BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:

WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR	)	
THE CHICAGO AREA WATERWAY	)	
SYSTEM AND THE LOWER	)	
DES PLAINES RIVER:	)	No. R08-9
PROPOSED AMENDMENTS TO	)	
35 Ill. Adm. Code Parts	)	
301, 302, 303 and 304	)	

REPORT OF PROCEEDINGS had before the ILLINOIS POLLUTION CONTROL BOARD held on September 24, 2008, at 9:00 o'clock a.m. at the Thompson Center, Room-2-025, Chicago, Illinois.

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

ILLINOIS POLLUTION CONTROL BOARD:

MS. MARIE TIPSORD, Hearing Officer

MR. TANNER GIRARD, Member

MR. THOMAS E. JOHNSON, Member

MR. NICHOLAS E. MELAS, Member

MR. ANAND RAO, Senior Environmental Scientist

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY:

Ms. Stefanie Diers

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BY: MR. FREDERIC P. ANDES

Appeared on behalf of the MWRDGC.

CHAIRMAN TIPSORD: Good morning. My name is Marie Tipsord, and I'm the Board hearing officer in this proceeding, water quality standards and effluent limitations for the Chicago are waterway systems and lower Des Plaines River, proposed amendments 35-Il Admn Code, 301, 302, 303. And 304. Docket number R08-9.

I'll introduce the panel this morning. To my immediate right is Dr. Tanner Girard, the lead Board member assigned this matter. To his immediate right is Board member Nicolas Melas, and Board member Andrea Moore will be joining us shortly. To my far left is Board member Thomas Johnson and to my immediate left is Anand Rao of our technical staff. I think that's all of us here today. This is day two of the fifth set of day of hearings to be held in this proceeding. We're going to continue with the District's testimony this morning and continued with Dr. Dorevitch and questioning by the IEPA.

With that, Dr. Dorevitch, I will remind you that you are still sworn in.

MS. WILLIAMS: Good morning, Dr. Dorevitch. Please let me know right away if

you can't hear me because I had some issues with that yesterday.

CHAIRMAN TIPSORD: That's why we moved you closer.

MS. WILLIAMS: We'll start off easily hopefully this morning with, it will be a housekeeping question. I want to turn to question 12 of our pre-filed question. And that question is, you testified that public comment 63 is from Daniel Woltering of WERF. Did you mean to say public comment number 66?

THE WITNESS: Yes.

MS. WILLIAMS: Question 13, I believe you talked about this yesterday, what water is the CHEERS study looking at for the general use recreators group? I know you mentioned Lake Michigan and Skokie lagoons yesterday. Are there others?

THE WITNESS: There are.

MS. WILLIAMS: Can you name them?

THE WITNESS: Tampeer Lake, Busse Lake, Crystal Lake, Fox River.

CHAIRMAN TIPSORD: You are going to have to speak up. We can't hear you at the end of

the table.

THE WITNESS: Tampeer lake, Busse Lake, Crystal Lake, in addition to the Skokie lagoons and Lake Michigan.

MS. WILLIAMS: And obviously you are referring to portions of the Des Plaines River that are not part of this study area that we are looking at in this rule making?

THE WITNESS: I'm referring to northern portions of the Des Plaines River, not downstream of the confluence with the CAWS system.

MS. WILLIAMS: Good. Thank you.

MR. ANDES: If I can follow-up just to expand on that a little bit.

Dr. Dorevitch, in terms of the Lake, you are looking at a series of locations along Lake Michigan, right?

THE WITNESS: Correct.

MR. ANDES: Do you want to lay those out?

THE WITNESS: Sure. At Lake Michigan we recruit people and make water quality measurements at 63rd Street, Montrose Beach, Montrose Harbor, Leon Beach, Diversey Harbor,

Fullerton Avenue, and -- by Northerly Island. I forgot the name of the designation for that beach, but -- I think Burnham Harbor -- no, not Burnham Harbor -- but at Northerly Island, at that site.

MS. WILLIAMS: Can you explain for us why you feel that the CHEERS study will "in several respects surpass USEPA's ongoing research about primary contact recreation known as the National Epidemiological and Environmental Assessment of Recreational Water or the NEAR Study?

THE WITNESS: Well, I don't mean to be criticizing the NEAR Study. We have the advantage of being able to develop the CHEER Study after the NEAR Study was piloted, developed, launched, papers published. So we had the opportunity to in some respects make additional types of water quality measurements and health measurements that they aren't making. The published papers that have come out of the NEAR Study have focused on enterococci and bacteroides in water samples measured by quantitative PCR measurements. We looked at a broader array of indicators, pathogen indicators, such as e-coli

and enterococci by culture, coliphages, malspecific and somatic and colophage stereotypes. We also measured pathogens in the water, such as girardia, cryptosporidium and neurovirus.

Second, the NEAR Study --

MS. WILLIAMS: Wait, let's stop there before we get to the next point to make sure I understand your first point.

So when you are referring to looking in a broader array of indicators, and then I believe you also said we look at more pathogens in the water?

THE WITNESS: We looked at pathogens, right.

MS. WILLIAMS: Explain to me, are you talking about the ambient monitoring or are you talking about the testing that's performed by people who are there or both?

THE WITNESS: I'm talking about the research team going out and collecting water samples.

MS. WILLIAMS: Okay. So in the NEAR Study the research team is only collecting --

THE WITNESS: I don't think they

are collecting pathogens, samples of pathogens analyses, and the pathogens indicators that they study are more limited. We study more indicators.

MS. WILLIAMS: Okay. Go ahead. Can you finish then with your second point?

THE WITNESS: Sure. The second point, the NEAR Study like most other studies of water recreation, rely on questionnaire data to determine if somebody gets sick. We do that as well, but in addition we attempt to collect clinical specimens from people who have gotten sick and to identify pathogens. So that is something that the NEAR Study doesn't do.

Third, in the NEAR Study, telephone contact is made between days 10 and 12 and participants are interviewed about their health status. We follow people on day two, day five and day 21 post-recreation or post-enrollment in recreation. So we're following them for a longer time period, which may make it possible for us to identify symptoms that develop late, potentially due to infections by giardia or cryptosporidium which have longer incubation periods. And because we're contacting folks three

times, we may be getting more accurate information about what happens in the initial days as well.

Fourth, the NEAR Study recruits family units and interviews family units, whereas we recruit and interview individuals. So although a parent may be asked questions about the health of their small children, in general each person is reporting their own health, and I think that may be an advantage. I am not sure how many parents of teens really know their child's bowel habits, let's say. So in that respect I think we may be getting more valid measures of development of symptoms and the timing of symptoms. So that's what I meant. I didn't mean it as a criticism of the NEAR Study.

MS. WILLIAMS: That's very helpful, Thank you.

Question 15 is referring to some testimony at the bottom of page 6. And I ask, can you point to a citation that supports the idea that U.S. EPA places considerable weight on epidemiological studies when establishing environmental standards?

THE WITNESS: Well, in terms of

water and air, it seems that the EPA does that. In 1976 the EPA, U.S. EPA proposed water quality criteria, and that was based solely on epidemiologic studies.

MR. ANDES: We actually provided a copy of that document yesterday. The 1986 Bacteria Criteria Document.

THE WITNESS: I'm sorry if I said --

MS. WILLIAMS: I thought he said '76.

THE WITNESS: Yes, there was an initial study based on the studies of Stevenson in the 1950's. In 1986 new recreational water quality standards were proposed, again based upon epidemiologic studies. This time the EPA studies by Dufour and Cavelli again in the late 70's. Again, even though there were other types of water quality research done at that point, it was strictly the epidemiologic studies that were considered. In 2000 under the Beach Act, again, the EPA initiated epidemiologic studies. In 2004 the EPA published a recreational water quality rule again, and this was based on the 1986 standard which was based on epidemiologic studies. Last month --

MS. WILLIAMS: Just to clarify, that's a draft, correct? That's the draft rule that you are referring to in 2004 or are you referring to something else?

THE WITNESS: I believe in November 2004 all states that hadn't already adopted the 1986 criteria or other criteria, I think there are 35 coastal states and great lake states and up to that point 21 had not yet adopted the 1986 criteria, and in November of 2004 they essentially, that was made law.

MS. WILLIAMS: Under the Beach Act?

THE WITNESS: Yes.

And last month the U.S. EPA and the National Resources Defense Council reached a settlement agreement, again, emphasizing the completion of epidemiologic studies, the support of ongoing epidemiologic studies. And even in the 1986 standards, it doesn't use the term only epidemiologic studies count, but it called for -- the document reviewed work to date in that area and stated that prior to the proposal there were limitations and studies of association between health and water quality were limited. So that

wasn't called an epidemiologic study, but that's what they were asking for and that's what the EPA did.

MS. WILLIAMS: So your conclusion is based upon what they had and what they relied upon developing?

THE WITNESS: Yes, I think it sort of speaks for itself that although there are risk assessments and pure microbial studies, it's the epidemiologic studies that seem to be the basis for the water quality standards.

MS. WILLIAMS: As far as you know, they haven't relied on risk assessment as a significant factor in developing their criteria to date?

THE WITNESS: For the -- I mean, it's really the 1986 standards that became the 2004 standards, and those were based on epidemiologic studies.

CHAIRMAN TIPSORD: Excuse me, Mr. Harley, you have a follow-up?

MR, HARLEY: Dr. Dorevitch, my name is Keith Harley. I represent the Southeast Environmental Task Force. Excited to see you

again.

Dr. Dorevitch, while we are on the topic of the role of public health studies, epidemiological studies and the development of rule making or regulatory standards, I don't believe we've had anyone in the record yet describe the concept of the Cautionary Principle. Are you familiar with the Precautionary Principle?

THE WITNESS: I'm familiar with the term, sure.

MR, HARLEY: Could you describe for the record what the Precautionary Principle is?

THE WITNESS: Well, I'm not really prepared to articulate in real specificity what it is, but I think in general terms it's a matter of playing things safe that, let's say, a new chemical comes into use, should it be widely used before there's substantial testing that goes on or should we take the precaution of saying, it may be harmful, let's first determine what the health risks are. So it's the view that play it safe rather than assume everything is benign, something along those lines.

MR. HARLEY: Another hypothetical.

If you are familiar with this, are you familiar with any situations where the Precautionary Principle has been applied in regulatory activity where you have already the presence of more toxins in the environment and also receptors, human receptors?

THE WITNESS: I'm not -- I don't really know the answer to that. I mean, no, I don't know about how the Precautionary Principle might have been applied in regulations -- in those, you know, in that setting that you are describing.

MR. HARLEY: So to be absolutely clear about your answer, you are not familiar of any instance in which the Precautionary Principle has been applied in regulatory activity where you have both the presence of pollutants or toxins in the environment and receptors?

THE WITNESS: I'm not sure exactly what you mean. I mean, in terms of water quality and air quality standards. Is there a way you can make your question more specific because I'm not sure what you mean?

MR. HARLEY: In your pre-filed

testimony you describe that you have extensive knowledge of rule making regulatory activity on both air and water side?

THE WITNESS: I'm not sure I said I have extensive experience in that, but I'm talking about how the EPA has used epidemiologic studies as the basis for regulation for both water and air.

CHAIRMAN TIPSORD: That's U.S. EPA?

THE WITNESS: U.S. EPA, right. I mean, are you asking about how does the EPA create safety factors to be more protective? I mean, I don't recall regulation where the term Precautionary Principle is applied saying that -- I'm not familiar with that.

MR. HARLEY: Thank you.

CHAIRMAN TIPSORD: Ms. Alexander, do you have a follow-up?

MS. ALEXANDER: This is Ann Alexander from the Natural Resource Defense Council. I want to follow-up with the settlement agreement with the Natural Resources Defense Council.

Have you read that settlement

agreement, Dr. Dorevitch?

THE WITNESS: Yes.

MS. ALEXANDER: Are you aware of anything in the settlement agreement that explicitly requires that U.S. EPA rely on the results of any one epi study in setting its standards?

THE WITNESS: No, the agreement called for the EPA to complete the ongoing epidemiologic study to support the epidemiologic study at Avalon, California, but it didn't explicitly say only one epidemiologic study counts and it requires it for regulation.

MS. ALEXANDER: And it required also that EPA review existing epidemiological studies, correct?

THE WITNESS: I believe so, but I don't have the document in front of me, but I believe it said that, yes.

CHAIRMAN TIPSORD: For the record, is this Exhibit 58 that we're discussing?

MS. ALEXANDER: Yes, it's Exhibit 58.

CHAIRMAN TIPSORD: I just want to be

clear that that is part of the record. So it's Exhibit 58. I apologize for interrupting.

MS. ALEXANDER: And it further requires before the promulgation of these regulations that the EPA will convene a scientific expert workshop to review the epidemiological study as part of the decision making process, correct?

THE WITNESS: Like I said, I don't have the document in front of me, but that sounds right.

MS. ALEXANDER: Okay, thank you.

CHAIRMAN TIPSORD: Ms. Williams?

MS. WILLIAMS: I believe yesterday you testified that you had reviewed the probabilistic Microbial Risk Assessment that was performed by the District; is that correct?

THE WITNESS: Performed for the District by Geosyntec, yes.

CHAIRMAN TIPSORD: Excuse me, again for the record that's Exhibit 71, I believe?

MS. WILLIAMS: I think that's correct.

Did you rely on that study at

all in developing your methodology for the CHEERS study?

THE WITNESS: No.

MS. WILLIAMS: I'm going to jump ahead to question 23 just because I think it flows. There's a quote in your testimony that "The conduct of an epidemiological and risk assessment in tandem is unusual and this opportunity to evaluate the strength and limitations of risk assessment methods is one reason there's considerable national interest in applying the final result of this research to the development of water quality regulations." Could you explain, just explain the statement a little bit. I think that will be helpful.

THE WITNESS: Well, there are many risk assessments, but there are very few epidemiologic studies. Epidemiologic studies are very costly, time intensive, labor intensive, and I think yesterday we reviewed the -- or at least mentioned a handful of studies that have been done, and there are many risk assessments which involve using mathematical models that can rely on epidemiologic studies for their inputs.

MS. WILLIAMS: So let me see if this is correct. So in theory after your study is completed, would you envision it would be helpful to rerun these models with new inputs and verify the results?

THE WITNESS: I think that may be helpful.

MS. WILLIAMS: And what do you think that would be helpful to show?

THE WITNESS: Well, I don't think it's a matter so much of showing anything, but I think that so little is known about incidental contact recreation that assumptions have to be made in developing the risk assessment models, and at the completion of our study some of the assumptions will be shown to be over, right on target or too conservative or not conservative enough. So I think that it may help produce results, not just in this setting, but in other settings about incidental contact recreation based on actual observations of hundreds of people.

MS. WILLIAMS: Can you specify inputs to that model that could be tweaked as a result of the epidemiological study you are doing?

THE WITNESS: I think -- well, the inputs include things like distribution of recreational activities, duration of recreational activities, the frequency of -- I believe frequency of swallowing water or capsizing. And those are areas that we'll have information about. Some aspects, such as the dose response -- let me back up.

I used the term yesterday dose response to mean something like concentration of microbes in the water as a predictor of health risks. In the risk assessment, they use dose response to mean how many cysts of giardia does somebody have to swallow before the probability of infection goes up. That's something that the researching, that the CHEERS research study won't be able to help with their input. How many neuroviruses in the water does somebody have to swallow before they get sick again. That's not something that the CHEERS study will be able to reduce uncertainties.

MS. WILLIAMS: Do you feel that the certainties of the science on the dose response inputs are good now or is more research needed in

that area as well?

THE WITNESS: I couldn't comment on that. I mean, I haven't gone through that literature about risk assessment regarding, you know, that kind of information, how many cysts or how many virus particles does somebody have to swallow. So I don't know if their assumptions are state of the science or more conservative or less or guesswork, I don't know.

MS. WILLIAMS: If you were going to rerun a risk assessment model, using some of the results of your study, would you think that it should also include ambient data that you've collected?

THE WITNESS: It could. It could.

MS. WILLIAMS: Can you think of anything else?

MR. ANDES: Anything else in his study that should be used in rechecking the risk assessment?

MS. WILLIAMS: Correct. Or any other input, right, that could be rechecked using outputs of his study.

MR. ANDES: Beyond water quality

data assumptions.

MS. WILLIAMS: I'm just asking if there's anything he may have left out of his answer.

THE WITNESS: No, I think those would be the ones, the recreational data, the sort of behavioral data, the water quality data.

MS. WILLIAMS: But the information you are developing about actually getting sick can't be used with this model?

THE WITNESS: No, it couldn't. The model could be compared to our results, but that isn't really an input to the model. That's sort of the final product of the risk assessment model.

MS. WILLIAMS: Thank you.

MR. ANDES: Let me clarify that. You wouldn't take numbers of people getting sick in an epidemiologic study and then plunk that into a risk assessment -- am I correct that the risk assessment gets to the same end goal but in a different way?

THE WITNESS: Correct.

MS. WILLIAMS: And if the numbers don't match, that indicates that the problem is

with the model, correct?

THE WITNESS: Well, it could be that one is wrong or both are wrong. I think the epidemiological study involves directly measuring something as opposed to modeling it. So you can call it my bias as an epidemiologist, but I would look at that as an opportunity to review the assessment, the assumptions that went into the model of the risk assessment and to see if there were any systematic errors in the epidemiologic study that produced a result that's, you know, discordant with what was found by the risk assessment.

MS. WILLIAMS: I'll go back now to question 16, which states, when you testify regarding methods of ingestion on page 6, you indicate that capsizing or falling into the water is an unlikely event. Can you tell me what you mean by that or what you base that on?

THE WITNESS: I base that on my own observations from working in the field, especially last season, and interviewing people. It's not based on analysis of the data. That question will be answered, but it seems quite uncommon.

CHAIRMAN TIPSORD: Mr. Harley, you have a follow-up question?

MR. HARLEY: In terms of your observations, what years are we talking about for your observations of users of the CAWS?

THE WITNESS: 2007 and 2008.

MR. HARLEY: And I believe you testified yesterday that the users that you will be following as part of your study will be 2007, 2008 and 2009?

THE WITNESS: Yes.

MR. HARLEY: In terms of the results of your study, will they be predicted in terms of what will happen in 2012 in terms of the types of uses of the CAWS?

THE WITNESS: If the uses are the same and the water quality is the same and the behavior of the people using the water is the same, yes.

MR. HARLEY: But what if any one of those three things is not true? What if the uses of the water are different in 2012?

THE WITNESS: You know, there could be any permutation of more use and less risky

behavioral or more risky behavior or increases in -- improvement of water quality in some areas and worsening in others, changes in rain fall patterns. So I couldn't tell you if in 2012 rates of illness may be higher, lower or the same, but it's conceivable that conditions can change and it could lead to different rates of illness in the future.

MR. HARLEY: And that would be true for every year subsequent to the completion of your study?

THE WITNESS: It would be true subsequent to the completion of any epidemiological study, that the NEAR Study is doing things right now on the Golf Coast and in Rhode Island, and next year at those same places they are not going to be out there doing that study, but the assumption is that dramatic changes aren't going to happen. And we can't continually conduct surveillance like this so that the findings should be generally applicable to future years, unless there are major changes, especially changes all in the same direction.

MR. ANDES: If I can follow-up on

that for a minute. A couple questions, Dr. Dorevitch. If you predict rates of illness, if you see rates of illness say per thousand recreators in the results from the epi study, would more people being on the water change the rate of illness?

THE WITNESS: More people being on the water may change the number of illnesses, but more people by itself shouldn't have an impact on the rate of illnesses.

MR. ANDES: And are the current EPA criteria for bacteria based on studies done in the 80's?

THE WITNESS: 70's and -- yes.

MR. ANDES: So those are generally felt to be relevant beyond just the immediate year they are done?

THE WITNESS: Yes, they are not considered to be the final word, but, right, the standards aren't updated every year based on 1987 data and 1988 data. The 1986 standard or criteria has held.

CHAIRMAN TIPSORD: Dr. Dorevitch, you are talking to Mr. Andes and not the rest of

us.

THE WITNESS: I'm sorry. Where did you lose me?

CHAIRMAN TIPSORD: Just, you were trailing off. Go ahead where you were at.

THE WITNESS: The assumption is that 1986 data are going to be relevant in 1987 and 1988, and I believe that would be true for our results as well.

CHAIRMAN TIPSORD: Mr. Harley, go ahead, and then Ms. Alexander.

MR. HARLEY: So that your testimony is clear on this, you mentioned, I believe, three important variables that could change over time, that might change the assessment that you are doing now. One was that the uses of the water could change; is that correct?

THE WITNESS: That is correct.

MR. HARLEY: The water quality could change?

THE WITNESS: Correct.

MR. HARLEY: Meteorological conditions could vary?

THE WITNESS: Yes.

MR. HARLEY: I have one question and then I'll turn it over to others. You mentioned in your pre-filed testimony that you do have experience participating in other rule making regulatory activity; is that correct?

THE WITNESS: That's correct.

MR. HARLEY: In the context of this regulatory activity, do you know if this regulatory activity is designed to protect actual uses only, today's uses only?

THE WITNESS: I believe that the standard a would have three components, one would be a use designation, one would be a water quality criteria, a measurement to protect those uses, and a third would be a plan to make, to keep the water quality at an acceptable level. So the use that's designated may be the same as current uses or it may be different.

MR. HARLEY: Let me be absolutely specific then in terms of what I'm asking, which would be a first. Are potential uses of the Chicago area waterways relevant to this rule making activity?

THE WITNESS: I think that we're

trying to answer a question about incidental contact recreation, not scuba diving, say, so whether or not scuba diving is a potential future use, it's beyond the scope of what can be studied.

MR. ANDES: If I can follow-up on that. Is scuba diving one of the designated uses in this proposal? Let me ask more generally. Is primary contact recreation one of the proposed uses for this water in the IEPA rules?

THE WITNESS: No, it's not.

MR. ANDES: Thank you.

CHAIRMAN TIPSORD: Ms. Alexander?

MS. ALEXANDER: Just a quick follow-up on that last exchange. I understand that you are saying the potential increased use for scuba diving, for instance, you don't believe is relevant, correct?

THE WITNESS: Correct.

MS. ALEXANDER: But do you believe that potential increased use for more high contact types of secondary contact activity, such as kayaking is relevant?

THE WITNESS: If it turns out that kayaking is a riskier activity than say fishing

and there in the future there would be more kayaking, then that could change the overall picture of use.

MS. ALEXANDER: Or riskier than say power boating?

THE WITNESS: Any activity of higher or lower risk could increase or decrease which would have an impact on overall risks.

MS. ALEXANDER: You testified in response to one of Mr. Andes' questions, I believe, that if the number of users on the CAWS went up, that might increase the number of illnesses but not the rate of illnesses; is that correct?

THE WITNESS: Yes.

MS. ALEXANDER: However, would it not be the case that if the increase were not across the board in every activity, such that the percentages stayed the same but there was a significant increase in an activity that lets hypothesize such as kayaking resulted in a higher rate of illness because people were more likely to get wet and fall in the water, would that not increase also the rate of illness?

THE WITNESS: Like I said, any changes can happen in the distribution of different activities. Some higher risks. Some lower risks. If it turns out there are differences in risk, those could be increases or decreases, and that could change the rate in either direction. So, yes, that is possible.

MS. ALEXANDER: So just to summarize if, for instance, there were going to be new boat launches going in, increased uses of boat launches and they were going to be used for activity such as kyacking which we'll designate as a higher risk, that could change the rate of illness?

THE WITNESS: That could change the rate of illness. I don't know if kayaking is going to increase the rate or lower the rate, but it could change it.

CHAIRMAN TIPSORD: Ms. Meyers-Glen?

MS. MEYERS-GLEN: You mentioned there were three factors which could alter -- basically when Mr. Harley asked you about factors which can alter pollution, you had mentioned that uses of water could change, water quality could change and meteorological conditions could vary.

Are you familiar with Tunnel and Reservoir Program or TARP?

THE WITNESS: Yes.

MS. MEYERS-GLEN: And once the completion of TARP -- are you familiar with the completion of TARP that the estimates by the District state that 98 percent of CSO in the Chicago area waterways --

MR. ANDES: I don't know that. That statement hasn't been offered.

MS. MEYERS-GLEN: Are you familiar as to how much TARP is supposed to remove CSOs when completed?

THE WITNESS: I don't know the exact number. I don't know the number. I don't know the percent of CSOs that are predicted to be produced.

MS. MEYERS-GLEN: As far as the completion of TARP, would that be another factor which could vary the rate of illness?

THE WITNESS: It could.

MR. ANDES: If I could follow-up on that. Would it be your sense that the completion of TARP would improve water quality and therefore

decrease the overall rate of illness?

THE WITNESS: If it did in fact result in less frequent CSOs or smaller volume CSOs and less pathogens entering the waterway, yes, I would think that specifically, especially on days following a CSO event or heavy rain fall, it would improve -- it would lead to relatively improved water quality and a lower rate of illness.

MR. ANDES: So that would be a lower rate of illness than you would have observed in your EPI study?

THE WITNESS: It could be that way, yes.

MS. MEYERS-GLEN: On dry water days when approximately one hundred percent or up to one hundred percent of the water flowing from the CAWS is from effluent, would that still be the case?

THE WITNESS: I was under the impression that it was 70 percent of the flow is effluent, not 100 percent. But would it still be the case that CSOs, that the completion of TARP is going to change water quality on dry weather days,

is that the question?

MS. MEYERS-GLEN: That is correct.

THE WITNESS: I think that the TARP is about protecting water quality following rain events.

MS. MEYERS-GLEN: So just to be clear then, so that would not effect dry weather days, is that correct?

THE WITNESS: Dry weather days in the sense after a heavy rain fall CSO's -- my understanding is that there are two kinds of CSOs, that there are the passive CSOs which happen in over hours or a day following a heavy rainy event, and then there are active CSOs where pumping station activity can go on for a week or more following heavy rain fall. So those days may be dry. But the effects of the CSO may still be felt. So I don't want to get into splitting hairs about what is dry, but it's not just days where there's no rain that are dry from the CSO perspective. It's number of days following heavy rain fall.

MS. MEYERS-GLEN: However we're defining dry weather, however, there will be days

where the CSOs are not going to be the same kind of factor when there is no rain event contributing, correct?

THE WITNESS: Correct.

CHAIRMAN TIPSORD: Ms. Williams, I think we're back to you.

MS. WILLIAMS: I guess I'll follow-up on this area before I go back. So in your opinion, just generally, no hair splitting here, do you believe less pathogens in the water will result in less illnesses to people?

THE WITNESS: I think the study will end up giving us an answer to that, but there haven't been incidental contact studies that have shown that, and even the larger studies like the NEAR Study didn't measure pathogens. So, you know, I think we could say a little bit more about indicators in health risk, but our work will be some of the first large scale studies of pathogens as predictors of rates of illness.

CHAIRMAN TIPSORD: Mr. Harley, you have a follow-up?

MR. HARLEY: Or on that very point. On page 2 of your pre-filed testimony, you reflect

on the fact that there are few studies that have been completed on the issue of recreation and limited contact recreation, and a quote from your pre-filed testimony is that, "We are just beginning to develop the scientific data that will help define what regulatory measures are appropriate for protecting the health of the public." Is that your testimony still today?

THE WITNESS: Yes.

MR. HARLEY: In light of the fact that we don't have a significant body of research, why shouldn't the precautionary principle apply in this rule making?

THE WITNESS: Are you asking me to interpret the Clean Water Act?

MR. HARLEY: No, I'm asking your opinion as a medical doctor and a public health specialist.

THE WITNESS: I think we have some sources of information already about whether there's an unacceptable health risk now. There are thousands of people who use the waterways. There is some surveillance system for disease outbreaks, and I myself have interviewed study

participants who say they've used the waterways a hundred times a year and have not gotten sick. So that doesn't mean that there's no risk. It means, I think, that we do have an opportunity to study risk. I think to say that we should shut down all recreation would be premature in that it isn't based on any data.

MR. HARLEY: To quote from your pre-filed testimony, "No studies have been done in the U.S. -- no studies have been done in the U.S. on limited contact recreation activity." Again page 2 of your prefiled testimony. How does your limited study, your limited observation of your study provide the basis for the conclusion that there is no health risk from human exposure to pathogens in the CAWS?

THE WITNESS: I'm not saying there's no human health risks to exposure to pathogens in the CAWS. I'm saying that we should find that out. I think if we're going to have recreation on the CAWS or no recreation on the CAWS, we should know what the risks are or if public health measures, disinfection, other procedures are going to be instituted, I think it's important to start

out with knowing what are the risks. So like I said before about Precautionary Principle, a new chemical is introduced, it would be important to know what are the health risks of that chemical and not to say we cannot have new chemicals, let's evaluate with it, and that's what we're doing. This is a little different in that recreation has been ongoing, and now we're saying it's continuing, let's find out what the health risks are.

CHAIRMAN TIPSORD: Ms. Williams?

MS. WILLIAMS: I'd like to go back to your answer to my last question because I'm not sure I understood it. So when I asked if less pathogens in the water would result in lower illnesses, I think you said we don't really know but we know more about indicators. Can you please explain that?

THE WITNESS: I'm talking about epidemiologic studies and the epidemiologic studies that have identified measures of water quality as predictors of illness rates have focused on indicators. The NEAR Study focusing on enterococci measured by the QPCR method. In other

primary contact research in the United Kingdom, controlled trials of swimming versus not swimming, again, it's indicators that have been studied. So I'm not saying pathogens are good for you or anything like that. I'm saying the literature is relatively silent on that matter.

MS. WILLIAMS: But it's the pathogens that make you sick, correct?

THE WITNESS: It's the pathogens as well as -- it may be chemicals in the water. It may be water contact itself is causing some skin breakdown and skin symptoms. So it's not exclusively the pathogens that cause symptoms, but pathogens make people sick.

MS. WILLIAMS: We spent a lot of time last week discussing or two weeks ago discussing that although it's indicators that have been used in the epidemiological studies, the link between indicators and illness is not a good one; Would you agree with that statement?

THE WITNESS: I'm not sure what "a good one" means.

MS. WILLIAMS: That there's a correlation or that it's reliable.

THE WITNESS: In the NEAR Study, indicators were shown to predict rates of illness.

MS. WILLIAMS: And which indicators?

THE WITNESS: Enterococci measured by culture and enterococci measured by QPCR, but when they used both in the same model, it was the enterococci by QPCR that was the better predictor.

MS. WILLIAMS: And did they look at e-coli and fecal chloroforms?

THE WITNESS: They didn't report that. They did look at bacteroides initially, but they had high rates of undetectable, below the limit of quantitation, and they didn't report that in their later work. Now that's the NEAR Study.

There was another study by Pullford in 2007 which didn't find a relationship between microbial measures of water quality and health risk. So it's not across the board that indicators are good predictors, but in the papers published by the NEAR Study, they were.

MS. WILLIAMS: I think I'm just a little surprised by that answer primarily because of the testimony previously from Dr. Gerba. I don't think that was what he testified when he was

asked these questions. Are you familiar with his answers to those questions?

THE WITNESS: No.

MS. WILLIAMS: Let's go back to my pre-filed questions. I think number 18 was sort of discussed yesterday, but I'd like you to answer for me, has U.S. EPA reviewed the methodology and preliminary data from the CHEERS study?

THE WITNESS: The U.S. EPA as an organization has not. When the study was on the drawing board still, I met with Mr. Efram King, the Director of the Office of Science and Technology within the EPA Office of Water, and several of his staff were in the conference room and several were on the phone, several folks from the EPA's Office For Research and Development were on the phone, and we discussed the protocol in draft form for the CHEERS research study and got feedback from Mr. King and other participants in those conversations. Two U.S. EPA staff are on our peer review committee that has reviewed our initial proposal and our summary of the 2007 season, and I remain in touch with them through conference calls and will continue having the peer

review group evaluate progress to date. So in that respect individuals from relevant branches of the EPA have had opportunities to comment on it, but I don't have an official EPA seal of approval saying, go to it, it looks good.

MS. WILLIAMS: How did you -- as far as the comments that they made, how did you deal with those comments?

THE WITNESS: Well, the comments were generally supportive. There were suggestions that came up that have been incorporated into the design of the study. People from Dr. King's office commented on coliphages being a potentially useful indicator, pathogen indicator to measure that was not part of our original research plan, and at that point that was incorporated into the study and we do measurements for coliphages so --

MS. WILLIAMS: Were there some discussions that you just felt were not appropriate to incorporate into the design?

THE WITNESS: Are you talking about specifically from Mr. King and that meeting or other comments along the way at peer review meetings or --

MS. WILLIAMS: Specifically at that meeting I guess at that point.

THE WITNESS: No, there wasn't anything that was not acceptable or not doable.

MS. WILLIAMS: And the other comments will be addressed through a peer review process -- when you said outside of that, comments received outside of that, I assume you are saying is part of the peer review process?

THE WITNESS: Right, correct.

MS. WILLIAMS: And the study will be peer reviewed when it's completed as well?

THE WITNESS: It is peer reviewed. It remains peer reviewed, and at the time that we have results and they would be submitted for publication in peer review journals, that would be another level of review. And certainly our peer review group would absolutely review our results before they are final.

MR. ANDES: Before you move on, if I can follow-up, and let me go back for a minute to the discussion about the NEAR Study, as well as Pullford. If I can characterize your testimony accurately, you talk about the NEAR study

indicating possible connections between certain indicators and rates of illness. The Pullford Study, on the other hand, did not indicate such a connection?

THE WITNESS: Correct.

MR. ANDES: Those are both as to primary recreation, am I right?

THE WITNESS: Yes.

MR. ANDES: Am I correct in terms of studies we have discussed regarding incidental contact recreation, which were the two Futrell Studies and the Lee Study, two of them which dealt with white water canoeing indicated some rate of illness, correct?

THE WITNESS: Yes -- well, the Lee Study, they all -- Lee and Futrell '92 reported rates of illness. Futrell '94 did not report rates of illness.

MR. ANDES: And Futrell '94 dealt with other types of --

THE WITNESS: Canoeing, marathon canoeing -- Futrell '94 dealt with canoe marathons and rowing regattas. Lee '97 and Lee '92 dealt with white water slaloming and canoeing.

MR. ANDES: So the Futrell '94 study did not afford a higher level of illness, correct?

THE WITNESS: Correct.

MR. ANDES: The Lee study had a report of significant rate of illness, but had no control group to compare it to, am I correct on that?

THE WITNESS: Yes.

MR. ANDES: Those are the incidental recreational contact studies that you've referred to?

THE WITNESS: Yes.

MR. ANDES: As opposed to the NEAR Study, Pullford, and other studies that are primary contact recreation?

THE WITNESS: Correct.

CHAIRMAN TIPSORD: Since this is a new transcript, those are all part of the record as exhibits and have been marked the last couple days and several days.

MS. WILLIAMS: Dr. Dorevitch, I think when Mr. Harley was asking you questions, and in other lines of questioning, you've testified that we really don't know what the risks

are from incidental contact recreation and we need to find those out. Does that sound like an accurate paraphrasing of your testimony?

THE WITNESS: Yes, we don't know what they are in this setting for sure.

MS. WILLIAMS: Based on some of those responses, I really want to ask you about a particular statement in your testimony that I find troubling and not really in line what I've heard from you here in person. On page 8 you say, and this is from question 20, "Our preliminary observation suggests no danger to the health of the population of limited contact recreators on the CAWS."

MR. ANDES: I'm sorry, what page was that?

MS. WILLIAMS: Eight.

MR. ANDES: And you are claiming that is somehow inconsistent with what he said? Would you like to elaborate on that?

MS. WILLIAMS: I'd like him to explain the definitiveness of this statement relative to his previous answers.

THE WITNESS: Well, what I was

talking about, I think I said that I was referring to a preliminary analysis of the 2007 data, and I said that that preliminary analysis didn't identify differences in rates of gastrointestinal symptoms in participants among the three groups. That's only 811 people were in that data set, and that's less than ten percent of our total. So I don't mean to say anything conclusive that limited contact recreation or incidental contact recreation is risk free.

MS. WILLIAMS: You don't mean to say that you are comfortable today to say you know it's safe?

THE WITNESS: I don't think anybody knows what the health risks are of incidental contact recreation on the CAWS. I think what I was saying is that, it's a little bit like what I was saying about the outbreaks. Outbreaks haven't been identified. The absence of known outbreaks doesn't prove that there's no risk. Likewise had the preliminary analysis from 2007 shown a very high risk in one group relevant to the other two, that would be concerning. That's not what was observed. It doesn't mean that there isn't a

risk, but at that point I hadn't identified any increased risk. I'm not saying that there is no increased risk. It's entirely possible that one of the groups is going to have higher rates than one of the others, but that didn't show up in the 2007 preliminary data. And I think this is consistent with what I'm saying, that conducting the study, completing the study, getting to the answers will tell us, are the risks increased, what is that increase and how does it compare to other groups.

MS. WILLIAMS: And there's certainly with only 10 percent of the study participants to reach that conclusion yet one way or another?

THE WITNESS: Yes, unless there were a very, very high risk, it wouldn't be detected in ten percent of a sample.

CHAIRMAN TIPSORD: Ms. Alexander, you had a follow-up?

MS. ALEXANDER: Yes, I had a follow-up on this question in the sample size. Am a correct in understanding that it's your testimony that a sample size of 811 people, which is approximately a little less than ten percent of

your total, is insufficient to produce statistically reliable data at this point?

THE WITNESS: It's insufficient to test the hypothesis that recreation on the CAWS is a different risk than recreation in one of the other two groups.

MS. ALEXANDER: And that would be because the number of people sampled so far is too small; you have to get up to your total number which I believe was 9333?

THE WITNESS: 9330, yes.

MS. ALEXANDER: How did you arrive at that number 9330?

THE WITNESS: There's a statistical method called sample size power calculation, and there's a statistician who is part of the research team, and the statistician and I developed that based on certain assumptions. We assumed that 15 percent of the people would drop out along the way, and it turns out that less than one percent of the people dropped out along the way. So we probably have more statistical power. We'll probably be able to say more than we thought we would once we get to that number.

Another assumption is rates of illness in the background group, the unexposed group, and that came from the rates of illness among the unexposed beach goers within the NEAR Study. That in the -- at a Lake Michigan Beach and a Lake Erie Beach about 50 to 75 people per thousand got sick who were nonswimmers. So that of one of the bases we used to determine -- that's one of the inputs that goes into a sample size calculation.

MS. ALEXANDER: You testified yesterday that the overall purpose of the study is to assess risks of all uses on the CAWS, is that correct, as they are currently occurring?

THE WITNESS: I'm not sure I said all uses as they are currently occurring.

MS. ALEXANDER: But essentially risks of use of the CAWS, including multiple activities I should say.

THE WITNESS: That subset of activity that fall into our definition of incidental contact.

MS. ALEXANDER: Now, if one were to decide to conduct an epidemiological study of just

one of those activities, say for instance one wanted to conduct a study to determine a risk, specifically of kyacking and not of the other activity, would you also need a sample size of 9330 or might you use a different sample size?

THE WITNESS: You would use 9330.

MS. ALEXANDER: Okay. Thank you.

MS. DEXTER: Jessica Dexter with the Environmental Law Policy Center. Would you say that based upon your, based on your observations that there are more recreators on the CAWS this year than you saw last year?

THE WITNESS: It's a little hard to know for sure because last year the study began on August 4th, so sort of past the midpoint of the summer. Whereas this year we began in April. So we've certainly enrolled many more people. At some locations I think use is higher. I can think of one particular location where use seems to be lower, but at North Avenue on the west side of the turning basin use is higher. I don't know how much angling took place on the main stem last year, but this year there are a number of events. So some places it's higher. It seems at the

Skokie Rowing Center there's less activity. There may be less at Worth and Alsip this year. These are just impressions. It's not definitive. But we do collect the kind of data that would allow us to compare year to year changes in use by location.

MR. ANDES: I'd like to follow-up going back to the size of the study. As I understand it right now, you don't know which particular uses might have more or less exposure?

THE WITNESS: Right.

MR. ANDES: That's one of the issues that the study will help determine?

THE WITNESS: Correct.

MR. ANDES: So at this point does it make sense to look at all uses and gather information about them all or would you highlight one and collect information only about that one?

THE WITNESS: Well, I wouldn't zero in on any one at this point. I think the question that we're trying to address is about the risks of current uses. So since there are multiple current uses, we enroll people doing a variety, and I'm not starting with any assumptions that one

activity is more or less risky than the others. So, no, I don't think it would be wise if we had restricted it to one particular recreation activity.

MR. ANDES: If you ended up finding that there were particular issues as to one or another of those activities, there's certainly the opportunity for further assessment of that issue, which could actually include going back as the Illinois EPA identified and rerunning the risk assessment model with the new inputs that you would have provided, correct?

THE WITNESS: I think that our inputs would be useful for future risk assessments, yes.

MR. ANDES: Thank you.

MS. WILLIAMS: Dr. Dorevitch, did you just testify that the NEAR Study found 50 to 75 illnesses in the nonexposed group?

THE WITNESS: It varied by beach, but that ballpark of about 75 per thousand nonswimmers got sick.

MS. WILLIAMS: I guess what's confusing me or what I want to understand a little

bit better is, that seems like a pretty wide variation, 25 per one thousand given what we're trying to find out in your study. Do you think it's a range? Do you think there was enough information in the NEAR study to say 75?

THE WITNESS: Well, that wasn't the only --

MS. WILLIAMS: I want to understand what the -- I don't want to say margin of error. That's not the right terminology, but what is the variability?

THE WITNESS: Variability? Well, that wasn't the only data source I looked at. I looked at studies of vaccine safety where thousands of people will get a vaccine and thousands of people will get a placebo, and they track symptoms as a way of monitoring side effects that follow vaccination. So I looked at rates of gastrointestinal symptoms among the people who got placebos, and that came out, again, about the same. That was about 50 per thousand.

Looking at the NEAR data is better because our questions -- our questionnaires come from their questionnaires. So the way you ask the

question has a lot to do with the results you get and -- so to keep this in apples to apples comparison, I relied more heavily on the NEAR Study rate of illness in unexposed, than say the vaccine trials where they assessed development of symptoms in a different way. But there is variability. Even within the NEAR Study they had rates of -- they would go to the same beach multiple times, and on some days the unexposed rate was 50 per thousand, and other days it was 100 per thousand. So this bounces around. There isn't a -- I can't think of a better way to predict what rates of illness will be in our unexposed group, other than the NEAR Study unexposed group where they use essentially the same questionnaire to determine the same information.

MS. WILLIAMS: But you'll rely on the actual rates that you find in developing the the NEAR Study?

THE WITNESS: Of course.

MS. WILLIAMS: And at this point in your primarily results are you finding an increased risk to recreators generally over the

control group?

THE WITNESS: Well, we don't really call any of them control. There's an unexposed group, a general use group, and a CAWS group, and that preliminary analysis of only less than ten percent of the data showed equivalent rates.

MR. ANDES: Equivalent rates between the unexposed group and the CAWS?

THE WITNESS: All three groups.

MR. ANDES: And the general use.

THE WITNESS: All three groups. Again, I don't mean to say that we won't find differences or there aren't differences, but just checking to make sure that we're not sitting on an epidemic of really high rates in one group, I don't see that so far. I don't see anything that looks like that.

MS. WILLIAMS: But when you say epidemiologic, you mean the same as an outbreak?

THE WITNESS: I mean, a big public health problem. I mean an outbreak, an epidemiologic, higher number of disease than expected, yes.

MS. WILLIAMS: Number 22, can you

explain the statement, "Preliminary analysis of 2007 data shows that the assumption regarding the duration of various recreational activities were quite accurate"?

THE WITNESS: I can, and you might not be surprised that I have a handout again.

MR. ANDES: No chart, just handouts.

CHAIRMAN TIPSORD: Darn, an hour and a half in before our first exhibit.

MR. ANDES: We overdosed on them yesterday.

CHAIRMAN TIPSORD: I've been handed a color chart, plural, stapled together with QMRA at the top. If there's no objection, we'll mark this as Exhibit 111. Seeing none, it's Exhibit 111.

(Document marked as Exhibit 111 for identification.)

THE WITNESS: So if I can walk you through it. These are comparisons of some of the assessment, some of the assumptions that went into the risk assessment which are things that we've observed in the CHEERS study. Again, not all of the inputs into the risk assessment model can be

validated or refuted in the CHEERS study, but they did make certain assumptions about durations of recreational activity. I have on this handout on the top half the risk assessment assumption about the duration of specific recreational activities, and on the bottom half what we observed in CHEERS.

What we have observed in CHEERS though, this is not limited to CAWS recreation. This would be from both the CAWS group and the general use group, and what I meant when I said that the assumptions were accurate, looking at the first page, it says "pleasure boating." In the risk assessment, they assumed a minimum duration of one hour. The most typical duration would be four hours, and the maximum would be eight hours. What we observed is that the minimum duration was one hour. The most frequent was four hours. The maximum was 11 hours. So this is pretty similar form -- this is similar to the triangle that they have in terms of the ends of the triangle and the peak of that triangle. For canoeing, the risk assessment -- this is now the back side of that first page -- for canoeing in the risk assessment, they assumed a minimum of one hour, a mode of two

hours, a maximum of five hours. We observed canoening generally was of shorter duration. The most common was under one hour, and there were some that went out to three hours, between three and four hours. So on this end I'd say that the risk assessment assumed longer durations than we observed.

For fishing the distribution does look different. In the risk assessment they assumed a mode, a most common duration of three hours, and the most common durations that we observed were between 0 and 2 hours. It tailed off quickly, whereas they assumed sort of a more is symmetric triangle. This would be mean that they assumed longer durations of recreation than we've observed, and then on the final page is kayaking, and I don't think the risk assessment -- I didn't see the risk assessment's assumptions about kayaking duration. I'm not sure if they had assumptions about that.

MR. ANDES: I think they were treating it based on certain types of activities relative to the amount.

MS. WILLIAMS: I thought you were

talking out loud.

THE WITNESS: But we have some observations about the duration of kayaking. So what I said, that assumptions were accurate or if anything a little conservative, it's about duration of specific recreational categories, and I don't mean to make it more than that, but that's the comparison.

MS. WILLIAMS: My understanding, and this may be incorrect, is that kayaking and canoeing were treated the same. And the risk assessment shows there is a difference one way or another.

THE WITNESS: That's a possibility. Well, they both seem to be different than boating, than say motor boating. They both seem to be shorter duration activities, but it looks like -- oh, I'm sorry, I skipped fishing.

MS. WILLIAMS: No, no, you said that.

MR. ANDES: If canoeing and kayaking is the same, which I believe is right of the risk assessment, if you look at the canoeing distribution assessment and applied to kayaking

what would be your conclusion?

THE WITNESS: Well, they assumed a mode of two hours, our most frequent duration of kayaking was three hours. So we observed something a little bit longer in duration. They assumed a maximum of five hours. We observed kayakers that went all the way between hours seven and eight. So it looks triangular. It does have sort of -- it's not an isometric triangle. Sort of the tail leads to the right, but for kayaking, think we observed longer duration of activity than canoeing, and they may be two different animals that have different durations that the shape of the canoeing triangle from the risk assessment looks similar to -- I mean, it looks similar to what we see for kayaking, but for canoeing we see shorter durations.

MR. ANDES: So in terms of canoeing, they in fact assume a fair number of expeditions are three hours or longer, and yours indicates that the bulk are two to three hours, between two and three hours, very little after that; am I correct?

THE WITNESS: For canoeing, and I'm

sorry, for kayaking, right.

MR. ANDES: Beyond three hours, their distribution assumes a fair number, a fair part of their distribution is after three hours?

THE WITNESS: Right, and for canoeing that's even more true that they assume longer durations than we observed.

MR. ANDES: Thank you.

MS. WILLIAMS: I understand these are very preliminary?

THE WITNESS: Yes.

MS. WILLIAMS: Would you think though one thing your study might be able to show is whether the risk assessment model should treat those two activities differently?

THE WITNESS: Yes.

MS. WILLIAMS: I think I understand number 24, but maybe I should explain it. When you identify the participants recruited for CHEERS, are they all different people or could the same individual be included multiple times?

THE WITNESS: The same individual could be included multiple times.

MS. WILLIAMS: And could you explain

the duration, distribution for that, how long in between?

THE WITNESS: Somebody who enrolled is followed for 21 days. Once somebody completes their final day 21 phone call, which may only happen on day 22 or 23 if we can't reach them on day 21, they are able to re-enroll.

MS. WILLIAMS: And will there be a way to tell at the end exactly how many individuals are included?

THE WITNESS: Yes.

MS. WILLIAMS: There will be a tracking of whether it's 8000 or something in distinct individuals somewhere in this?

THE WITNESS: Yes, we'll be able to tell that.

MS. WILLIAMS: On page 8 you state, "Well, inconsistencies between our observations and those of the UAA regarding the frequency of specific recreational activities and the distinction between uses and users are likely due to different methodologies." Could you explain what you are referring to here?

THE WITNESS: Well, what I'm

referring to is a comparison of our use survey, not the refusal tally, not the people who we approach to enroll but don't enroll, but when our staff are out there tallying how many people are launching, are beginning new recreational activity, the summary of that information gives -- paints a different picture of use of the CAWS than what was in the UAA report. Specifically there seems to be more fishing and boating especially noted on the north branch in the UAA than what we observed, and we're doing it different ways. I don't have a real clear picture of how the UAA process worked for tallying use, but it seems to me that fishing is less common, especially on the north branch in relation to other activities, and the north shore channel in relation to other activities and motorboating, again, is a lower percent of recreational activity on the north branch than what was summarized in the UAA report.

MR. ANDES: So if I'm clear, you found more fishing, less power boating?

THE WITNESS: We found less fishing and less power boating.

MR. ANDES: Okay, I'm sorry.

THE WITNESS: We found more, relatively more canoeing, kayaking and rowing.

MS. WILLIAMS: And I think you are being very polite in your references to the UAA because I'm not sure there was a methodology that was trying to very accurately give numbers to users as opposed to identifying that the use was occurring.

THE WITNESS: Yes, I can tell that there were two approaches. There was a going out and counting people approach, and there was a getting information from boat launches, license fees, kayak vendor receipts, things like that. But I know that our method is fairly rigorous in protocol driven, and I can evaluate the strengths and limitations of that method. I couldn't say that about the UAA.

MS. WILLIAMS: And that's really more what my question is getting at. What are the some of the strengths -- I mean, I am not sure I understand your methodology exactly.

THE WITNESS: Our methodology is that a person, at locations where we conduct the research study where we are enrolling study

participants and sampling water, a member of the research team is the use survey person. That's their job for the day or for several hours and they can rotate. And they have a clipboard, and there's a chart where they tally new uses. In other words, somebody passing by on a boat isn't a new use. Somebody launching a boat is a new use. Three people going out in one boat is three uses. Not one. We don't count people who are returning. We don't want to count the same person twice. So if we count somebody when they launch, we don't count when they return. So I think that it's a pretty good way of estimating use, new uses at a location per unit of time. It's not a comprehensive rereview of everything that's going on all over the waterways. But, you know, I kind of know what my measurements are at the end of the day.

MS. WILLIAMS: And I think you've explained what my question 28 was asking. In your testimony I think it implied or in the letter attached to your testimony, I'm sorry, it implied that the same person was enrolling new participants as was also counting recreators, and

to me that seemed like a lot?

THE WITNESS: No, it isn't that way. The priority of the staff is to interview and recruit study participants. So if let's say a group goes out kayaking and twenty people come back at once, we're not going make them wait in line so the use survey can be done. The use survey person would be pulled and would do interviews and we would have missing data during those intervals when no data is collected. We wouldn't assume that no people are launching, no observations are made. That generally doesn't happen though. That's unusual.

We also obtain information from organizers of events such as Friends of the Chicago River Flat Water Classic, the Dragon Boat Races, the Mid-America Canoe Marathon. Just different activities where it isn't always easy to count all the people, but the organizers generally have information about the number of people who participated in an event.

MS. WILLIAMS: Okay, I think that helps. So when I asked how do they count recreators while simultaneously signing up

participants, is the answer they stop counting?

THE WITNESS: Yes. They tally every ten minutes. So if they start at 10:00 a.m., at 10:10 they will write down the number of people who began using the waterway during that ten-minute interval. So if somebody is interviewing a study participant during that time, that ten-minute block would be empty and we wouldn't know.

MS. WILLIAMS: And if you are counting from 10:00 to 10:10 and you've kind of got seven or eight people, say you have eight people and it's 10:07, do you discount that loss because he wasn't able to complete the ten minutes or do you take the numbers that were --

THE WITNESS: I think we have to -- I don't know if that's come up, but I think it would be tricky unless they kept very accurate time of when they stopped and sort of prorate it as a seventy-percent of a block, I think we probably just consider the entire block missing.

MS. WILLIAMS: I don't think I have any other questions for Dr. Dorevitch.

CHAIRMAN TIPSORD: Mr. Harley?

MR. HARLEY: Could an individual who is exposed by pathogens by the CAWS be asymptomatic and transmit the disease to others?

THE WITNESS: That's theoretically possible.

MR. HARLEY: How would that happen?

THE WITNESS: Just like you said. A person who is asymptomatic with an infection transmits it to another person. Usually we are talking about intentional illness. It's the fecal-oral route. I think I was in the room when Dr. Gerba explicitly explained a little bit more about fecal-oral transmission, but if they didn't wash their hands carefully after going to the bathroom, they could spread the infection to another person, whether they are symptomatic or not symptomatic.

MR. HARLEY: In your epidemiological study, are you looking at the universe of the exposed individuals or are you really focusing on the users of the waterway?

THE WITNESS: We're only able to study people who enroll in the research. So if there's a user who not a study participant, I

don't know if they've gotten sick if that's what you mean.

MR. HARLEY: So it's possible that there are individuals who are experiencing secondary exposures who are not being assessed in your study?

THE WITNESS: Yes. I think we talked about this yesterday, that we do ask questions about ill family contacts, other people in the family who may have gotten sick. But the study is not designed to be able to -- the study is not designed to establish secondary attack rates, rates of illness that you are describing.

MR. ANDES: If I can follow-up on that. Is it your understanding that the Geosyntec Risk Assessment Report did deal with secondary attack rates?

THE WITNESS: They did, but our study is based on the NEAR Study, which does not do that, and so we don't do that either.

MR. ANDES: So let me ask then, would it be productive to look at risk assessment and the epidemiological study together perhaps to get a full picture of what the potential risk is,

particularly since they look at things in different ways.

THE WITNESS: I think it's good to look at both. I'm not exactly sure how we put it all together to get a comprehensive picture of secondary attack rates, but it's two different ways of handling -- you could just add it together, but you might want to look at both to give you a fuller perspective. Yes, it would be worth looking at.

MR. HARLEY: So the record is clear, as part of your study, secondary attack rates or secondary disease occurrences were not something that you assessed beyond the immediate family?

THE WITNESS: That is correct. Just like the other cohort studies of primary contact recreation in the U.S., we're not doing that either.

MR. HARLEY: One other question that I have for you is, is it as focus of your study not only -- let me strike that.

Does your study assess the likelihood of an outbreak?

THE WITNESS: Our study --

MR. ANDES: How are you using outbreak?

MR. HARLEY: In the way that he described it in his testimony yesterday.

THE WITNESS: Our study is focusing on the development of illness. There's endemic disease and epidemic disease. Endemic disease are sort of the background rate of illness. Epidemic disease is a greater than expected number of cases. Our study is looking at endemic disease. Is there a certain percent of the population with water exposure who has a higher background rate than the unexposed group. On top of that, it's conceivable that an epidemic could occur. If ten percent of the people have GI symptoms in their unexposed group and 11 percent have symptoms in the two water exposed groups, and one day at a particular launch for people doing a specific activity, we see a rate of 20 per hundred, we see a rate of 20, that would sound like an epidemic superimposed on this endemic rate slightly above the unexposed population's rate.

MR. HARLEY: But your study is not focused on the risk of epidemic outbreak; your

study is focused on endemic occurrence?

THE WITNESS: It's much harder to track endemic rates than epidemic. So we're certainly able to identify higher than expected rates within our study. We're able to evaluate day-to-day rates as well.

CHAIRMAN TIPSORD: Ms. Alexander?

MS. ALEXANDER: Yes, I have a few general follow-ups.

Dr. Dorevitch, would you say there are some types of risk that are more conducive to being studied through epidemiological study than others?

THE WITNESS: Well, something that is easily measurable is easier to study than something not measurable. I'm not sure what you mean.

MS. ALEXANDER: Well, perhaps I can clarify. Would you say that frequently occurring behavior or occurrences are easier to assess through epidemiological study than infrequent occurrences?

THE WITNESS: Well, infrequent things are harder to count, but if you are talking

about the risk of infrequent things, it would depend. If there's a very high risk, it may be easier to study in a smaller number of people than a very subtle risk in a larger sample of people.

MS. ALEXANDER: Well, just to take as a hypothetical, if you are conducting a one year, two or three year epi study, a broadly defined a public health risk study, it would be easier to study, for instance, automobile traffic deaths than airplane deaths, right, because you have more autos on the street, more frequent occurrences, you might not ever have an airplane crash during that period, right?

THE WITNESS: That's right.

MS. ALEXANDER: But you wouldn't want to conclude from the fact that there was no airplane crash that there's no risk to air travel just that it couldn't be studied effectively in a three-year epi study because there haven't been enough crashes to assess in that time frame, correct?

THE WITNESS: If there were no crashes in that time frame, you could say there were no crashes.

MR. ANDES: If I can follow-up on that for a moment. If there were a high number of airplane flights during that time period but no crashes, couldn't you reach conclusions that airplane travel is generally safe because there were no crashes?

THE WITNESS: The rate you would observe would be zero. So that's information -- it doesn't mean that there was no information obtained by studying it. There were no crashes, and there were car crashes, and there's something to be said there.

MS. ALEXANDER: But you probably wouldn't conclude from that data that there zero airplane crashes in one or two or three years that the risk of airplane travel was zero?

THE WITNESS: Well, statistics never talk about zero, but things approach zero. And based on the three-year period, one thing that you could do is you could say, well, there were a million airplane flights and zero crashes; there were 20,000-car crashes and 200,000,000 vehicles. You could say had there been one crash of an airplane, what would the rate have been. And

there are statistical tests that could be done to say given that period of observation, what do we think had that study been conducted multiple times, multiples years what the difference in rates would have been. So zero car crashes doesn't mean zero information. That's actually helpful information.

MS. ALEXANDER: Well, bringing this back to the CAWS, is it fair to say that incidental contact recreation in the CAWS overall was fairly conducive to an epidemiological study in the sense that it happens reasonably frequently and you could enroll some reasonable number of participants?

THE WITNESS: I don't know if there is a lot about the study that's easy, but there are thousands of people who use the CAWS and we are able to enroll them and follow them over time.

MS. ALEXANDER: Would it also be fair to say that the risk of more infrequent occurrences on the CAWS, and I would use as an example a child falling out of a boat near an outfall would not be as conducive to epi study, just as the airplane crashes would be; would that

be correct?

THE WITNESS: I didn't say the airplane crashes were, that such a study is not helpful. It sounds like you've introduced a very substantial statement about car crashes are common and airplane crashes are rare. I think if we are talking about a child failing out of a boat by an outfall that I agree that sounds like something that would be very rare. The study isn't actually designed to make those kinds of observations. Child falling out of boat, yes. Falling out of boat by outfall, that isn't something specifically we would record. But if it isn't observed or isn't observed frequently, that would suggest that it doesn't occur commonly.

MS. ALEXANDER: But that would not lead to a conclusion that there were in fact no risks associated with a child falling out of the boat, particularly if it was near an outfall, is that correct? Just that it doesn't occur frequently?

THE WITNESS: Just that I wouldn't say that planes never crash.

MS. ALEXANDER: Okay, thank you.

CHAIRMAN TIPSORD: Anything further for Dr. Dorevitch?

Thank you very much. We appreciate your testimony. And with that we will take a ten-minute break and come back and start with Suzanne O'Connell.

(Whereupon a brief recess was taken, after which the following proceedings were had:)

CHAIRMAN TIPSORD: We're back on the record. Welcome, Ms. O'Connell.

Can we have Ms. O'Connell sworn in.

SUZANNE O'CONNELL

having been first duly sworn, was examined and testified as follows:

CHAIRMAN TIPSORD: If we can have a copy of her testimony, we'll enter it into the record. Thank you very much. And I will enter the pre-filed testimony of Suzanne O'Connell, if there's no objection. Seeing none, here is Exhibit 126789.

And I believe the IEPA is the

first of the group with questions.

MS. DIERS: Good morning, Ms. O'Connell. My name is Stefanie Diers and I'll be asking you questions on behalf of the IEPA.

I'm going to begin with question one on our pre-filed testimony.

Are the figures the most current information available concerning the number of CSOs in the CAWS and lower Des Plaines River?

THE WITNESS: Yes, to my knowledge.

MS. DIERS: And I believe the information was 2005, 2006 and 2007; is that correct?

THE WITNESS: That's correct.

MS. DIERS: Do you have any information thus far for 2008 on the two CSOs?

THE WITNESS: On the two CSOs.

MS. WILLIAMS: In 2008 any of the CSOs.

THE WITNESS: We submit a report quarterly to the IEPA so we do have data.

CHAIRMAN TIPSORD: Ms. O'Connell, you are going to have to speak up.

THE WITNESS: We do keep a record

and we submit them to the IEPA on a quarterly basis. So far this year we've submitted, for January through March quarter, we submitted a report in May, and then for the second quarter we submitted that report in August. And so we'll be submitting another one in November for the third, and next February for the fourth quarter of 2008. So we do have some data.

MR. ANDES: If I can interrupt here for a moment. One thing we do have as a handout and as a chart is the attachment which shows the locations of the combined sewer overflow points. So if that's okay, we can put that up and pass out copies.

CHAIRMAN TIPSORD: And that's the attachment to Ms. O'Connell's testimony?

MR. ANDES: Yes.

CHAIRMAN TIPSORD: We won't enter that as a separate Exhibit.

MS. DIERS: How many overflows are expected to occur after the completion of TARP?

THE WITNESS: I don't know.

MS. DIERS: No. 3, how many times does an average CSO discharge per year?

THE WITNESS: Well, I'm not sure what you would call an average CSO. I'm not sure that there is such a thing so that's difficult to say. There's many variables involved in the CSO.

MS. WILLIAMS: Can you explain some of those many variables you are referring to in the CSOs?

THE WITNESS: Well, it's the duration of the rainfall, the intensity of the rainfall, the distribution of the storm that's occurring and that can vary greatly.

MS. DIERS: Finally, with question four, do you know how many of the overflows you mentioned on page 2 of your pre-filed testimony occurred during the recreational season proposed by IEPA?

THE WITNESS: Yes. In 2005 there were a total of 33 days that had CSO activity, and 22 of those days occurred during the recreation season. In 2006 there were 55 days out of the 65 that had CSO activity occur in recreation season, and in 2007 there were 37 out of the total of 42 days that occurred in the recreation season.

MS. DEXTER: Jessica Dexter with the

Environmental Law Policy Center, do you know how many of those days might have happened consecutively?

THE WITNESS: Offhand, no, but I seem to have track of when those occurred, yes.

MEMBER GIRARD: Can I ask a quick follow-up. Can you point to your testimony where you define recreation period or tell us what you refer to as the recreation period?

THE WITNESS: I don't think it's in my report, but my understanding is in the draft regulation. It's March 1st through November 30th.

MEMBER GIRARD: Thank you.

CHAIRMAN TIPSORD: We'll turn it to The Environmental Law and Policy Center.

MR. ETTINGER: This is Albert Ettinger. I'm going to move down here. It's a little hard to be heard from the end of the table.

Let the record show that, first of all, I'm wearing my Bavarian jacket in honor of our Eastern River Restoration project and October Fest.

And my first question is, are there CSO discharges that discharge into Lake

Michigan?

THE WITNESS: I am not aware of any within the District's jurisdiction.

MR. ETTINGER: Do you know OF any that are within or near the City of Chicago?

THE WITNESS: Well, the City is in our jurisdiction.

MR. ANDES: She's not talking about Milwaukee.

MR. ETTINGER: Okay, good. Looking at this map, which I gather was attached to your testimony, I see a couple points here that appear to discharge to Grand Calumet. Are those above or below the O'Brien Lochs.

THE WITNESS: The Grand Calumet is below the O'Brien Lochs.

MR. ETTINGER: Are there any discharges into the Calumet River below the O'Brien Lochs?

THE WITNESS: Below?

MR. ETTINGER: On the lake side of the O'Brien Lochs.

THE WITNESS: We have two pump stations.

MR. ETTINGER: And they have CSO discharges?
THE WITNESS: Yes.
MR. ETTINGER: Mr. Andes and I discussed the second question, and I guess we were just going to have you or he make a statement as to what the data was rather than me try to do it through examination.
THE WITNESS: Well, the data is the data that we do submit to the IEPA on a quarterly basis. So it's any monitored CSO that has discharged, we log it and send the information to the IEPA.
MR. ETTINGER: Do you do that as to the both CSOs and the City's CSOs?
THE WITNESS: All monitored CSOs no matter who they are.
MR. ETTINGER: That's within your jurisdiction?
THE WITNESS: Yes.
MR. ETTINGER: But not Milwaukee?
THE WITNESS: Not Milwaukee.
MR. ETTINGER: Thank you. We can get those from either you or IEPA? Are they

discharge monitoring reports or what do you call them?

THE WITNESS: It's a quarterly CSO monitoring report. It's submitted separately from the DNRs.

CHAIRMAN TIPSORD: Anything further for Ms. O'Connell? Thank you very much, Ms. O'Connell. We'll move on to Dr. Rijal, if I'm pronouncing that correctly?

Can we have her sworn in, please.

GEETA RIJAL

having been first duly sworn, was examined and testified as follows:

CHAIRMAN TIPSORD: And if we have a copy of her testimony.

MR. ANDES: We do. Since when with attachments it's a, I believe, 886 pages we have that on disk.

CHAIRMAN TIPSORD: Okay. If there's no objection, I will mark Dr. Rijal's testimony as Exhibit 133 with the CD Rom attachment as part of that Exhibit. Seeing none, it's Exhibit 113. And I believe we start with Ms. Alexander.

EXAMINATION

MS. ALEXANDER: Good morning, Dr. Rijal. I'm Anne Alexander with the Natural Resource Defense Council, and I have just a couple preliminary questions before I start with the pre-filed questions.

Did you have any involvement with the preparation or review of the Microbial Risk Assessment document that's at issue?

THE WITNESS: What do you mean by involvement?

MS. ALEXANDER: I'm referring to the document prepared by Geosyntec in connection with this rule making.

THE WITNESS: I was involved starting from the request of the proposal stage and we had reviewed the proposals and finally the project was awarded to Geosyntec, and we had followed up with interim report until the end of the final report.

MS. ALEXANDER: Were you involved in any manner -- once Geosyntec was awarded the contract, were you involved in any manner in the substance of the study either in terms of review

or commenting on drafts or commenting on procedures and protocols, methodologies or anything like that?

THE WITNESS: No, because the Geosyntec advisory team, panel, was in there. So we based it on their final comments and their study design. So we didn't comment on the methodology they selected for the study. And at that time to be correct, I was not -- I was not the head, section head of the microbiology section. There were supervisors at the upper management level. And we participated in terms of the scientific methodology they were proposing in the study. We were involved in that. There was some discussions, but there were no written comments exchanged.

MS. ALEXANDER: What was the nature of the discussions? Was there any disagreement concerning methodologies and protocols?

THE WITNESS: If I recall, based on my involvement during that, I don't recall any disagreement.

MS. ALEXANDER: And have you reviewed the final Microbial Risk Assessment?

THE WITNESS: Yes, I have.
MS. ALEXANDER: Have you reviewed any of the correspondence between the districts and/or Geosyntec and the United States Environmental Protection Agency.
THE WITNESS: Yes, I was.
MS. ALEXANDER: Were you involved in any manner in responding to that?
THE WITNESS: What do you mean involvement in responding? Because we received the response and comments from EPA, and the Geosyntec team you know prepared the comments and we sent those comments to EPA.
MS. ALEXANDER: My question is were you in any way substantively involved in preparing the substance of those comments or did you merely pass them along to U.S. EPA?
THE WITNESS: Just passed it along to the EPA.
MS. ALEXANDER: Now, regarding the two District reports that are addressed in your pre-filed testimony, who if anyone at the District worked with you on preparation of those?
THE WITNESS: Which report are you

referring to?

MS. ALEXANDER: Referring to District Report No. 2003-20, which is cited starting on page 2 of your pre-filed testimony and District Report No. 2007-79 cited starting at page 3 of your testimony.

THE WITNESS: So you want me to list all of the authors of this report?

MS. ALEXANDER: Are there a lot?

THE WITNESS: Well, I can just go, to begin with the first report which is 2003-20, I was the primary author, and we had a biostatistician Zenal Abadin, Dr. Zamuda and Bernard Sawyer, and another report --

MS. WILLIAMS: Can we just stop for a second. Is that the same as attachment 3 to your testimony?

THE WITNESS: Yes, I believe.

MS. ALEXANDER: I don't know that there's any point reading into the record the names of a lot of people who are listed on a document. Is there a specific place that you are looking on the study document itself that's in the record already?

THE WITNESS: Oh, okay, no, I thought you wanted me to name all those people who were involved in the studies.

MS. ALEXANDER: Yes, I am looking. All I have is a PDF page unfortunately. But I see that you have listed a biostatistician, a microbiologist and an assistant director of research and development. I should rephrase the question not to waste the room's time.

Were any people of those listed on the documents involved in the preparation of these studies? Anyone at the district or otherwise?

THE WITNESS: Well, involvement does involve the labs that did do that phase. So we did acknowledge them. But the report is -- based on the report prepared, these were the people that were involved in the completion of this project.

MS. ALEXANDER: Turning to the pre-filed questions. Question No. 1, which is regarding District Report No. 2003-20, based on sampling conducted in 2002, am I correct that the sampling essentially compared fecal chloroform levels at a monitoring location on the Des Plaines

River with level at the monitoring location downstream of the Stickney Plant?

THE WITNESS: Yes.

MS. ALEXANDER: And were the fecal chloroform levels at the Des Plaines River site found to be higher in levels than the Sanitary and Ship Canal site?

THE WITNESS: Yes.

MS. ALEXANDER: How many miles downstream of the Stickney Plant was the monitoring location of the Sanitary and Ship Canal?

THE WITNESS: The sampling location at the Sanitary Ship Canal is approximately 25 miles downstream of the Stickney plant.

MS. ALEXANDER: Why did you choose a location so far downstream? What was the scientific purpose in selecting that?

THE WITNESS: Because I was told to.

MS. ALEXANDER: By?

THE WITNESS: I'm just -- if you have time, I'm going to give you what triggered the study because of -- and there is a follow-up question I think we have like why did you conduct

the study when there was no rule making, so I'm going answer it also right now. That Stakeholder Committee Meeting which was established I believe in 2002 and the District went into agreement with the Agency and with the IEPA consultants. This was the discussions on the issue raised for use of day-to-day analysis on the CAWS, and there were several meeting, summary meetings reports that we didn't attend, but we got the meeting minutes and the issue raised in that meeting was to meet the water quality standards to achieve water quality standards for the lower Des Plaines River. And this is in the meeting minutes of the May 16, 2002 -- I have that -- and I do have also the agreement letter which was addressed -- where the discussion about Lake Michigan -- not Lake Michigan -- the lower Des Plaines River water quality standard was discussed. And on that basis we decided to select -- because the lower Des Plaines River is below the confluence of the Des Plaines River and the Chicago Sanitary Ship Canal location where we sampled the Lockport location.

So in order to achieve the water

quality standards at the lower Des Plaines River, we wanted to understand the microbiology of the fecal chloroform levels at these two locations to see whether it is -- the district is the primary source of FC burden at the lower Des Plaines River. So that factor was used as one of the issues that we would like to address before the rule making.

MS. ALEXANDER: So the focus in other words in a sense was the lower Des Plaines River?

THE WITNESS: Yes.

MS. ALEXANDER: Not anything in the CAWS per se?

THE WITNESS: During that time, yes.

MS. ALEXANDER: You reference two documents, the meeting minutes of May 16, 2002 and the agreement letter. Are those marked as exhibits yet? I don't believe they are.

CHAIRMAN TIPSORD: The meeting minutes are Exhibit 36. They are the minutes from lower Des Plaines and CAWS that the Agency provided during their testimony. And I believe those are meeting minutes from all of the meetings.

MS. ALEXANDER: Okay.
THE WITNESS: Yes, I have the agreement letter here. This is December 8, 2002 from Mr. Lanyard to Mr. Rab, and this statement of understanding was between IEPA and the District on use of intermittent analysis of Chicago area waterways.
MR. ANDES: I think that the point there is simply that that was the agreement under which the District performed various studies. It doesn't refer to specifically the study. Everything was done consistent with that letter.
THE WITNESS: Yes.
MS. ALEXANDER: Okay. So in other words, nothing from this study reached any results, any conclusions regarding fecal coliform levels closer to the Stickney plant; is that correct?
THE WITNESS: This study was basically comparing FC levels at the two sampling locations.
MR. ANDES: Fecal coliform.
THE WITNESS: Fecal coliforms only.
MR. ANDES: The other two locations

were?

THE WITNESS: One was the Des Plaines River which is above -- before the Lockport, and another one is the Chicago Sanitary and Ship Canal. It's not the same location, but it's the location where we collect our ambient water quality samples.

MS. ALEXANDER: Now, regarding District -- this is pre-filed question two -- regarding District Report No. 2007-79, which was commenced in 2004, in which you found that measurable rainfall in the period March through November on various years occurred between 33 and 46 percent of the calendar days approximately. My question is, I'm altering the pre-filed question just a bit based on previous testimony, but what did you count as a measurable rainfall day? Was that only the days that it actually rained or was that the days that it rained plus days in which water quality may have been influenced by that rain?

THE WITNESS: The table that is described in that report is based on, we have rainfall gauge -- you know, the measurable

rainfall that was monitored by grading stations by the District. And so if there was any measurable rainfall for the year, the entire year recorded in that report and that report also includes the rain all within the recreational season, that's May to October too. So it includes any measurable amount of rainfall that was recorded by the rain gauge station by the district, yes.

MS. ALEXANDER: Now, in the context to this particular study, did you make any effort to quantify the concept that's been referred to in these proceedings as wet weather days? In other words, this idea of days on which rainfall actually occurs, plus days on which the levels of discharge indicator bacteria are influenced by those days?

THE WITNESS: Well, as you know the other expert witness testified earlier, you know, the wet weather influence is just not the day when it rains. It doesn't end the same day. Then the next day if it is dry, there is no measurable rainfall recorded actually by the rain gauge station, but the influence of the rainfall event lasts longer.

MS. ALEXANDER: And my question is, did you make any effort in the context of this study to quantify the number of days in which that lingering influence was there? In other words, total days of rainfall plus influence?

THE WITNESS: We in the report that we are referring to, 2007-79, we had fecal coliform data from 2004 to 2006. We collected the data, and whenever there was a heavy rain, the criteria was that when the heavy rain or any storm occurred, that it exceeded the capacity of the TARP and there was an active discharge from the pumping station of the District, then we will follow the monitoring of fecal chloroform density for three days. So we do have to that extent fecal coliform distribution data.

MS. ALEXANDER: And I guess my question is a little more specific than that. Given that, I understand the raw data that you say you followed for three days after rainfall prompting one of these events, did you ever attempt for any given years than to total up the number of days in which either rain fell or there was this lingering influence such as you can say

on, you know, 65 days were wet weather days under that definition or 45 percent of the days, that kind of thing?

THE WITNESS: Well, we have the rainfall -- influence of the rainfalls. We did evaluate that. And approximately the rainfall days that occurs each year is about 145 days. So the wet weather effect comes to 145 days each year. This is approximate again. This is based on the rainfall measured by the rain gauge station. Now, if you factor in the influence of rainfall events, which lasts longer than the rain day, the first rain day, then you will have two more days following the rain event. So if you factor that in, say even one day post the rain event, 145 plus 145, it's about 290 days. It's more than 60 to 70 percent of -- you will see the effect of the rainfall event.

MS. ALEXANDER: But of course you wouldn't do that because not all of the rain -- because some of the rainy days occurred consecutively, right? In other words, if it rains for seven days straight, then you have seven days of rain, plus three days under your scenario where

you have the lingering effect, right? You don't have seven plus, you know, three, three additional days for each of those seven days, correct?

THE WITNESS: You know, the evaluation to the extent that we compared our results with the risk assessment, what they found in 2006, the true dry weather was approximately 85 percent time of the year. So when we looked into that, it comes out pretty close to what we are extrapolating based on we didn't actually look at the the consecutive days that it rained, and then the dry weather period. But it comes out to be more than 50 to 60 percent that we will see the effect of rain events.

MS. ALEXANDER: Now, in choosing when to look at this lingering event, am I correct in understanding that you didn't look at the lingering effect after every single rainfall event, but only after those that caused a discharge of some sort?

THE WITNESS: No, that's not correct.

MS. ALEXANDER: So did you -- help me understand, did you actually measure the

lingering effect after every rainfall event regardless of whether there was a discharge or did you simply did you make an assumption regarding whether there would be a lingering effect?

THE WITNESS: It's not an assumption. We said that whenever there is a heavy rain that will exceed the capacity of the District TARP and there will an active discharge from the pumping station, we will be sampling three days consecutively after that rain event.

MS. ALEXANDER: What about a light rain that would not prompt a discharge?

THE WITNESS: We do have data for those events too.

MS. ALEXANDER: But as I understood from your report, there were some rain events which in fact did not result in a discharge?

THE WITNESS: Yes.

MS. ALEXANDER: What was the basis for the decision to sample for three days following an event?

THE WITNESS: The decision is, I was going to refer to our sampling design, because you know we are the lab people. We also have to work

it out with our sampling personnel who go out and do the sampling. And if you owe -- I'm referring this to Report No. 2007-79.

CHAIRMAN TIPSORD: Which attachment is that to your testimony, please?

THE WITNESS: I believe it's attachment 5. Yes, I'm going to this page because I don't remember the days when they collected the samples. So it was the north area station. It was, the sample was collected on the first Tuesday and second Mondays of each month.

CHAIRMAN TIPSORD: Excuse me, Dr. Rijal, what page are you reading from?

THE WITNESS: Page 3.

CHAIRMAN TIPSORD: Go ahead.

THE WITNESS: So at the north area stations on the first Tuesday and the second Monday of each month the sample was collected for fecal coliform, and at the south area station the third Tuesday and the fourth Monday of each month. And the samples were not collected during weekends and holidays because of the overtime incurred. So if you look at the data, we do have following the rain event, the three days, but if it falls on the

weekend, we don't have the fecal chloroform data for that day.

MS. ALEXANDER: So you sampled regularly on the dates that you cited, and then in addition to that, except on weekends, for three days after an event?

THE WITNESS: Yes.

MS. ALEXANDER: My question is, what is the basis for choosing three days? Why not four? Why not two?

THE WITNESS: Well, it was basically because to avoid overtime. If you have to give overtime to the staff, this was an expensive two-year project. But we did cover that also for certain heavy rain events. We did have samples for that. But there are studies that show the die-off effect which lasts -- there was one study -- I don't recall bacteria by USGS, and they found that there is a lingering effect for almost 72 hours after the rain event. So we factored that in, and we decided to select three days. Like the day one is the rain event, and then the first day and the second day we did the sampling.

MS. ALEXANDER: And you sampled for

these three days following a heavy rain event, correct?

THE WITNESS: Yes.

MS. ALEXANDER: But not other rain events?

THE WITNESS: When we analyzed all the data, we found that there was a light rain event period that was which, the light rain here which fell into .1-inches of rainfall to less than .5 inches of rainfall, and we have the data for some of those events which followed for two days post a light rain event.

MS. ALEXANDER: But you didn't deliberately go out and sample for three days anything other than heavy rain, correct?

THE WITNESS: Yes.

MS. ALEXANDER: Okay. Does your data contain any comparison in the context of this sampling after a heavy rainfall event of the levels before and after the first flush of indicator bacteria?

THE WITNESS: I would like you to explain. I know what is first flush, but I want you to explain what you mean by first flush in

context to this large watershed in the Chicago area.

MS. ALEXANDER: Well, then, I mean, I think it would be better if you gave me how you understand the first flush, and I'll tell you if it's consistent.

THE WITNESS: Well, as Susan pointed out earlier, the intensity, the first flush depends on the intensity of the rainfall, the duration of the rainfall, and the maximum volume of, you know, rainfall needed to produce a first flush will rarely -- and it was not asserted in this report because we did not see -- look at the levels of fecal chloroforms with the inclement of rainfall events, which if he had done that, we will get inclement rainfall event changes in the rainfall levels which we did not do it. I would also like to point out that it's going to be difficult to determine the first flush because it will depend upon again the intervals between the storm event, the dry period, and the duration of rainfall and also the characteristics of the drainage basin area too.

MS. ALEXANDER: I'm afraid I missed

a word in there. Did you say incremental rain event? I didn't quite catch that.

THE WITNESS: Yes.

MS. ALEXANDER: What do you mean by incremental rain event?

THE WITNESS: An incremental rain event is like -- it started out in Des Plaines and then you follow the rain event and measure as the day progresses, you get increased rainfall and how much of the rain sets, what is the duration and intensity that will vary.

MS. ALEXANDER: Okay. So am I correct in understanding that it's not always clear when, you know, what constitutes the first flush or when it occurs?

THE WITNESS: The first flush, it's my understanding -- I'm not an engineer, but it does get captured in the District jurisdiction and gets treated.

MS. ALEXANDER: Now, turning to pre-filed question four. This is regarding the conclusion in the 2004 study that levels of fecal chloroform indicator bacteria in the CAWS upstream of the waste water treatment plants frequently

exceed the proposed IEPA discharge standard of 400 colony forming units per 400 millimeters. What is the significance of that comparison in your understanding?

THE WITNESS: The significance of this comparison here is to indicate that the effluent limits of 400 fecal chloroforms is not justified when a higher number is introduced into the CAWS from upstream and other contributory loads. So the measure that is mentioned here, the 400, is not reflective of water quality microbiological water quality in the CAWS.

MS. ALEXANDER: Do you have an understanding of what level of fecal chloroform indicator bacteria are generally found in the effluent from the District's waste water treatment plants at issue here being North Side, Calumet and Stickney?

THE WITNESS: Yes, I do. And I give you exact, it would not be accurate. So I'm going to give you an approximate range. That it would be 10,000 to 200,000 colony forming units per 100 million, but on average it's between 10,000 to 40,000 or 50,000 CFUs per 100 million.

MS. ALEXANDER: So in other words, the numbers coming out of the effluent are essentially higher than 400 and in many cases higher than what's found upstream, is that correct? Not in every case, but in many cases.

THE WITNESS: What do you mean by many cases?

MS. ALEXANDER: The levels in the down -- in the effluent are at least during dry weather -- are generally higher than the levels in the upstream area, not influenced by backwash?

THE WITNESS: I will not answer that question because, again, the question of dry weather, what you consider dry weather, we do have -- we do see effects of rainfall which lingers following dry weather. So there are times we see high levels of fecal chloroform which are higher than 400 CFU per hundred million in the upstream location, and also in the contributory loads, which is discharged into the CAWS.

MS. ALEXANDER: Allow me to define my terms then. By dry weather, I am referencing a period of time in which no rain is occurring and there is no lingering influence as it's generally

been defined by Geosyntec in your study period of three days. Dry weather being that, would it be fair to say that generally the plant effluent has higher levels of fecal chloroform bacteria than are in the upstream portion?

THE WITNESS: Yes.

MS. ALEXANDER: So would it also be fair to say that if you impose the 400 colony forming unit limits, you are going to reduce the amount of these indicator bacteria at least that are going into the downstream portion of the river?

THE WITNESS: My answer is, no, because, again, the upstream location, it fluctuates the FC loading that's coming in. It's higher than the 400 FC limits that is proposed for the effluent limit. So it is -- the levels are higher also in the upstream locations.

MS. ALEXANDER: Isn't it a fact that if the plant effluent is 10,000 and you impose a limit on that and you lower it to 400, that you are going to be putting fewer fecal chloroforms indicators overall into the river?

THE WITNESS: Just for fecal

indicators?

MS. ALEXANDER: Yes, we are just talking about indicators right now because that's the subject of your study.

THE WITNESS: Yes, that's the subject of my study.

MR. ANDES: If I can follow-up on that. Dr. Rijal, and we can talk about some figures in your report, but can you talk to me about the comparison of the upstream levels and not the effluent, but the downstream levels, downstream of the discharges from the District and how those compare in terms of how -- are the levels upstream and the levels downstream sometimes in the same --

THE WITNESS: They are sometimes in the same -- you asked generally there are -- there are times when they are the same.

MS. ALEXANDER: Are they more likely to be the same during wet weather or dry weather, and dry weather as defined moments ago.

THE WITNESS: Well, both during the light rain events and during sometimes during the wet events, it's usually the same.

MS. ALEXANDER: But when you say it's the case that during dry weather, the levels below the plant outfalls of fecal chloroform indicators are likely to be higher than the levels upstream?

THE WITNESS: Yes.

MR. ETTINGER: May I just interrupt here. We've been discussing upstream and downstream a lot. Have you studied the flow from the North Side plant?

THE WITNESS: No.

MR. ANDES: Studied the flow in what way?

MR. ETTINGER: Have you or do you know whether water from the North Side plant sometimes flows north as well as south from the plant?

THE WITNESS: You mean backflow, is that what you are saying?

MR. ETTINGER: Well, back is an implication too. We know the plant discharges to a channel which flows north-south, correct? And and from north to south.

THE WITNESS: North to south.

MR. ETTINGER: The north shore channel flows north-south?

THE WITNESS: Yes.

MR. ETTINGER: I'm asking have you studied or do you know of a study that says whether wet water from the North Side treatment plant sometimes goes north from that plant as well as south?

THE WITNESS: I don't know.

MR. ETTINGER: And do you know whether water from that plant gets up to Oakton Avenue?

THE WITNESS: It is my understanding that there is a lake diversion and the water from Lake Michigan is diverted and flows inland from through the north shore channels to the Chicago river and it flows down inland. So the chances of flowing to the north direction is highly unlikely.

MR. ETTINGER: Do you know how often that lake diversion is open?

MR. ANDES: Lately? A lot.

MR. ETTINGER: Well, not counting the last two weeks.

THE WITNESS: There is a

discretionary diversion which flows --

MR. ETTINGER: I'm sorry, my question was do you know how often the diversion into the north shore channel is open?

THE WITNESS: I don't know.

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

MS. ALEXANDER: I'd like to turn to Figure 18 in the study we're discussing which is on page 28. And we are back to, I think it was your study was attachment 5 to Exhibit 113.

CHAIRMAN TIPSORD: Wait a minute. The 2007 study? Is that the one we are talking about still?

MS. ALEXANDER: Yes.

MR. ANDES: We actually have copies of that chart if that would be helpful.

CHAIRMAN TIPSORD: So the 2007 study is attachment 5.

MS. ALEXANDER: This is attachment 5 and this is Figure 18.

MR. ANDES: If I can mention, we do have a few notations on this particular copy just to make it clear where the locations were, otherwise it's the figure from the report.

CHAIRMAN TIPSORD: Since there are notations on it, I'm going to go ahead and mark it as an exhibit. We'll mark this as Exhibit 114 if there is no objection. Seeing none, this is Exhibit 114.

MS. ALEXANDER: Now, looking in particular at the top figure, this is subquestion A, would it be fair to say that these show that during wet weather, the level in fecal chloroform in the CAWS increases somewhat downstream of the waste water treatment plant outfalls?

THE WITNESS: Can I explain further? That's not correct, and I'm going to provide explanation to that.

MS. ALEXANDER: Okay.

THE WITNESS: Now, if you look at this Figure 18, the top one, it gives you the fecal coliform geometric mean concentration during heavy rain day 1, day 2, day 3. And if you look at the upstream location and the downstream fecal coliform levels were higher both the day 1 and day 2. Both in the upstream and the downstream location which I'm talking about, which is Foster, which is 3.1 miles downstream, and also the

contributory, the Albany Avenue. If you look at the numbers here, it's about 25,000 fecal coliform -- colony forming units per hundred million. This level, high level of FC is measured both under day 1 and day 2. And we see that the downstream location at Wilson. There is an increase in the FC level. And this increased level you see downstream of the outfall only immediately after the contributory input here. And that level remains high until 6.6 miles downstream of the locations.

MS. ALEXANDER: Perhaps I'm misunderstanding you. You characterized my question as incorrect, but it sounds like you answered it yes, which is in fact the upstream level, which is about 25 on the heavy rain day, is lower than the levels downstream, and in particular pointed out downstream of the tributary, but that shoots up to 35,000 and higher; is that correct, that's what's going on on wet weather days? I'm sorry, I'll define that on heavy rain days.

THE WITNESS: No, I'm trying to provide a clarification to your statement there

that when we are comparing downstream locations, the downstream of the outfall immediately downstream, by Foster Avenue, the fecal coliform levels are compared similar to the upstream location here.

MS. ALEXANDER: All right. So then to clarify my question, it appears what's going on heavy rain day 1 is that the levels are about the same until you get past the tributary, in which case they go up?

THE WITNESS: Yes.

MS. ALEXANDER: Now let's look at the dry days. Isn't it a fact that on the dry days you start out with very low levels upstream. You get a spike immediately downstream, and then those levels steadily drop; is that correct?

THE WITNESS: It drops until it passes the tributary, and then you see it increases back.

MR. ETTINGER: I'm sorry. We are having trouble seeing part of this. On your dry days, this tributary, it's actually above -- it's above the effluents with the north shore channel, right?

THE WITNESS: Yeah, but that feeds, this location here is upstream of the Lohan dam on the north branch of the Chicago River.

MR. ETTINGER: And Wilson is below that, right?

THE WITNESS: Wilson is below that.

MR. ETTINGER: So just looking at, what we don't see as we see a dry day level at Foster, which is it looks like around 9000 just eyeballing it, and a level at Wilson which is about 7000 just eyeballing it, but we can't really tell what happens with the tributary there because we don't have a chart right at that spot.

THE WITNESS: But we do have fecal coliform levels there, and it is about 400 CFU's per hundred million, right?

MR. ETTINGER: Right, on the dry days, on the tributary according to that.

THE WITNESS: Right.

MR. ETTINGER: On the charts you are presenting, we can't see a rise in the north branch from that tributary, but you believe it exists based on your measurements of the north branch above the effluence?

THE WITNESS: And there is no, if you look at it, there is no steady pattern of decline here based on the distances here we compared for the dry weather.

MR. ETTINGER: Well, there is a steady decline if you look at one body of water coming down from the sewage treatment plant, if you look at Foster, Wilson, I can't read the next one, Grand.

THE WITNESS: There is a decline. There's not a steady decline is what my point is.

MR. ETTINGER: What is the one that's 6.6? I can't read the writing in there.

THE WITNESS: That's Diversey.

MR. ETTINGER: If you look at Foster, Wilson, Diversey and Grand, which is the water that's all in one direction, you do see a steady pattern of decline on this chart, don't you?

MR. ANDES: You are talking specifically during dry days?

MR. ETTINGER: That's right. I'm just asking about dry days. I'm just saying there you do see a steady pattern in the lower --

THE WITNESS: Well, based on those distances we have, I think when we compare like at the downstream location it was about 9010, then we compared that to the level of 6000. I don't know if that is significantly lower, but if you compared the location from the 3.1 to the 10.7 miles downstream of the plant, then you see there is a drop there. But the level is, you know, there is a decline, but not a steady decline.

MS. ALEXANDER: I'm sorry, help me understand.

MR. ETTINGER: I'm sorry, I'm just -- We are trying to understand the chart here the way we understand the way the water flows. Just looking at your stations downstream from the North Side plant, on dry days, the highest number is Foster. The next highest number is Wilson. The number after that is Diversey, and the number after that is Grand, and each one drops in comparison to the one above it?

THE WITNESS: Yes, it does.

MS. WILLIAMS: Just to follow-up, the upstream number is the lowest of all, of all

the four that he named, upstream that number is lower?

MR. ANDES: During dry days?

MS. WILLIAMS: Yes, during dry days.

THE WITNESS: Yes.

MR. ANDES: Not talking about the other days?

MS. WILLIAMS: Correct.

THE WITNESS: Yes.

MS. ALEXANDER: Just to clarify, where you indicate tributary here, this 3.3, are you sampling in the river itself or are you sampling in the tributary?

THE WITNESS: We are sampling on the north branch of the Chicago river which is a tributary to the CAWS.

MS. ALEXANDER: Okay. So you are sampling on the north branch.

MR. ETTINGER: Can I just ask, do you know what the sources of the fecal coliforms are at the north branch?

THE WITNESS: There are diverse sources.

MR. ETTINGER: Well, do you know

what they are?

THE WITNESS: Could be treated waste water from effluents upstream, upstream could be starting from, you know, the middle fork that meets down at that location. There are other environmental nonpoint sources. The sand, soil run-off, wild animals, foul, and so they all contribute to the levels.

MS. WILLIAMS: What about CSOs?

THE WITNESS: There could be CSOs.

MS. WILLIAMS: Do you know if there's CSOs?

THE WITNESS: We have reported based on the District reporting CSOs data only, yes.

MS. WILLIAMS: I'm sorry, I don't understand.

MR. ANDES: And we are talking about, this is the north branch?

MS. WILLIAMS: Outside the CAWS, are there CSOs?

THE WITNESS: We know there are CSOs.

MS. WILLIAMS: Thank you. That's all I was asking.

While we are waiting, let me just ask in follow-up. You mentioned that there was a USGS study, and I'm not sure you could recall the citation. Is that something you could provide for the hearing, the USGS studies you looked at for those days?

THE WITNESS: Yes, I could provide that.

MR. ETTINGER: Could I ask one more question about this chart while we are on it? Just looking at Foster, just making sure I'm reading this right, it indicates that dry weather fecal coliform levels are higher than the heavy rain day three levels; is that correct?

THE WITNESS: It is possible.

MR. ETTINGER: Well, that's what your data shows.

THE WITNESS: Yes, that's what the data is, yes.

MR. ETTINGER: Do you have any understanding of why that might have happened?

THE WITNESS: Again, this level here would be the level that you find in the -- see, if you see at the driver, this would be the level

that you find in this location? FC levels.

MR. ETTINGER: So if I were paddling around Foster, I'd be better off, if I was just worried about fecal, three days after heavy rain than I would be on a dry day?

MR. ANDES: The data say what the data say.

THE WITNESS: I will not comment on that.

MS. WILLIAMS: But could you comment on whether it might indicate that the actual impact on a wet weather day is less than three days or less than the two days following the rainfall that you measured.

THE WITNESS: To make a statement here, you know the microbiology itself of the water is more complex. It would change. So based on the data here, the levels of fecal coliforms levels are lower. The dry weather period as compared in this study is lower than compared to the rainfall period.

MR. ANDES: To follow-up. Is it true that the levels in the first chart, the levels of fecal coliform on heavy day 1 are orders

of magnitude above dry day numbers?

THE WITNESS: Yes.

MS. ALEXANDER: I think I'm finally ready to clarify the tributary issue. Would I be correct in understanding that the flow that originates from the North Side plant into the north shore channel doesn't flow into the tributary where you sampled, correct?

THE WITNESS: No.

MS. ALEXANDER: So in other words, the flow goes past the tributary, the tributary goes flows in at that point. So what you are really measuring is the flow that goes into the flow that is coming from the north shore channel, is that correct?

THE WITNESS: That is correct.

MS. ALEXANDER: If you exclude the tributary, which is not in fact in that flow, you would then have the pattern that I've described, would you not, which is that there are low levels of fecal coliform upstream, they spike to a little below 10,000 immediately downstream and then steadily drop, is that correct, excluding the tributary which is not part of the flow?

THE WITNESS: But the rain event, if you look at the rain levels, the Foster levels -- the upstream levels, it's a continuous point system. So even if you block the tributary, the upstream, the levels of heavy rain period, you are getting higher numbers than down stream.

MS. ALEXANDER: Excuse me. I'm excluding heavy rain. I'm only talking about dry days. Would you agree that excluding the tributary, which is not part of the flow from the discharge into the north shore channel from the North Side plant, there is in fact a steady drop after a spike immediately downstream of the plant?

MR. ANDES: So you are talking about which -- you are talking about specifically the -- you are asking us to ignore the tributary and ignore the heavy rain, day one, day two and day three, and all only talk about dry days.

MS. ALEXANDER: Yes, I am talking about the dry days and exclude the tributary which is not part of the facility. Would you agree with the statement?

MR. ANDES: But it's part of the CAWS.

MS. WILLIAMS: What did you say, the tributary?

THE WITNESS: It needs into it.

MS. WILLIAMS: Becomes part of the CAWS.

THE WITNESS: Well, we have. We didn't subtract that in our study here. The data is what the data we have currently, and if you even exclude, if you look at the FC levels during the dry weather, it's like maybe in between two times higher, the 400 levels, and the level here when we compare at the location Foster Avenue which is three miles downstream of the outfall to the four miles, you know, when we compared these two locations. There, it's not -- there's not a steady design here.

MS. ALEXANDER: Well, hold on a second. Let's look at the level of 3.3, which is also an indication is Foster, would agree that on the dry weather day, that level is higher than at 4.0, the bar goes higher on the chart, correct?

THE WITNESS: Yes, but how significant higher is it.

MS. ALEXANDER: Well, that wasn't

the question. Would you agree it's higher?

THE WITNESS: No.

MS. ALEXANDER: Would you agree that it's higher?

THE WITNESS: Higher to what level?

MS. ALEXANDER: At 3.1 to 4.0.

THE WITNESS: Compared to 4.00, it going to be marginally higher.

MS. ALEXANDER: And would you also agree that the level at the dry weather bar is higher than the comparable bar at 6.6?

THE WITNESS: Yes, to the same my answer previously it is the same here.

MR. ANDES: So if I can follow up on that. So does that indicate during dry weather days the levels of fecal coming from north side are significantly attenuated as they go downstream?

THE WITNESS: It looks like it. You see a natural attenuation here.

MS. ALEXANDER: And would you agree that there is roughly the same natural attenuation for heavy rain day 3, again, including the tributary, which is not part of the flow?

THE WITNESS: I didn't understand your question.

MR. ANDES: And not day 1 or day 2, only day 3?

MS. ALEXANDER: Only day 3 would you agree that you see essentially the same pattern for dry weather? In other words, relatively low levels upstream, a spike immediately downstream, followed by attenuation, excluding the tributary, which is not part of the flow?

THE WITNESS: There is a decline, but how significant it is, it's hard to say from this figure here.

MS. ALEXANDER: Okay.

MR. ANDES: If I can follow-up on that. Is it true that on heavy day 1 and heavy day 2, there is no indication of steady decline? In fact the levels go up significantly as you go down the CAWS?

THE WITNESS: Yes, that's correct.

MR. ETTINGER: Can I ask a question. Part of the problem here is we've got miles that we're talking about and days. Have you ever measured how many days it takes the water to go

down into miles?

THE WITNESS: How many days?

MR. ETTINGER: Yes, what's the flow rate on a dry or a wet weather day; do you know? Is there a drop in fecal in the water at the North Side plant? How many days or hours does it take to get to Grand?

THE WITNESS: The flow is -- it's not a high flow. That's my understanding. But it's flowing probably during May to October -- I don't know. I'm not going to speculate any numbers.

MR. ETTINGER: I'm not asking you to speculate. I'm asking if you know what the flow rate is so we can somehow chart this, and have a better understanding of how long it takes water discharged at a point to get to another point?

MR. ANDES: She doesn't know. That information may be available for to us provide.

THE WITNESS: We can provide that information.

MR. ETTINGER: Okay, thank you.

MS. ALEXANDER: Just a couple follow-up questions from me. Did the 2007-79

study, attachment 5, draw any conclusions regarding water quality improvement resulting from disinfection during dry weather?

MR. ANDES: I'm sorry, which study?

MS. ALEXANDER: The study we've been discussing of which Figure 18 is a part.

MR. ANDES: 2007.

MS. ALEXANDER: Yes, this is 2007.

MR. ANDES: Attachment 5.

THE WITNESS: We did not make any conclusion for the dry weather, but we did report that there is influence of the rain event which lingers beyond the rain event and which extends to the driver of the NVC, the elevated level of fecal coliforms even during the dry weather period.

MS. ALEXANDER: And do you have an understanding whether CSO events in the CAWS will be reduced after TARP is completed?

THE WITNESS: I don't know.

MS. ALEXANDER: All right. That concludes my questions.

MS. WILLIAMS: You don't know if they'll go down?

THE WITNESS: What? The CSO

events?

MS. WILLIAMS: CSO events.

THE WITNESS: When the TARP will be completed?

MS. WILLIAMS: Yes.

THE WITNESS: I don't know if it will completely reduce the number of CSOs, I don't know.

MS. WILLIAMS: But you know they will go down?

THE WITNESS: They will go down, yes.

CHAIRMAN TIPSORD: Ms. Alexander, if you are done, we'll go ahead and take an hour for lunch and we'll come back and start with the IEPA's questions for Dr. Rijal.

(Whereupon a lunch recess was taken.)

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

I, DENISE ANDRAS, being a Certified Shorthand Reporter doing business in the City of Des Plaines, Illinois, County of Cook, certify that I reported in shorthand the proceedings had at the foregoing hearing of the above-entitled cause. And I certify that the foregoing is a true and correct transcript of all my shorthand notes so taken as aforesaid and contains all the proceedings had at the said meeting of the above-entitled cause.

_____

DENISE ANDRAS, CSR

CSR NO. 084-0003437