the moment anyway. I would only try to head off this line of discussion from the following point of view. This was an illustrative example.

What I was trying to communicate was you have to balance the seriousness of the individual event that may occur relating to some regulatory decision that you may be making. You have to balance that with the difficulty with respect to an epidemiologic study which tends to homogenize the population and gives us a risk over a large group of people. And if the serious enough -- if the event is serious enough and the subgroup is at risk enough, a public body may well want to make a decision purely on the possibility or on a low likelihood of risk. And that's the issue with respect to a child dying because a car hits them at a street light. I'm not going to have a discussion about which streets should have

lights, which corners shouldn't. That's way beyond my expertise and I suspect not terribly relevant to this.

That was an example of the problem before a board such as yours and other regulatory board's and that's what you have to weigh. I'm here to help with an understanding of the question as to whether or not a single epidemiologic study can be used as the basis, especially a single negative epidemiologic study, can be used as the basis for a regulatory decision to overturn current approaches and policies that are well established.

MR. ANDES: Dr. Orris, is any one here suggesting or has said in writing that this should be the sole basis for the decision by the Board?

MR. ORRIS: What I take to be the question I'm asked is should the Board rely on the CHEER study as the basis for making their regulatory decision within this situation and that is what I am specifically talking about. In fact, when I read my colleague, Dr. Dorevitch's excellent testimony about his -- I want to say

again, his excellent study. And we appreciate the fact that you came to the U of I to secure such an excellent study.

MR. ANDES: As the brother of an alumnus, I appreciate that as well.

MR. ORRIS: Good. Having said that, reading his last line within his system and perhaps this was overstated unintentionally, but he does say that this is the -- that this should be the basis for consideration here. "The" is the word I take issue with.

MR. ANDES: Your --

MR. ORRIS: It should certainly be a basis.

MR. ANDES: So your quarrel is with that one word in Dr. Dorevitch's testimony?

MR. ORRIS: I'm sorry?

MR. ANDES: Your quarrel is with that one word in Dr. Dorevitch's testimony.

MR. ORRIS: Yes. The rest I thought I have some differences with, but he has high quality testimony.

MR. ANDES: Now, when you talk about balancing, it sounds like there are other factors

the Board should consider. Would one of them be if you have a particularly sensitive population that you explore opportunities to risk exposure. For example, would you tell particularly sensitive populations don't go in that water body?

MR. ORRIS: Yeah. I am appreciative of our difficulty today in having tools to protect individuals without changing the environment in this recreational use of water. What do I mean by that? I am particularly interested in the CDC's recommendation that relies heavily on education about how you handle yourself in a variety of different waters with bacterial contamination. In general, we find personal education and the effort to have personal individuals not behave in certain ways not an effective means of preventing environmental exposures. Many of the exposures in this setting are accidental. Many of the exposures in this setting may come from behaviors that are in general okay, but in one situation may be a problem.

And I think they're characterized by the signs you see on that river now that tells everybody who is going up and down

the river kayaking or whatever don't open your mouth. You know, I mean it says don't swallow the water. Be very careful. Don't fall in, et cetera. That's a real problem when you have to rely on that to protect people. It is a problem because it doesn't work and it's probably not possible for those people to do.

MR. ANDES: It's not possible for these people to do what?

MR. ORRIS: It is probably not possible --

MR. ANDES: Is it possible --

MS. TIPSORD: You have to let him finish.

MR. ANDES: Sorry.

MR. ORRIS: And I'm sorry for taking a while on this, but I think it's important that it is not possible for individuals who are recreationally using the water to prevent some of the exposures that the signs tell them to do, especially young people, especially people who are involved with quite active activities there. It reminds me to some degree -- well, nevermind. Tom Lehrer was very poplar when I was in college and

there was a song he had about how to protect yourself from pollution and it was "Don't drink the water and don't breathe the air." That doesn't work in a setting in which we can take appropriate, preventive public health measures.

MR. ANDES: Let me ask a couple questions.

MS. WILLIAMS: Can I ask a follow up real quick. Good morning. I'm Debra Williams from the Illinois EPA. Dr. Orris, I'd just like to ask a quick follow up.

MS. TIPSORD: You need to slow down. You're words are mashing together through the mic. Go ahead.

MS. WILLIAMS: Are you aware, Dr. Orris, whether this Pollution Control Board has any regulatory purview over controlling recreation, who can recreate on the waterways and what activities they can perform?

MR. ORRIS: I'm aware that there are regulated activities. In other words, no one is supposed to be swimming within these waterways and that is not a topic for this nor the recommendation from the Illinois EPA in this

situation. I'm also aware that in the observational studies that regulation appears to be valid because nobody saw anyone swimming in these prefatory studies from Dr. Dorevitch, et cetera.

MS. WILLIAMS: My last question is whether you understand one way or the other as whether the Board can prohibit, even from swimming, can the Board prohibit people from going into these waters? Is that part of their role? Do you know the -- answer, yes or no. I don't know.

MR. ORRIS: You mean going into these waters for recreational purposes?

MS. WILLIAMS: For any type.

MR. ORRIS: I don't know the limits. My assumption is that the Board advises the agency that takes the action, but that's outside of my purview, if you will.

MS. WILLIAMS: Thank you.

MR. ANDES: Dr. Orris, as opposed to breathing and drinking water recreating in the CAWS is a conscious choice, correct? People don't have to recreate there. They can either not

recreate or they can recreate in other ways or other waterbodies in the areas, correct?

MR. ORRIS: Yes.

MR. ANDES: So if we're talking about balancing risk, which is what we talked about as not so much a regulatory matter, but balancing a number of issues, there are -- in terms of these particular sensitive populations, one of the factors to consider might be that a -- particularly with a water body that has limited access points, that one of the ways to address the risk of those people is for those people whether they're pregnant, amino compromised or other sensitive populations, to not go in that water body at all?

MR. ORRIS: The advice you're saying is one of your policy options is to put one of those signs on that limit access or a policeman there or -- I'm not clear.

MR. ANDES: I think there are a variety of options.

MR. ORRIS: For these communities in and along these waterways, which I consider to be one of the advantages of living in Illinois and on

these waterways as they become cleaner and cleaner, you're saying that you would take somebody living on the north branch of the Chicago River and tell them "Well, you can go kayaking in the Fox or maybe even in the Mississippi. They should drive out there. I'm not clear as to what you're asking me.

MR. ANDES: You're aware that there's a lake, too?

MR. ORRIS: Yes. As a matter of fact, being a cochair of the Health Professionals Task Force of the International Joint Commission, we're looking at some of these similar issues from the question of the lake usage and having some of the same problems that the Board is having with respect to them. Having said that, we have similar problems there. I would hope that the citizens of Illinois have access to all of these resources possible.

MR. ANDES: And when we look particularly at the CAWS, you're aware that independent of the outcome of this rulemaking there are hundreds of combined sewer overflow discharges. There is other storm water runoff and

that those will not be largely addressed through the TARP program for, say, 15 years or so?

MR. ORRIS: Yes. And, again, that's one of those issues. We're also having to cope with the Great Lakes' water quality and I understand we're building a rather deep tunnel to try to deal with those because they need to be dealt with as best as we can in that situation.

There's also interesting new aspects of that that we're looking at and that is the question of pharmaceuticals in this runoff and other things of this sort. So there's a whole variety of issues here that are very difficult and very important for us.

MR. ANDES: So does disinfection from the three District facilities remove any of that bacterial loading from the waterbodies?

MR. ORRIS: Well, when you say any, again, you're using these sort of global terms. Yes, certainly, any if it's appropriately done, especially with UV, but let me --

MR. ANDES: Well --

MR. ORRIS: Having said that, all probably are not experienced and the data, the

outbreaks in Milwaukee, et cetera, would tell us that overwhelms much of the system when it occurs.

MR. ANDES: Let me go back because that's not really the question I was asking.

MR. ORRIS: I'm sorry.

MR. ANDES: My question was disinfection at the three District plants, does that address in any way bacterial loadings from the combined sewer overflows or the storm water runoff?

MR. ORRIS: Well, again, you're saying any way. I have a hard time dealing with these global statements.

MR. ANDES: I can offer --

MR. ORRIS: When you disinfect, you're dealing with some of the bacterial load and some of that bacterial load will come from run off, et cetera.

MR. ANDES: We're still not reaching the same point. As a matter of fact, combined sewers and storm water runoff are not addressed by this rulemaking. The District's effluents are addressed by this rulemaking. So I'm just trying to clarify, disinfecting the District's effluents

does not address any of those other sources?

MR. ORRIS: Then I suppose my confusion is in your word address and then I would agree with you that this rulemaking from my understanding, although, again, this is at the Board and not by contribution here, from my understanding, is meant to handle -- is not meant to handle what you're talking about.

MR. ANDES: So those bacterial contributions will remain independent of this rulemaking and potentially affect, in your mind, the people recreating in the CAWS?

MR. ORRIS: Well, you're asking legal questions relating to a scientific aspect. If some of this stuff goes into the river, some of it will be handled by the disinfectant process that is in place if you're using chlorine, let's say. If you're using UV, it may or may not handle that depending on where things flow. Having said that, as a caveat, I agree with you that this is not designed to address those issues in the way that you've said it and, in fact, we will still need to take precautionary approaches to those events. So that, for instance, the kind of thing

we're considering with respect to beaches is what kind of modeling do you need to be able to say the beach should be shut down today and not three days later when you get the results back from the lab.

MR. ANDES: So if we're talking about that there's a current need to tell people not to open their mouths, take precautions in the CAWS, even if you were to disinfectant the three treatment plant effluents, which you've acknowledged doesn't remove all bacteria and doesn't remove all viruses and we've had testimony about that and the other sources, combined sewer overflows, which are completely unaddressed by this rulemaking, storm water runoff, which is completely not addressed by this rulemaking, you would leave the same precautions in effect as there are present now because there's still bacterial loads in the water body?

MR. ORRIS: We need to look at how we make those educational precautions and those signs effective. We know that the current approaches are not effective.

MR. ANDES: How do we know that?

MR. ORRIS: Well, we know that from

the assessment of the small studies that are done of this kind of use of contaminated water. In fact, lower levels than these contaminations have been identified and the fact that that's incorporated into people and has produced symptomatic disease. So we know that this type of use of this type of contaminated water is a problem and it needs effective preventive measures. And, again, a sign that says "Keep your mouth shut. Don't swallow anything," to a kayaker or wind surfer is not effective public health. It may be the only thing we have available now, but long term, we have to come up with better approaches.

MR. ANDES: As to the CAWS itself, I gather we'll have a better sense through the questions in the CHEERS study as to what extent those precautions have affected people's habits, correct?

MR. ORRIS: Again, this goes over what we previously talked about with respect to the study. We may learn some very important things from that study about the water use, et cetera. If we do not see a relationship that we

have previously seen in other studies and that, again, we understand based on the medical of infectious disease, et cetera for over 200 plus years, since antiquity, in fact, then we have to look again to see how we might redesign further studies to understand more about this. In other words, a negative study that tells us that we missed this does not rule out that 20 percent possibility, but we've gone through this.

MR. GORELICK: If I might add because this question was raised to me as well in the pre-filed questions. So the proposed rulemaking addresses one aspect of pollution in the CAWS, which is effluent from the treatment plants. It does not address pollution from combined sewer overflows and storm water runoff. Those are time limited events. They're wet weather events as opposed to the discharge, which is an ongoing event.

So I think the point to make is that the proposed rulemaking, we believe, will diminish the risk for recreators in the CAWS. It is not intended to eliminate that risk because it doesn't address all the sources of risk. We

distinguish between making the water safe versus making it safer and I think that's the point to make and I would agree with you that the proposed rulemaking does not, in fact, eliminate risk to recreators, especially during wet weather events for that reason.

MR. ANDES: So people would still need to take all the same precautions they currently take because there are wet weather events and the effects of those last for some time, correct?

MR. GORELICK: The duration of that effect I'm aware of there. It is a time limited duration. There is some data looking at water quality after storms, for example, showing that there is a relativity quick return. People are generally not recreating during the wet weather event itself. There would potentially need to be -- the need to take additional precautions or restrictions or whatever regulators decide and that's not a decision for me to make. The question is how do we assess what the risk is with and without proposed rules and to what degree can we reduce it and determine if that reduction has

occurred.

MR. ANDES: Let me clarify because one of the things we've heard here in these hearings is the potential that there could be much greater risk if the waters were made safe. You're not saying the waters are going to be made safe. You're saying the risk would be less if these waters -- if these plants -- discharges are disinfected, risk would not be removed, there would still be bacterial loadings in the water body and people would still need to take the appropriate precautions?

MR. GORELICK: Correct.

MR. ANDES: Let me go back to the balance that we've talked about in terms of considering a variety of factors. One of the issues that we've talked about here has been that treatment of these discharges would involve installation of pollution controls that's would have significant energy use and testimony has been provided regarding the effects of that in regards to air emissions and carbon footprint effects. Would you agree that before considering a balance that those would be relevant factors for the Board

to consider whether installing these controls would have potential adverse impacts in other meetings?

MR. ORRIS: Absolutely. Especially with respect to the carbon footprints. Certainly, the Board should consider the fact that we ought to be moving away from energy generation from these high carbon footprint methods to begin with with all due respect to Illinois coal and fossil fuel generation, but I'm afraid that individual protective measures like this cannot wait on the overall society movement towards wind turbines or others for that. And the assumption about where you would get your energy to do this would be, I think, beyond what needed to be considered within this discussion. I should add, though, that as long as you raised global warming, the question of increasing the microbial and infectious disease burden in this area as temperature warms is something that we in public health have been looking at over a period of time and there are numbers of water borne diseases that are now in the southern states that may well move into the Great Lakes over a period of time that we're quite

concerned about.

MR. ANDES: Thank you. Let's move on. On page three of your testimony, there's a discussion about sensitive populations and contact with sewage contaminated water. Are you aware that in many waterborne disease outbreaks, most, in fact, the CDC has reported as associated with treated water? In other words, swimming pools, spas, wading pools, et cetera.

MR. ORRIS: Yes.

MR. ANDES: And we actually have an exhibit which is a CDC report that we cited, but we have a press release from the CDC concerning -- I think I have the wrong exhibit at the moment. We have the CDC report regarding this issue that we want to enter into the record.

MS. TIPSORD: And is this the report cited on page three of your pre-filed questions?

MR. ANDES: Yes. I think I've just asked the initial question about it. The report is entitled Surveillance for Waterborne Disease and Outbreaks Associated with Drinking Water and Water Not Intended for Drinking, United States 2005, 2006, from the CDC.

MS. TIPSORD: If there's no objection, we will mark this as Exhibit 235.

MS. WILLIAMS: Hang on. Do the dates match? I don't think the dates match what was cited here, do they?

MS. TIPSORD: Right. The title and the footnote don't match either.

MR. ANDES: That's true.

MS. TIPSORD: I just assumed it was a typo in the pre-filed questions because the title didn't match either. The title is longer in the footnote.

MR. ANDES: We will clarify that.

MS. TIPSORD: Because the title also talked about recreational water, United States 2003, 2004.

MS. ALEXANDER: This is a different document than is cited.

MS. TIPSORD: Do you still want to admit it?

MR. ANDES: No, we will introduce the proper exhibit later.

MS. TIPSORD: Then we will not mark this as an exhibit.

MR. ORRIS: We're not going to use this?

MS. TIPSORD: No. Thanks, Deb.

MR. ANDES: In the greater Chicago area, do you think more people who swim or -- are at more risk in public and private swimming pools rather than in the CAWS?

MR. ORRIS: I haven't done a study.

MR. ANDES: Would you imagine that a lot more people use swimming pools in the Chicago area than use the CAWS?

MR. ORRIS: You said the CAWS. I'm sorry. I mis-answered because from my understanding you're not allowed to swim in the CAWS and from Dr. Dorevitch's excellent study and previous work that he cites, they didn't see anybody swimming in the CAWS.

MS. ALEXANDER: I want to object to that. The question was framed not comparing swimming specifically, but comparing use of the CAWS to use of swimming pools and I would object to that because I think it calls for speculation and assumes facts not in evidence, but if you're just talking about swimming, then I'll let --

MR. ANDES: I can rephrase the question. Do you think more people swim in swimming pools in the Chicago area than recreate in the CAWS?

MR. ORRIS: I'm sorry. Apples and oranges.

MR. ANDES: Just answer the question.

MR. ORRIS: I can't answer the question.

MR. ANDES: Really? You don't think more people swim in swimming pools in this area than recreate in the CAWS?

MS. ALEXANDER: I object. That calls for speculation.

MR. ORRIS: From my understanding, sir, I've been invited here today to share my expertise and my speculation about how many people, without a study, swim versus recreate in kayaks or whatever is not within my body of knowledge.

MR. ANDES: Very well. Are you aware that employees, ill of gastroenteritis at a California water park, continued working and

swimming in the pools resulting in a cryptosporidium outbreak involving 336 persons in 2004?

MR. ORRIS: I believe I read that report, yes.

MR. ANDES: Should all water parks and swimming pools be closed to protect sensitive populations that might use them?

MR. ORRIS: Again, you're asking me for a public policy position here and certainly preventive measures should be taken in all of these settings. The exact preventive measures ought to be evaluated based on all of the evidence that we have previously discussed today and I don't want to comment specifically on what most appropriately should be done at a water park in California.

MR. ANDES: Are you aware that the CDC has identified that for treated water of any use, no federal regulatory agency or national guidelines for standards of operation, disinfection or infiltration exist?

MR. ORRIS: I think that was written in that earlier CDC report that I read.

MR. ANDES: Should the Illinois Department of Health which has regulations associated with bathing beaches start requiring that all public swimming pools upgrade to microfiltration and UV disinfection?

MR. ORRIS: Again, that's not an issue that's come before me and I wouldn't want to comment on it until I looked at the materials since I do sit on the Illinois Board of Health.

MR. ANDES: As to the Milwaukee cryptosporidium outbreak and it may be an issue for Dr. Gorelick as well, are you aware that the Wisconsin agencies have reported that the outbreak was not associated with treated effluent from the Milwaukee Sewerage District, but will result in a number of factors that include heavy rains, frozen ice covered ground, particularly where manure has been spread, barnyard runoff, raw sewage overflows, slaughter house effluent, removal of the dam on the Milwaukee River and/or changes in filtration practices at the drinking water plants?

MR. ORRIS: I would defer on the specifics. That sounds like the list I read based on that review, but I wouldn't swear to every one

of those things that you said, but let me defer to you on that.

MR. GORELICK: Yeah. That particular outbreak was felt to be multi-bacterial including many of the factors that you read.

MR. ANDES: I believe I have an exhibit. I'm just looking for it. We'll probably come back to that issue later. Dr. Orris, while you've talked in your testimony about the risks of illness and contact with sewage contaminated water, have you compared the difference in health risks between treated secondary effluents, in other words, effluent that has been biologically treated as opposed to raw or partially treated sewage?

MR. ORRIS: I believe the studies that were done -- well, I'd have to go back and look at that specifically. The studies that I recall that were done for recreational use in South Africa, Europe, Canada, et cetera -- and in the States, talked about the contamination of the water based on indicator bacteria and did not deal with what prior treatment occurred. So they did make mention of the fact that the water was still

contaminated. So the answer to the question is simply put as, no, I don't recall the specifics. It is the water itself that I believe was tested in most of these studies.

MR. ANDES: Okay. On page four of your testimony you discuss the, quote, high, unquote, levels of fecal bacteria that the District has measured in the CAWS, and you stated that the high levels of indicator bacteria found in the CAWS are very likely correlated with the presence of waterborne pathogens that threaten human health. Can you explain the basis for your statement that those high levels of indicators are very likely correlated with the presence of waterborne pathogens?

MR. ORRIS: Yeah, that's one of the issues that is really rather well known with this and that is you can use these indicator bacteria's as markers of the overall bacterial load for human pathogens and that disease is correlated with that. We've just been involved in reviewing some research again on the Great Lakes issues of -- on the same manner and while -- and it's pretty clear that you don't have to get every bacteria and

measure every bacteria. You can use certain of the indicator bacterias and that tells you the correlate stories and the response story as well as exposed, nonexposed, so yes.

And in most of those studies the levels that they measure are in the hundreds, sometimes low hundreds, but hundred, two hundred, per hundred milliliters of water. In these areas you had on your web pages, et cetera, are bacteria in the thousands. So, you know, we're not -- we're a whole order of magnitude above some of these things that were considered to be contaminated in these other studies.

MR. ANDES: In prior testimony -- have you read the testimony provided by Dr. Blatchley in this proceeding?

MR. ORRIS: I scanned it.

MR. ANDES: All right. Are you aware, if I characterize what he said, he talked about whether conventional disinfection would in fact, be effective in removing various pathogens both in terms of bacteria and viruses and suggested that, in fact, these disinfection methods, they would meet the Agency's proposed

standard -- would, in fact, not be effective in removing those pathogens?

MS. ALEXANDER: I'm going to object to the characterization of the testimony. I believe that that was precisely the issue.

MR. ANDES: I can rephrase.

MS. ALEXANDER: Okay.

MR. ANDES: Do you believe that conventional disinfection methods would, in fact, effectively remove any risk presented by bacteria and viruses?

MR. ORRIS: Of course, this is some degree out of my area. This is microbiology and sanitation, but I know because of the reviews that we're doing and the overall look at this that there have been real advances made in disinfection. So when you say conventional methodology, we don't use some significant lack of effectiveness of chlorine, for instance, that, for instance, with cryptospirosis and others that is now overcome by the use of UV and other methodologies. So depending on your terminology, conventional, I would certainly agree that, one, none of these disinfection methods removes all of

the bacteria or inactivates all the bacteria and some are better than others.

MS. TIPSORD: And, for the record, I would note that Dr. Blatchley's testimony was Exhibit 93.

MR. GORELICK: If I could add because this question, again, came up in pre-filed questions to me. I've also looked at Dr. Blatchley's testimony as well as his article and my understanding is that disinfection does not, in fact, remove all pathogens, however the disinfection method studies shows that when you disinfect levels of indicator bacteria do drop. That in some cases they come back, that some methods are more beneficial than others, but I don't think the conclusion was that disinfection is useless.

MR. ANDES: I don't think anyone suggested that. As to the -- and to some extent we may have addressed this, Dr. Orris, when you reviewed to the CHEER study as an excellent study, you're aware, are you not, that the research plan was evaluated by a panel of recognized leaders in the field and they determined the study, quote,

has been designed to provide information that is valuable in the area of health risks associated with secondary contact recreation and addressed potential deficits in the current knowledge and health risks associated with limited contact water recreation and the measures acquired to protect the public?

MR. ORRIS: Yes, I absolutely agree with that.

MR. ANDES: Okay. Thank you.

MS. TIPSORD: Excuse me, Mr. Harley has a question.

MR. HARLEY: Hi. My name is Keith Harley. I'm an attorney for the Southeast Environmental Task Force. There was a pre-filed question I believe you skipped over that I believe might be helpful in terms of creating the record. The pre-filed question was seven and it was subpart A. It was: What do you consider to be high levels of indicator bacteria? You eluded to the effect in an answer to another question that you believe the levels of indicator bacteria found in the CAWS were high. Could you please explain for the Board on what basis you came to that

conclusion?

MR. ORRIS: I'm sorry. I thought that's what I was referring to in some of these prior studies and the levels were in the hundreds and I'm not speaking absolute levels, but qualitatively looking at these indicator bacteria, I think 200 is often used as the marker, but, again, these were levels that were considered contaminated at those levels and what I, and is attached to my testimony, have here is the documentation to have of the levels in the CAWS that are in the thousands. So it's an order of magnitude above these other ones.

MR. HARLEY: So that is high. You consider the levels to be high?

MR. ORRIS: Yes.

MR. HARLEY: Thank you.

MR. GORELICK: I would just like to add that there are studies that have shown increased risk of disease from -- again, this is swimming so I know it's not the kind here, but risk of exposure in recreational water from counts ranging from only a few indicator per hundred ML to about 30 indicator per hundred ML. So

relatively low levels still associated with increased risk of illness in those exposed to the recreational waters.

MR. HARLEY: When you say a range of 1 to 30 --

MR. GORELICK: This was a review of 22 different studies.

MR. HARLEY: When you say 1 to 30, is 1 to 30, by range of comparison, to the thousands which are found in some locations in the CAWS, is that correct?

MR. GORELICK: Right.

MR. HARLEY: Thank you.

MR. ANDES: Again, those were all swimming studies, right, so in terms of epidemiologic study of secondary contacts of the types of recreation we talked about in the CAWS this really is your study, first study, that really looks at that issue, correct?

MR. GORELICK: I don't think it's the first study. There have been studies of canoeing and kayaking that have been performed. It is the first study that is being done on the CAWS and it's the first one that I know of that is

actually looking at both water quality indicators and pathogens from the people who are exposed at least in some way.

MR. ANDES: Thank you. And when we talk about levels of --

MR. ORRIS: Can I --

MR. ANDES: When we talk about levels of indicator bacteria in the CAWS, I assume you're not distinguishing among sources in terms of whether those could be due to the fact of combined sewer overflows, which we know do lead to high levels at some points. You're speaking generally about the level of the water quality in the CAWS from whatever source?

MR. GORELICK: Yes. The question was are they high and the conclusion that they are high is because those levels have been associated with disease.

MR. ANDES: Okay. In terms of the issues concerning enrolling people in high risk groups, the statement, Dr. Orris, was that the understudy would not enroll -- won't enroll enough people in high risk groups. You're aware that survey research generally samples less than a

hundredth of one percent of the population?

MR. ORRIS: That's what I understand also from CNN on election night.

MR. ANDES: And if this study, in fact, enrolls 5 or 10 percent of CAWS users or maybe more, isn't that actually a fairly high percentage of the population surveyed?

MR. ORRIS: Again, we review the difficulties in these studies and understanding when you have a negative study, whether it's due to a lack of a relationship or that you miss the relationship and I would only be repeating that again. We have more elegant ways of assessing it and this study used more elegant ways to priority assess whether or not they would identify it.

MR. ANDES: So what that says is, correct me if I'm wrong, A, we'll need to see what the study says and that will help us determine how much weight to give it and that it can then be assessed with other factors in making a regulatory decision?

MR. ORRIS: Certainly. It should be considered with other factors in making a regulatory decision and it should not be relied on

on its own. And I guess the other response is maybe we should recount Ohio again from two elections ago.

MR. ANDES: We won't go there.

MR. ORRIS: Okay.

MR. GORELICK: This question was also posed to me in the pre-filed questions and this one one hundredth of a percent versus 5 to 10 percent is actually a little bit irrelevant. It's actually the number that gives you the degree of precision. So the margin or error in a poll or in a study is based on the size of the sample, not the proportion of the population that's being sampled. So one hundred subjects gives you a margin of error that is the same regardless if that one hundred is ten percent of your population or one one thousandth of a percent of your population. It's the sample size that determines margin of error.

MR. ANDES: Let me ask the question. If the sample population is one hundred people and you survey all hundred people --

MR. GORELICK: Then you're no longer doing a survey. When you start to approach the

majority of the sample, then the margin of error becomes irrelevant.

MR. ANDES: Where's the dividing line if we're saying on five to ten percent is a lot better than a hundred percent?

MR. GORELICK: If you're much less than 50 percent, it's somewhat irrelevant. And to give an example, if I wanted to know the average age of the people on this panel, and there are eight, and I asked two of them, that's 25 percent, but I would have a very high margin of error by asking only two people. If I ask all eight, then I'll know the answer for all eight.

So it's a question of sampling from a population and who you're hoping to extrapolate from. The other thing is even if you sample a high percentage of a study population, one hopes that one will extrapolate those results, not just for the people who are in the study, but all future users of the CAWS. So even if you have five to ten percent of the people who are using the CAWS during the time of your study that is still a smaller fraction of the people to whom those results will be extrapolated, which is all

people you think will be using the CAWS during the time this will be in effect. But my point is valid. Five to ten percent is really no different.

The sample size is what matters and the sample size of this study is relatively quite large, 9,000. The concern, again, is that of those 9,000 if I were interested in a subgroup of them, for example, children or, for example, people engaging in one particular activity, now my sample size isn't 9,000. It's the number who engaged in that activity. It's the number that fall into that risk group.

So the effective sample size to answer the question in that subgroup which may be an important subgroup because different activities, different age groups may differ, et cetera. I will have even less power than the 80 percent to answer that question in the subgroup even if it's a relatively high percentage of that population.

MR. ANDES: So what that then says is, am I right, it would be possible you would get the results back and you may have enough people in

a given subgroup that you want to focus on that you can reach some conclusions that you were comfortable with or you may decide you need to look at that group more intensely.

MR. GORELICK: Right. And the power of this study depends in part on the number of people. It depends in part on how strong an association you wish to find. The smaller the association, the more people, subjects you need to answer the question.

So if I think that, for example, children are at ten times higher risk, actually I don't need all that many children, but if I think they're only at twice the risk, I'll need more children. So a positive finding in a subgroup might actually be very important because if you find a positive association despite the small sample size, that means it's a fairly high, strong association. On the other, a negative finding in a subgroup is of less value because the chance of it being a false negative, the type two error that we talked about to be technical, is that much higher given the smaller sample size in that subgroup.

MR. ANDES: Okay. Dr. Orris, on page six of your testimony, there are statements made regarding putting users of the CAWS at risk of infection if disinfection does not occur. First of all, since, as we have talked about before, whether disinfection is practiced or not, there are still bacterial loads from other sources so I assume you think that even if disinfection were to happen those users would still be at risk of infection, am I right?

MR. ORRIS: Of course, but then again you're using the terminology, this global terminology of at risk.

MR. ANDES: That was your term.

MR. ORRIS: The question is how -- that's the correct use of the terminology when you talk about would people still be at risk. Again we've had this discussion about how we're trying to reduce risk in this situation, not eliminate it. There's no such thing as eliminating it.

MR. ANDES: But when you say that every year when disinfection does occur puts users of the CAWS at risk of infection, all I'm saying is they're at risk of infection under your view of

bacterial loadings anyways, right? It's not that they're not going to be at risk and you're positive here that if there's disinfection and they're not at risk, that's the implication and they're put at risk by no disinfection, all I'm saying is that's not really accurate.

MR. ORRIS: Again, I was told in college that the contrapositive is not necessarily true logically and that's what you're implying. I said a correct statement which is in the positive. That when you don't disinfect, there is a risk from that waterway that people are using and you're saying to me that if you do disinfect, there is no risk. That is not the logical conclusion based on my statement, but, again, what I'm just trying to communicate is you will reduce the risk through disinfection of the waterway.

MR. ANDES: Thank you. Do you have -- other than based on the high levels of indicator bacteria, are you aware of any information regarding what the current health risk is to people recreating in the CAWS?

MR. ORRIS: No. Burden of disease as we're discovering with respect to all these is

quite problematical. That's why we think that all of these studies are useful and the more specific we can get with them, the better.

MR. ANDES: Have you reviewed the risk assessment conducted by Geosyntec that has been put into the record in this proceeding?

MR. ORRIS: Sometime ago. I don't recall it now.

MR. ANDES: Are you aware that if the District's plan were required to disinfect, it would take some years before those plants would actually be disinfecting?

MR. ORRIS: I understand it would take some time, yes.

MR. ANDES: But it sounds like you're not recommending that people stop recreating in the CAWS in the meantime?

MR. ORRIS: I am not -- I have no recommendation on that per se. I would have to look at that question specifically. I do not -- from what I have looked at already, that would not be the approach I would take.

MR. ANDES: But if you think there's a significant risk now, why wouldn't you tell

people don't go in the water?

MR. ORRIS: I would certainly try to improve on this risk communication that's currently being done and look for mechanisms outside of the education of the individual with the signs that we've had a discussion about prior. The solution while simple, is not always correct that you eliminate all exposures based on a whole lot of other things. Now, those whole lot of other things in this setting is a burden that is on the Board and the District with respect to this issue.

MR. ANDES: I assume that in the balance we've discussed -- concerning various risks, one would also want to consider whether there are risks from disinfection bi-products. That would be a factor to take into account in determining what course of action the Board ought to take?

MR. ORRIS: Yes.

MR. ANDES: Let me move onto questions for Dr. Gorelick, although I assume some of them will be answered by either one of you.

MS. TIPSORD: Before we do that,

let's take a short break.

MR. HARLEY: And I have one follow up for -- when the time comes.

MS. TIPSORD: Go ahead. We'll do it before the break.

MR. HARLEY: I want to -- again, my name is Keith Harley from the Southeast Environmental Task Force. I wanted to go back to question 14 again because in your quote you say every year in which disinfection does not occur puts users of the CAWS at risk of infection. Would you be able to comment on the ways in which nonusers of the CAWS may also be at risk by virtue of the transmission of illness, for example, gastrointestinal illness?

MR. ORRIS: That's an interesting point. Obviously, these are uncommunicable diseases. I had not looked at that issue specifically to this point, but certainly these are communicable diseases.

MR. HARLEY: So it's possible that a user of the CAWS could communicate disease to nonusers during the same period of time that you're talking about when you say every year in

which disinfection does not occur put users of the CAWS at risk of infection?

MR. ORRIS: Certainly, most of the diseases we're talking about here are only transmitted through close contact, et cetera, so there would be some limitation, but there would be residual risk.

MR. HARLEY: Thank you.

MR. GORELICK: And I should indicate one of the points I made in my testimony was exactly that, which is that the CHEER study, among others, by looking only at people who have actually used the river or the waterway in question may, in fact, underestimate the amount of illness because people who become infected, even those without symptomatic infections which many of these pathogens cause, can then spread that to household contacts and most of the studies have not asked about illness in people in the home and we know that presence of ill contact in the home is one of the biggest risk factors for, at least, gastrointestinal illness.

MR. ANDES: Can I follow up on that? Are you aware that the Geosyntec risk assessment

did look at that possibility of transmission?

MR. GORELICK: It wasn't a study that looked at whether it happens. They were modeling that.

MR. ANDES: Okay.

MR. HARLEY: When you say homes, would that also include other settings in which there is direct contact, for example, a child care center?

MR. GORELICK: Yes.

MR. HARLEY: Or a school?

MR. GORELICK: A place where there is close contact that would allow and the type of contact depends on the disease organisms, but it's usually by close direct contact.

MR. HARLEY: Could it occur in a health club?

MR. GORELICK: The one I'm most familiar with is risk in the home and daycare setting.

MR. ORRIS: Could I add one -- amplify my last answer a little bit because of the areas --

MR. ANDES: Yes.

MR. ORRIS: I'm sorry. I need a break also. There was something in which I thought we were going to get into with the CDC study -- or the CDC report and MNWR, but there is a useful critique both in that one and the other one, et cetera, about our problems with surveillance and this is the same issue where we're coming up against with IJC, the International Joint Commission and that is we really do not have good methodologies to track these illnesses.

So that when we say there's no outbreak that occurred, it is not comforting. It is rather a comment on our lack of ability to effectively track illnesses related to these kinds of waterways and other ubiquitous sources, if you will. It is almost amazing that we do see something reported through the systems that we have.

So as a correlate of the question of trying to improve the educational component and the preventive methods as you are moving ahead with gearing up the disinfection, which I hope you will do. We ought to also be

looking at and perhaps also considering recommendations to the District about how should we try to, on a regular basis, monitor these kinds of diseases and it's not easy, but it needs some more thinking and discussion.

It's the kind of thing that we're going to be doing around the Great Lakes as a whole between the US and Canada and I'm not sure we'll go over this specifically. Thank you.

MS. TIPSORD: With that, let's take a ten-minute break.

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

MS. TIPSORD: Okay. Is everybody ready? Let's go back on the record. Mr. Andes.

MR. ANDES: Thank you. Dr. Gorelick, if I can go to the questions that we raised for you. On page one of your testimony, you talk about the study and whether its basis for allowing a heavy pathogen load in recreational waters -- I guess I'm questioning what's the basis for that statement regarding heavy pathogen loads when the measured concentrations of actual

pathogens, not indicator bacteria, but actual pathogens in the risk assessment document were actually very low?

MS. ALEXANDER: I'm going to object to the characterization of risk assessment. With that said, you can answer.

MR. GORELICK: I think there's a few things. First is, there's a large body of evidence showing that high indicator levels are correlated with high risk of disease. There are studies showing that indicator levels are correlated with the presence of pathogens. There are studies showing that you can have high levels of pathogens even in absence of high levels of indicators for a variety of reasons.

So there's a fairly established, I think, consensus that indicator loads are indicative of fecal contamination which correlates with health risk and correlates with presence of pathogens.

I am not intimately familiar with the risk assessment, but I have looked at it and I would comment a few things. One is, they only looked at a small number of pathogens. There

are many, many viruses, protozoa and bacterial pathogens that are implicated in human illness and there were several of them that were looked at, but by no means the majority.

So it was relatively a small number of pathogens looked at. The second thing is that the pathogens were looked at, as I recall, using a cell cultured technique. And there are a variety of ways of identifying particularly viral pathogens and I'm not a microbiologist, but my general understanding as a physician is that cell cultured techniques are less sensitive, that some of these viruses are harder to grow in culture than they are to detect, for example, using PCR or DNA based methods.

So it may be that there is actually some underestimation based on the use of that, but, again, that is somewhat outside my area of expertise. Just my comment would be that single risk assessment, finding low levels of pathogens, when I take that into account with the full body of literature knowing what I know about the level of indicator bacteria in the waterway, that's the basis for my conclusions.

MR. ANDES: Let me ask you then. Are you aware, in fact, the folks who conducted that assessment, did use a PCR method?

MR. GORELICK: They used it as well as the culture method?

MR. ANDES: Yes.

MR. GORELICK: Okay.

MR. ANDES: Also, my recollection and you said that you weren't intimately familiar with the risk assessment, but if those pathogens that we looked at which were most commonly occurring then, in fact, would be fairly representative of the risk since it's not really possible to look at all the pathogens if you look at the ones that are most common, that would probably give you some sense of the issues that would occur, correct?

MR. GORELICK: I think there's a few things. First is, I'm not sure we know what occurs most commonly because we haven't been looking for pathogens very often. Most of the water quality studies looked at indicators. I would raise neuroviruses as an example of something that was relatively unheard of 20 years

ago. It turned out to be a very common pathogen. So these new pathogens as we get better techniques are being identified all the time. So I don't know that I would say they're most common.

MR. ANDES: Are you aware that the neuroviruses were looked at in that study?

MR. GORELICK: Yes, that's an example of one that is common, but I used it as an example of one that 20 years ago we would not have said was a common one and one we would not have looked for.

MR. ANDES: And as to testimony in this matter by Dr. Blatchley and others, to the effect that there is not such a good correlation between indicator bacteria and pathogens, you would disagree with their statements?

MR. GORELICK: I'm sorry. Can you say that again?

MR. ANDES: There was testimony by other parties by other witnesses concerning that correlation which reached a result somewhat different than yours. So I'm just wondering if you examined that testimony and have any assessment of that.

MS. ALEXANDER: I'm going to object to the characterization of that, but I'll let the witness answer because I believe he's reviewed Dr. Blatchley's study.

MR. GORELICK: I've reviewed Dr. Blatchley's study, but I haven't reviewed in detail the testimony that he gave here and I'm not sure that the conclusion from this study is that levels of indicators don't correlate with levels of pathogens.

MR. ANDES: Are you aware in the risk assessment that was conducted of there being instances where one found fairly high levels, as Dr. Orris identified, of indicator bacteria, yet the pathogen levels were low?

MR. GORELICK: Again, given the small number of pathogens that were looked at and other issues of risk assessment that may be what they said, but the consensus over the years, including the US EPA's consensus is that indicator bacteria are indicative, that's why we call them that, of health risk and presence of pathogens.

MR. ANDES: There's a paper you coauthored and reference in your testimony

entitled Pediatric Emergency Department Visits for Diarrheal Illness Decreased after Release of Undertreated Sewage in which you made a statement in which I'll summarize which refers to situations where the usual secondary treatment with biological agents do not occur and you specifically refer to, quote, the usual secondary treatment with biological agents where most pathogens are removed, unquote.

So that seems to be the statement that, and correct me if I'm wrong, that, in fact, secondary treatment processes, biological treatment processes do, in fact, achieve a high level of remove of pathogens?

MR. GORELICK: Yeah, there are sequential stages in sewerage treatment. The primary treatment removes some pathogens, secondary treatment removes more pathogen. Pathogens remain, disinfection then further removes the pathogens.

MR. ANDES: Okay. In your testimony on page eight, you mentioned plagues that have been caused by untreated sewage and this really goes to the same question I asked Dr. Orris in

terms of distinguishing between -- and I understand you are distinguishing between raw sewage being discharged in waterways versus discharges that have been subject to secondary biological treatment and those are two different things?

MR. GORELICK: Those are two different things.

MR. ANDES: Okay. Are you familiar with the report entitled Public Health Risks Associated with Waste Water Blending by Katonak and Rose.

MR. GORELICK: I have not seen that report. I have only seen Dr. Roses testimony at a conference about that report.

MR. ANDES: And we will introduce that as an exhibit and I wish I had it here. There we go. But the name of the report is Public Health Risks Associated with Waste Water Blending, November 17th, 2003.

MS. ALEXANDER: And I just want to point out for the record I'm not going to object to the introduction of this document, but we did, in fact, ask for this by letter. We did not

receive it. Therefore, the witnesses have not had an opportunity to review it.

MS. TIPSORD: If there's no objection, we'll admit the Public Health Risks Associated with Waste Water Blending, Rachel Katonak and JB Rose final report, November 17th, 2003, as Exhibit 235. Seeing no objection, it's Exhibit 235.

MR. ANDES: Do you agree with the reports finding which we're characterizing here although I can cite to a page. The report discusses -- and I can refer to a page on this. The discussion of secondary treatment on pages 22, 23, and 24 refers to a reduction of various bacteria protozoa, metazoa, by cryptosporidium, giardia, by 9 -- 99.9 percent and 2 percent and other high percentages -- do you have any reason to doubt that information?

MS. ALEXANDER: I would like to give the witnesses an opportunity to review this. I objected to the question before they had an opportunity to read the document. So can you please clarify specifically what you're asking them to agree with? It's the section, secondary

treatment, that begins on page 22 and where do you want them to read to?

MR. ANDES: Page 24. There are statements made concerning the levels of reduction of pathogens by secondary treatment.

MS. ALEXANDER: Okay. Why don't you go ahead and read this and let us know when you're ready.

MR. GORELICK: This report shows data suggesting that secondary treatment results in a reduction in pathogens. Dr. Roses testimony to Congress said that secondary removes anywhere from 80 to 99.9 percent. I would also point out that she then goes on to say -- I want to talk briefly about disinfection. We know that disinfection is an important process for control with these microbes. So I think the message here is that secondary treatment is important and, in fact, I know that the issue of waste water blending revolves around skipping secondary treatment and whether that's a safe practice.

MR. ANDES: In fact, you're not aware --

MR. GORELICK: I would say that

while secondary treatment leads to a further reduction in pathogens from sewage so primary treatment is an improvement over raw sewage. Secondary treatment is an improvement over primary treatment and the bulk of the evidence would suggest that disinfection is an improvement of secondary treatment. So I would agree that it looks like much of it comes out from secondary treatment, but not all of it.

MS. ALEXANDER: And I would just like to clarify for the record that we have Dr. Roses testimony from Congress, but unfortunately I didn't make enough copies. I can offer it as an exhibit now or we can make copies and offer it later, but I wanted to make it available in light of Dr. Gorelick's testimony.

MS. TIPSORD: Let's admit it as an exhibit and then we can get copies at lunch.

MS. ALEXANDER: This is a copy of a day in testimony. It concludes on page 17, which contains the record statement which I will offer as an exhibit.

MR. ORRIS: If I might just intervene for a moment on this being attracted

to --

MS. TIPSORD: Let me finish with the business.

MR. ORRIS: I'm sorry.

MS. TIPSORD: Let me mark this as an exhibit first. We will mark this as Exhibit 236 and then we'll get copies for every one at lunch. It's Exhibit 236. Go ahead.

MR. ORRIS: I'm sorry. I had seen this as part of another review, but I'm only -- and I recall, and as attracted as I am to this last sentence of most of these studies, I would only call to your attention that the last sentence of this study under conclusion or the last two sentences does emphasize what you've just raised and that is greater than 99 percent of the loading pathogenic viruses and parasites come from the untreated portion of the flow, but then the final sentence which is quite interesting with respect to this and the questions here before us. The risk associated with swimming -- again, this is not swimming per se. The risk associated with swimming in waters receiving such flows are a hundred times greater than waste water than if the

water waste had been completely treated. So your secondary treatment as you say does quite well, but it still is a hundred times poorer than the existing --

MR. ANDES: With regard to swimming risks.

MR. ORRIS: With regard to swimming, yes.

MR. ANDES: Okay. With regard to the Milwaukee cryptosporidium outbreak, as I understand it, that was a drinking water related outbreak, not a recreational water outbreak, am I right?

MR. GORELICK: That is my understanding as well, yes.

MR. ANDES: And that incident occurred when?

MR. GORELICK: 1993.

MR. ANDES: We referred earlier to a report from the Wisconsin State Agencies concerning the causes of that outbreak and I have copies of that for the record. The title is Cryptosporidium SPP. Oocyst and Giardia SPP. Occurrence, Concentrations and Distributions in

Wisconsin Waters, 1995.

MS. ALEXANDER: I'm going to point out once again for the record, we will not object to the introduction of this, but the witness had not reviewed it, notwithstanding the fact that we specifically requested it by letter.

MS. WILLIAMS: Can I just ask a clarification for --

MS. TIPSORD: Debbie, don't use -- just speak up. We can't understand you through the mic.

MS. WILLIAMS: So you're telling us that you asked the District by letter for the documents that were cited in the pre-filed questions and they did not provide them?

MS. ALEXANDER: That is exactly correct. I have the letter with me that I wrote to the District. I did not receive a response to the letter nor did I receive a copy of these documents.

MR. ANDES: Dr. Gorelick, are you familiar with the report?

MR. GORELICK: Not with the report per se, but as you can imagine, Milwaukee comes up

in conversation from time to time so I'm aware of the gist of the findings.

MS. TIPSORD: Excuse me. Before we go on, I'm going to mark this as Exhibit 237. If there's no objection, seeing none, it's Exhibit 237.

(Document marked as Group Exhibit No. 237 for identification.)

MR. ANDES: And I will say we regret the oversight of not providing that information before now. As I talked about before, it appears that the statements in this report indicate that the outbreak was not associated with treated effluents. Do you disagree with that conclusion?

MR. GORELICK: No, I mentioned cryptosporidium simply as an example of a waterborne pathogen not because I thought the Milwaukee outbreak had any direct relevance to this particular question.

MR. ANDES: Okay.

MR. ORRIS: I'm sorry. You had asked me the same question and it appears to be contradictory to some of these things now upon

reviewing this. Having been around and concerned with these issues at the time, I should only tell the Board that what was startling about the cryptosporidium outbreak in Milwaukee and what really riveted our attention was it was only picked up because there were the volume of patients in the emergency rooms and the number of people that were sick not going to work suddenly alerted the public health authorities, again, underlying our need for these conditions that it cited as probably contributing were not a one time occurrence. They occurred, but to a lesser degree with some regulatory and we never picked up that illness going on. So there's a lot of these things. But I must say that your statement that this doesn't relate to drinking water at all is not reflected well within the text and that is it says the other things that could be involved here is at or changes in filtration processes and drinking water plants. So some question about the drinking water contribution as well is part of it.

MR. ANDES: I don't believe I said that it wasn't related to drinking water, but actually I will introduce one other related

document in that regard, which is a memorandum from the city of Milwaukee Health Department, April 28th, 2006, which states "There currently is no evidence of drinking water quality degradation at MWW treatment plants as a result of secondary sewage bypasses at the waste water treatment plant.

MS. TIPSORD: We will mark this memorandum dated April 28th, 2006, as Exhibit 238. If there's no objection, seeing none it's Exhibit 238.

(Document marked as Group Exhibit No. 238 for identification.)

MR. ANDES: In fact, as you said, we're not really talking here on the CAWS about secondary sewage bypasses anyway?

MR. GORELICK: Correct.

MR. ANDES: Dr. Gorelick, these are questions that Dr. Orris addressed and I'm not sure if you answered them as well, but when you refer to the proposed effluent limits the question that I have is do you believe that with the proposed effluent limits, the waterways would be

safe for the general public? Would it make it safe for the general public?

MR. GORELICK: It would make it safer for the general public.

MR. ANDES: Given the bacterial loads from CSO's and storm water runoff that would be present anyways for the next 15 to 20 years, would you think that there is a significant risk of illness from those loadings?

MR. GORELICK: I don't have data to know what the risk would be based on sewer overflows, et cetera. The issue at hand, I think, is every activity carries a risk. Recreating on the CAWS carries a risk. Can that risk be lower to public health measures and would it be worth doing that, I would suggest that whether it's worth doing that is a regulatory decision that needs to incorporate a lot of other information. Will it make it safer? I think the answer to that is, yes, it would. And, you know, every activity we do in our lives we assess what those risks are and we take reasonable steps to make those risks lower.

I took the train here this

morning. I took a little bit of a risk. I took probably less of a risk then if I had driven and if I had driven, I took less of a risk if I used my seatbelt than if I don't. So I wouldn't say that driving or taking the train is a safe activity, but it has been made safer by public health intervention.

I believe that when you talk about whether it would make it safe, I think the answer to that would be no. Nothing we do is perfectly safe, but I would argue that the body of evidence would suggest that it would make it safer.

MR. ANDES: You haven't looked at the levels of loadings between the discharges from the treatment plants versus the various wet weather sources, am I right?

MR. GORELICK: That's correct.

MR. ANDES: So you really don't have an opinion as to the extent of risk reduction relative to the remaining sources?

MR. GORELICK: Right. I think part of this ties in with the point Peter made earlier about outbreaks versus indemnis illness. So, you

know, combined sewer overflows occur during specified periods of time. There's a time limited effect as opposed to an ongoing level of risk associated with ongoing treatment -- release of treated water at treatment plants.

It ties in and this comes up a few times in the question so I might as well address it now, but the question of outbreaks versus endemic risk. I think by focusing on outbreaks, this is clearly just the tip of the iceberg and arguing from presence or absence of outbreaks doesn't really answer the question about whether something is safe.

So -- and I think another overall point to make and I have to concede that there is real paucity of information about what risks are from secondary contact recreation. There are a few studies of kayaking, canoeing, surfboarding, all of which have shown increased risk, but those are relatively small studies. I think the magnitude is unclear, although the weight of the evidence would suggest that there are risks associated with it.

But clearly we have more

information about the swimming and clearly we have much more information about drinking water. But the point about disease surveillance is the same regardless of whether it's secondary, recreation or swimming or drinking water, which is that disease outbreaks identify a tiny percentage of the diseases and I'll refer to what you were going to introduce earlier, The Surveillance for Waterborne Diseases and Outbreaks Associated with Drinking Water.

This was a review of studies over 20 years of outbreaks and it said during that -- I'm sorry. Not 20 years, two years, but there were 20 drinking water associated outbreaks causing illness among an estimated 612 people. So 612 reported cases they identified. On page ten of this document, they reference a US EPA study with a symposium that they did with several studies that tried to estimate what is nationally the amount of illness annually from drinking water. Endemic drinking water, not outbreaks. And the estimates ranged from 4.3 million to 16 million. So the outbreaks that have been identified are just the tip of the iceberg and I

think the same is true when you're looking at recreational exposure.

Try to identify outbreaks of diseases is very challenging for a lot of reasons about which Peter talked about. Many of these things don't get reported. When the diseases come to medical attention, they don't necessarily get attributed to the exposure at hand unless all of a sudden you get 400,000 people showing up in the emergency room like you did in Milwaukee.

I think that's actually one of the nice strengths of the CHEER study is -- that it is another study that is attempting to look at this in a way that identifies prospective diseases that may not occur in outbreaks. Like some of the other surveys that have already been done in other settings that have shown there is an increased risk. None out of those reported outbreaks. They were done through prospective surveillance. We need more of that kind of prospective surveillance to add to the existing body that shows that there are risks associated with that and to try to quantify it.

MS. TIPSORD: Excuse me,

Dr. Gorelick. Were you just reading from the prior document that was passed out that we did not enter? Surveillance for Waterborne Disease and Outbreaks Associated with Drinking Water.

MR. GORELICK: Yes.

MS. TIPSORD: And with that then, I think we should probably put it into the record because Dr. Gorelick did read from it. So the Surveillance for Waterborne Disease and Outbreaks Associated with Drinking Water and Water Not Intended for Drinking, United States, 2005, 2006, will be admitted as -- Okay. Fred, I think we gave you back our copies. We're going to admit that as Exhibit 239.

MR. ANDES: Yes, I have copies.

MS. TIPSORD: That's Exhibit 239 if there's no objection. Seeing none, it's Exhibit 239.

(Document marked as Group Exhibit No. 239 for identification.)

MR. ANDES: Dr. Gorelick, on page 12 of your testimony you speak of the problem of waterborne pathogens in the CAWS as a situation

that we know is inherently dangerous and that is bound over time to result in severe injury to someone even if that injury cannot be captured in the narrow window of a scientific study. Are you saying we should basically act as if it's inherently dangerous to take action that even if we have no studies that support that finding?

MR. GORELICK: No. I'm saying there is scientific evidence to suggest that there is risk and that not finding risk in a single study would not negate that because the risk level might be such that you're not going to capture it even in a reasonable large study like the CHEERS study.

MR. ANDES: And that will really depend to some extent, and I think you both testified to this, the nature of the study and really what we find when the results are reported?

MR. GORELICK: Yes.

MR. ANDES: And I believe you all stated that at that point the Board could consider that information along with other information whether it's carbon footprints, other practical considerations, other -- the other policies and issues. The Board would have to balance in

deciding when and how to act to address the issue.

MS. ALEXANDER: I object to any characterization of the legal question as to what is appropriate for the Board to consider. Over that objection, you may answer.

MR. GORELICK: So the CHEER study is going to provide an additional piece of information in addition to all the knowledge that's been accumulated over the years about risks associated with levels of indicators, the little bit of information we have directly related to secondary contact, microbiologic information, et cetera. I think, again, getting to a point that Peter made earlier in his testimony that I want to second is that let's assume for the moment that the CHEER study finds that there is no increased risk.

The fact that it is one study that finds no increased risk would need to be corroborated before you could give too much weight to it. Partly for the reason that Dr. Orris already mentioned, which is that by their name we design studies to be more likely to have a false negative result than a false positive result.

So if I have a study with a negative result, it's immediately somewhat suspicious. The second is for the reasons we talked about in terms of whether or not the results would apply to all subgroups and types of activities, et cetera. It's an overall risk.

So one could just wait and then -- until the results come in and then decide "Gee, when that result comes in, we're going to have to corroborate it so let's wait another five or eight years until we can get another study corroborating it." Before you know it, you haven't taken action. I would argue that as imperfect as this state of knowledge is, we're not arguing for no information, that the Board has information on which it can base a decision and waiting for that result would potentially prolong that duration of risk unnecessarily while we're waiting for additional information because I don't think we're going to have the answer in a year or two.

MR. ANDES: And that depends partly on the extent of the risk, right? If the report says -- were to find conclusive percentages of

population that it defined a fair number of those people and that even at significant levels of bacteria in the water that there is no significant increase of risk, but the Board can certainly -- and, again, I think we're arguing over legal questions, that the Board can decide that's sufficient information to set a water quality standard based on --

MS. ALEXANDER: I'm going to object to the characterization of the study. I think it's a question at issue whether or not the study, the CHEER study ever could get into risk assessment of population. You've been characterizing it as a possibility that it could.

MR. ANDES: I don't think -- have either of the experts here testifying -- that it cannot possibly address the risk to the sensitive populations?

MR. GORELICK: No, just that it's less likely to.

MR. ANDES: Okay. And we'll know better once we see the results, correct?

MR. GORELICK: We will know better what the results are. We won't know better

whether or not it was less able to find. That's the inherent design of the study, that it is less able to find an association in a lower risk group.

MR. ANDES: Less able than in the general populations?

MR. GORELICK: That the power in those specific subgroups is lower. That's inherent to the design of the study.

MR. ANDES: Of any study?

MR. GORELICK: Correct.

MR. ANDES: I think those are all the questions I have for these witnesses at this time.

MS. TIPSORD: Mr. Harley.

MR. HARLEY: Good morning. Keith Harley. Southeast Environmental Task Force. I think I'm maybe more impressed with Mr. Andes' questions than he himself was in light of how many he skipped over, but there are some that I would like to ask you in order to create a study before the Board. One of the questions that I wanted to ask you is actually the very first question posed in the pre-filed questions in which the question quotes from your testimony "disinfection is nearly

universal in major cities in the United States. Prevalent in most smaller communities for the simple reason that it is widely recognized as necessary to protect public health." And then the question is, do you believe that the historic practice of waste water disinfection in the United States is justified? I want to ask you that question. Do you believe it is justified?

MR. GORELICK: I do. I think there is a large consensus that disinfection is an additional step on top of primary and secondary waste treatment that further improves the quality. The US EPA, I think, shares that assessment. It's possible that all the other major cities in the United States are incorrect on this. I'm not going to say that's not possible, but certainly the weight of the evidence would suggest that disinfection is useful.

There have been two papers that were introduced by the District to call that into question. I think finding two articles in 20 years doesn't necessarily invalidate a consensus. I think any scientific question you will find some disagreement. I would also say that the

characterization of the conclusions of these papers is maybe overstated. I don't think that this paper by Blatchley strongly suggests that disinfection processes are not effective. It states in the abstract, they may not be -- the water quality may not be substantially improved. It's says it's not clear that they are effective.

It's a little bit different than saying it strongly suggests that it's not. It is a piece of information. I think there is some useful data in here. The data shows when you take disinfection that levels drop immediately. In some of the circumstances, they then come back later. How that filters into the real world? I don't know.

So when I look at the whole body of literature, I would say, yes, this practice still appears to be justified despite these few contrarian positions.

MR. HARLEY: Thank you. I wanted to call your attention to question 14. The pre-filed question 14, several of the water samples in the CAWS have levels of e-coli that was found in the urine sample of an infant would be considered a

sign of a urinary tract infection. Could you please comment on the way that you came to that conclusion as part of your pre-filed testimony and what that means?

MR. GORELICK: I wouldn't place too much emphasis on this. A lot of numbers get thrown around. I was trying to put this into context. If the number is 30 or 60 or 10,000, is that a high number, is that a low number? Without a context, it's difficult to know. The context is is that, again, just for illustration purposes, not because I'm suggesting that the water needs to be treated with antibiotics. I don't want you to read into it. But this is a level that in that clinical circumstance is considered a high level and the reason it's a high level is because it's indicative of, you know -- well, it's a high level because you're not supposed to have that much e-coli in the urine.

One of the questions was would that level in feces be of concern? Absolutely not. It's supposed to be there. So the question is, is this number high? Well, high in relation to what? You're not supposed to have feces in

river water so the presence of those levels of bacteria are high. You're supposed to have them in your colon. It was intended strictly as an illustration of, you know, what's a high number. A more relevant thing would be what levels have been associated with risk of illness and as I've already said, even relatively low levels, far lower than what was reported in the CAWS have been associated with the risk of illness to people exposed to it.

MR. HARLEY: Thank you. Madam Hearing Officer, I have a housekeeping issue related to pre-filed request 10. In pre-filed question 10, Mr. Andes refers to a portion of the testimony in which there's a citation to the Water Reclamation District website and on the Water Reclamation District website on an ongoing basis the District is posting information about the levels of different indicators at different sampling locations throughout the District's jurisdiction.

Some of that information for past years has been entered into the record, but new information is constantly being posted by the

District with up-to-date contemporary information about the levels of different pathogens, which are at issue in this rulemaking. I was hoping that we could come to some agreement that when it comes time to do our post hearing comments that we would be able to refer to that contemporary levels of pathogens without having to constantly update the record with paper copies of what's found on the District's own website.

MR. ANDES: No objection.

MS. TIPSORD: I was going to say, I think the best way to handle that is when you get ready to do your final comments, print it out and include it as part of your final copy. And then what the numbers are -- these are the numbers as of this date and cite back to the record. But I think you will have to -- I mean they will have to be placed into your final comment, but I don't think there's any problems with you using data that's still out there in the public domain. When you put it in your public comment, it becomes part of the Board's record.

MR. HARLEY: Thank you. Thank you for the clarification and thank you.

MS. ALEXANDER: Unless there are other follow up questions, I also am somewhat more impressed with Mr. Andes' questions then he appears to be and I would like to refer to pre-filed question 21A concerning peer review for Dr. Gorelick. The question is in your testimony you referenced a peer review study of diarrheal illness waste in children and the question is, who were the peer reviewers of the study and what were their credentials? Do you know the answer to that or were the peer reviewers anonymous?

MR. GORELICK: The process for a peer review for a scientific journal is -- this practice is changing a little bit, but by and large it's conducted anonymously. Peer reviewers are generally selected by editors as expert -- disinterested experts who will review a paper to look to -- to critique the paper and look for methodologic flaws to decide whether the methods were appropriate, whether the conclusions are valid, et cetera.

So most people feel that that process is best done anonymously because if people know who the reviewers are, they may be less

likely to be critical. So all the journals are interactive with -- I think there's one where the peer reviewers can identify themselves if they choose to, but they're not required to. But by and large, they're required to be anonymous. They're selected on the basis of their areas of expertise and most of the time we are asked as peer reviewers to identify whether we have any potential conflicts of interest, either financial or scientific.

If somebody is doing a study where they're criticizing a study I've done, I would have to identify that I might have a conflict of interest or if it's somebody from my own institution, I'm generally not permitted or certainly not from within the department to review those papers. That would be considered a potential conflict. So it's anonymous disinterested experts.

MS. ALEXANDER: Would you say as a general matter that the presence of absence of peer review is an important factor in assessing the credibility of any scientific study?

MR. GORELICK: Yes, I think that's

critical. I mean, Peter, you can maybe comment on this as well, but this is a well established part of the scientific process as we currently practice it is that when a study is done and we talked about, you know, a number of studies, the CHEER study and a number of others.

There is no perfect study, but being able to really identify what are the strengths of the study, what are the weaknesses on the strengths on balance, counteract the weaknesses, can the conclusions be supported? I think an independent review of that is absolutely critical to ensure that what gets released out into the scientific literature is valid.

MS. ALEXANDER: Do you have an understanding of whether the Districts risk assessment is being or has been peer reviewed as you've just defined in the process?

MR. GORELICK: I'm not a hundred percent sure, but my understanding is it's not peer reviewed. It wasn't fully submitted for publication. It was an internal document.

MR. ANDES: If I can add to the record? I believe there was testimony to the

effect that articles are being prepared and being submitted for publication at this point and subject to peer review.

MS. TIPSORD: Are there any other follow ups on the District's questions? All right. I think we're ready for the IEPA's questions.

MS. WILLIAMS: Good morning --

MS. TIPSORD: You'll have to speak up. The mic isn't going to do any good. It just makes everything blend together worse.

MR. WILLIAMS: Good morning. I believe Dr. Gorelick has answered my pre-filed question one and I think Dr. Orris and maybe Dr. Dorevitch as well -- and number three. So I'm going to ask pre-filed question number two. What conclusions have you drawn from the tables you include as Exhibit 3 to Dr. Gorelick's testimony and exhibit 2 to Dr. Orris' testimony?

MR. ORRIS: Number two was my CV.

MR. WILLIAMS: Did I get it backwards?

MS. TIPSORD: The Urban Rivers Analysis and --

MR. ORRIS: Right. I commented before on the levels, the general levels of these bacteria in these documents and, indeed, orders of magnitude above what was previously studied in some of these small studies of recreational use of waters?

MR. GORELICK: I would conclude the same. That these levels are very high and these are levels that in the literature have been associated with risk from exposure albeit it's not studied in the sense of exposure for secondary recreation, but these are levels that would indicate likely very high levels of pathogens. And I would also conclude that the other cities that are treating their water differently have much lower levels and presumably much lower risk.

MR. ORRIS: And to go back again for a moment. The studies identified recreational use of waters that were far less contaminated, identified the integration within the bodies of the people using it -- of the pathogenic or even the indicator bacterias and finally correlated illness with that and in some of the studies even on a ghost response basis. And this is all at

contamination far lower than is documented here for the CAWS.

MR. ANDES: If I can follow up on that? You're not speaking of contamination with regard to actual pathogen levels, you're speaking of indicator bacteria levels, correct?

MR. ORRIS: Each one looked at a different set and I believe we are talking about a mixture of both basically.

MR. ANDES: Are you aware of any studies showing increased risk due to exposure? I'm going to go back to the risk assessment done by Geosyntec, which reported certain levels, non-detect and low -- of actual pathogens. Are you aware of studies showing that exposure to pathogens at those levels creates increased risk in the secondary contact or even swimming?

MR. ORRIS: I would defer to Dr. Gorelick and I thought his analysis was quite persuasive vis a vis that those indicators and the correlation between the pathogenic bacteria and the indicator bacteria --

MR. GORELICK: Right. If there is no -- if a particular pathogen is not present in

the water, then there would be no risk from that pathogen. It would indicate there is no risk from other pathogens that may not remeasure.

MR. ANDES: Okay.

MR. WILLIAMS: Do you have the pre-filed questions in front of you? Question four asks Dr. Gorelick -- gives him an opportunity to correct a typo, I believe.

MR. GORELICK: Yes, that would have been more hazardous and it's on page 11 of my testimony or is a word so spell check doesn't pick that up.

MR. WILLIAMS: Question five for either of you. Why would the District's CHEER study not fully reflect the potential danger of unintended ingestion and significant exposure to especially vulnerable individuals? And question six is who are you referring to when you say vulnerable individuals.

MR. GORELICK: Again, vulnerable individuals would be children. Children are considered more vulnerable for a number of reasons. Again, there's no data from secondary recreation, but from swimming we know they swallow

more water when they're swimming. I can tell you antidotically, having teenagers they're not particularly careful about anything. Unfortunately, the exact amount of an organism that you need to ingest to become ill isn't known for the large majority of organisms, but there are at least some organisms for which there is data that is actually lower for children.

Many of these organisms are organisms that prior infection or prior exposure can induce partial or complete immunity. So somebody who either has not had an opportunity to be exposed because they're a child and they haven't been around as long or somebody who is immune compromised, for example, someone with immunosuppressant medications, somebody with an immune disorder, whether it's acquired like aids or inborn, would be at higher risk because of the lack of that immunity.

There's only one study that's actually looked at children specifically in a recreational context and, again, I can see that this is swimming, but they show that children were, in fact, at higher risk than adults and both

of them were at higher risks than controls from a swimming exposure. So I'm focusing on children because that's the nature of my business. I take care of kids, but I believe immune compromised individuals, it would be the same.

All of those taken together, the power to identify a risk in those populations is lower than the power of the full study because almost certainly not all of the subjects in the study will be children. I'm sure there will be some adults. It may be a small minority of the children. It may be a healthy minority. It may even be a small majority, but the sample size for those populations will be smaller than for the full population and, therefore, the ability to find a risk in them will be reduced.

MR. ANDES: If I can follow up? On the immunocompromised people, given that we've talked about combined sewer overflows, storm water runoff, wild life contributions, other significant contributions of bacterial loadings to the CAWS will remain independent of what happens in the rulemaking, wouldn't you advise immunocompromised people not to get in this water body at all,

strongly advise them?

MR. GORELICK: No. My advice would be, you know, there are a lot of people walking around with immune compromises. I wouldn't advise them to stay at home in a bubble. They're going to go out and do activities. Whatever can be done to minimize those risks of activities should be done. If those risks can be quantified, then we can decide whether the risk is sufficiently high and that given person should our shouldn't engage in it.

MR. ANDES: From a precautionary standpoint, wouldn't you tell that kind of person to find another type of recreational activity, perhaps one on a water body that didn't have those issues?

MR. GORELICK: They would be better off -- you're right that they would be better on a water body that doesn't have those issues. If the CAWS could become one of those waterbodies, that would be ideal.

MR. ANDES: Should we spend public resources and potential carbon footprint impacts of being induced to protect those people who are

particularly sensitive?

MS. ALEXANDER: I object to that question because this witness is not being offered to testify about carbon impacts or cost or anything like that. You're going way outside the realm of his expertise.

MR. GORELICK: I would say in general, it's up to regulatory bodies to decide what should be done to protect the public at large and vulnerable populations. I don't think the fact that it's a vulnerable subpopulation would invalidate their right to be protected from public harm.

MR. ANDES: Even though they can easily avoid that risk?

MR. GORELICK: I'm not even going to go into things like the American Disabilities Act. People with disabilities can avoid public buildings. We've made a decision that we're going to accommodate them. So, again, that's not an area for epidemiologists or clinicians. That's for regulatory bodies to decide.

MR. ORRIS: This question was asked of both of us. I'm a little nervous about several

pieces of terminology. First of all, as you've defined these other sources for this contamination much of it is transient. So one might say just as we close the beach in Chicago to everybody one might say on advice to certain patients don't use the waterways over this period of time and that's useful.

Second of all, obviously choosing a waterway in which one has disinfection is safer for the group as a whole, but I'm really nervous about the terminology those people. It is a terminology that tends to set up somebody out there sitting in the back row as not part of us.

In general, we find that those people are all of us. Who is immunocompromised? And you cannot use any kind of wording that might signal other things. Yes, immunocompromised takes into account people with AIDS. It also takes into account people with rheumatic diseases that are on Pretesone. It may take into account somebody who is recovering from an asthmatic attack on Pretesone. It may take into account others on a variety of steroids in a variety of situations. So those people may tend to be all of us in one

way or other.

MR. ANDES: My question was, if I can follow up, is as public health professionals, wouldn't you advise those people on those medications and other conditions -- if we're talking about -- you've talked about risks on this water body. And there would be risks remaining that aren't present on other water bodies even if disinfection is practiced. And I'm trying to ask the question of wouldn't you advise those people to avoid this particular risk if they had other alternatives?

MR. ORRIS: Again, you're postulating other alternatives. You're assuming people will leave their communities to exercise. You're balancing the public health value of certain kinds of exercising, et cetera. All of these questions are both translated for an individual by their own physician, but from a public health point of view as we've previously discussed. A lot of these things do not have individual solutions so, for instance, let's look at mercury on the Great Lakes and fish. We target our information to women who are thinking about

getting pregnant within the next year or two. Obviously, that's a rather difficult population as they don't self-define themselves that well. So we broaden that out to women in reproductive years.

We target the information and our prevention strategies with respect to urging them to eat fish low in mercury, high in ammonium three fatty acids. The problem is you can't identify that as we well defined a few years ago. You go to a restaurant and you have sushi, one fish will have a high level and the next piece looking exactly like it will have a lower level of mercury. The only way to do that process with respect to mercury and protect that subgroup that we are particularly concerned about, pregnant women, because the neurotoxic effect on the child is to reduce the amount of mercury in fish which is why that is the public health advice in general how do we reduce the mercury of fish? How do we catch the mercury coming out of our fossil fuel plants? How do we remove the mercury from health care and other things of the sort? A universally accepted consensus because of its effect on that

population. So that is the choice that the Board has to make and has to balance.

MR. ANDES: And isn't part of the balance there the fact that fish is an affirmative good, that public health officials generally want people to consume? So we're trying to balance a couple of different factors, which is a little different than a situation of should we -- what public resources should we spend -- let me finish. What public resources should we spend to address bacterial issues on the CAWS with respect to the extent of the risk that is being addressed and, as you have both said, balancing all of these factors and determining how to best spend these public resources, which could be spent also for other purposes?

MR. ORRIS: And that's what I really don't understand about the position the District is arguing here, I guess. You know -- and without discussing the public health impact of the lack of exercise, the need to get people out and more exercise and more involved, the need to use our natural resources in Illinois, the possibility of using it by the whole population -- putting that

all aside, it would appear and I may be wrong on this because I'm not part of the whole process, the argument you're making is purely an economic argument that says the only reason we're concerned about this is from an economic point of view.

This in the face of a -- again, a well acknowledged risk related to polluted water from the time of antiquity, well documented studies, not many of them, that says if you recreationally use polluted water, you get it in your system and it correlates with disease and now you're saying once again we have to reprove that for these particular rivers just around Chicago is beyond me why you would raise that level of proof in the face of such a public health well established consensus.

MR. ANDES: But beyond the fact that the first course object to the characterization of the District's testimony which definitely is not that economics is the reason -- economics is not the sole reason for not regarding disinfection. It's simply not accurate at all, but, again, as you've testified, correct me if I'm wrong. The studies you talked about do not deal with

secondary contact recreation as practiced in the CAWS and you have not -- and correct me if I'm wrong again. You have not discussed any way to quantify risks from these treatment plants which is where most pathogens are already removed relative to other sources including wildlife, combined sewers and storm water runoff.

MS. ALEXANDER: I'm just going to object to that question. I know you asked him to correct you, but I think it's a very vague comparison to say that the studies don't deal with recreation as practiced in the CAWS. I think you need to define that further. With that said, since you've offered it to the witness, you may answer.

MR. ORRIS: What she said. I mean you're incorrectly characterizing what I said during the whole morning so, yes, you're wrong about both of the characterizations you made, but I don't want to repeat all the testimony from earlier in the day for the benefit of the Board.

MR. GORELICK: If I could get back to this business of vulnerable populations. An analogy I would offer is what's been done with air

quality. Air quality now in general is much better than it was 30 years ago. Thirty years ago probably most people with asthma would have been advised not to go out and exercise at all in certain metropolitan areas because the air quality every day was sufficiently bad. That they didn't want you to do that.

We're not at the point where in most metropolitan areas where there are ozone alert days where there are certain days of the year -- because we haven't been able to clean the air completely, that people with asthma or other respiratory conditions are advised not to exercise, but the whole rest of the year they can. So instead of saying we're never going to be able to get rid of all the problems so let's not clean up the air, we've managed to decrease the risk to everybody. We've managed to get the risk to a manageable point for a vulnerable subpopulation. The analogy here would be if we can allow people to recreate except the couple of days after a sewer overflow and maybe there would be a health warning with, isn't that a reasonable step to take? And that's been a big pubic health advance

in air quality and I would hope that the Board would consider a similar approach for the water quality.

MR. ANDES: Let me ask. Part of the basis for what you're assuming is the -- mentions that the facts of these other sources are transient. Have you reviewed the testimony of other witnesses indicated in the fact that loadings from wet weather, the last four days after and at significant portions of the year are effected by wet weather loadings?

MR. GORELICK: I'm not familiar with that in the CAWS specifically.

MR. ANDES: So it's hard to say really, correct me if I'm wrong again, it sounds like it's hard to say to what extent the risk on the CAWS would be reduced by disinfection because you don't know the extent of the risk posted by other sources versus the --

MS. ALEXANDER: We need clarification. Hard for anyone to say or hard for this witness to say? This witness has testified that he has not reviewed all the information about exactly how long wet weather events are measured

on the CAWS. So I don't think he can answer it at all. That's a separate question from whether anybody can.

MR. GORELICK: I cannot answer that question.

MR. ANDES: Thank you.

MS. TIPSORD: Ms. Williams.

MR. WILLIAMS: Just a couple more follow up. Have one of you reviewed Dr. Dorevitch's testimony? Has anyone reviewed that?

MR. ORRIS: I reviewed it briefly, not entirely.

MR. WILLIAMS: If you don't recall the answers to this, that's fine, but I seem to recall Dr. Dorevitch was asked a similar question that you two were just asked about whether or not he would recommend his patients recreate in the CAWS. Do you recall what his answer to that was?

MR. ORRIS: No. What did he say?

MS. WILLIAMS: That's fine. We'll let the transcript speak for itself. I don't recall.

MR. WILLIAMS: Are either of you familiar or able to articulate the Agency's

proposal with regard to control of bacterial contamination in this rulemaking?

MR. GORELICK: The specifics you mean?

MR. ANDES: You're asking them to characterize --

MR. WILLIAMS: Do they know? Are they familiar with it? Do they know it's in the proposal?

MR. GORELICK: Just in some sense which is that disinfections be required to get below a certain level of indicator organisms as I understood it.

MR. WILLIAMS: So question 17 from the District -- I'd like to go back to one that I thought I liked that I skipped. Do you believe that the proposed fecal coliform limits, which as you described requires disinfection to get below a certain level, for the waste water reclamation plants will sufficiently protect the general public?

MR. GORELICK: Again, that's sufficient -- I think it's a regulatory question. Will it decrease at the risk of the general

public? I think it will.

MR. WILLIAMS: Okay. That's all I have for these witnesses. Thank you.

MS. TIPSORD: Anything else for Dr. Orris or Dr. Gorelick?

MR. ANDES: We're fine.

MS. TIPSORD: Thank you, both, very much. We appreciate your testimony. And with that, let's go ahead and take lunch and come back in about an hour and we'll go to Dr. Van Bonn.

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

MS. TIPSORD: Good afternoon, everyone. I hope you had a nice lunch and I think we're ready to start now with the testimony of Dr. William Van Bonn. Is it Van Bonn or Van Bonn?

MR. VAN BONN: Van Bonn.

MS. TIPSORD: From the Shedd Aquarium. Ms. Meyers, would you like an opening statement or are you ready to proceed?

MS. MEYERS: We're able to proceed.

MS. TIPSORD: If there's no objection -- Wait. Swear him in first.

WHEREUPON:

DR. WILLIAM VAN BONN

called as a witness herein, having been first duly sworn, deposeth and saith as follows:

MS. TIPSORD: We will enter the testimony of Dr. William Van Bonn as Exhibit 240 if there's no objection. Seeing none, it is Exhibit 240.

(Document marked as Group Exhibit No. 240 for identification.)

MS. TIPSORD: And I think we have questions pre-filed from the District. Mr. Andes.

MR. ANDES: Thank you. Good afternoon. On page one of your testimony, you state that the massive influx of effluents from waste water treatment plants is one of the notable human impacts on the CAWS, but you also mentioned reversing the flow of the Chicago River, which obviously led to the creation of the Chicago area waterways. Did you consider the relative impacts on wildlife or recreation of the system versus the waste water treatment plants?

MR. VAN BONN: Yes, I did, which is

the reason I mentioned the reversal, the flow reversal of the river, but my testimony really is to the risks of undisinfected effluents discharged into those systems.

MR. ANDES: Do you know what the present levels of pathogens in the effluents are?

MR. VAN BONN: I am aware of a risk assessment study that was conducted where there were some pathogens innumerated. I don't know of current levels. I don't have today's numbers, but I'd be happy to look at them.

MR. ANDES: Are you aware of the conclusions of that risk assessment in terms of the significance of risk on the waterways?

MS. MEYERS-GLEN: I'm sorry. I'm trying to track where you are as far as questions. You seem to be bouncing around a little bit. Where are you as far as questions?

MR. ANDES: Question number four was about the present level -- 4A was the present level of pathogens and then I was following up from that because Dr. Van Bonn referred to the risk assessment report. So I was asking some questions what else he might be aware of in the

risk assessment report.

MR. VAN BONN: I took a cursory look at the risk assessment report to familiarize myself with what pathogen had been reported. I'm not familiar with the overall report in detail.

MR. ANDES: Okay. On page three, you stated the natural systems are complex and subject to multiple factors. Can you explain what those factors are?

MR. VAN BONN: Natural systems, I believe, are very complex and I think it's very difficult to characterize them completely. I think that when people discuss natural systems, they tend to break them down into complex parts and they talk about the biotic components or the abiotic components or a variety of different cycles, the nitrogen cycle, the carbon cycle, these sorts of means to try to characterize a very, very complex system and it's not easy to capture it in one simple explanation. I do have -- there's some good examples of the people that have tried to characterize samples or systems as natural systems. One is a paper that describes the human influence on land based systems, but

demonstrates or diagrams some of the inputs to the system and how complicated it can be and that's a paper by Papislol (phonetic).

MS. MEYERS-GLEN: And I'd like to offer, just so you all can see what he's talking about, as an exhibit entitled Unhealthy Landscapes Policy Recommendations on Land Use Changes --

MS. TIPSORD: Stacy, can I get a couple more copies?

MS. MEYERS-GLEN: Absolutely. I'm sorry. Land Use Change and Infectious Disease Emergence.

MS. TIPSORD: If there's no objection, we will mark this as Exhibit 241. Seeing none, it's Exhibit 241.

(Document marked as Group Exhibit No. 241 for identification.)

MR. VAN BONN: So there's -- that has a diagram on page 1096 there that -- this is one example of -- attempts to characterize very complex natural systems and, again, this example happens to be a land use example. There are similar attempts with marine systems. There was a

recent article in BioOne that describes -- it doesn't have any diagrams, but it describes similarly the influences of many different factors, inputs, to natural systems. And it is directed specifically towards marine environments.

MS. MEYERS-GLEN: Actually, if I could just real quickly. I should have done this all in one swoop. I'd also like to introduce that article into evidence at this time.

MS. TIPSORD: If there's no objection, we will enter Sea Sickness, the Upsurge in Marine Diseases by Yvonne Baskin as Exhibit 242 if there's no objection. Seeing none, it's Exhibit 242.

(Document marked as Group Exhibit No. 242 for identification.)

MR. ANDES: How would these factors and analyses pertain when we're talking about a non-marine extensively altered environment, including waterways that were artificially created?

MR. VAN BONN: If those waterways are continuous with or connected to other

waterways, I would expect a lot of natural influences to be very similar, the inputs to be very similar to the systems. You know, any of those that are connected are going to have life that is able to move back and forth between different components of the systems.

MS. MEYERS-GLEN: If I may follow up with something? In looking at marine systems and the complexity for potential movement in conversation, how would that compare to, say, terrestrial --

MR. VAN BONN: Aquatic systems both marine and fresh have a very high density of microbes in the water column. As a general rule, there's lots and lots of microbes in the water column. So it's even more -- my understanding is it's even more microbial rich than, say, terrestrial environments.

MS. MEYERS-GLEN: And is that supported by the BioOne article?

MR. VAN BONN: Yes.

MS. ALEXANDER: What's the difference when you're looking at pathogens in a marine environment and that in a fresh water

environment as far as pathogens being able to survive and move around in either one of those environments?

MR. VAN BONN: Pathogens that are adapted to a particular environment will have a harder time -- well, sometimes will have a harder time in the opposite environment. So fresh water adapted pathogens oftentimes will have difficulty in marine or salt water environments and vice versa. There are always pathogens that can do both.

MS. MEYERS-GLEN: I'm sorry. I wasn't clear. If you have a -- say, the same form of giardia in a marine environment in a fresh water environment, would there be as far as explaining -- does the density of the richness of the pathogens -- let me rephrase that. I'm not being clear. Sorry. If you have a certain form of giardia that's within a marine environment, how would that translate if you had concerns with a fresh water environment?

MR. VAN BONN: I'm not sure I still understand the question. Giardia can be found in both of those environments.

MR. ANDES: We can move on. On page four, you make a statement concerning how disinfecting waste water will lead to a more natural balance, healthy ecosystem. Can you explain how disinfecting the treated waste water at the District's plants will lead to a more natural balance of aquatic ecosystem into the CAWS?

MR. VAN BONN: I don't believe it's natural to collect and hold and consolidate waste and then discharge them as undisinfected point sources into a water system. If that practice is discontinued, it will more approximate a natural system.

MR. ANDES: You're aware that this isn't the national system, right? So removing --

MS. MEYERS-GLEN: Objection. There was no answer and I would like for the witness to be able to answer before --

MR. ANDES: Sure.

MR. VAN BONN: I have a question. What are you referring to as this?

MR. ANDES: The Chicago Area Waterways System, the proposed waterway is about

70 percent treated effluent from the District's plants.

MR. VAN BONN: Are contiguous with the surrounding environment, the natural system or --

MR. ANDES: Not really. We're talking about this system as a whole. We're not talking about Lake Michigan. We're not talking about the Mississippi. We're talking about this system, which is extremely artifical. So what I'm trying to understand is what is the benefit besides the fact that it's not natural to have waste water treatment plants, how is specifically disinfecting the treated waste water, biologically treated waste water, from the District's plants going to improve the aquatic ecosystem?

MR. VAN BONN: Disinfecting an effluent will change the characteristics of that effluent, which will more closely approximate a natural system wherever it's discharged. So I'm still not sure --

MR. ANDES: Do you have any evidence that current levels of bacteria in the water column in the system are adversely effecting

aquatic life in any way?

MR. VAN BONN: I am not aware of any specific survey or health assessment done on aquatic life or mammals in the area. The health assessment that I referred to and I'm familiar to -- familiar somewhat with, to my understanding, was a human health risk assessment and I'm not aware of any similar documents for animal health.

The animals are presumably living in that water whether -- regardless of how long the water has been there. It's contiguous with systems that have animals, natural populations in them. They're sharing it. The water is free to move.

MS. MEYERS-GLEN: If I may ask a follow up to that?

MR. ANDES: Sure.

MS. MEYERS-GLEN: You previously testified that you looked at MWRD's microbial risk assessment and saw pathogens listed in that report, is that correct?

MR. VAN BONN: Yes.

MS. ALEXANDER: And those pathogens were present in the treated effluent of MWRD

released into the Chicago area waterways, is that correct?

MR. VAN BONN: The tables that I reviewed had a number of sample cites listed which included upstream, downstream, outfall and I'm not sure where all the samples were collected, but my assumption is it includes effluent from the treatment plants.

MS. MEYERS-GLEN: And as an animal care specialist at Shedd and director of their animal health program, do you work with any species that are present in the CAWS?

MR. VAN BONN: At the Aquarium, we house a number of animals that are probably found in the CAWS, including the river otters. We also house closely related sea otters and we maintain those animals in artifical systems or close systems in the building.

MS. MEYERS-GLEN: And are their pathogens in effluent that you would be concerned with as far as exposure to river or sea otters within the Shedd Aquarium?

MR. VAN BONN: Yes.

MS. MEYERS-GLEN: Can you name a

few?

MR. VAN BONN: Well, giardia, as you mentioned, toxoplasmosis, toxoplasma. Both of those have infected sea otters and river otters.

MR. ANDES: If I can follow up? Are you saying you found toxoplasmosis in the risk report?

MR. VAN BONN: Say that again.

MR. ANDES: Or significant levels of giardia in the risk assessment report into the CAWS?

MR. VAN BONN: No, I said those are pathogens that have been described in effluent from treatment plants, to my understanding, and those particular pathogens can infect otters.

MR. ANDES: And how many river otters have ever been seen in the CAWS?

MS. MEYERS-GLEN: Are we going to question nine, is that where you want to go?

MR. ANDES: Yes.

MS. MEYERS-GLEN: Okay.

MR. VAN BONN: By whom?

MR. ANDES: I believe in your testimony you reference a single sighting of a

river otter.

MR. VAN BONN: My testimony references a sighting that was listed in the newspaper, several articles. The sighting was by a biologist from the Forest Preserve District to my understanding.

MR. MEYERS-GLEN: Actually, if we could figure out exactly what pre-filed question we're on that would be great.

MR. ANDES: Nine P.

MS. MEYERS-GLEN: Nine G. Okay.

MR. ANDES: Nine, generally, I would say. We're investigating river otters.

MS. MEYERS-GLEN: So actually if we're referring to the sighting --

MR. ANDES: We can start with the earlier questions first. What's the basis, first, that maybe river otters are indigenous particularly when significant portions of the system didn't exist previously?

MS. MEYERS-GLEN: I would object to that as your characterization of what did or did not exist. There's no basis for that and --

MR. ANDES: Really? There's no

basis for it?

MS. TIPSORD: I'm going to sustain and really, Fred, you need to stop. You're doing a lot of editorializing in your questions and leaving them hang there. So unless you want me to swear you in and start testifying --

MR. ANDES: No, that's fine.

MS. TIPSORD: I'm going to sustain that. I think the record speaks for itself as how the Chicago area waterway has been developed.

MS. MEYERS-GLEN: So question 9A?

MR. ANDES: Yes.

MR. VAN BONN: Nine A as listed in your pre-filed?

MR. ANDES: Yes.

MR. VAN BONN: My feeling that the CAWS is contiguous with natural waterways within the known historical geographic range of otters and that there are a number of people who can attest to the presence of otters here historically -- here historically that otters have been present almost everywhere in North America except the desert southwest and the arctic. So otters historically have been present in this

geographic region.

MR. ANDES: Okay.

MS. MEYERS-GLEN: Actually, there's an article right here. At this point, in order to basically exemplify that point, there's an article by Bob Bluett, the Wildlife Diversity Program Manger of the Department of Natural Resources Division of Wildlife Resources that at this time I would like to ask to be admitted into evidence.

MS. TIPSORD: If there's no objection, we will enter this exhibit dated -- it's an exhibit dated January 2007. Outdoor Illinois -- In Illinois, the River Otter Got a Shove from Endangered to Common Status. Over-achievers. We'll admit this as Exhibit 243 if there's no objection. Seeing none, it's Exhibit 243.

(Document marked as Group Exhibit No. 243 for identification.)

MS. TIPSORD: I do have one clarifying question. Is this the entire article or the first page?

MS. MEYERS-GLEN: That's the entire

article.

MS. TIPSORD: Thank you.

MR. ANDES: So this article is not with reference to the one river otter sighting, correct?

MR. VAN BONN: This article is not in reference to the one river otter sighting that I mentioned in the testimony, correct.

MS. MEYERS-GLEN: This article is in response to question 9A, correct, and not the sighting that is a question further down in the pre-filed questions?

MR. VAN BONN: Correct.

MR. ANDES: So what you're saying is river otters are indigenous to the area, but the statement that river otters were indigenous to the CAWS you're assuming based on the fact that they were present throughout the area?

MR. VAN BONN: Correct.

MR. ANDES: What do river otters eat?

MR. VAN BONN: There are various reports of what river otters eat. They tend to be opportunistic. They eat fish, prey fish,

invertebrates. There are a number of places that describe things that they've been maintained on in captive settings. At the Aquarium, we feed them a wide variety of things. I believe they're fairly opportunistic.

MR. ANDES: Do you know if the CAWS would have adequate food sources for river otters?

MR. VAN BONN: I don't know personally what the status of the potential food sources are in the CAWS. I know that there has been previous testimony in the proceedings regarding different types of fishes in the CAWS. You'd need to speak to a field biologist about what is present and the abundance.

MS. ALEXANDER: Sir, if I may follow up. Are you familiar with articles pertaining to the river otter sighting on December 12th, 2007?

MR. VAN BONN: That's the one that's in my testimony, yes.

MS. MEYERS-GLEN: Correct. And that was a river otter sighting downtown behind the Lyric Opera House on the Chicago river system?

MR. VAN BONN: Yes.

MS. ALEXANDER: And in those

articles is there a wildlife biologist from Cook County Forest Preserve District referenced by the name of Chris Anchor.

MR. VAN BONN: Yes.

MS. ALEXANDER: And did he talk about food sources as far as having tons and tons of carp available within the Chicago River?

MR. ANDES: Are we going to introduce that document?

MS. MEYERS-GLEN: Yes. Absolutely.

MR. VAN BONN: That is his statement.

MS. MEYERS-GLEN: And at this time I'd like to introduce into evidence --

MR. ANDES: What kind of habitat do river otters require to be successful?

MS. MEYERS-GLEN: If we could just wait one second while I pass these out, I'd greatly appreciate it. There are two newspaper articles that are attached, that are both relevant to the river otter sighting that I'm sure we're going to get to next as well as this question at hand.

MS. TIPSORD: I've been handed what

has obviously been downloaded from the Internet with two river otters on the front. On The Otter Hand is the title of the first and Otterly Amazing. They're everywhere. Is the title of the second. The second is December 12th, 2007, by Maureen O'Donnell. The first is by Margaret Lyons also December 12th, 2007. If there's no objection, we'll mark these as Exhibit 244. Seeing none, they're Exhibit 244.

(Document marked as Group Exhibit No. 244 for identification.)

MR. ANDES: In terms of what they eat, it sounds like they're eating road kill?

MR. VAN BONN: I'm sorry. I had two questions in front of me.

MR. ANDES: In reading the article, it sounds like these otters are eating road kill?

MR. VAN BONN: I thought you asked what type of habitat was required.

MR. ANDES: I did. You can answer that one first.

MR. VAN BONN: The habitat is required to whatever will support their prey and

amphibious lifestyle.

MR. WILLIAMS: Can we ask what they eat?

MR. VAN BONN: What they eat?

MS. MEYERS-GLEN: What their preferred diet is.

MR. VAN BONN: As I mentioned, they eat a variety of food items. They eat fish, invertebrates, mollusks. They're fairly opportunistic. At the Aquarium, we feed them all of those things. With reference to the question about road kill, I believe there was a statement in that article or several of the articles where the -- Mr. Angus or someone has observed the animals feeding on road kill. I don't believe that they exist predominately on road kill.

MS. MEYERS-GLEN: If I may follow up? On the sighting along the Chicago River that was right by the Lyric Opera House, when Chris Angus had the opportunity to spy a river otter there, did he also see any evidence of what they would possibly be eating at that location?

MR. VAN BONN: This story refers to a cone shaped pile of fish scales and carp and

that's a typical otter behavior to -- at a feeding station is to have an accumulation of food items or debris in a pile and that's what he's referring to.

MR. ANDES: So all of this, including eight spots with otters in county waterways, this is all happening and the District is not disinfecting its treatment plants, right? The otters are coming back right now with no disinfection?

MR. VAN BONN: It appears that otters are here currently.

MR. ANDES: Do we have any indication that they're suffering adverse effects from lack of disinfection?

MR. VAN BONN: As I mentioned before, I'm not aware of any health assessment on these otters or any surveillance. Maybe there would be 50 times as many as there have been sighted if there was disinfection.

MR. ANDES: That would be speculation?

MR. VAN BONN: It would be.

MR. ANDES: Why would you believe

that the population would multiply if there was disinfection of the District's treatment plant? What's the technical basis for that?

MR. VAN BONN: I said in speculation. You mentioned that the otters appear to be here in spite of the fact that there's no disinfection and the question is if there were disinfection, how would they change that and I can't answer that.

MR. ANDES: Thank you.

MS. MEYERS-GLEN: Can you please discuss why you feel it is important that pathogens are eliminated through or reduced greatly through disinfection for otters in the CAWS? What's the general principal behind why this is important?

MR. VAN BONN: As I mentioned before, a natural system does not include collecting, consolidating, holding and then discharging billions of gallons of undisinfected sewage effluent. That effluent will contain pathogens, potential pathogens, organisms that can, in fact, infect and cause disease in animals and otters are one example. It's a health --

optimum health is about a balance as I mentioned in my testimony and with influencing some of those factors, the many factors of natural systems to upset that balance, tip the balance in favor of the organism or the pathogen and you will have something less than optimal health, which we refer to as disease or illness. If the effluent does not contain pathogens, the risk of that happening is reduced.

MR. ANDES: You're aware that there are other sources of fecal sources to the waterways such as combined sewers, storm water runoff and wildlife, correct?

MR. VAN BONN: Sure. Natural systems have many inputs. If the effluent is disinfected, the risk from the effluent will be reduced.

MR. ANDES: So you haven't assessed to what extent the risk is doing to its other sources and would remain even after the disinfection would have occurred?

MR. VAN BONN: No. I'm discussing the effluent risks. The other risks, I have not assessed.

MR. ANDES: And you actually haven't assessed the effluent risk itself in any quantitative way, correct?

MR. VAN BONN: Only in looking for documentation of the presence of the pathogens and having some sense of the volume of discharge.

MR. ANDES: When you're looking at the presence of pathogens and you refer to the risk assessment report, that's ambient water quality data from a variety of sources, right?

MR. VAN BONN: Well, as I mentioned, I'm not sure of all the sources of where they were. I looked at a number of tables that listed the presence of microbes that can be pathogenic and it appears to me that that's from effluent of the treatment plants.

MS. MEYERS-GLEN: If I could follow up? Exactly, do you know what charts you looked at as far as within the microbial risk assessment to show exactly where you found the pathogens within MWRD's effluent that was then discharged into the CAWS?

MR. VAN BONN: I looked at a number of the different charts. I looked at the report a

number of times, charts that I recall are --

MS. ALEXANDER: It's question four by the way.

MR. VAN BONN: -- the tables 3-2A, tables 3-3A through C and table 3-4A through C. All of those tables, I believe, show the presence of pathogenic microorganisms in a number of the samples.

MR. ANDES: From the waterways?

MR. VAN BONN: From a number of locations. All the locations listed in the tables.

MS. MEYERS-GLEN: Did you also have the opportunity to review testimony provided by Richard Lanyon, general superintendant of MWRD, in the proceeding?

MR. VAN BONN: I did, yes.

MS. ALEXANDER: And do you know -- I guess we're going back to question four.

MR. VAN BONN: I lost where we are.

MS. ALEXANDER: Sorry. We're on question four. As far as recalling his testimony, do you recall whether or not he made any statements regarding the fecal coliform units that

were found within the treated effluent of MWRD for the Calumet, Stickney and North Side plants?

MR. VAN BONN: Yes, I think you're referring to the testimony of Richard Lanyon on September 8th, 2008.

MS. MEYERS-GLEN: Correct.

MS. TIPSORD: Excuse me. For the record, that's Exhibit 60.

MR. VAN BONN: There were some questions about the number of microbes in the water, in the effluent, and there was a statement made that the fecal coliform colony forming units can be as high as 200,000 per 100 mill. and that was the same as for the treated effluent discharged at Calumet, Stickney and the North Side treatment plants.

MR. ANDES: So now you're saying your conclusions are not based on looking at the risk assessment report, but looking at Dr. Lanyon's testimony?

MR. VAN BONN: No. I'm not saying that. I'm saying that the conclusions are based on looking at both of them.

MR. ANDES: But I asked you what

data as to effluents you looked at and didn't you point to something in particular in your risk assessment report that was effluent data?

MR. VAN BONN: The tables that I referred to have microbes listed that are effluent data as I understand it.

MR. ANDES: And sample stations, am I right?

MR. VAN BONN: I don't know where all the sample stations are.

MR. ANDES: So you don't know where those were effluent pipes or not?

MR. VAN BONN: That's correct.

MS. MEYERS-GLEN: As a follow up. Was one of the columns on the charts that you looked at labeled outfall?

MR. VAN BONN: Yes.

MS. MEYERS-GLEN: And are you aware of whether or not that was taken directly at the outfall or near the outfall?

MR. VAN BONN: I don't know where the actual sampling sites are. I'm assuming the outfall means the output or the outfall.

MS. ALEXANDER: And did you rely on

that to determine whether or not the effluents in the outfall of those treatment plants potentially contained the pathogens that were on that chart?

MR. VAN BONN: Yes.

MR. ANDES: What specific pathogens were you talking about?

MR. VAN BONN: I'd have to look back at the charts, but if I can read them off of there.

MS. TIPSORD: Just for the record. We're talking about the risk assessment, which is Exhibit 71, are we not?

MS. MEYERS-GLEN: That's correct.

MS. TIPSORD: Then in that case, we need to know what page numbers you're looking at in both charts.

MR. VAN BONN: It's tables 3-2A, 3-3A through C, 3-4A through C.

MS. ALEXANDER: And, unfortunately, the copy of the risk assessment that I have that was tendered into evidence did not have page numbers. So I went by table numbers instead.

MS. TIPSORD: As long as we have table numbers, that's fine.

MR. VAN BONN: So table 3-2A lists a number of sampling sites, locations and dates and then has some numerical data for a number of potential pathogens, including salmonella, pseudomonas aeruginosa, aerucrocis (phonetic), fecal coliform and e-coli are also listed there.

MR. ANDES: And what information are you relying on here, which particular data are we talking about? I'm trying to figure out where you're identifying the risk to wildlife from the levels in the CAWS of indicators or pathogens or both.

MR. VAN BONN: Let's look at the North Side site. The location listed as outfall and then under pseudomonas aeruginosa, the value of 1,091.

MR. ANDES: Does pseudomonas come from soil?

MR. VAN BONN: Pseudomonas is a potential pathogen.

MR. ANDES: Does it come from soil?

MR. VAN BONN: Pseudomonas aeruginosa can come from -- is present in a lot of places, but you can probably find it in soil.

MS. MEYERS-GLEN: If I may, I have a follow up question here because I'm confused. Are you looking to these charts in response to the initial question, which was whether or not there are pathogens from MWRD's effluent in the CAWS or are you trying to use these numbers in the study as a basis for reducing the risk? What was the intent of your review?

MR. VAN BONN: The intent was to determine whether there were pathogens in the effluent. I'm not conducting a risk assessment. I don't know of one that's been conducted for nonhuman animals in that area.

MR. ANDES: So you're conclusions are based simply on the fact that pathogens are present?

MR. VAN BONN: Correct.

MR. ANDES: Okay.

MS. MEYERS-GLEN: And that was in response to the question of whether or not pathogens were present in the CAWS, correct?

MR. VAN BONN: Correct.

MR. ANDES: I'll move on. On question number 11, your testimony discussed

toxoplasmosis, which is caused by a parasite in cat feces and you state that cat feces in discarded litter is being found in contaminated waste water. Do you have any information showing that that parasite is present in treated effluent from waste water treatment plants?

MR. VAN BONN: There's been a lot of attention focused on the potential role of domestic cats in transmission of that particular parasite and the role of -- and in particular with relation to sea otter health. Toxoplasmosis is one of the leading causes of recognized death in sea otters and there are a number of investigations into the source of the oocysts that do suggest treated effluents may be a source.

MR. ANDES: Treated effluents may be a source. Do you have any report that documents that?

MR. VAN BONN: Well, there's a number of things. There's an article by Jessup in the Journal of the American Veterinary Medical Association that shows a spacial association with this disease and some waste water treatment plants.

MS. MEYERS-GLEN: Would that be Sea Otters in a Dirty Ocean?

MR. VAN BONN: Yes.

MR. ANDES: Is that regarding California discharges, California coasts?

MR. VAN BONN: This is a commentary in the American Journal of Veterinarian Medicine and it's specifically focusing on some issues in California, but it talks about ocean health.

MS. MEYERS-GLEN: If I may ask to enter this into evidence so that folks can see what we're talking about.

MR. ANDES: You're aware that ocean discharges don't always receive the same level of treatments?

MS. TIPSORD: Let me finish marking this as an exhibit and let her get back to her seat.

MR. ANDES: Okay.

MS. TIPSORD: If there's no objection, we'll mark commentary, Sea Otters in a Dirty Ocean, David A. Jessup and Melissa A. Miller and that's all I'm going -- et al -- from December 1st, 2007, as Exhibit 245 if there's no objection.

Seeing none, it Exhibit 245.

(Document marked as Group Exhibit No. 245 for identification.)

MS. TIPSORD: Okay. Mr. Andes, go ahead.

MR. ANDES: You're aware of the fact that this chart is -- marine discharges aren't always subject to the same treatment requirements including -- until sometime ago ocean disposal of raw sludges was allowed?

MR. VAN BONN: I'm not sure I followed the question. Can you ask that again?

MR. ANDES: Well, you're earlier statement was that you felt that there was evidence that treated effluents were causing this problem and I'm trying to understand are we talking about treatment, the secondary treatment of effluents discharged by the District or are we talking about ocean discharges that aren't always subject to those requirements?

MR. VAN BONN: What I said was there was some evidence, several pieces of evidence that suggest that effluent streams may be a source for

infection -- infected oocysts of toxoplasmosis. The one I gave you is one. There's another study by Kourenti, et al, in 2003 which talks about the infectivity of the oocysts in contaminated water after some aspects of treatment, after flocculation.

MR. ANDES: Flocculation would be a primary treatment?

MR. VAN BONN: Sure.

MR. ANDES: I'm asking about a secondary treatment.

MR. VAN BONN: I'd like to see that other study if it's available.

MS. ALEXANDER: Sure.

MR. ANDES: As to this one, I'm --

MS. MEYERS-GLEN: If we want to introduce that so you can see it --

MR. ANDES: Sure.

MS. MEYERS-GLEN: I would ask to enter into evidence Development and Application of Different Methods for the Detection of Toxoplasma Gondii in Water.

MS. TIPSORD: If there's no objection, we will mark Different Methods for the

Detection of Toxoplasma Gondii in Water by Kourenti, et al, dated January 2003 from Applied and Environmental Microbiology as Exhibit 246. Seeing no objection, it's Exhibit 246.

(Document marked as Group Exhibit No. 246 for identification.)

MR. ANDES: If I can direct your attention, a couple of statements look interesting in this document and perhaps you can comment on. One is on the bottom of 1649 and top of 1650.

MS. MEYERS-GLEN: I'm sorry. Which document are you referring to?

MR. ANDES: I'm sorry. The Initial Digestive Study, the Jessup paper.

MS. TIPSORD: Exhibit 245.

MR. VAN BONN: Say again the pages.

MR. ANDES: Bottom of 1649, top of 1650. It says in three small coastal communities near Morro Bay, California, feral and free roaming cats deposit an estimated 106.4 tons of feces per year onto land that drain immediately into the Pacific Ocean. And earlier it says introduced invasive terrestrial mammals are the primary hosts

for these protozoa. Is there anything there about treated waste water effluent?

MR. VAN BONN: Is there anything in those statements that you just read me --

MR. ANDES: About the threat to implicate treated waste water effluents?

MR. VAN BONN: In the statements that you just read, no, they do not mention treated waste water effluents.

MR. ANDES: When it then discusses on 1650 the unusual mortality event in 2003 and it says "blooms of toxic algae appear to have been an important contributor to this event and then nutrients, specifically nitrogen in the form of urea may trigger these events," that's not bacteria, right?

MR. VAN BONN: Urea is not a bacteria, correct.

MR. ANDES: Thank you.

MS. MEYERS-GLEN: In following up, does this article also list Morro Bay as being part of the problem?

MR. VAN BONN: Yes.

MS. MEYERS-GLEN: And do you have

information as to issues concerning the Morro Bay Waste Water Treatment Plant with regards to this article?

MR. VAN BONN: Yes, I'm aware of a waste water treatment plant at Morro Bay that is one of the -- its a waste water treatment plant is operating, as I understand it, under a waiver currently that was granted by the EPA after concurrence with the official wildlife service, but as a condition of that permit, the waste water treatment plant agreed to measures to minimize the input of cat litter box waste into the municipal water systems and accurately quantitated 2.2 tons of cat litter or feces that entered that plant directly on an annual basis. So I did that.

MR. ANDES: If I may ask a question about that?

MS. MEYERS-GLEN: If I could just follow up real quick about the article?

MR. ANDES: I'd like to follow up first.

MS. MEYERS-GLEN: Sure.

MS. TIPSORD: Go ahead, Mr. Andes.

MR. ANDES: Thank you. That's a

301H waiver, a waiver from secondary treatment?

MR. VAN BONN: I'm not sure what the waiver is.

MR. ANDES: Well, if that's a 301H waiver from secondary treatment that means that plant doesn't do the secondary treatment that the Districts --

MS. MEYERS-GLEN: Objection. This is testimony and not a question. He already said he was unfamiliar with what a 301H waiver is.

MS. TIPSORD: Actually, his answer was he didn't know what the waiver was. I don't think you let Mr. Andes finish. I'm sure he's going to ask the question.

MR. ANDES: Are you aware of whether that plant does secondary treatment?

MR. VAN BONN: I'm not aware of the level of treatment, no.

MR. ANDES: Would you like to follow up?

MS. MEYERS-GLEN: Thank you. Within the article, does it talk about in the Sea Otters for a Dirty Ocean talk about the fact -- does it talk about the practice of flushing cat litter

down the toilet as far as how waste water treatment practices were not designed to destroy the highly resistant oocysts of gondii and that would be toxoplasmosis? The one I think I would like to follow up with the Morro Bay treatment plant in response to them finding 2.2 tons of cat litter laden with cat feces in the effluent streams, did the US EPA recommend taking any measures to correct this?

MR. VAN BONN: I believe that's what I stated in there in their -- in the issuing of the permits were some conditions that included and addressed the fact that cat feces were known to enter that plant at a rate of 2.2 tons annually.

MR. ANDES: Can you tell us why the EPA didn't require them to install secondary treatment?

MR. VAN BONN: This is a temporary waiver to my understanding and they --

MS. MEYERS-GLEN: Actually, we might have it. At this time, since there seems to be -- I'm just going to enter this into evidence. We have it so if --

MS. TIPSORD: I've been handed a US

EPA Region IX letter to Mr. Roger Briggs of the California Regional Water Quality Control Board from Alexis Strauss, Director, dated January 8th, 2008. We will mark this as Exhibit 247 if there's no objection. Seeing none, it's Exhibit 247.

(Document marked as Group Exhibit No. 247 for identification.)

MS. MEYERS-GLEN: Isn't this a temporary waiver until the waste water treatment plant in question can actually bring online full secondary treatment, isn't that correct, in 2014? I refer to page four.

MR. VAN BONN: That's my understanding.

MS. MEYERS-GLEN: And in the interim what this waiver addresses is measures to try to temporarily reduce the effects of the kitty litter that's being flushed into the systems so as to reduce the toxoplasmosis issue that's present in that area?

MR. VAN BONN: The potential for toxoplasmosis infection, yes.

MR. ANDES: Am I correct that based

on the statements on page two that this plant does only partial secondary treatment and then blends that effluent with primer effluent that doesn't receive secondary treatment until 2014? The first full paragraph on page two.

MR. VAN BONN: It looks like that is correct.

MR. ANDES: So this is all blended effluent situation with some waste water that doesn't get secondary treatment. How do you relate that, how do you analogize that to the situation with the District's effluents that receive full secondary treatment? What does this tell you about the District's effluent?

MR. VAN BONN: That toxoplasmosis can be present in the influx to the plant, to the water treatment plant. That if not treated appropriately, can be discharged as well.

MR. ANDES: Do you have any information indicating that the District doesn't treat it appropriately in its secondary treatment facilities?

MR. VAN BONN: I can't speak to that.

MR. ANDES: Thank you.

MS. MYERS-GLEN: If I may follow up? What is the size of this Morro Bay plant?

MR. VAN BONN: In the discharge, annual average is a million gallons per day, I believe, for 2005, 2006.

MS. MYERS-GLEN: And how much effluent does the MWRD three treatment plants, to your knowledge, discharge daily into the CAWS?

MR. VAN BONN: To my knowledge, it's over a billion gallons.

MR. ANDES: And do you have any information as to levels of toxoplasmosis in that billion gallons?

MR. VAN BONN: No.

MR. ANDES: Thank you.

MS. MYERS-GLEN: To your knowledge, did the risk assessment look at toxoplasmosis?

MR. VAN BONN: I think a risk assessment should look at all recognizable risks to the health of the animals in the area.

MS. MYERS-GLEN: And when you looked at the MWRD risk assessment, did you see any indication that they had looked at toxoplasmosis

as one of the pathogens in the CAWS?

MR. VAN BONN: Yes, I believe there was data on toxoplasmosis and giardiasis included in the report.

MS. MYERS-GLEN: And that was within their effluent?

MR. VAN BONN: I don't know where it was.

MS. MYERS-GLEN: Okay.

MR. ANDES: Can we move on?

MS. TIPSORD: Yes.

MR. ANDES: Thank you. On question number 13, several cases are cited of otters in captivity or zoos having bacteria associated with problems. Is it correct that the sorts of bacteria in those cases were not waste water treatment effluents?

MR. VAN BONN: The source of the bacteria in those cases wasn't always stated or known, but exposing otters in a managed collection to an undisinfected waste water treatment plant would be against the best practices. In fact, the Animal Welfare Act dictates from marine animals and water quality standards that we must adhere to

in order to maintain acceptable water quality, microbial water quality and the limit that is set by that act is one thousand total coliforms per one hundred mills. So any time we see a number that approaches that, we will take action.

MR. ANDES: Thank you.

MS. MEYERS-GLEN: And can you please describe the difference between one thousand total coliforms and one thousand fecal coliforms units?

MR. VAN BONN: As I understand it, fecal coliforms -- I'm not a microbiologist, but fecal coliforms are a subset of the coliforms in the water column. As a clinician, practically the numbers that we see -- the total coliforms tend to be as a general rule higher than the fecal coliforms.

MS. MEYERS-GLEN: And you had mentioned that you would take action. Are you required to take action if the total coliform limit is above one thousand?

MR. VAN BONN: Yes. If it's above one thousand, we're required by law to take action.

MR. ANDES: What's the level of the

water quality requirement being proposed here?

MR. VAN BONN: I'm sorry?

MR. ANDES: What's the level of the effluent requirement being proposed here?

MR. VAN BONN: I don't think it's total coliform counts. That is the metric.

MR. ANDES: Fecal coliform, but it's not a thousand, right?

MR. VAN BONN: Different numbers.

MR. ANDES: Okay. And they're really different situations, aren't they?

MR. VAN BONN: They're bacteria in the water that are accounted and the total coliforms, we have a limit, a thousand per hundred mill. We do not have a limit specifically for fecal coliforms.

MS. MYERS-GLEN: Would fecal coliform be a subset of total coliform?

MR. VAN BONN: That's my understanding, yes.

MR. ANDES: If I can move to question 17? You cite a reference relevant to microbial source tracking and I'll introduce that to our article at this point. The name of the

paper is Determining Sources of Fecal Bacteria in the Waterways.

MS. TIPSORD: If there's no objection, I will mark Determining Sources of Fecal Bacteria in Waterways by Tao Yan and Michael J. Sadowsky, dated July 2005 as Exhibit 248. Seeing no objection, it's Exhibit 248.

(Document marked as Group Exhibit No. 248 for identification.)

MR. ANDES: Dr. Van Bonn, in the abstract of this report does it state the measurement of fecal indicator bacteria does not define the pathogens or define the pathogens or presence or define the sources of these bacteria?

MR. VAN BONN: It says fecal indicator bacteria have been used successfully as the primary tool for microbiologically based risk assessment.

MR. ANDES: Yes.

MR. VAN BONN: However, measurement of fecal indicator bacteria does not define what pathogens are present or define the sources of these bacteria.

MR. ANDES: Thank you. That's all the questions I have.

MS. MYERS-GLEN: Actually, if I could follow up with that. Why did you refer to this article?

MR. ANDES: I'm sorry?

MS. MYERS-GLEN: The article by Yan that you just had him read from. Why did you include this when you referred to it?

MR. VAN BONN: I referred to this article as an example of the difficulty of tracing back individual specific microbes to source. Because the system is so complex and the inputs are so complex that it can be very difficult to identify and a lot of attention is focused on it because it's important. It doesn't negate the statement that there are certainly pathogens in undisinfected effluents.

MR. ANDES: Dr. Van Bonn, that statement is providing as a broader viewpoint after you've made a statement that since cat feces and discarded litter have been found to contaminate waste, the effluent discharge by MWRD's three plants could also pose a risk of

toxoplasmosis to resident river otters in the CAWS and lower Des Plaines River.

We've just gone through the statements concerning the cat feces and toxoplasmosis and I haven't heard a basis for any actual finding that there's toxoplasmosis present in the treated effluents from the District that poses a risk other than your general statement about cat feces in Morro Bay, California. So tell me what and end with this statement at the end -- I'm trying to understand when the paper specifically says that fecal coliform doesn't tell you what the sources are or what pathogens are present, what the basis is for any statement you made that there's actually an increased risk here from the pathogens from the District's treatment plants, that disinfection would significantly reduce?

MS. MEYERS-GLEN: I would object to the first part of the characterization, the link between toxoplasmosis and potentially being found in effluents from MWRD's treatment plants. As far as the initial statement made by Andes, I would object to that. As far as the question, if you'd

like to answer.

MR. VAN BONN: I think there were at least two questions there or maybe I didn't catch it all. Can you ask the question again?

MR. ANDES: I'm not sure I can. I was quoting from your statement.

MR. VAN BONN: Tell me what it was then.

MR. ANDES: Perhaps we can simply go -- it sounds -- tell me.

MR. VAN BONN: Tell me -- you did quote from it. Tell me where it was again.

MR. ANDES: That was on the next to last page. We're talking about cat feces and toxoplasmosis. We've addressed that issue and then you say for a broader viewpoint, you cite this study. I'm trying to understand what does that study add regarding --

MR. VAN BONN: I think I can clarify this for you. What I say in the testimony is that cat feces and discarded litter has been found to contaminate waste water.

MR. ANDES: No information about the District's waste water, right?

MR. VAN BONN: The effluent discharged by the MWRD's three plants could also pose a risk of toxoplasmosis to river otters in the CAWS. It could. Cat feces can enter a waste water treatment plant. Cat feces could potentially be -- the effluent could be a source. And, again, otters are one example. Toxoplasmosis is one example. There's a myriad of things in raw sewage, in treated sewage, in undisinfected sewage.

MR. ANDES: Let me stop you there. That's the particular example that you cite, but yet what I was asking was is there any information indicating that while cat feces may come into the system, is there any information you have indicating that the District doesn't adequately treat for that in its secondary treatment systems which are not the same as what was present in Morro Bay?

MR. VAN BONN: I don't know either way. I don't know either -- I don't know whether it's appropriate or inappropriate for toxoplasmosis specifically.

MR. ANDES: Thank you.

MS. MYERS-GLEN: And you had mentioned that toxoplasmosis is only one of the pathogens of potential concern for wildlife such as river otters in the CAWS. If I may refer you to page six of your testimony? You quoted a veterinary article from 2004 stating that "to date, giardia of human origin appears to be the main source of water contamination and as such may impact negatively on ecosystems health leading to infections in aquatic wildlife." And did this article, did that also include sea otters?

MR. VAN BONN: Yes.

MS. MEYERS-GLEN: And would this potentially also be applicable to river otters?

MR. VAN BONN: Yes, they're both susceptible.

MS. MYERS-GLEN: And as a health care specialist, especially in your current position with Shedd, would you risk this form of giardia to river otters at Shedd?

MR. VAN BONN: Not knowingly.

MR. ANDES: And did you look in the risk assessment report at the levels of giardia detected or not detected in the CAWS?

MR. VAN BONN: I'm not sure I reviewed that part, but if it's in the report --

MR. ANDES: It is.

MS. MEYERS-GLEN: Did you determine whether or not giardia was, in fact, a pathogen within MWRD --

MR. VAN BONN: I believe it's listed as a risk in that report.

MR. ANDES: Listed as a risk -- I'm sorry. What does that mean? Listed as detected in ambient samples or you're not familiar, you're just not familiar enough with the data to say?

MR. VAN BONN: Correct.

MR. ANDES: Thank you.

MS. TIPSORD: Actually, I think we're about ready to wrap up. Is there anything else?

MR. ANDES: No.

MS. WILLIAMS: I have a little follow up.

MS. TIPSORD: You know what, I have to give the court reporter a couple of minutes to make a phone call. We'll take a break.

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

MS. TIPSORD: Ms. Williams, you had a few questions.

MR. WILLIAMS: Dr. Van Bonn, on page three of your testimony it has a heading that ends with the otter as an example. Are there any other aquatic mammals that are present in the CAWS to your knowledge? I'm just getting that you said the otter was an example. Are there other aquatic mammals in the CAWS waters that you know?

MR. VAN BONN: That have been documented in the CAWS itself?

MR. WILLIAMS: Correct.

MR. VAN BONN: I don't know of any other surveys in the CAWS specifically. I don't know of any surveys.

MS. MYERS-GLEN: Do you know personally though of any mammals that -- are there beavers in the CAWS?

MR. VAN BONN: I know that there are beavers geographically in this area, whether they fall within the waterways of the CAWS or not, I

don't know.

MR. WILLIAMS: And just out of curiosity, what temperature do you keep the water at in the aquarium where the river otters are kept?

MR. VAN BONN: I can't tell you the exact number off the top of my head. We have hundreds of systems and hundreds of exhibits.

MR. WILLIAMS: Is it ever allowed to get up to a hundred degrees?

MR. VAN BONN: No. I can say that for sure.

MS. MYERS-GLEN: If I can follow up briefly on that? We had touched on the fact earlier that Dick Lanyon had testified that MWRD effluent that's discharged into the CAWS can have upwards of 200,000 fecal coliforms units per hundred milliliters, is that correct?

MR. ANDES: Are we characterizing Mr. Lanyon's testimony.

MS. MYERS-GLEN: I believe that's what we had testified to before, but if you like, we can go back to the original transcript as far as characterizing that exactly as the way that

Mr. Lanyon said it.

MR. ANDES: Go ahead. We'll see if we need to.

MS. MYERS-GLEN: Okay. Do you recall that testimony?

MR. VAN BONN: I recall testimony by Mr. Lanyon about the numbers of fecal coliforms and the similarity to effluents.

MS. MYERS-GLEN: And do you recall the number of 200,000 fecal coliform units being used to characterize MWRD?

MR. VAN BONN: I remember that number as one of the numbers he cites.

MS. MYERS-GLEN: And if at Shedd the water in which the river otters or the sea otters reside had a fecal coliform count of 200,000 per one hundred milliliters, what would your response be?

MR. VAN BONN: We would definitely take action immediately to figure out why that number was reported. That's much, much higher than any numbers we normally see in any of the systems. So we would probably remove the animals immediately from the water and investigate how we

got a number like that.

MS. MYERS-GLEN: Would this number concern you?

MR. VAN BONN: Yes.

MS. MYERS-GLEN: Why?

MR. VAN BONN: Because it would suggest that there's been an influx of fecal bacteria into the water that the animal is living in.

MS. MYERS-GLEN: And why would that concern you?

MR. VAN BONN: Because that also suggests that there would be an influx of additional microbes along with the fecal coliforms that could potentially cause illness in the animal.

MS. MEYERS-GLEN: And, for example, what kinds of illnesses would you be concerned about with fecal coliform counts like that?

MR. VAN BONN: There could be any number of illnesses, but antritis, gastritis, pneumonias. There's a number of them. A lot of different potential --

MS. MYERS-GLEN: Would giardia and

cryptosporidium be among those?

MR. VAN BONN: Yes.

MR. ANDES: Dr. Van Bonn, have you looked in the risk assessment report at data in the ambient -- in the -- at various monitoring stations in the CAWS for bacteria?

MR. VAN BONN: I've seen the numbers reported in those tables. Wherever they were collected, I'm not --

MR. ANDES: And those are in situations where the District is not disinfecting, right?

MR. VAN BONN: I'm not sure of where the one that's labeled outfall comes from and at what point. There's a discussion about the total flow contribution to the CAWS from the treatment plants.

MR. ANDES: Have you assessed whether the pathogen levels in the waters cause any adverse impact to river otters in the CAWS?

MR. VAN BONN: I am not aware of any health assessment specifically focused on river otters in the CAWS.

MS. MEYERS-GLEN: Does that --

MR. ANDES: Reasonably --

MS. MEYERS-GLEN: If I may have a quick follow up to that. Does that alleviate any concerns that there may still be a risk to river otters by effluent coming out of MWRD's treatment plants?

MR. VAN BONN: No.

MS. MYERS-GLEN: Why?

MR. VAN BONN: Undisinfected effluent is going to contain potentially pathogenic microbes, bacteria, funguses, viruses, protozoa, metazoa, parasitus, that can potentially infect a number of animals, including otters.

MR. ANDES: And those same bacterial -- that same bacterial presence, they are also from other sources, including wildlife sources in the CAWS, correct?

MR. VAN BONN: There are many inputs into a system. Disinfected effluents will be one source.

MR. ANDES: And you have not assessed, am I right, the degree to which disinfection will reduce the levels?

MR. VAN BONN: Disinfection by

definition would reduce the number of pathogens in the effluent. Any disinfection would cause some reduction.

MR. ANDES: Have you looked at the report by Blatchley in terms of repair and regrowth of bacteria after disinfection?

MR. VAN BONN: I think you referred to it in one of the questions that we didn't get to.

MR. ANDES: Have you looked at that report?

MR. VAN BONN: Are we going to go back to that question?

MR. ANDES: Sure.

MS. MYERS-GLEN: What question are you on?

MR. ANDES: I don't know. I put it away. I'm really following up on the questions asked just now.

MR. VAN BONN: Effective disinfection will reduce the risk.

MR. ANDES: And you haven't assessed how much?

MR. VAN BONN: No, I'm not assessing

the magnitude.

MR. ANDES: Thank you.

MS. TIPSORD: Is there anything else for Dr. Van Bonn? All right. Thank you very much, Dr. Van Bonn. It's been a pleasure.

MR. VAN BONN: It has.

MS. TIPSORD: We will then adjourn and go -- we'll start again on May 5th and our witnesses that day will be Marilyn Yates and possibly Margaret Frisbie and Thomas Bamonte. Thank you very much. We'll see you all on the 5th.

STATE OF ILLINOIS.)
) SS.
COUNTY OF COOK)

I, Steven Brickey, Certified Shorthand Reporter, do hereby certify that I reported in shorthand the proceedings had at the trial aforesaid, and that the foregoing is a true, complete and correct transcript of the proceedings of said trial as appears from my stenographic notes so taken and transcribed under my personal direction.

Witness my official signature in and for Cook County, Illinois, on this 27th day of April, A.D., 2009.

Steven Brickey

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