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 10, 2008, at 9:00 o'clock a.m. at the Thompson Center, Room-9-040, 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. ANAD RAO, Senior Environmental Scientist

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY:

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BY: MS. ANN ALEXANDER
MS. MEYERS-GLEN

CHAIRMAN TIPSORD: Good morning. We're back again. My name is Marie Tipsord. And I'm not going to go through the whole spiel, but this is the Water Quality Standards and Effluent Limitations for the Chicago Area Waterways System and Lower Des Plaines River, proposed amendments to 35 Il. Admin Code 301, 302, 303, and 304 docket number R08-9.

To my right is Dr. Tanner Girard. He is the presiding Board member in this matter. To my left is Dr. Anand Rao, from our technical staff. Board members Nicolas Melas and Andrew Moore will be joining us later today. Both had emergencies arise.

Which brings us to, at the close of yesterday we were still with the Natural Resource Defense Counsel, Ms. Ann Alexander, who also has had an emergency and will join us later. So rather than finishing her questions this morning, we'll go to the IEPA. So that leaves us with our panel, which is Dr. Petropoulou, Dr. Tolson, Dr. Gerba. I'll remind you all, you were sworn in yesterday, and you are still sworn in today. I apologize for the out of order

nature, but we're going to go to the IEPA who is going to ask you some questions.

MS. DIERS: I'm going to begin with my pre-filed questions for Dr. Petropoulou. I'm going to start with number one.

You state in your pre-filed testimony the following: "For the last three years I have been the project manager for the Metropolitan Water Reclamation District of Greater Chicago's Microbial Risk Assessment Study. I have been intimately involved in every aspect of the MRA study." When you state, "The main objective of the MRA study was to evaluate the human health impact of continuing the current practice of not disinfecting the effluents from the North Side, Stickney and Calumet water reclamation plants versus initiating disinfection of the effluents at these three plants"; did you formulate that objective?

DR. PETROPOULOU: I did not.

MS. DIERS: Who did formulate that objective?

DR. PETROPOULOU: That objective, the way you stated your question, was formulated

in the request for the proposal that the District should conduct a study.

MS. DIERS: Do you know when that was put together?

DR. PETROPOULOU: I believe it was issued in January of 2005. I don't recall the exact date that they issued the RFP.

MS. DIERS: If I understand, you said the district formulated the objective; is that correct?

DR. PETROPOULOU: I don't know if the district alone formulated the objective or they had a panel that worked preparing the request for the proposal, but it was in the request for the proposal.

MS. DIERS: So as you are sitting here today, you don't know what individuals were involved in that?

DR. PETROPOULOU: No.

MS. DIERS: I'm going to skip to question eight. And ask about how the sampling locations were chosen for this study? Could you just explain that?

DR. PETROPOULOU: Yes. We selected

a subset of the District's ambient water quality stations for the sampling that we did during dry and wet weather for this study, and we also collected samples at the outfalls and at the pumping stations at the each of the Calumet, North Side and Stickney waterway segments as well.

MS. DIERS: When you were talking about sampling at the pumping stations during the wet weather events, can you explain was the sampling performed at the outfall itself or was it near the waterway near the stations?

DR. PETROPOULOU: Okay. It was at the North Side -- because the sampling crew for safety reasons, they could not go close to the outfall of the pumping station. Based on the boat's captain, they made the decision that the safest location to anchor the boat and collect the samples was at the Wilson Avenue ambient water quality station. At the Stickney waterway segment upstream of Stickney actually at the Racine Avenue pumping station, I believe the sample was collected at the south fork or public station at 35th Avenue. So that was the most approximate location they could collect that samples. And for

the 125th Street pumping station, the sample was collected downstream. I believe it was Halsted Avenue.

MS. DIERS: On page 2 and 3 of your pre-filed testimony you list three specific objectives of the 2005 dry weather samplings. Can you explain when these objectives were formulated, and were you involved in formulating those objectives?

DR. PETROPOULOU: These objectives were formulated at the kick-off meeting for the project. After we were awarded the project we met with the District and we formulated the objectives.

MS. DIERS: Do you recall what individuals were involved in formulating the objective?

DR. PETROPOULOU: It was the GeoSyntec team, which includes, as I defined yesterday in my testimony, GeoSyntec, our experts and also the District. Like we met with the District and we discussed the objectives of the study.

MS. DIERS: And would that be the

same for the 2006 wet weather sampling?

DR. PETROPOULOU: It's very similar. The objectives for the 2006 study were actually not different at the beginning. At the beginning we set the same objectives. The idea was that in 2005 we would collect samples, and we would -- we anticipated that we would account for both dry and wet weather, but when we did the sampling, we realized that we didn't capture wet weather events, and the district decided to extend the study in 2006. So the objectives for the most part remained the same except we added an additional set of sampling events to capture specifically wet weather in 2006?

MS. MEYERS-GLEN: May I actually ask a follow-up question.

CHAIRMAN TIPSORD: You need to speak up. They can't hear you in the back of the room.

MS. MEYERS-GLEN: With the pumping stations I had a quick question. At 125th Street, the pumping station -- actually it's two. You said the sample was collected downstream at Halsted Avenue. How far approximately is that, the location it was sampled from, from the outfall

itself?

DR. PETROPOULOU: I don't know the exact mileage from that.

MS. MEYERS-GLEN: Approximately.

DR. PETROPOULOU: But I can tell you -- I know the distance from the Calumet outfall to Halsted, which is about 1.1 miles. I can't give you a number. I don't know.

MS. MEYERS-GLEN: Do you know approximately? I know you can't give me by feet, but is it like a mile, two miles, a quarter of a mile? I'm just trying to get a sense of how far away from the outfalls this actually was sampled for the purpose of outfalls.

MR. ANDES: I'm sure we can provide that answer.

DR. PETROPOULOU: Right. I just don't have that number. Again, just to clarify, we wanted to capture the effect that the pumping stations had in the waterway. So we went approximately as close as we could to the outfalls, but it wasn't the idea to capture the outfall itself for the risk assessment. Because what really matters is what goes in the waterway.

That's what the recreational users are exposed to.

MS. MEYERS-GLEN: The highest concentration though, if you are going to be capturing it, would actually com from the outflow itself, correct?

DR. PETROPOULOU: Right. Assuming that the recreational user would be exposed to the outflow of the pumping station discharge, which is not very likely.

MS. MEYERS-GLEN: But it is possible?

DR. PETROPOULOU: I don't know if it's possible. I know that the sampling crew could not get very close to collect the samples for safety, so based on that I assume it's unlikely.

MS. MEYERS-GLEN: There are 230 CSOs, correct?

DR. PETROPOULOU: I'm talking about the pumping stations. I'm not talking about the CSO outflows.

MR. ANDES: Yes, I think we might want to clarify. Which outfalls are we talking about?

DR. PETROPOULOU: Just pumping stations.

MS. MEYER-GLEN: If it's possible my two questions were going to be in the proximity of the other two points, so instead of doing that, if you were going to provide me with that in the first one, if you could provide me with all three instead of going through those questions?

DR. PETROPOULOU: All right.

MS. DIERS: I want to go back and clarify when we were talking about the objective from 2005 to 2006. When I'm looking at your pre-filed testimony you had three objectives for the dry, and then there were four for the wet weather. So in 2006 did you add the objective that's number four on page 3 of your pre-filed testimony, does it quantify any reduction of risk that would result from disinfecting plant effluents during wet weather?

CHAIRMAN TIPSORD: For the record that's Exhibit 68.

DR. PETROPOULOU: That objective was the same both in dry and wet weather.

MS. DIERS: Could you explain what

objective changed in 2006 --

DR. PETROPOULOU: We added an additional objective, which is objective number one under wet weather, and that was to account for any influx of the increased flow, the wet weather flow from the treatment plants would have on the microbial flow from the waterway.

MR. ANDES: If I could just follow-up. Two questions. First, am I correct to say that the 2005 initial objective included looking at wet versus dry, there simply weren't wet weather events in 2005; is that correct?

DR. PETROPOULOU: Yes.

MR. ANDES: And then the additional objective that was added of wet weather, was to consider the additional wet weather flow through the treatment plants?

DR. PETROPOULOU: Correct.

MR. ANDES: Okay, thank you.

MEMBER RAO: Just as a follow-up to that. This additional objective that you added, it states, "To evaluate the impact of reclamation plant wet weather flow on microbial quality of the plants outfall." So did you sample the outfall or

it was still in the waterway?

DR. PETROPOULOU: We collected samples in the outfalls both during dry and wet weather.

MEMBER RAO: For all three plants?

DR. PETROPOULOU: Correct.

MS. DIERS: I'm on question 16. Why did you take dry weather measurements at the surface at one meter depth, but not take wet weather measurements at the same depth?

DR. PETROPOULOU: We collected samples at the surface at one meter depth during dry weather and we looked at the results to see if there was a statistical difference between the one meter depth surface, and we found there was not. So during wet weather we collected samples at the surface.

MS. MEYERS-GLEN: Can I ask one follow-up? You guys testified yesterday that you didn't take into account temperature, is that correct?

CHAIRMAN TIPSORD: The trains go by and we can't hear you at all up here.

MS. MEYERS-GLEN: You stated

yesterday, however, that in the study you did not take into account temperature as one of your parameters, is that correct?

DR. PETROPOULOU: We didn't correlate the results to temperature, but we did measure the results of the temperatures to the waterways.

MS. MEYER-GLEN: But that wasn't a factor in the risk assessment?

DR. PETROPOULOU: No, it was not.

MS. DIERS: I'm on question 19 now. Explain what you mean by the statement on page 6 of your pre-filed testimony that states, "The results indicate that there are no significant correlations between dry weather fecal chloroform, indicator bacteria and pathogens. The wet weather results indicate that there is a better correlation between fecal chloroforms and other indicator bacteria and pathogens.

DR. PETROPOULOU: We looked at the correlation statistics between the different bacteria types, which included the three indicators that we did, E. Coli, fecal chloroform and enterococci with pseudomonas and Salmonella.

The only other two bacteria that we analyzed which are pathogens, and we found there was no statistical correlation. There was no good statistical correlation between the indicators and the pathogens, and that included indicators such as fecal chloroform, enterococci and E. Coli lie with the pathogens.

MS. DIERS: Do you know why you were seeing that type of -- I guess, do you know why you were seeing that type of statistical analysis when you did your study?

DR. PETROPOULOU: You mean for the wet weather?

MS. DIERS: Yes.

DR. PETROPOULOU: Or for the dry?

MS. DIERS: For both. Can you explain wet and then dry?

DR. PETROPOULOU: For the wet weather we found that there was actually better correlation between the indicators and between the indicators and the pathogens. And when I'm talking about pathogens, I'm referring again to bacteria data. We did this analysis only for bacteria. Now, why we find the better correlation

between -- during wet weather samples, I can't tell you why. I didn't research that subject. Perhaps Dr. Gerba can speculate why the wet weather data correlates better than the dry weather.

DR. GERBA: Might be fresher materials. It's probably not treated sewage. When you go through sewage treatment and waste water treatment, the ratios between the indicators and pathogens may change because there's differences in removal rates by the waste water treatment. When you are doing wet water flows, basically from the surface sources, you are getting raw waste water. So there's probably going to be better correlation. There's no differential for the survival of that process. I would expect a much better correlation through the wet weather for that reason because it's fresher stuff and not treated.

MS. DIERS: Can you explain why you noticed significant differences in the E. Coli and enterococci results by site during wet weather?

DR. PETROPOULOU: Again, that was a factual finding in our statistical analysis. We

found that when we tested the data with the Nova, the tests -- whether the data are the same or they are not, we found that the set that describes E. Coli and enterococci are different by site, which means they are different statistically between North Side, Stickney and Calumet.

MS. DIERS: But you had no indication as to why?

DR. PETROPOULOU: No, that was outside our study. We didn't do forensics to find out why.

MS. DIERS: Did you look at whether or not indicator organisms other than fecal chloroforms had better correlations with the pathogens during dry weather?

DR. PETROPOULOU: We did. We looked at correlations between all bacteria types.

MS. DIERS: What are the results of those?

DR. PETROPOULOU: Similar to what we found between E. Coli. There were other indicators between the pathogen types that we looked at.

MS. DIERS: I'm on 23. On page 5 of

your pre-filed testimony you state, "Results indicate the concentrations of bacteria, viruses and protozoa in the waterway increase during wet weather conditions." Will the bacteria, viruses and protozoa that are present and due to CSOs decrease as CSO flows are decreased or eliminated with a completion of TARP?

DR. PETROPOULOU: Is this a hypothetical question?

MR. ANDES: Her study didn't really deal with TARP in any way.

MS. DIERS: Do you have an opinion?

DR. PETROPOULOU: I don't know enough about the TARP to express an opinion.

MS. DIERS: Is that the same for the other individuals sitting on the panel; do you have an opinion about the impact with TARP?

DR. TOLSON: I don't know what frequency CSOs would occur from the TARP.

DR. GERBA: I don't have enough data to do that anyway to make a judgment.

MS. WILLIAMS: I'm going to ask a couple follow-up on the sampling since these are the questions for Dr. Petropoulou.

I'm looking at pages 12, 13, and 14 of the report. Maybe if you turn to that, it would be --

CHAIRMAN TIPSORD: That's Exhibit 71?

MS. WILLIAMS: Exhibit 71 --

-- it would be more helpful.

I'm trying to understand some of the differences here about how the sampling stations are defined. First on page 13, under upstream sampling locations, number one, it says, "NSC Oakton Avenue also known as WW102 sampling location 3," and then it says, "8200 feet or 1.6 miles." Do you see that?

Then if you turn to page 15, under "Upstream of North Side Water Reclamation Plant at the NSC, it says NSC Oakton Avenue, again also known as WW102, sampling location three. And then it says, "2800 feet or .5 miles from the Water Reclamation" -- can you explain that?

DR. PETROPOULOU: It's probably the number was transposed instead of 8200 feet. Obviously it's an inconsistency. I would have to verify which one is the distance.

MS. WILLIAMS: You don't know whether that distance was 8200 or 2800 feet upstream?

DR. PETROPOULOU: I don't know.

MS. WILLIAMS: Will the District be able to supplement that after the hearing into the record?

DR. PETROPOULOU: Yes.

MS. WILLIAMS: I think I have the same issue -- look at page 13 again. Let's look at number 3, "CSC Indiana Avenue, also known as WW56, sampling location 29, that has the same value there, 2800 feet or .53 miles." Then when you turn to page 15, near the top, "Upstream of the Calumet Water Reclamation plant at LCR, that says, "WW 56 is 6300 feet or 1.2 miles." Do you know as you sit here today whether that station is 2800 feet or 6300 feet upstream of the plant?

DR. PETROPOULOU: I would have to verify that.

MS. WILLIAMS: You would agree, those are a big difference?

DR. PETROPOULOU: Right, right.

MS. WILLIAMS: Would that difference

effect whether it was representative of an upstream location or not?

DR. PETROPOULOU: We went to the closest upstream and downstream location during dry weather.

MS. WILLIAMS: The closest one?

DR. PETROPOULOU: Yes.

MS. WILLIAMS: So then how did you determine that the station was not too close so that it was impacted by the plant itself?

DR. PETROPOULOU: I think we had criteria that we used for the location of the stations, and that included a distance of about 10 to 15 waterway widths. I know that when we calculated those distances, we verified them with the District's sampling staff with the GPS units and the distances checked out. I can see the discrepancies and the way the distances are important, but when we planned the closest locations from the station, we had the District sampling crew verify that they were 10 to 15 waterway widths from the outfalls.

MS. WILLIAMS: But you didn't compare that to any modeling that's been done to

determine the length of any upstream impacts from the plant effluent itself, correct?

DR. PETROPOULOU: We based that on practical information that we had.

MS. WILLIAMS: I'd like to point out one more of the descriptions that I think has an error in it.

MR. ANDES: I'm sorry, can I follow-up on the questions that you just asked?

MS. WILLIAMS: Well, this is the last one for this. I want to get out on the record where I think there are errors so you can fix them. Then you can follow-up. Is that okay?

On the bottom of page 13, the last station that you've listed, CSE Halsted, it states that that station is 5800 feet or 11 miles --

DR. PETROPOULOU: It's 1.1 miles.

MS. WILLIAMS: So your testimony is this should be 1.1; you don't need to look into that one? Okay, thank you.

MR. ANDES: First, I will just state that we will certainly in one form or another get back to you to address those typos.

MS. WILLIAMS: What, I'm sorry?

MR. ANDES: First I can state that we will get back to you promptly to clarify the numbers. I wanted to ask Dr. Tolson what effect this might have on any estimates of risk, these issues?

DR. TOLSON: Because these are, these sampling locations are in close proximity to the outfall, we feel that they are probably conservative if you are estimating the concentrations, as we discussed yesterday, we didn't have upstream and downstream's. If there's any impact from the upstream location of the outfall, then we overestimated the concentrations in the waterway.

MS. WILLIAMS: But wouldn't it change at all your opinion of what impact disinfection would have on the instream values if you were using upstream, un-impacted numbers that were impacted, wouldn't that effect the conclusions about the impact of disinfection?

DR. TOLSON: Yes, it would tend to diminish the impact of disinfection -- it would strengthen the argument that disinfection would have a lower impact on the overall risk of the

waterway.

MS. WILLIAMS: I have one more follow-up regarding sampling for Dr. Petropoulou. Yesterday we talked about the differences or the different definitions, I guess, of wet weather. You for sampling purposes, had a definition of wet weather and then Dr. Tolson went and made some extrapolations about days that were impacted after a rain event. So when I was asking him questions yesterday about how he used meteorological data, I wanted to follow-up with you and understand for purposes of sampling, when you detected rain at one station but not another, how was that interpreted for the samplers?

DR. PETROPOULOU: Actually the sampling protocol included input from the District's waterway weather center. So if we were planning to do something in Calumet, those were the gauges that were used to trigger the sampling. If we were planning something for Stickney, the same thing, or North Side. And actually we would send the boat where the rainy event was predicted to occur.

MS. WILLIAMS: So would it be

possible that you would have sent a boat to the North Side where a rain event was predicted to occur, but at the same time someone would be taking a dry weather sample at Stickney on that day?

DR. PETROPOULOU: No, absolutely, no, because we didn't do the dry and wet weather sampling at the same time. One was done in 2005 and the other 2006.

MS. WILLIAMS: Okay. In 2005 -- that the dry year, right -- how did you determine that the dry weather samples were not being impacted at rain events at a different station?

DR. PETROPOULOU: Because, as I said, originally the study was to capture randomly dry or wet weather events, but the reason the District decided to expand the study is because when we look at the data, all the sampling took place without rain. Like there was at least three days of dry weather --

MS. WILLIAMS: Throughout the system?

DR. PETROPOULOU: It was at three of the segments where we did the sampling.

MS. WILLIAMS: So you did not look at for sure whether, for example, a Stickney dry weather sample, there were three days without rain at Stickney, but you did not look at for sure whether there had been rain at North Side?

DR. PETROPOULOU: We actually did. I think for the 2005 season it was a dry season. We didn't get rain events. I know that it rained a couple times after we completed the sampling, but not before the sampling.

MS. WILLIAMS: So it just didn't rain in 2005, so it wasn't an issue?

DR. PETROPOULOU: I didn't say it didn't rain in 2005. I said in 2005 when we did the sampling, we didn't capture those weather events, and that's what made the District decide to expand the study in 2006.

MS. WILLIAMS: Can we find this in the report? Does it explain this issue?

DR. PETROPOULOU: We have that data, and we can compile and provide that data.

MS. WILLIAMS: That would be helpful. Thank you.

MR. ANDES: And would that data be

in the appendices in that report?

DR. PETROPOULOU: So we have used that data for modeling purposes to calculate dry and wet weather data. So from the District we have.

MR. ANDES: So what specific data are we talking about?

DR. PETROPOULOU: Rain gauge data.

MS. WILLIAMS: Rain gauge data would be helpful for 2005 and 2006.

MR. ANDES: Sure.

MS. MEYER-GLEN: Can I ask a few follow-up?

MS. WILLIAMS: Yes, I think we are done with Dr. Petropoulou.

MS. MEYER-GLEN: We were talking about whether it was raining at North Side and not at Stickney, I was wondering about the converse. If you had a rain event triggered at Stickney and not at North Side, which is upstream, how would that have been handled?

MS. ANDES: Is that a hypothetical? I think they already said it wasn't.

MS. MEYERS-GLEN: Well, did it

happen? If it did happen, how was it handled?

DR. PETROPOULOU: Was that the question?

MS. MEYER-GLEN: And would you know?

DR. TOLSON: Under wet weather sampling?

MS. MEYERS-GLEN: Wet and potentially dry. I guess I'm asking how would you have characterized it. If you would have characterized it as wet weather for the entire system or only at Stickney which is downstream, and if so, then how would the North Side plant, which would not have been wet, have been handled?

DR. PETROPOULOU: We didn't -- I believe we didn't sample, unless it rained in the entire waterway. I know there was one sampling wet weather day where we sent two sets of boats, one at North Side and one at Stickney on the same date because there was rain events at both waterways. So we have captured a situation like that, where it rains in both waterways. The way we account are sampling measured what was in the waterway in that particular segment of the waterway when we had the significant rain event.

So we didn't account specifically for what was like at North Side or Calumet except for the measured concentrations in the waterway.

MS. MEYERS-GLEN: I think that answers it.

DR. TOLSON: I have one more thing. For our Stickney dry water samples, I don't believe there were any days where there was rain at North Side that would have drifted into --

MS. MEYER-GLEN: I'm asking the converse. If you have downstream, if you have rain at Stickney, and yet you don't have the alarms go off or you don't have enough prediction over .5 at North Side, how would that be handled because then you have rain downstream but not upstream, potentially attributed to the waterways in general, and I was wondering how that would have been handled?

MR. ANDES: I guess the first question is whether in fact that's just a hypothetical or whether that -- do you know of any situation that would have happened?

DR. PETROPOULOU: How would that be captured in North Side or at Stickney?

MS. MEYERS-GLEN: I was wondering how that would be characterized with both, because if you have dry on top and wet on bottom, would that be considered a wet day for the system as a whole or would it be then accounted for that it was dry at North Side?

DR. TOLSON: So there would be no samplings taking place at the north side?

MS. MEYERS-GLEN: Correct.

DR. TOLSON: Because it was wet somewhere.

MS. MEYERS-GLEN: Correct.

DR. TOLSON: So that is off the table. For Stickney it would be considered a wet weather day for Stickney, but that would be for sampling purposes only. I don't know if that situation actually occurred. I don't know if we had a situation where it occurred there.

MS. MEYERS-GLEN: That answers half my question, and that's helpful. But then what would happen at North Side if it's not wet --

CHAIRMAN TIPSORD: He answered. I believe he did answer, there be wouldn't be sampling at the North Side.

MS. MEYERS-GLEN: But would it be characterized as a wet day through the system, even though there was not enough rain to actually technically have it be a wet weather day.

CHAIRMAN TIPSORD: Again, what he's answered is it would be a wet weather day for Stickney. Perhaps this is some of the confusion, when you classified a wet weather event, it was for that segment of the stream; it is not a systemwide weather event; is that correct?

DR. TOLSON: There's two different situations here, sampling where we took the wet weather and dry weather, and there is the analysis for risk, where it's more nebulous where we couldn't say it's wet or dry and we had to take into account that it was wet two days ago. So there is a difference there. For the sampling we had to be very sure that we captured wet days and dry days, that's why we had the antecedent periods of dry weather before we considered it a dry day.

MS. MEYERS-GLEN: So that wouldn't be effected then when you averaged it throughout the system, correct?

CHAIRMAN TIPSORD: I couldn't hear

you.

MS. MEYERS-GLEN: It wouldn't have an effect then when it was averaged throughout the system for risk?

DR. TOLSON: It is not averaged. That's a different calculation. The sampling and the risk assessment components here on dry and wet, we have to think about them differently.

MS. MEYERS-GLEN: Thank you.

CHAIRMAN TIPSORD: Did the IEPA have anything?

MS. WILLIAMS: I just want to ask one clarifying point about the additional information. So you are going to provide us information on the rain gauge data. And can you point me to where, like in the appendices we would look if we wanted to match that up with the sampling data; is the sampling results --

DR. PETROPOULOU: It's the dates. It's the sampling dates.

MS. WILLIAMS: But are the actual sampling results, like the raw data included in the appendices at all?

MR. ANDES: I believe the raw data

is not included in appendices A through D. We can provide that. We have that electronically. We can provide it. It's voluminous even on a disk, but we can certainly provide all of the raw data sheets.

MS. WILLIAMS: I think we would like that.

MR. ANDES: That's fine.

MS. WILLIAMS: That's all. So if you want us to move on to Dr. Gerba --

CHAIRMAN TIPSORD: No, let's go off the record.

(Brief recess taken, after which the following proceedings were had:)

CHAIRMAN TIPSORD: Back on the record. Ms. Alexander, we'll return to you and let you finish with this panel.

MS. ALEXANDER: I'm Ann Alexander from Natural Resources Defense Counsel for the record. I'm going to pick up where I left off which is at Tolson 24 and Gerba question 32. The question, that pre-filed question was asked and answered, which was did you use a Monte Carlo

simulation in quantifying risk? Please describe how that was done. Dr. Tolson responded to that question.

To follow-up on that, I would like to turn to Figure 5.2 in Exhibit 71, if you will. My question regarding Figure 5.2 is, would that be an example of range of values for one parameter of Monte Carlo analysis, which would be the incidental ingestion rate?

DR. TOLSON: Correct. That is a truncated distribution for ingestion of paracinetics.

MS. ALEXANDER: Just to understand the graph, it would look to me that the percent probability of ingesting 4.18 ml's per hour of water is around .15; if I'm understanding it correctly?

DR. TOLSON: That is correct.

MS. ALEXANDER: So in other words, it's an illustration of percent probability of this range of events?

DR. TOLSON: Probability, distribution, function, yes.

MS. ALEXANDER: Am I correct that

you also used a probabilistic range of values in your calculation for the other input variables instead of just one value?

DR. TOLSON: That is correct. Those input variables that had some variability we captured the variability with a range similar to what we've shown here for the ingestion.

MS. ALEXANDER: That would include, for example, the exposure duration, water consumption, pathogen concentration, all of those would have ranges?

DR. TOLSON: Pathogen concentration is a little bit different. That was actually developed from a Monte Carlo boot strap resampling from the data set. But the other ones, yes, those were all input ranges or distributions that were used in the model.

MS. ALEXANDER: Okay. And you used a probability density function or PDF for those, correct?

DR. TOLSON: You got it.

MS. ALEXANDER: My question is, then given that you did PDF for those different input variables except in pathogen concentration, why

did you not include an illustration of a probabilistic spread similar to what's in Figure 5.2 for each of those input variables? Why just one of them?

DR. TOLSON: Well, we could have. We could have made illustrations for each one, but the long normal parameters for the other ones are listed in the text.

MS. ALEXANDER: But am I correct there's no illustration for the others, you just did one illustration?

DR. TOLSON: The model input that would create that under any statistical programs are listed in the text.

MS. ALEXANDER: Okay. But there's no pictures is my question; I'm just confirming.

DR. TOLSON: I like pictures too, but I only included a couple pictures in here, illustrations.

MS. ALEXANDER: Now turning to table 5.13 --

MR. ANDES: I'm sorry, table 5.13?

MS. ALEXANDER: 5.13. My question on that is, why did you present your risk numbers

in that table as a single number rather than a probabilistic spread given that the inputs were probabilistic?

DR. TOLSON: In order to have a comparison point for the U.S. EPA acceptable risk number of eight per thousand, we actually computed the estimated point value from the probabilistic distribution. In other words, for each individual within the distribution of ingestion rates that had a chance of getting sick, we rolled the dice to see whether they were actually sick or not sick, took the total number of those per thousand and presented the results.

MS. ALEXANDER: So in other words, you did a probabilistic spread but did not present it here, but rather presented a point data as opposed to a spread?

DR. TOLSON: For ease of presentation of the results, we presented a single point number so we could basically compare it against the EPA numbers. It's also much easier to interpret a number versus a number, disinfection-not disinfection versus a range versus a range.

Q. Did the Monte Carlo Analysis conclude that there was a one hundred or lower probability of the risk identified in table 5.13? I mean using the language of these probabilistic spreads, was your conclusion that there was a one hundred percent or lower probability of either risk numbers listed in table 5.15?

MR. ANDES: Isn't every probability 100 percent or lower?

MS. ALEXANDER: No. In the context of the Monte Carlo Analysis, if you are presenting point data like this, you might also be presenting median probability. In other words, a 50 percent or lower probability of these numbers, where there may actually be a possibility of a higher risk; that's how the Monte Carlo Analysis works, correct?

DR. TOLSON: I'm sorry, it's not quite that way. The way that we've developed these numbers here, the numbers presented in table 5.13 is actually to create an outcome from each one of the simulations and produce the approximate frequency of the outcome per thousand as shown in this table.

MS. ALEXANDER: Are these numbers derived from a probabilistic spread that you did? Derived from something like what's illustrated from one of the input variables?

DR. TOLSON: Yes, probabilistic techniques went into deriving these numbers, that is correct.

MS. ALEXANDER: So is it your testimony, correct me if it's not, that there is a 100 percent or lower probability of the risks presented in this table?

DR. TOLSON: The probability of a person getting ill is somewhere between 0 and 100 percent. The lower probability that we've estimated on this table is certainly between 0 and 100 percent. I'm really not sure how to characterize that.

MS. ALEXANDER: Let me rephrase the question. I'm not sure if it's lack of clarity on my part or -- but, for instance, for pathogenic E. Coli -- actually let me look at this a little differently.

For total illness, including secondary, you presented a number associated with

North Side of 4.15. Is it your conclusion that there is a hundred percent or lower probability that 4.15 is in fact the number of anticipated illnesses?

DR. TOLSON: That's not the way that this number should be interpreted.

MS. ALEXANDER: Okay. What is the way it should be interpreted?

DR. TOLSON: This number is our estimate of the illnesses, including secondary illnesses, that would result from one thousand exposures to the North Side segment.

MS. ALEXANDER: When you say it's your estimate, presumably estimates have uncertainty that surround them. In other words, there are bounds on that. You have confidence bounds. Is that accurate?

DR. TOLSON: We did not do a quantitative uncertainty analysis on this data. Our probabilistic assessment was through the dimension of variability. To do a certainty analysis, it would be a two dimensional Monte Carlo, which is a little trickier sort of device to construct and do, and to my knowledge -- do you

know of any two dimensional Monte Carlo probabilistic -- I don't not know of any two microbial two dimensional Monte Carlo analysis that have been done.

MS. ALEXANDER: So this is a single dimensional analysis.

DR. TOLSON: Correct. I'm impressed with your knowledge of probabilistic analysis.

MS. ALEXANDER: I still flunked math.

MR. ANDES: If I can follow-up for a moment.

Was it your testimony earlier that these numbers in fact were overestimates of risk?

DR. TOLSON: That is correct, a number of the input that went in here were conservatively developed, and I believe this number is a conservative estimate of the risk.

MS. ALEXANDER: Referring back to the documents marked yesterday, which were exhibits, the EPA documents or the exchanges of correspondence, Exhibit 73 is the correspondence of EPA. I'm going to refer back to that again. I

want to ask you as a general question, would it be fair in your view to say that EPA was consistently critical of your failure to include the full results of your Monte Carlo analysis and to essentially show your work, present your graphs and data?

CHAIRMAN TIPSORD: Excuse me, if I may too, that's U.S. EPA. Yesterday we did refer them to as U.S. EPA, since this is a new transcript we better be clear that it's U.S. EPA or the confluence.

MS. ALEXANDER: Yes, U.S. EPA.

DR. TOLSON: We've had numerous correspondence with the EPA, and I don't think that that characterization is accurate. In fact, I think up until the final EPA letter, it would have been very complimentary to the approach. There were some comments within in it suggesting ways we could add transparency, and I believe we addressed those in responses back to the EPA.

MS. ALEXANDER: Let's dig into that just a little bit. Can we turn to the documents under the May 28, 2008 cover letter from the Water Reclamation District to Allen Melzer. The

document I'm referring to is the first attachment, which is a review conducted by U.S. EPA's Office of Research and Development, page 5, toward the bottom. There's a bullet point. Do you see that? That states, "Inadequate reporting of risk assessments and methods," and then there is the statement that they make -- again, I'm reading from the EPA's transcribed text that you are responding to -- "The actual risk assessment is brief and contains no graphs and few brief tables." Would you consider that to be a statement critical of your presentation?

DR. TOLSON: I'm going to need more help. There is a four-page and then there's like one page. Are you on the five-page?

MS. ALEXANDER: I'm on the five-page, so it's the last page on the bottom.

DR. TOLSON: The last page, it starts with "Overall, the risk assessment" at the top?

MS. ALEXANDER: No, the top of the page 5 I'm looking at is a sentence that includes the words "Enteric viruses" -- and the first page is "Review conducted by U.S. EPA Office of

Development" -- in other words it's the first attached to the May 23rd.

CHAIRMAN TIPSORD: Actually it's the last attachment to the May 23rd.

MS. ALEXANDER: I stamped it wrong.

CHAIRMAN TIPSORD: At least on our copy it's the last attachment.

MS. ALEXANDER: Okay, no more late night stapling. So you found it. Let me restate my question.

I'm referring to the bottom of the page. You see the bullet point that says, "Inadequate reporting of risk assessment results and methods," and then there is the statement they make, "The actual risk assessment is brief and contains no graphs and few brief tables." My question is, would you consider that to be a criticism of the amount of data presented and your failure to show your work?

DR. TOLSON: It was clear that they didn't understand it. You know, we've tried to correct that through additions to the text, and we also have a response here that tries to provide some clarity for the Agency.

MS. ALEXANDER: But my original question went to whether they were consistently critical, and I just want to establish whether we have the -- whether we can agree as it were on what is a criticism.

MR. ANDES: This is one instance. Consistent would imply a series.

MS. ALEXANDER: I'm aware it's one instance. Let me continue.

Moving on to what I've just been informed was the first attachment, which is entitled "Review Conducted by US EPA Office Of Water, Office of Science and Technology," turn to page 6.

MR. ANDES: Can I clarify one thing first?

MS. ALEXANDER: Certainly.

MR. ANDES: These issues raised by EPA were in the interim report.

MS. ALEXANDER: I understand that.

MR. ANDES: And the letter, the subsequent letter from EPA indicating that most of their concerns had been addressed regarded the interim report, so as long as we have that on the

record as well.

MS. ALEXANDER: Yes, that is understood. And my question went to whether they were consistently critical on this issue, and I'd like to establish that. So going to page 6, you see the bullet that says, "Interval estimates were not recorded." And then the text under that, "This is a major failing since only one estimate of the risk was reported with a significant amount of assumptions and uncertainty bounds on these estimates must be provided. 95 percent bounds. Complete details of the Monte Carlo analysis should be provided so that the distribution of risk can be visualized." Do you see that?

DR. TOLSON: Yes, I'm with you. These are concerns that are raised by the Agency on the interim report. You know, we responded to them. We've had discussions with them based on the correspondence subsequent to this, they indicated that those were addressed.

MS. WILLIAMS: I need to interrupt at this point. We let kind of let this go yesterday, but just to be clear in line of the questioning, the EPA is U.S. EPA. I think when

you went to Agency --

CHAIRMAN TIPSORD: We can ask them every time. I think I made that clear at the beginning this morning. If you are concerned, I can have them do it every time.

MS. WILLIAMS: As he started saying the Agency, I just want to have it clear on the record that the Agency is not us. Sorry to interrupt.

DR. TOLSON: Can I add one more thing to that? Just based on this comment, I think it is really a misunderstanding on the U.S. EPA'S part about how we conducted the risk assessment, because the context of what we are asking here does not fit with the context for which we were presenting the results. So I really believe it's a misunderstanding on the U.S. EPA's part on how we conducted the risk assessment and what he numbers we presented mean.

MS. ALEXANDER: Can you clarify the statement you just made about the different context about why this does not reflect the context in which you presented your results?

DR. TOLSON: Sure. Often in a

probabilistic risk assessment one would produce a distribution of outcomes, but those are exposure outcomes. And within the context of the way that we've conducted the risk assessments, there are within the model, those distribution of exposure outcomes. But for each one of those exposures, the total dose, we actually calculated whether that person got sick or not, and then counted those people. So we used those intermediate sort of distributions to do sensitivity analysis and do other things that you are allowed to do with a probabilistic risk assessment. We can tell which of the input models had the most effect on the risk. We presented that into the report. We could look at the effects of changing input parameters, increasing them or decreasing them. How that would change the overall effect of risk. Those are in the report. In fact, those are in the report based on comments by U.S. EPA, and I think those are good comments, and we responded to those by including the information. But the end risk numbers that we presented in the report are misinterpreted by EPA as opposed to what we were really doing.

MS. ALEXANDER: Let me just ask a couple follow-ups to that. Referring to the statement under the bullet point, "Interval estimates were not reported" they make the statement "with significant amount of assumptions and uncertainty bounds on these estimates must be provided (95 percent bound)." Is the reference to uncertainty and 95 bounds to the two dimensional analysis?

DR. TOLSON: That would be correct. That's one of the reasons that I'm fairly certain that this was misinterpreted by U.S. EPA.

MS. ALEXANDER: Isn't it possible that in fact here they were asking, recommending that you perform the two dimensional analysis which you then did not do?

DR. TOLSON: I don't believe so. I don't think they understood exactly the implications of what they were asking.

MR. ANDES: Just to follow up, did the EPA ever in any of its correspondence or report ever suggest you do a two dimensional model?

DR. TOLSON: No, they did not.

MS. ALEXANDER: Isn't it a fact they repeatedly asked you to do uncertainty analysis? They used the term "uncertainty" as they did here?

DR. TOLSON: I'm unaware that they repeatedly asked. They asked in the context of these questions. We had a meeting with the Agency. We responded to those from the interim draft. We got some concurrence on the final draft that we've addressed those questions.

MS. ALEXANDER: Just with reference to uncertainty, I would call your attention to the text under the bullet point that says, "Variability and Uncertainty were not discussed, evaluated or quantified." The text is, "Each step of risk assessment contains variability and Uncertainty. Uncertainty could be considered in the dose response parameters or in microbial densities." Would the method by which you would consider uncertainty be a two dimensional analysis?

DR. TOLSON: Not necessarily. And in fact, if you look at Exhibit 71, page 130 to 132, we provide several pages of text describing sensitivity and uncertainty analysis, and some of

this we included after we got the comments from the Agency just to be more responsive to their desires to see some of the information in there, information about uncertainty in the report.

MS. ALEXANDER: And just so I understand, I'm looking at your text at the bottom of 130 of Exhibit 71, which state a probabilistic assessment of uncertainty combined with variability data could be used to create a two dimensional probabilistic input, however such assessment was outside the scope of the study due to logistical constraints." Am I correct in understanding here that you were essentially saying that you were declining to consider uncertainty as we've used the term here to create a two dimensional probabilistic output?

DR. TOLSON: We did not include uncertainty.

MR. ANDES: To follow-up in discussing logistical constraints, it talks about boundary conditions. Can you explain?

DR. TOLSON: Yes. For the uncertainty analysis -- uncertainty is different than variability. Maybe I should go back to that

definition. Variability has to do with sort of the natural differences between input models, the nature difference between or the differences between ingestion rates. There's some variability, not every person goes out. With additional information, one can reduce or one cannot reduce that variability. Some people are going to capsize and some people are going to not get wet at all. That's the natural condition of things. Uncertainty has to do with something that you can't measure or can't provide additional information to, to reduce within the analysis.

MS. ALEXANDER: Moving on to page 7, same document. I call your attention to what's the first nonitalicized text on that page, which begins "In summary" -- which states, "In summary, while the QMRA methodology is appropriate, many assumptions are questionable and important details are left out. There's no evaluation of the potential range of risk and no sensitivity analysis, therefore the QMRA does not provide sufficient information to support the assertion that there is minimal risk of the current state of no disinfection. These details should be provided

to support the claims made or another independent risk assessment should be conducted." And my only question there is, would you consider that to be a criticism of the level of data actually presented in the report?

DR. TOLSON: I wish I could give you a yes or no answer, but I'm going to expand on it slightly, as you knew I would.

Yes, we took into consideration this comment. However, this is a comment on the interim report. We've included, for example, table 5.17 within Exhibit 71 that takes into account sensitivity of these parameters to see what the effect the ingestion rate or duration of weather type, this is actually kind of an uncertainty analysis that was conducted here that gets to that point. This says, what if we're off, what if we move the whole distribution one way or another, how would that effect the outcome? And this was provided in response to the Agency comments. We had discussions with the U.S. EPA, and it would appear from their response letter from this, that they have some concurrence that we've addressed those concerns.

CHAIRMAN TIPSORD: Excuse me, Dr. Tolson, for the record before we get too far way, can you please tell us what QMRA stands for?

DR. TOLSON: Quantitative microbial risk assessment.

MS. ALEXANDER: But in fact the response given to this statement does not contain the information that you just provided; it simply points to a section of the report; is that correct?

DR. TOLSON: Yes. It appears that we went over and above the initial response. With our addressing this comment, we went over and above the response.

MS. ALEXANDER: And I would point out in your response, you state, "In addition, uncertainties associated with risk assessments are also discussed in this section." Just to clarify, when you in fact in Exhibit 71, the risk assessment, the only way in which you addressed uncertainties as you've used that term in the context of two dimensional analysis is to say that you weren't going to do it; is that correct?

DR. TOLSON: That's not true. We

actually discuss uncertainties associated with the number of input parameters and their biases and whether their biases were conservative or anti-conservative.

One other point is, the section that you've referenced here includes pointing to table 5.17 in the Exhibit 71, which is an uncertainty analysis associated with this assessment.

MS. ALEXANDER: But in fact there is one meaning to the term uncertainty which you assign it, if I'm correct, in Section 5.4.7, which is the type of uncertainty that would be associated with two dimensional analyses, correct? I mean, you use that term in a very specific way, do you not, at the bottom of page 130, "A probabilistic assessment of uncertainty combined with variability could be used to create a two-dimensional probabilistic input," and then you proceed to decline to perform that kind of analysis; is that correct?

DR. TOLSON: That's not the only uncertainty. We have developed some uncertainty estimates within the response to the Agency's

comments.

MS. ALEXANDER: Turning to page 12, same document. At page -- there is, at the very top, there is a reference to page 111, and they state "Since Monte Carlo analysis was used, why wasn't a risk distribution e.g., 50th percentile, et cetera, generated?" Do you understand that -- I mean, perhaps this is a better presentation of the question I was trying to ask about your final risk results -- Do I understand correctly that your response is as stated here, that you wanted to simplify the presentation?

DR. TOLSON: I think my response to that comment is it speaks for itself. That was one of the reasons that are listed here. If you want, I could read that response into the record.

MS. ALEXANDER: No, that's not necessary. My question there would be, did you in fact generate a risk distribution along the lines of the example given here? For example, 50th percentile, 90th percentile, et cetera, is that something that you generated?

DR. TOLSON: No. A risk distribution does not come out, an exposure

distribution comes out.

MR. ANDES: If I can follow-up. Your understanding was, as with the previous issues on sensitivity and uncertainty, EPA raised these questions as to the interim report and you addressed the issues with the Agency. Your understanding was by, you told them that these additional analyses would be performed and they indicated those would address their concerns; is that correct?

DR. TOLSON: That is correct. In addition to that, we've described in a little more detail exactly what we had done with the Agency so they would understand why the results looked like they did.

MR. ANDES: Thank you.

CHAIRMAN TIPSORD: Excuse me, Ms. Alexander, I have a question as well.

We are talking about a lot about the Agency's comments and correspondence on the interim report. Has the U.S. EPA seen the final report? And are we expecting them to comment on that?

MR. ANDES: I believe the July 31,

2008 document from U.S. EPA concerns the final report.

CHAIRMAN TIPSORD: Okay.

MS. ALEXANDER: Well, this is a good segue to another one of the documents contained in 73, which is the May 31, 2007, letter to U.S. EPA from the District. And this attaches what appears to be, and was discussed yesterday, a summary of responses to meeting discussions, which is a follow-up on the April 10th meeting; is that correct?

DR. TOLSON: Yes, according to the cover, that's what this is.

MS. ALEXANDER: Now, just to summarize, is it your testimony that all of the issues identified in bullet points here were resolved to the satisfaction of the U.S. EPA?

DR. TOLSON: I don't know that.

MS. ALEXANDER: So they may or may not have been?

MR. ANDES: The documents speak for themselves.

MS. ALEXANDER: Well, the documents are the documents, but there are conversations

that happened outside the documents. I'm not asking about the documents. I'm asking about his understanding as to whether these issues were resolved. People can pick up phones.

MR. ANDES: Were there other conversations you had with them besides the April 10, 2007 conference call?

DR. TOLSON: I did not have any additional conversations with them.

MS. ALEXANDER: And do you have any knowledge whether anybody else at GeoSyntec did?

DR. TOLSON: I do not believe that anyone else did, but I don't have knowledge of anyone else having discussions.

MS. ALEXANDER: Well, let me ask about a couple specifics.

Can we please turn to the last page of that document. The one which text fills half the page. The second to the last bullet states, "The U.S. EPA requested that the report also examine strep either as to determine illness rates associated with specific secondary contact activities such as canoeing and fishing. In the final report we will include a summary of the

proportion of the overall illnesses that were attributed as identified uses (canoeing, fishing and recreational boating)."

DR. TOLSON: Yes I see that.

MS. ALEXANDER: Is it your belief that this response was satisfactory to the U.S. EPA, that that was resolved?

DR. TOLSON: I haven't had additional comments with them. Although, we did do what we stated that we would do here in table 5.11 of Exhibit 71, there's a proportion of recreational -- I'm sorry, it was table 5.12 on Exhibit 71, there's stratified risk estimates, still estimated illness, rates assuming single recreation use with no effluent disinfection.

MS. ALEXANDER: And then moving to the last bullet point, that one reads, "U.S. EPA asked if fish consumption, (particularly by sensitive population such as women and children was considered in the risk assumption.) We explained that the fish consumption was not included in the subject design. We added that the states usually issue fish advisories to protect sensitive populations." I believe -- I'm not sure

I'm confident to say it was yours -- but it was one of your testimony that this issue was in fact resolved to the satisfaction of the EPA; is that your recollection?

DR. TOLSON: When we left the meeting, it was my impression that we had resolved that but --

DR. GERBA: I think the issue here is -- if the issue you are using ineffectivity as your -- oh, the fish you mean?

MS. ALEXANDER: I'm talking about the fish.

DR. GERBA: Yes, I've studied fish around the sewage ponds before in the United States and different parts of the world. And other investigators have studied it, actually growing in completely raw sewage. You can actually grow fish. They get pretty big and tough, but you can grow them and harvest them. But they don't take up these pathogens quite interestingly if you clean them and process them correctly. Even fish growing in the sewage ponds, like Tilapia. If you've ever been to Israel and eaten Tilapia in Israel, it was probably grown in

a waste toxication pond, that you are being served in a restaurant. So you can actually produce fish. So I didn't think that, considering the quality of this water compared to other fish are grown in the lack of any, health risks, I kind of neglected that as being really significant.

MS. ALEXANDER: One follow-up to that, aside from the fact that I'll never eat Tilapia again, do you know of any research to the contrary, in other words research that found that fish grown in contaminated waters are an exposure to for pathogens?

DR. GERBA: I would imagine in certain types of environments you would have that possibility with certain types of pathogens in different parts of the world. If you have abraded hands and that, certainly.

MS. ALEXANDER: But you don't know of specific research to the contrary?

DR. GERBA: Talking about fresh water environments now, right?

MS. ALEXANDER: Well, let me first limit it to fresh water.

DR. GERBA: Not off the top of my

hand -- the top of my head, no.

DR. TOLSON: I would add, I do recall that there has been a study done on handling fish and they did washing, and they were looking for cryptosporidia, which I believe they found, but considering the pathogen had dry weather and zero viable in the waterway, I'm not too sure of the relevance of that fact.

MS. ALEXANDER: Dr. Gerba, the same question for salt water since you drew that distinction?

DR. GERBA: Salt water, you can get infections. I mean, possibly if you are -- I would think there's a possibility with maybe cholera, vivio-cholera may cause skin infections on non-homeland types. May be related to fish handling and may be related to sewage polluted waters in the developing world too.

MR. ANDES: A follow up. Is cholera common in Illinois?

DR. GERBA: Not for over a hundred years.

CHAIRMAN TIPSORD: I'd like to follow-up too. Any of you know of the fish

advisories issued by the State of Illinois for the CAWS system?

DR. TOLSON: I haven't paid attention to those, so I do not know.

DR. PETROPOULOU: I do not know.

CHAIRMAN TIPSORD: Thank you.

MS. ALEXANDER: Okay, I would like to turn next to the portion of Exhibit 73, which is the letter dated July 12, 2007, from U.S. EPA to the District. And I'd like to specifically call your attention to the text toward the bottom. The paragraph that begins, "We believe." Do you see where I'm looking?

DR. TOLSON: Yes, I do.

MS. ALEXANDER: And that text reads in full "We believe it would be helpful to also include a discussion of how only including certain pathogens effected, and in all likelihood resulted in an underestimation of the risk estimates." The first question, I'm sorry I should ask for background, is it your understanding that this letter -- this letter appears to be a response to the summary of issues that was provided in the May 31, 2007 letter; is that your understanding as

well?

DR. TOLSON: Based on the dates, that seems reasonable.

MS. ALEXANDER: And I'd call your attention to the very first paragraph just to establish this.

DR. TOLSON: Yes.

MS. ALEXANDER: All right. So referring back to the text that I just read, where they state, "It would be helpful to include a discussion of how only including certain pathogens effected and all likelihood resulted in an underestimation of the risk estimate," did you in fact include a discussion, not of your justification for selecting the pathogens, but of the impact of that decision in terms of creating a likely underestimation of the risk?

DR. TOLSON: I would characterize it as, yes, there is some underestimation of risk. We just don't think it's a very important underestimation of risk. In fact, within the uncertainty and sensitivity section, we highlight out a bullet that this study did not account for all pathogens that might be present. However, the

pathogens that were selected include those that we think are most responsible for illness in the Chicago Area Waterways.

MS. ALEXANDER: I'm aware that you included a section that states that you did not study all pathogens. But my question is, I was not able to find a discussion specifically of the fact or the fact as expressed by U.S. EPA that this will result in an underestimation of risk. Did you include such a discussion in the document? I could not find it.

MR. ANDES: That's what he just referred to.

MS. ALEXANDER: Well, what he referred to is something different from my question, which is the fact that not all pathogens were studied. But the statement here by U.S. EPA is what they say, it would be helpful to include a discussion of how only including certain pathogens effected and in all likelihood resulted in an underestimation of the risk estimate. So they are not just asking it would appear for a discussion of what pathogens you included and why, but are they not asking specifically for a discussion of

the impact of that choice on underestimation of the risk?

MR. ANDES: You are asking for his speculation as to the EPA's state of mind?

MS. ALEXANDER: I'm asking for his understanding of the statement here.

DR. TOLSON: Yes, I can give you the specifics that we have in the report. It says, this is Exhibit 71, page 131, it says, "The following factors may lead to an overestimation or underestimation of risk. We did not quantify obviously the" --

MS. ALEXANDER: I'm sorry, what page did you say?

DR. TOLSON: 131, this is the sensitivity and uncertainty analysis on Exhibit 71. They read you the bullet that's there. It says, "This study did not account for all pathogens that may be present in the CAWS, recreational water, however the pathogens that were selected for inclusion in the study include regulatory indicators and those that can be measured by EPA approved methods and were judged most likely through gastrointestinal illness. See

Section 2.1 for more complete rationale of pathogen selections."

MS. ALEXANDER: So am I correct in understanding that there is no further discussion beyond the text you just read and the text referenced by it, which is presumably roughly summarized by it, of the way in which your choice of pathogens to select may have resulted in an underestimation of the risk; is that correct? That's it?

DR. TOLSON: I have no clue about the magnitude of that underestimation quantitatively. But we believe, you know, the best scientific evidence would suggest we've captured, most, if not all of the risk, associated with illness because we've captured pathogens that are representative of what we would expect to find in the waterway when we found them. We picked the ones that we expected there to be in high concentrations. And for some we didn't detect those.

MS. ALEXANDER: And isn't it a fact that early on in reviewing the interim dry weather risk assessment, EPA also expressed the concern

that due to failure to consider risks from hepatitis A, Shigella --

MR. ANDES: Are we on a particular document?

MS. ALEXANDER: Yes, I can refer you to this is the review conducted by U.S. EPA Office of Research and Development, page 2, this is an attachment to Exhibit 73, under cover of the May 28, 2008 letter, top of page 2. You see the first bullet is, "No justification" -- My only question is, the question I was starting to ask is, isn't it a fact that early on, U.S. EPA expressed the concern that given that the risks presented are only for a few gastrointestinal pathogens and risks were not presented for Hepatitis A, Shigella, campylobacter, to name a few. The risks presented will be biased low."

DR. GERBA: I think when we discussed this yesterday. Again, if you want me to go through the list, hepatitis A, there is a vaccine available for that. The incidence is declining. The exact amount of Hepatitis A is very small so the risk is going to be much smaller than the other risks we have. We picked the

organisms and viruses that would be in the greatest concentration, and therefore present the greatest risk. Shigella, there have been no recreational outbreaks in at least the -- at least from 1971 associated with sewage discharges. It was only with bathers in the water where there was accident fecal discharges in the water. Also the organism does not survive well in the aquatic environment and methodologies for it.

Campylobacter is another one that does not survive well in the environment. There are many sources in the environment, birds excrete this and seagulls and that, so the amount of risk to the other water borne pathogens would be low. And the methodology for getting it out of waste waters is inadequate and would underestimate the true concentration. So we went through that with the EPA and discussed those, and as far as I know there was agreement to that. Salmonella was the one selected because it's usually always found in waste water, certainly raw waste water it can be detected fairly earlier and easier. EPA has developed regulations using Salmonellas. Salmonella has been used as an indicator of

recreational water quality in Europe.

MS. ALEXANDER: Dr. Gerba, are you disagreeing with the concern expressed by U.S. EPA here and in their subsequent correspondence that the fact that the analysis includes only a few gastrointestinal pathogens will bias the risk as low?

MR. ANDES: I'm going to object to the characterization of subsequent correspondence. You can ask him about that particular correspondence. Correspondence were different for different statements.

MS. ALEXANDER: I'll limit it as to this correspondence.

My question is, are you disagreeing with the statement here that choice, including only a few gastrointestinal pathogens, will bias the risk low?

DR. GERBA: I couldn't say that. I think we went to the high side because I think the risk from these would be insignificant compared to Salmonella, for example, for all the reasons I just gave you. So, no, I don't think we -- you might move it up in insignificant notch by

including one. But saying it's low, low that's a relative term.

MS. ALEXANDER: So there is a possibility it could be biased low, but you are not quantifying that?

DR. GERBA: Yes, I'm saying statistically it probably wouldn't be any different, if you give the variations of the limitations that I just did for what we used with Salmonella. The data and estimate would be statistically different.

MR. ANDES: If I can follow-up. Is it accurate in terms of what you just said that overall you believe the risk assessment was biased high?

DR. GERBA: Yes, I believe it was on the high side actually.

MR. ANDES: In terms of the -- back to Dr. Tolson -- back to the July 12, 2007 letter, is it accurate for me to read that in the discussion about how, concerning a discussion of only including certain pathogens, the first statement by EPA is "We believe it would be helpful to also include..."?

DR. TOLSON: That is correct, that's the characterization by the EPA.

MR. ANDES: Thank you.

CHAIRMAN TIPSORD: Ms. Alexander, do you have more questions along this line or can we take a short break?

MS. ALEXANDER: I do, but I don't mind taking a break. That's fine.

CHAIRMAN TIPSORD: Let's take a ten-minute break.

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

CHAIRMAN TIPSORD: It's 11:11. Let's continue with Ms. Alexander.

MS. ALEXANDER: Okay, I'm continuing with questions on the document we were on before the break, which is the July 12, 2007 letter, a portion of Exhibit 73.

I want to call your attention at the bottom of the first page to the quotation of text from the document we were previously referring to on the cover of the May 31, 2007 letter.

MR. ANDES: I'm sorry, where are we again?

MS. ALEXANDER: We are now on the July 12, 2007 letter.

MR. ANDES: Okay.

MS. ALEXANDER: Bottom of the page, the fourth bullet on the page states, the quotation states, and then there's a quotation of text from the May 31, 2007 letter which we've established is a summary of the April 10th meeting and the quoted language reads: "There were comments regarding the use of risk model pathogen and analytical data. Please note that the microbial concentrations were not estimated. They were based on actual measured concentrations in the samples collected from the waterways." And then I would call your attention on the following page to the comment on that text made by U.S. EPA in the letter which is, "But actual samples are only an estimate of the range of pathogens that can occur. The observed data can be used to estimate a distribution of pathogen exposure." And my question is, in the risk assessment did you do this? Did you use the observed data to

estimate a distribution of pathogen exposure?

DR. TOLSON: No, we did not. We did a boot strap resampling within our Monte Carlo analysis.

MS. ALEXANDER: So that was the boot strap analysis?

DR. TOLSON: Yes.

MS. ALEXANDER: Moving down to the text that begins, the second bullet on page 3 -- do you see that on page 2, and then they quote the language from the attachment to the May 31st letter which stated, "The U.S. EPA requested that the report also examine stratified risk to determine illness rates associated with specific secondary contact activities, such as canoeing and fishing." In the final report, we will include a summary of the portion of the overall illness that were attributed to the identified uses (canoeing, fishing and recreational boating)." And then I call your attention to the U.S. EPA's response to that quote which states, "The approach described above while useful is not the same as reporting stratified estimates. Stratified estimates should include illness rates for each activity, not just

a portion of illness attributed to that activity. For example, what would the risk be for one thousand canoeists on the Chicago area waterways. Since such competitive activities take place in the waterway, this is a relevant question." Now my question to you is, did you in fact do the analysis recommended here?

DR. TOLSON: I believe so. I believe we've discussed that. Maybe that was in my testimony.

MS. ALEXANDER: You've included stratified estimates for illness rates for each activity, not just the proportion of illness attributed to that activity?

DR. TOLSON: That is correct. If you go to Exhibit 71, table 5.12 you'll see that individual activity and their risks are listed on table 5.11, a proportion of recreational use attributed to gastrointestinal illnesses due to effluent disinfection, we did what we said we did and we carried it a step further and produced the actual numbers. And we broke that down not only by recreational activity but by waterway stretch that we evaluated.

MS. ALEXANDER: I'm going to call your attention to the text beginning the last bullet on page 3, it states and then the quoted text from the earlier document is "U.S. EPA fish consumed by sensitive population, we explained that the fish consumption was not included in the study design. We added that states typically issue fish advisories to protect sensitive populations." And then I call your attention to the response which follows, "Our concern on this issue is not what is the risk of fish consumption in and of itself, it is that people engage in fishing and incidental contact activity have a likelihood of consuming fish they catch in the waterways, which will lead to an overall higher risk for that group, even though they are engaging in an incidental contact activity, the true total risk for appreciable percentage of anglers is the risk of secondary exposure to the water, plus the risk due to fish consumption since fishing is being actively promoted on several portions of the waterways, the is studies should calculate the total risk to this group."

Now, Dr. Gerba, I'm aware of

your testimony regarding your views on that exposure pathway, but my only question is, is it your understanding that in fact this issue of whether or not fish consumption is an exposure pathway was never resolved to the satisfaction of U.S. EPA?

DR. GERBA: As far as I know it was. We discussed it.

MS. ALEXANDER: Does the language that I just read in your understanding reflect a resolution of that issue to their satisfaction?

DR. GERBA: I don't even understand the type -- if they are talking about microorganisms if you processed the fish and cooked it, there is no risk. So I'm not sure what the issue is here. As far as I'm aware it was resolved.

MS. ALEXANDER: I'm aware of your testimony, that there has been some discussion previously in the record as to whether or not this issue was resolved to the satisfaction of the EPA. And my question is, does it not appear from this that U.S. EPA in fact was not satisfied with your response and still wanted you to, as of the date

of this letter, to include that information in your risk assumption, in your risk assessment?

DR. GERBA: I don't know. I really couldn't say. As far as I know, it was satisfactory. I have nothing I can really add to that except for what I've already stated.

CHAIRMAN TIPSORD: You have to speak up.

DR. GERBA: I don't know what I can add to that except for what I've already stated. I don't know if it was the same individual that responded. As far as I know, it wasn't.

DR. TOLSON: I'd like to point out that people who are engaged in fishing have contact and ingestion of the water, and that ingestion is about half of what canoeing is. It's fairly appreciable ingestion.

MS. ALEXANDER: That's a different exposure pathway than eating the fish that comes from the water, correct?

DR. TOLSON: That is correct. We did not evaluate eating the fish, but we did evaluate people licking their hands after they were playing with the fish.

MS. ALEXANDER: But this reference I just read concerns fishing consumption, is that correct, as opposed to the other pathway you just referenced?

DR. TOLSON: That is correct.

DR. PETROPOULOU: That is what was discussed at the meeting when they brought up the issue at the April 10th meeting. They were talking about eating the fish.

MS. ALEXANDER: Correct. And that's what is referenced here, fish consumption, eating the fish.

DR. PETROPOULOU: Right, this is a new comment. I concur that the reviewer who wrote this comment expresses a new concern about fish.

MS. ALEXANDER: Was Mr. Melzer, the signatory of this letter, at that meeting? We can probably answer that from the document. I would call your attention to the attachment to the May 31, 2007 letter, page 1.

MR. ANDES: Mr. Melzer is the active chief of the branch. Do we have any reason to believe these are his comments?

MS. ALEXANDER: I would call to your

attention that Mr. Melzer was at the meeting.

MR. ANDES: We have no foundation for this because we don't know who wrote this letter from the EPA, do we?

MS. ALEXANDER: I call your attention to page 3, isn't it a fact that Allen Melzer is the person who signed this letter?

DR. TOLSON: His signature is on the letter, that's correct.

MS. ALEXANDER: Do you have any reason, one way or the other, to believe that he didn't write this letter?

DR. TOLSON: I don't know that.

MS. ALEXANDER: Lastly, I call to your attention the only line on page 3, "Please call me at" -- and he provides a phone number -- "if you'd like to discuss these further." Am I correct from your previous testimony that you did not in fact -- neither you or nor anyone else from GeoSyntec didn't call?

MR. ANDES: The letter wasn't addressed to them.

MS. ALEXANDER: I'm sorry, you are right. It was addressed to MWRD. I assume you

did not have further contact with Dr. Melzer after this based on your earlier testimony?

DR. TOLSON: I did not.

MS. ALEXANDER: Do you have any knowledge as to if anyone from MWRD had any further knowledge?

MR. ANDES: I don't know if he is a doctor. I don't know anything about his scientific background.

MS. ALEXANDER: I'm sorry, I should have said Mr. Melzer. I don't know his background. Let me ask the same question of Dr. Gerba and Petropoulou. Do you have any knowledge as to anyone from MWRD ever contacted Mr. Melzer after this letter?

DR. PETROPOULOU: In general?

MS. ALEXANDER: No, following the receipt of this letter at the investigation to call him if necessary.

DR. PETROPOULOU: I don't know.

DR. GERBA: I don't know.

MS. ALEXANDER: Okay.

MR. ANDES: Can I follow-up for a moment? In terms of the EPA's request to add the

risk due to fish consumption to the risk of secondary exposure, you've discussed in the report the risk of secondary exposure?

DR. TOLSON: Yes, and is it your testimony that the fish consumption would be negligible?

DR. GERBA: Yes.

MR. ANDES: So it would add a negligible amount to the risk?

DR. GERBA: Yes.

MS. WILLIAMS: Can I follow-up? When you use the term secondary exposure, did you mean to say secondary contact exposure as opposed to -- isn't secondary exposure a term you use when referring to people who weren't recreating?

MR. ANDES: I'm using the EPA's term in the letter.

DR. GERBA: I'd have to look at the letter. Even though they are engaging in incidental contact, the two total risks for a appreciable anglers is it's a risk of secondary exposure to the water plus the risk due to consumption.

MS. WILLIAMS: So what does

secondary mean as it is used in there?

DR. GERBA: Well, I didn't write it, but he refers to angling as a secondary exposure, meaning there's no direct link or contact with the water is what I assume.

MR. ANDES: It's not like swimming.

DR. GERBA: Not like swimming. So in other words, fishing here is considered a secondary exposure.

MS. WILLIAMS: Thank you.

MS. ALEXANDER: I have what I believe is my last question or set of questions on Exhibit 73, which concerns page 14 of the 15 page document, whichever one that is.

CHAIRMAN TIPSORD: Which is the attachment to the May 28th letter?

MS. ALEXANDER: Yes, I'm sorry, attachment to the May 28th letter, and I would call your attention -- you'll see that there is a discussion of a text on pages 115 to 116 of the report, and then there's a response. And I'm going to call your attention to the second to the last sentence which states -- of the response -- which states, "Therefore the proposed dynamic

model" -- and this is referring to secondary transmission" -- considers a stated estimated level of immunity and estimated disease incidence only in the recreational population and their immediate family." Do you see that?

DR. TOLSON: Yes -- I don't have it in front of me.

MS. ALEXANDER: Just to clarify, that means that this disease model did not consider anyone -- let me ask the question. Who was included in immediate family?

DR. TOLSON: Say that again.

MS. ALEXANDER: Who is included in the immediate family?

DR. TOLSON: For that input we looked at Cook County census records to figure out the number of people living within one household and there's a distribution obviously, so it's somewhere between one and it was eight or so individuals in the house.

MS. ALEXANDER: So in other words your disease transmission model did not consider secondary transmission by, you know, any family members not living in the household or friends?

DR. TOLSON: That is correct. It is limited as it says in the report to the immediate family.

MS. ALEXANDER: Okay.

MR. ANDES: Follow-up. Could you read the last sentence of that paragraph, your response on that issue?

DR. TOLSON: The last sentence is, "This approach addresses the important dynamic aspects of disease transmission from CAWS exposure and the population most at risk."

MR. ETTINGER: I'm confused. You looked at secondary diseases within a family, is that what you did?

DR. TOLSON: That is correct.

MR. ETTINGER: How do these diseases spread? You don't have to get too graphic.

DR. TOLSON: Dr. Gerba will give you the more interesting explanation, so I'm going to defer to him.

MR. ETTINGER: Just in general.

DR. GERBA: Most of these diseases are transmitted by the fecal-oral route. So they could be spread in the family by touching food

surfaces. You completely wash your hands in the restroom, but you've always got a little bit of fecal material on your hands. So you can spread it from one location to another, and somebody puts their fingers in the mouth, for example, which children do at a much more frequency than adults, that's been quantitated in the risk models.

MR. AL: Is that why we have waiters wash their hands after they use the restrooms?

DR. GERBA: That's one of the reasons why they do.

MR. ETTINGER: So adults can potentially spread this disease to unrelated persons if they don't wash their hands in the restroom?

DR. GERBA: That's correct.

MR. ETTINGER: And they might maybe go into a Subway if they hadn't washed their hands and put their hand on a rail --

DR. GERBA: That's correct.

MR. ETTINGER: Thank you.

MR. ANDES: Please expand on that.

DR. TOLSON: If you refer to Exhibit 71 on the uncertainty and sensitivity

analysis on page 131, we clearly indicate that that's a limitation of our study, that there's a potential that this may have underestimated total population risk. We don't think that underestimate is due to a significant degree given the conservative nature to which we described secondary attack rates.

MR. ANDES: Can you state the last sentence of that paragraph, explain why that's likely very low? Do you want to read that?

DR. TOLSON: "Due to the small recreational population compared to the total metropolitan population and the endemic nature of pathogens on the population, this essential underestimation of risk and the effects of recreational illness is based on population illness rate is likely very low."

MR. ANDES: Isn't it also accurate in the previous bullet, that your assumptions on the secondary transmission rates are actually biased high?

DR. TOLSON: Correct. As we stated, secondary transmission rates are generally at the high end of those reported in the technical

literature, therefore the assumptions of secondary transmissions are conservative and as a result the rates are biased high.

MR. ETTINGER: How is that literature developed? What did they do to determine the secondary rates?

DR. GERBA: A lot of these studies took place in households Rotavirus, Salmonella or E. Coli. They look at the number of individuals who became ill after the index case in the house.

MR. ETTINGER: Did they look at the population size of the area in which the people were living in conducting these studies?

DR. GERBA: To go beyond that, they used dynamic models, secondary transmission in epidemiology. That's another approach for microbial risk assessment is to put this in a dynamic model to determine the effect on the entire community. It takes a lot of work, but generally I don't like that approach because it minimizes the risk here that we saw. You can see that most of these illnesses for example, like Rotavirus are being spread by people who have developed foodborne illnesses who go to a show or

a hospital or some other case, and I think using that approach would minimize the risk that we see here because it makes the newer risk look totally insignificant compared to the enteric viral infections going on in Chicago at one time.

MR. ETTINGER: It would minimize it in terms of percentages, but if I were to look at the number of total cases, that would be something I would want to look at, isn't it?

DR. GERBA: It gets much more difficult once you move beyond the household because then how many times do you touch the Subway handle, and how many times are Nora virus there in that -- your speculation and assumptions become gigantic after that point after. You are doing it. Usually people default into using epidemiological models to go beyond that, but that takes a great, a lot of assumptions. And, again, it would minimize, if I wanted to show that was no impact on this community, that's what I would use, the dynamic models. We wanted to be more conservative than that and look at who is going to become ill. And I think the uncertainty would become huge at that point. That's one of the

reasons I think that approach has a lot of limitations to it.

MR. ETTINGER: Would it make a difference to your model whether there were a hundred canoers a year or a million canoers a year?

MR. ANDES: In what respect? Would it make a difference to his model?

MR. ETTINGER: Would it make any difference to the conclusions if there were a hundred canoers or a million?

DR. TOLSON: If you were to go all the way up to a million, then I might consider changing the way that we view our models and make them population based as opposed to the way we've done it here because at that point pretty much everybody is a recreater, and the dynamics would change in the population. But I don't anticipate having a million -- I don't anticipate having the entire community of Chicago on the waterway. If that were the case, I may change the fundamental structure of the way we did our model.

MR. ETTINGER: Somewhere between a hundred and a million would you start thinking

about it or it's only a million --

MR. ANDES: A hundred thousand. We don't have testimony in terms of the actual number of recreaters. And if it did, it would be more than a few thousand, not a hundred thousand.

MR. ETTINGER: Well, we don't know what's going to happen. I'm asking a hypothetical question if the number of canoers were to increase a great deal, would that effect the relevance of your study?

DR. TOLSON: If a large portion of the entire metropolitan area, Chicago area were being engaged into recreating on the waterway, then it might make sense to evaluate it on a population level. In that case we would tend to dilute the effect of the waterway because you'd have to take into account the endemic illness rates for all these different pathogens that are spread around through ways other than contacting through the waterway, and those would need to be integrated through the model.

MR. ETTINGER: Now, just as a matter of arithmetic, if I've got two cases per a thousand, I'm going to have more total cases if

I've got a hundred thousand users than one thousand users, right?

DR. TOLSON: Your arithmetic is exactly right.

MR. ETTINGER: And nothing you did looks at that issue?

MR. ANDES: Looks at that issue? He laid out risk numbers.

MR. ETTINGER: That's it. That's what I'm asking. You did not -- none of your conclusions are effected by how many users there are?

DR. TOLSON: We selected the models and the methodologies that we think would be the best to capture potential risk from the waterway. Those tend to overestimate the risk and the contributions from the waterway, did not include dynamic models that were population based. Had we gone to population based models, we would have arrived at different conclusions, but we would have had another four days of testimony on all those additional assumptions that we would have made about whether somebody was ill because of the tomato that they had on their sandwich rather than

the waterway.

MR. ETTINGER: If you were going to build a dynamite factory that had a one in a thousand chance of exploding, but you were going to put it in a remote location or across the street from a school --

MR. ANDES: That is just not relevant. It's hypothetical. We are not talking about a dynamite plants.

CHAIRMAN TIPSORD: Is that an objection?

MR. ANDES: It absolutely is.

CHAIRMAN TIPSORD: Sustained. Let's move on.

MS. MEYERS-GLEN: I'll just ask one quick follow-up to that. On page 7 -- well, looking at, Dr. Tolson, attachment 3, page 120 of your testimony, just following up on a quick secondary attack rates question that was asked, you confine your analysis of secondary attack rates to immediate family and you don't go expand beyond that is what I'm hearing; is that correct?

DR. TOLSON: That's correct. We may have underestimated the total illness rates that

could be contributed to that.

MS. MEYERS-GLEN: And in other parts of your testimony, in fact you talk about how -- I'm trying to remember -- yes, viruses, cryptosporidium in common settings are commonly spread in daycare centers and schools; is that correct?

DR. TOLSON: Correct.

MS. MEYERS-GLEN: So if a child or youth is paddling on the waterway and is asymptomatic, but then goes to daycare, that was not accounted in your study, even though you listed that as being one of the places where studies occur predominantly for this type of virus; is that correct? That's where you get a lot of your data as far as endemic behavior for cryptosporidium; is that correct?

DR. GERBA: Can I make a correction. It's a parasite, not a virus.

MS. MEYERS-GLEN: Sorry about that.

CHAIRMAN TIPSORD: Ms. Meyers-Glen, you've already asked him two questions and now you are getting ready to ask a third. Can he answer the first two before you ask the third?

DR. TOLSON: Going back to the first question, did we account for the potential for a child recreating on there to spread that to a school, to his class at school?

MS. MEYERS-GLEN: That's correct.

DR. TOLSON: No, we did not account for that specific pathway.

MS. MEYERS-GLEN: Your data, whether you are talking about cryptosporidium -- you use that very situation because in your data you talked about how cryptosporidium through crowded settings is spread through daycare centers and schools; is that correct?

DR. TOLSON: That's correct. I recall for dry weather or upstream or downstream there was no cryptosporidium, no infections.

MS. MEYER-GLEN: That you detected?

MR. ANDES: They can detect it.

MS. MEYERS-GLEN: They did detect it in wet weather. So it was detected in the study?

DR. GERBA: Some of the secondary attack rates we discussed were developed from daycare centers too, just to mention that.

MS. MEYERS-GLEN: The reason being,

there are hot beds for that kind of an illness, correct?

DR. GERBA: I hope they are not hot beds, but secondary transmission occurs in there. I think situations are better than they used to be because of laws in certain states requiring them to use disinfectants and cleaning, but usually you get a greater secondary spread because children don't have great sanitary habits as adults do.

MR. ANDES: So those rates were considered in this calculation?

DR. GERBA: So, yes, those rates were considered.

MR. ANDES: And the higher attack rates you see are because they come from daycare centers.

MS. MEYERS-GLEN: But then that wasn't applied as far as outside the family?

DR. GERBA: Attack rates were.

MR. ANDES: You need to explain. Would you explain rates secondary transmission?

DR. GERBA: One is tax rates, a tax rate, a lot of them have been developed in daycare centers or institutions where you have a large

number of people?

MR. ANDES: We use those rates?

DR. GERBA: We use those rates because they tend to be higher because small children with poor sanitary habits, so it spreads easier with a lot of those infections.

DR. TOLSON: I think -- what you are getting at is, we don't have a separate subgroup that looks at how many children are actually on the waterway and how many of those could possibly be transmitted to a larger than their family size, which would be class size.

MS. MEYERS-GLEN: This is not only for daycare centers, but for crowded centers like nursing homes, correct?

DR. TOLSON: Correct.

MR. ANDES: Do you expect a lot people in nursing homes to kayaking on the waterways.

DR. TOLSON: I don't have any data to support that that happens.

MS. MEYERS-GLEN: Or summer camp?

DR. TOLSON: We don't have data from the UAA on specific age ranges of the individuals

that were participating.

DR. GERBA: That would take a lot -- that kind of information would take a lot of speculation to do that. We'd have to figure out how often some of these people might go to a daycare center or children who are not preschool children. So to try to do that, I think, is a little bit unrealistic. You have to make so many assumptions that the uncertainty would be increased to a great degree. If you wanted to look at specific groups of people, like how often does a child get infected and how often do they go to a nursing home after a period of time in which they are in infected, which may only last a week to five days, so the amount of uncertainty you are creating becomes greater and greater. Especially when you don't have data to back up that type of assumption with the frequency of occurrence.

CHAIRMAN TIPSORD: Ms. Alexander?

MS. ALEXANDER: I'm going to continue with questions that were posed in the pre-filed questions specifically to Dr. Gerba. The first question is number four to Dr. Gerba, which is regarding the statement on page 5 of your

testimony that disinfection "is warranted in situations where direct human contact in the immediate vicinity of an outfall is possible," and the question is, do you have any basis to believe that recreation on the CAWS does not occur in the immediate vicinity of the water reclamation district outflow?

MR. ANDES: I believe we answered that yesterday that specific question.

MS. ALEXANDER: I don't have a recollection that that specific question was answered, and it's pretty much a yes or a no.

MR. ANDES: I think because I objected and asked for clarification of it. So I'd rather not go back over that question.

MS. ALEXANDER: My recollection is that he did not have any basis to believe. Do you have any different recollection?

MR. ANDES: Any basis to believe?

MS. ALEXANDER: Any basis to believe the recreation does not occur in the immediate vicinity of the water reclamation district outflow.

MR. ANDES: We had an extended

conversation of what direct human contact meant.

CHAIRMAN TIPSORD: My recall is this was specifically about Stickney and North -- it was only about two, not the more general, all of the outfalls. And he did specifically discuss there not being Stickney, and also because you had not taken samples at the one site close to the outfall for safety reasons and this is only based on the captain -- is this bringing it back to you, Ms. Alexander?

MS. ALEXANDER: Yes. This is a very general question as to whether you have any basis to believe generally that recreation does not occur in the immediate vicinity of any of the reclamation district outfalls, any of the three here? Do you have any knowledge yourself or any basis?

CHAIRMAN TIPSORD: We've already discussed Stickney and North Side. So could you discuss the other ones.

DR. GERBA: What do you mean vicinity?

MS. ALEXANDER: Vicinity is your term, Dr. Gerba, so I would put that back to you.

Your statement was, "Disinfection is warranted in situations where direct human contact in the immediate vicinity of an outfall is possible.

DR. GERBA: What was your question again?

MS. ALEXANDER: My question is do you have any basis to believe that recreation on the CAWS does not occur in the immediate vicinity of the water reclamation outfalls?

DR. GERBA: No.

MR. ETTINGER: I think yesterday I did ask about that quote, and I think I also asked you what you meant by immediate vicinity, and I think you said something like it depends or that you have to look at different factors. Do you recall that?

DR. GERBA: Yes, I do. I said it's a site specific situation.

MR. ETTINGER: Yes. If I were --

MR. ANDES: I think he already answered it.

MR. ETTINGER: I'm going to ask a new question based on that. What factors would I use then to decide what the immediate vicinity is?

DR. GERBA: Well, I think it depends on a lot of factors. Probably a lot to do with hydrology, dilution rates, the volume of the waste water relative to the volume that it's being released in. The type of treatment, degree of treatment the waste water may receive. The types of flows or CSOs involved in that type of treatment or are they contained in that process. Water use in the community. And a lot of it has to do with how, where the outfall might be located in that area. There's a lot of factors, rainfall events and other things that might be considered.

MR. ETTINGER: Well, so, if I were trying to decide whether or not to disinfect at a plant that was some distance from a beach, I would look at all of those factors?

DR. GERBA: I think I would put all of those into consideration in the water quality on the beach and the occurrence and concentration of pathogens in the water too, because a lot of those factors, without actual data on the occurrence of pathogens and indicators might be difficult to sort out, so you would take a whole range of factors in there.

MR. ANDES: And this really has been addressed. This is pretty much a repeat of his answer from yesterday.

MR. ETTINGER: No, it's not.

DR. GERBA: Excuse me, I thought it was because I just listed the factors I listed yesterday.

MR. ETTINGER: How many miles could the pathogens continue downstream from the plant?

DR. GERBA: How many miles?

MR. ETTINGER: Of pathogens.

DR. GERBA: Well, one, right a way, it depends on the pathogen. It depends on the flow rate. It depends on the climate. There are a large number of factors that have to be considered.

MR. ETTINGER: Well, your study assumes that some of these pathogens hang around for three or four days after a weather even occur.

DR. GERBA: I assumed that it did --

MR. ANDES: You asked that it assume. Did you assume anything or measure?

DR. GERBA: (Response inaudible.)

CHAIRMAN TIPSORD: She's right, I've

got four people talking at once. We all need to talk at once. We're going to ask these questions and we're going to answer them. If some repetition occurs, I apologize, but it's already been a long couple of days.

Dr. Gerba, do you two need to confer before I ask this?

Dr. Gerba, the question was, did you assume that the pathogens did or did you actually measure? And your answer is.

DR. GERBA: Measured the pathogens.

CHAIRMAN TIPSORD: Mr. Ettinger then had a follow-up question based on that.

MR. ETTINGER: You found through measurements that some pathogens can live up to three days in ambient rivers, correct?

DR. GERBA: Let me qualify that, when you say live, they may be decreasing in concentrations. Usually once you discharge a pathogen, they will be decreasing in population. So we usually refer to things like, okay, in 24 hours you get 90 percent reduction, you get 99 percent reduction. So there's no like one individual lives and dies, so they decrease in

concentration over time. Once they leave -- well, actually once they leave the human body, it's a rough world out there so they decrease. Particularly in waterways. It's not as we talked about yesterday things like sunlight will inactivate organisms is one factor, antagonistic organisms, which eat the organisms you put out there. That's why you can't answer that generically. They will be decreasing over time is the best answer. But usually from a discharge you might find these organisms three days later.

MR. ETTINGER: So depending on flow conditions, you might be concerned about a beach that was three days below a sewage discharge plant?

DR. GERBA: That's always a possibility, but finding a pathogen doesn't mean there's a significant risk or finding an indicator there isn't a significant risk. In other words, I could start out with a hundred pathogens per hundred meters, and by the time it gets to the beach, because of inactivating factors such as sunlight. Basically that level of risk is one and becomes insignificant or meets the requirements

that might be set by the regulatory agency for the risk.

MR. ETTINGER: Thank you.

MS. ALEXANDER: Continuing with Dr. Gerba. Question number five, and that is regarding the discussion on page 5 of your testimony concerning disinfections byproduct, which I may refer to as DBPs. Are DBPs produced as a byproduct of chlorination?

DR. GERBA: Yes.

MS. ALEXANDER: Does UV, ultraviolet disinfection create the same type and level of DBPs as chlorination?

DR. GERBA: Repeat, DBPs?

MS. ALEXANDER: DBPs, disinfection byproducts.

DR. GERBA: With UV light there is a lot of uncertainty about potential of disinfection byproducts because it hasn't been studied that much. I was on U.S. EPA's advisory committee for five years, and I've attended workshops on UV light. And one of the things that comes through is they really haven't been studied very thoroughly. There have been fewer byproducts, if

there are any byproducts. But questions have been raised about potential production of byproducts with UV light, particularly going to medium pressure of vapor lamps, which have a big receptor of light and it effects more molecules in the environment. To say that there might be none, I think there probably haven't been enough studies. A lot of people feel there are probably lower levels of disinfection byproducts, but a lot of committees I've been on there have been concerns voiced that we haven't really studied the range of disinfection byproducts, particularly when we are looking at the sewage influence which have a large variety of organic matter that may be effected by ultraviolet light processes.

MS. ALEXANDER: I'd like to call your attention in Exhibit 71 to page 66, if I may. Let me first ask you, would it be fair in your view to characterize the level of disinfection byproducts generated by UV conventional doses as negligible?

DR. GERBA: I think -- I didn't write this section for one thing. Let me just say that right off the bat.

MS. ALEXANDER: Are you disagreeing with the statement in this section that "The formation of harmful byproducts by UV is negligible at conventional UV doses?

DR. TOLSON: Can you point to us where in the document?

MS. ALEXANDER: That's what I was searching for. I have it in my notes. It's on this page, but I may have gotten the page wrong.

MEMBER RAO: It's on page 67, third paragraph.

MS. ALEXANDER: Okay, yes, that's one reference. I believe there is another. But there's a statement made, and I quote on page 67, "UV disinfection results in DBPs and is not discussed further." Do you agree with that statement?

DR. GERBA: Based on the current state of knowledge for low vapor pressure lamps and drinking water, yes, I think you could say it's negligible but it hasn't been studied in great detail. That's based on the current state of knowledge.

MR. ANDES: I think for the record

we have other witnesses later who can testify further about that issue.

MS. WILLIAMS: Who?

MR. ANDES: Possibly Dr. Blanchly and I believe Dr. Hass.

MR. ETTINGER: Have you looked at, on the next page of your testimony, on page 68, you discuss other disinfectants in addition to chlorine.

CHAIRMAN TIPSORD: Just for the record, Mr. Ettinger, you say he discusses, he said he didn't write the report.

MR. ANDES: What page, I'm sorry?

MR. ETTINGER: Page 68. The EPA found use of disinfectants other than chlorination does not necessarily eliminate the use of halogenated DP -- whatever it is -- disinfection byproducts is easier than the letters for me. Did you look at other forms of disinfection?

DR. PETROPOULOU: This section compiles information from other forms.

MR. ETTINGER: Did you look at boron?

DR. PETROPOULOU: I don't believe

so, no.

MR. ETTINGER: Are you aware of disinfection byproducts from boron?

DR. GERBA: Can I ask a question bromine or boron?

MR. ETTINGER: Bromine or boron, what is that?

DR. GERBA: The question is, I think you are confusing bromine with boron because I've never heard of boron being used as a disinfectant before whereas bromine is used as a disinfectant.

MR. ETTINGER: I believe I have, but you are saying boron you have not heard of being used as --

DR. GERBA: No, I have not.

MR. ETTINGER: And bromine --

DR. GERBA: Has been used as a disinfectant.

MR. ETTINGER: And does it have disinfection byproduct that could effect aquatic life?

DR. GERBA: Bromine does produce disinfectant byproducts to my knowledge. Its effects on aquatic life, I don't know.

MR. ANDES: I may have other witnesses that can answer that.

MS. ALEXANDER: I wanted to clarify for the record, I quoted some language a moment ago which I could not find. It was defined on page 66. It is in fact on page 64. This is two-thirds down the page, there is a statement, "UV disinfectant is reportedly characterized by the following advantages over chlorine and then a study is cited from 2004," and the third bullet is the language I quoted, "The formation of harmful byproduct by UV is negligible at conventional UV doses." I offer that as clarification of my question.

My question is, Dr. Gerba, turning to your question number six to you, what is the most common method of disinfection currently used in waste water treatment?

DR. GERBA: I don't have any statistics I could quote, but from personal experience chlorination in the United States.

MS. ALEXANDER: And are you familiar generally with U.S. EPA health criteria governing disinfection byproducts?

DR. GERBA: No.

MS. ALEXANDER: Would you be aware generally that those criteria are set based on assumptions of long-term chronic exposure?

DR. GERBA: Yes.

MS. ALEXANDER: Were you aware that the maximum containment -- the MCLG -- now I'm blanking on what exactly that stands for -- maximum contaminant level goal for trichlormethane was set based on an assumption of studies. The consumption is two liters per day for a 150 pound adult over a period of seven years?

MR. ANDES: We will have someone offer testimony on this later.

MS. ALEXANDER: I'm just asking if you are familiar with that or have any disagreement with that?

DR. GERBA: Yes, I'm aware of it because I served on the EPA's drinking water advisory committee. For drinking water I should say all those things are related to what we've been talking about.

MS. ALEXANDER: Are you aware of any health data or standards that have been set

concerning occasional exposure as opposed to chronic exposure to chlorination disinfection byproducts in a recreational context?

DR. GERBA: Repeat the one part.

MS. ALEXANDER: Are you aware of either any health data that have been generated or standards promulgated concerning occasional exposure to chlorination disinfection byproducts in the recreational context?

DR. GERBA: Yes.

MS. ALEXANDER: Can you explain?

DR. GERBA: There have been various studies about, particularly in swimming pools, exposure to disinfection byproducts being inhaled or absorbed through the skin from chlorination of swimming pool waters and even hot tubs.

MS. ALEXANDER: So am I correct in concluding from that, that there is current ongoing exposure to trichlormethane associated with use of swimming pools that are disinfected with chlorine?

DR. GERBA: I believe there are, yes.

MS. ALEXANDER: This is Gerba

question number eight, which is slightly different. Have there been any studies to your knowledge of the impact of these byproducts on recreational users as opposed to their presence in water?

DR. GERBA: I believe there have been, yes.

MS. ALEXANDER: Can you identify any of those studies or describe them?

DR. GERBA: I can't describe the studies. There have been studies on chlorination means, for example, causing respiratory problems among people using swimming pools.

MS. ALEXANDER: Based on this knowledge of any of these studies that you just referenced, do you have any basis to believe that the effects of disinfection byproducts on recreational users would be comparable to the effects from chronic injection?

DR. GERBA: I don't have any basis. That would be too much speculation.

MS. ALEXANDER: Okay. Let me turn to question nine, which is how do you believe that the risks from recreational exposure to

microorganisms, and I'm asking that question generally not specific to the CAWS, would compare to the risks from disinfection byproducts.

DR. GERBA: That would be too much speculation. I would have to sit down and do a calculation to know that one. But usually risks are greater from the microorganisms.

MR. ANDES: You can expand on that.

DR. GERBA: I would point on that the way you do risk for chemicals is so much different -- lot of ways much more conservative to the microbial risks that we actually perform in that. So that should be pointed out.

MR. ETTINGER: Can you read that back.

(Record read as requested.)

DR. GERBA: Maybe I should extrapolate. In the chemical risk assessment, a lot of times they add a lot of factors that make -- maybe I want to mention that.

DR. TOLSON: Sure. We usually do that to provide a greater protection because the end points tend to be very severe end points. Cancer would be one of them. So there is a lot of

uncertainty factors built in. In other words, there's a desire to err on the side of safety. For microbial risk assessments we really try to focus in on what we predict would be the actual number of events. So it's very difficult to compare chemical versus microbial.

DR. GERBA: To give you maybe one example right away. The dose response data we are talking about is developed in human beings, the dose response for chemicals is developed in rats and mice, so they add extra safety factors in there for that reason. That's why we're fairly sure about our risk models because we actually develop those in human beings. We have ways of validating our models because of outbreak data. We know often times how much people ingested in food and water from that. We can look at our dose response models and risk models and validate it. And that's why we feel very confident in microbial risk models because we have the ability to validate it, and we don't really, usually have that ability in the chemical risk assessment models. So we feel much more confident because we have the ability to validate from outbreak data or

exposure data.

MS. ALEXANDER: Just to follow-up on the comparison. Dr. Gerba, did you write a chapter entitled "Risk Assessment" for a book entitled "Environmental Microbiology" that was published by Academic Press?

DR. GERBA: Yes, I did.

MR. ANDES: Is this a follow-up question? We haven't seen this?

MS. ALEXANDER: Yes, this is a comparison to microorganisms as opposed to DBPs, and I'd like to discuss this. I'm presenting as an exhibit the title page from the book, and on the back side is a page from the chapter that I just referenced.

CHAIRMAN TIPSORD: If there's no objection, I will mark this as Exhibit 78. Seeing none, it's mark as Exhibit 78.

(Document marked as Exhibit No. 78 for identification.)

MS. ALEXANDER: And I call your attention in the text on the back side under the heading 24.4, "Microbial Risk Assessment" in the

second paragraph, the language beginning, this is starting with the second sentence, "The trouble is that the risks posed to the community by these low levels of pathogens in the water supply over time are not like those posed by low levels of chemical toxins or carcinogens. For example, it takes just one amoeba in the wrong place at the wrong time to effect one individual, whereas the same individual would have to consume some quantity of a toxic chemical to be comparably harmed." My question is, do you still believe that statement to be accurate?

DR. GERBA: Oh, yes. Can I follow up? Of course it refers to drinking water.

MR. ANDES: Are you trying to compare the risk from these two types of exposure?

DR. GERBA: No, it's just a statement of fact.

MR. ANDES: Are they two different kinds of risks?

DR. GERBA: Yes.

MS. ALEXANDER: And in fact the point is they are two different kinds of risks, correct?

DR. GERBA: Yes.

MS. ALEXANDER: With that, I have no further questions for this panel.

THE COURT: Thank you. It's about ten after 12:00. Why don't we go ahead and take a lunch break then and come back with the IEPA.

(Whereupon the hearing was adjourned and a lunch recess was taken.)

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

I, DENISE A. 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 A. ANDRAS, CSR
CSR NO. 084-003592

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