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: PROPOSED AMENDMENTS TO 35 Ill. Adm. Code Parts 301, 302, 303, and 304,	) R08-9)(Rulemaking - Water)

TRANSCRIPT OF PROCEEDINGS had in the above-entitled matter, taken before MARGARET R. BEDDARD, a Notary Public within and for the County of Kane, State of Illinois, and a Certified Shorthand Reporter of said state, at Room 9-040, James R. Thompson Building, Chicago, Illinois, on the 9th day of September, A.D. 2008, at 9:08 a.m.

BEFORE: ARBITRATOR MARIE E. TIPSORD.

PRESENT:

MS. MARIE TIPSORD, HEARING OFFICER,
MS. ALISA LIU, Environmental Scientist,
MR. ANAND RAO, Senior Environmental Scientist,
MR. G. TANNER GIRARD, Acting Chairman,
MR. NICHOLAS J. MELAS,
MS. ANDREA S. MOORE,
MR. THOMAS JOHNSON;

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,
(1021 North Grand Avenue East,
P.O. Box 19276
Springfield, Illinois 62794),
BY: MS. DEBORAH WILLIAMS,
MS. STEPHANIE DIERS,
MR. SCOTT TWAIT;

BARNES & THORNBURG, LLP,
(One North Wacker Drive, Suite 4400,
Chicago, Illinois 60606),
BY: MR. FREDERIC P. ANDES,

Appeared on behalf of the Metropolitan
Water Reclamation District;

NATURAL RESOURCES DEFENSE COUNCIL,
(101 North Wacker Drive, Suite 609,
Chicago, Illinois 60606),
BY: MS. ANN ALEXANDER;

THE CHICAGO LEGAL CLINIC,
(2938 East 91st Street,
Chicago, Illinois 60617),
BY: MR. KEITH HARLEY;

FRIENDS OF THE CHICAGO RIVER,
(28 East Jackson Boulevard, Suite 1800,
Chicago, Illinois 60606),
BY: MR. ALBERT ETTINGER.

REPORTED BY MARGARET R. BEDDARD, CSR.

E X H I B I T S

NUMBER	MARKED FOR ID
Deposition Exhibit	
No. 66	4
No. 67	6
No. 68	7
No. 69	7
No. 70	8
No. 71	8
No. 72	61
No. 73	62

ARBITRATOR TIPSORD: Good morning, everyone. Again, this is the rulemaking R08-9. I am Marie Tipsord, the hearing officer assigned to the matter. I'm not going to read the whole intro, but I will reintroduce our panel. This is -- To my immediate right is Dr. Tanner Girard, the board member assigned to this matter; to his right is Nicholas J. Melas, board member; and to his right is board member Andrea Moore. To my far left is board member Thomas Johnson. To my immediate left is Anand Rao from our technical unit and to his left Alisa Liu from our technical unit.

Before we begin, there's a couple of housekeeping things. First of all, I received an e-mail from Mr. Andes, which includes a link to the budget books that we discussed yesterday. I'm going to mark that as Exhibit 66, if there's no objection. Seeing none, it is Exhibit 66. And there are copies

of that e-mail available on the table to the right.

(WHEREUPON, said document was marked Exhibit No. 66, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: Also, Member Melas, you had something you wanted to say this morning?

MR. MELAS: Yes.

Before we get started, in the interest of full disclosure, I think I ought to make this statement. Most of you already know this, but for purposes of disclosure. From December of 1962 through December of 1992 I served as a commissioner at the Water Reclamation District. It's been a long time since I've been there, but I thought I would mention that for the purposes of the record.

The other thing that I would just -- In passing, a slight correction to the record. As I mentioned to Ms. Meyers earlier, when she was discussing the project along the river walk, she mentioned me by name, Nicholas J. Melas. Instead of saying the word "fountain," she said the word

"foundation." That should be corrected. I do not have such a foundation. I'm in the water business.

MR. JOHNSON: At least she didn't say "memorial."

MR. MELAS: That's coming.

ARBITRATOR TIPSORD: And, for purposes of the record, I actually had marked yesterday a picture of the barge on the Calumet-Sag River as Exhibit 66, so the e-mail is Exhibit 67. That's what happens when I

don't write things down right away.

(WHEREUPON, said document was marked Exhibit No. 67, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: With that, I understand we're going to actually let the three witnesses present their testimony and do all the questioning at once; is that correct, Mr. Andes?

MR. ANDES: That would be fine.

ARBITRATOR TIPSORD: In that case -- And please forgive me if I'm mispronouncing the names, but I'm going to try. Chriso Petropoulou, Charles Gerba, and Keith Tolson.

Can we have them sworn in, please.

(WHEREUPON, the witnesses were duly sworn.)

ARBITRATOR TIPSORD: And do you have copies we can mark as exhibits?

MR. ANDES: Yes, I do. The one thing I would mention is that the Geosyntec report Dry and Wet Weather Risk Assessment is an attachment to all three testimonies. I've provided one copy of that.

ARBITRATOR TIPSORD: That's fine.

MS. ALEXANDER: For the ease of the record,

would it make more sense to do each testimony and then make the report a separate exhibit?

ARBITRATOR TIPSORD: I was just going to suggest that. That's okay. Wonderful. Thank you.

MR. ANDES: That's fine.

ARBITRATOR TIPSORD: For purposes of the record, we will mark Petropoulou as Exhibit 68 with the attachments except the report, which we'll mark as a separate exhibit. So that's -- If there's no objection, that's Exhibit 68. Seeing none, that's

Exhibit 68.

(WHEREUPON, said document was marked Exhibit No. 68, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: Gerba's testimony with his attachments, other than the report, will be marked as Exhibit 69, if there's no objection. Seeing none, it's Exhibit 69.

(WHEREUPON, said document was marked Exhibit No. 69, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: And Tolson's testimony with attachments, other than the report, will be Exhibit 70, if there's no objection. Seeing none, it

is Exhibit 70.

(WHEREUPON, said document was marked Exhibit No. 70, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: And then the report, which is Dry and Wet Weather Risk Assessment of Human Health, Impacts of Disinfection versus no Disinfection of the Chicago Area Waterway System

dated April 2008 will be marked as Exhibit 71, if there's no objection. Seeing none, it is Exhibit 71. And it's prepared by Geosyntec Consultants.

(WHEREUPON, said document was marked Exhibit No. 71, for identification, as of 9-9-08.)

ARBITRATOR TIPSORD: With that, whenever you're ready.

MS. PETROPOULOU: My name is Chriso Petropoulou, and I am a licensed professional environmental engineer in the state of Illinois. I earned a bachelor of science degree in chemical engineering from the National Technical University in Athens, Greece, and a doctor of philosophy degree in environmental engineering from the Illinois Institute of Technology in Chicago, Illinois. I am also a

board certified environmental engineer by the American Academy of Environmental Engineers. I have been employed with Geosyntec Consultants, Inc. (Geosyntec) in Chicago, Illinois, for the last nine years. Before that I was employed by Patterson

Associates, Inc., for about four years and PRC Environmental Management, Inc., (now known as TetraTech EMI) for about four-and-a-half years. I have over 17 years of experience in the wide range of environmental engineering projects, involving design, schedule, and implementation components. I also have experience in evaluating and interpreting laboratory analytical results and other field data in order to make critical project decisions. In addition, I have extensive experience in environmental permitting and compliance issues.

For the last three years I have been the project manager for the Metropolitan Water Reclamation District of Greater Chicago Microbial Risk Assessment (MRA) study. The District has conducted the MRA study to determine health impacts of the recreational use of the Chicago Area Waterway System (CAWS). 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 District's North Side, Stickney, and Calumet water reclamation plants versus

initiating disinfection of the effluent at these three plants.

I have been intimately involved with every aspect of the MRA study. The results of the MRA study are summarized in the April 2008 Geosyntec report, which is incorporated herein by reference. The report is entitled Dry and Wet Weather Risk Assessment of Human Health Impacts of Disinfection versus Non-Disinfection of the Chicago Area Waterway System. I was responsible for the composition, assembly, and production of the subject report.

My testimony today will provide a brief description of the microbial sampling, analytical testing, and results of the MRA study.

Microbial Risk Assessment Sampling. The MRA study included collection of dry and wet weather microbial samples from the surface water in the Chicago area waterway system and the water reclamation plant effluents. The dry weather sampling was completed during the 2005 recreational season when the climatic conditions were not suitable

for wet weather sampling. The wet weather sampling took place during the 2006 recreational season. The dry and wet weather microbial results were integrated to enable an evaluation of the potential impacts of disinfection and overall risks associated with the recreational use of the waterway.

During dry weather, the District's North Side, Stickney, and Calumet plants contribute the majority of the flow in the Chicago Area Waterway System. The specific objectives of the 2005 dry weather sampling were as follows:

1. Evaluate the impact of the treated effluent from the District's three major plants (North Side, Stickney, and Calumet) on the microbial quality of the Chicago Area Waterway System.

2. Estimate health risks to recreational users of the Chicago Area Waterway System due to incidental contact pathogen exposure under dry weather conditions.

3. Quantify any reduction of risk that would result from the disinfection of plant effluents during dry weather.

During wet weather, in addition to the reclamation plant effluents, several sources

contribute to the microbial load in the Chicago area waterway system, including combined sewer overflows, discharges from storm drains, overland runoff, land-use activities such as agriculture and construction, erosion, and habitat destruction. The specific objectives of the 2006 wet weather sampling were as follows:

1. Evaluate the impact of the reclamation plant wet weather flow on the microbial quality of the plant outfalls.

2. Evaluate the impact of combined sewer overflows in the microbial quality of the Chicago area waterway system.

3. Estimate health risks to recreational users of the Chicago area waterway system due to incidental contact pathogen exposure under wet weather conditions.

4. Quantify any reduction of risk that would result from disinfecting plant effluents during wet weather.

A total of 75 dry weather samples and 50 wet weather samples were collected at the North Side, Stickney, and Calumet waterway segments, including upstream, downstream, and outfall samples. Exhibit 1

shows the dry and wet weather locations. The wet weather locations were spaced at significantly longer distances away from the reclamation plants compared to the dry weather locations to account for the contributions of storm water runoff, CSO outflows, and pumping stations. At the North Side, wet weather samples were also collected near the North Branch Pumping Station (NBPS). At Stickney, wet weather samples were collected near the Racine Avenue Pumping Station (RAPS). At Calumet, wet weather samples were collected downstream of the 125th Street Pumping Station at Halsted Avenue.

Analytical Testing. The MRA study focused on the detection of microorganisms typically present in the feces of humans and other warm-blooded animals as indicators of fecal pollution. Hence, a group of US EPA-approved indicator microorganisms, such as E. coli, Enterococci, and fecal coliform, was selected for the MRA study. Indicator microorganisms are used as an index of the microbial quality of water, but are not pathogenic to humans. The presence of indicator microorganisms may be indicative of the presence of microbial pathogens, while their absence is thought to be indicative of

the absence of microbial pathogens. In addition to the indicator microorganisms, pathogens representative of those present in the wastewater that are also of public health concern were selected. The rationale for selecting the pathogens for the MRA study included the following criteria:

The pathogens selected are associated with documented outbreaks of disease, including gastrointestinal and respiratory diseases and infections.

There are US EPA-approved methods or laboratory standard operating procedures (SOP's) available for the measurement of the selected pathogens.

Based on the rationale and selection criteria outlined above, the objective of the dry and wet weather sampling was to determine the concentrations of the three major groups of indicator and pathogenic microorganisms, including bacteria, protozoa, and viruses. The bacteria samples were analyzed for fecal coliforms, E. coli, Enterococci,

Salmonella spp., and Pseudomonas aeruginosa. The protozoa samples were analyzed for infectious Cryptosporidium parvum and viable Giardia lamblia.

The virus samples were analyzed for enteric viruses, including total culturable viruses, viable adenovirus, and Calicivirus, which refers to human Caliciviruses, specifically the genus norovirus.

ARBITRATOR TIPSORD: Off the record.

(WHEREUPON, discussion was had off the record.)

ARBITRATOR TIPSORD: Back on the record. I apologize for the interruption.

MS. PETROPOULOU: Microbial Results. The microbial analytical results generated during the MRA study were evaluated and interpreted within the framework of dry and wet weather conditions. However, for the MRA estimates, the dry and wet weather microbial results were integrated in a comprehensive dataset representative of all weather conditions in the waterway. In summary, the microbial analytical results indicate that the concentrations of bacteria, viruses, and protozoa in

the waterway increased during wet weather conditions. The following sections discuss the dry and wet weather analytical results of bacteria, protozoa, and viruses.

Bacteria Results. Bacteria were the most

abundant microbial species detected in the waterway, compared to viruses and protozoa, during both dry and wet weather events. Analysis of Variance (ANOVA) statistical tests were performed for the dry, wet, and combined dry and wet weather bacteria results to determine differences of bacteria concentrations by site (i.e., North Side, Stickney, Calumet), by location (i.e., upstream, downstream, outfall), by depth (for dry weather only; i.e., surface and 1-meter depth), and by weather.

The dry weather results indicate that there's significant -- there is a significant difference between bacteria concentrations by site (North Side, Stickney, Calumet) and by location (upstream and downstream). Downstream concentrations are consistently greater than upstream. Bacteria

concentrations in dry weather samples did not show a statistically significant difference by depth. The wet weather results indicate that E. coli and Enterococcus data are significantly different by site. Fecal coliform, Pseudomonas aeruginosa, and Salmonella spp. do not differ by site or any other factor. The results indicated that during wet weather there was no statistical difference between

bacteria concentrations upstream and downstream of the three reclamation plants.

The wet weather bacteria concentrations are significantly greater than the dry weather concentrations in each reclamation plant waterway segment. Also, the wet weather geometric means at each sampling location (upstream, downstream, outfall) at the North Side and Stickney waterway segments indicate that most of the North Side and Stickney geometric mean bacteria concentrations upstream and downstream of the plants are higher than the outfall concentrations. Fecal coliform and E. coli wet weather concentrations are greater than the other bacteria geometric means at each sampling

location for all the plants. The wet weather outfall samples have lower levels of Pseudomonas aeruginosa than the corresponding upstream and downstream wet weather samples. This suggests that the major inputs for Pseudomonas aeruginosa in the waterways are sources other than the reclamation plant effluents.

The results of the combined dry and wet weather ANOVA analysis indicate the dry and wet weather combined bacteria data for E. coli, Enterococcus, and Pseudomonas aeruginosa are

significantly different by site and weather. Fecal coliform data differ by weather only (not by site). The fecal coliform dry weather concentrations upstream of the North Side and Stickney plants were greater than the IEPA proposed effluent limit of 400 colony forming units (CFU)/100 mL. Also, the wet weather fecal coliform concentrations upstream of the North Side, Stickney, and Calumet plants were above the IEPA proposed effluent limit of 400 CFU/100 mL.

The bacteria analytical results were also analyzed using correlation statistics. The results

indicate that there are no significant correlations between dry weather fecal coliform indicator bacteria and other indicator bacteria and pathogens. The wet weather results indicate that there is a better correlation between fecal coliform and other indicator bacteria and pathogens.

Cryptosporidium and Giardia Results. The concentrations and frequency of detection of Cryptosporidium oocysts and Giardia cysts were greater in wet weather samples compared to dry weather samples. For dry weather samples, no infectious Cryptosporidium oocysts were detected in the outfalls or the waterways. Similarly, for wet

weather samples, no infectious Cryptosporidium oocysts were detected, with one exception. During wet weather conditions, Cryptosporidium oocysts and Giardia cysts were detected in some of the samples collected upstream of the North Side and Stickney plants.

During dry weather, most Giardia cysts were non-viable. The average percentage of viable Giardia cysts found in samples from the Stickney waterway

segment, including outfall and instream concentrations, was 21 percent during dry weather and increased to 47 percent during wet weather. The average percentage of viable cysts found in samples from the North Side waterway segment, including outfall and instream concentrations, was 26 percent during dry weather and increased to 49 percent during wet weather. Under both dry and wet weather, samples from the Calumet waterway contained the smallest percentage (10 percent) of viable Giardia cysts compared to Stickney and North Side waterways.

Outfall samples at the North Side and Stickney plants contained higher levels of viable cysts compared to the Calumet outfall. The percentage of viable Giardia cysts in samples from

the Calumet outfall was 10 percent during both dry and wet weather conditions. The percentage of viable Giardia cysts in samples from the Stickney outfall was 47 percent during dry weather and 50 percent during wet weather. The percentage of viable Giardia cysts in samples from the North Side outfall was

51 percent during dry weather and 42 percent during wet weather.

Virus Results. The percentage of samples with enteric virus detections at the North Side waterway was only 29 percent during dry weather and increased to 69 percent during wet weather. The percentage of samples with enteric virus detections at the Stickney waterway segment was only 24 percent during dry weather and increased to 88 percent during wet weather. The percentage of samples with enteric virus detections in the Calumet waterway segment was only 12 percent during dry weather and increased to 77 percent during wet weather. The concentrations of total enteric viruses detected during wet weather sampling are generally greater than the dry weather concentrations. Also, some of the wet weather samples collected upstream of the North Side, Stickney, and Calumet plants had detectable

concentrations of total enteric viruses.

The adenovirus concentrations detected during wet weather sampling are generally greater than the dry weather concentrations. Also, some of

the wet weather samples collected upstream of the North Side, Stickney, and Calumet plants had detectable concentrations of adenoviruses. The percentage of wet weather samples with adenovirus detections were greater than the dry weather detections. The percentage of samples with adenovirus detections in the North Side waterway segment was 48 percent during dry weather and increased to 88 percent during wet weather. The percentage of samples with adenovirus detections in the Stickney waterway segment was 52 percent during dry weather and increased to 94 percent during wet weather. The percentage of samples with adenovirus detections in the Calumet waterway segment was 24 percent during dry weather and increased to 72 percent during wet weather.

The Calicivirus (norovirus) concentrations detected during wet weather sampling are generally greater than the dry weather concentrations. Also, the percentage of wet weather samples with norovirus

detections were greater than the dry weather

detections. The percentage of samples with norovirus detections in the North Side waterway segment was only 4 percent during dry weather and increased to 44 percent during wet weather. The percentage of samples with norovirus detections in the Stickney waterway segment was 12 percent during dry weather and increased to 63 percent during wet weather. The percentage of samples with norovirus detections in the Calumet waterway segment was only 4 percent during dry weather and increased to only 17 percent during wet weather.

Conclusion. The microbial analytical results indicate that the wet weather samples had a higher frequency of detection and higher concentrations of pathogens and indicators compared to dry weather samples. The pathogen concentrations within the waterway are largely a result of non-water reclamation plant derived wet weather inputs. The analytical results also indicate that, despite elevated levels of fecal coliform indicator bacteria, the concentrations of actual pathogenic microorganisms in the waterway are low and many are often not detectable.

Thank you.

ARBITRATOR TIPSORD: Okay. Let's continue.

MR. ETTINGER: Albert Ettinger. I represent various environmental groups.

Was there a ruling that we're going to be reading all the pre-filed testimony for the rest of this hearing?

ARBITRATOR TIPSORD: There was not necessarily a ruling. I know we talked to them yesterday about summaries. Mr. Andes explained that these were summaries. But no one's actually objected to the reading.

MR. ETTINGER: Well, I object to the readings. The Agency was not allowed to read any.

MR. ANDES: I don't recall the issue coming up.

MS. WILLIAMS: The issue was raised. We actually asked to read very brief, less than two-page, summaries into the record, and the Hearing Officer told us that we were not to read summaries. We were to go directly into questions.

MR. ANDES: We wouldn't have objected to that. And I think it's helpful to -- particularly because we have charts and exhibits that we want to point out. I think they're in the context of the

testimony. Based on a discussion yesterday, our impression had been that this was going to be allowed.

ARBITRATOR TIPSORD: Well, there was never an objection made until now. I did tell the Agency that we were going directly to the questions given the need for timing. As I said yesterday, we've all read this testimony. It has been pre-filed. I understand it's a summary. I did ask if you would look to see if you could summarize it more.

Let's go off the record.

(WHEREUPON, discussion was had off the record.)

ARBITRATOR TIPSORD: All right. Let's go back on the record.

My inclination -- And we did talk a little bit yesterday off the record about this. I think we left -- You were going back to your office to talk with your witnesses about summaries last night. And I did suggest at that time that we could just go directly to questions. I understand you have charts. There's no problem with putting the charts up, and they can certainly refer to them in answering questions. But I do think that since the objection's

been raised and since I did rule that the Agency would go directly to questions that we're going to --

MR. ANDES: But I think -- I guess my objection is that I thought it was pretty clear at the end that we would be allowed to read these into the record today, that we would look for opportunities to shorten them. And it was specifically noted that the total number of pages for these three witnesses is only 20 pages. We do have other witnesses where I do expect we'll have an opportunity to shorten and summarize their testimony. But my understanding going forward --

ARBITRATOR TIPSORD: Given that there was some confusion yesterday at the end of the day off the record, I will let these three witnesses read their testimony in. That's it. From then on we're going directly to questions. No summaries at all.

And I apologize to the Agency.

Mr. Gerba?

MR. GERBA: My name is Charles P. Gerba. I earned a bachelor of science degree from Arizona

State University in 1969 and a Ph.D. from the University of Miami, Florida, in 19 --

ARBITRATOR TIPSORD: Mr. Gerba, you need to speak up.

MR. GERBA: Both of my degrees are in microbiology. I was a postdoctoral fellow and assistant professor of environmental virology at Baylor College of Medicine in the Department of Virology and Epidemiology from 1973 through 1981. I am currently professor of environmental microbiology in the Department of Microbiology and Immunology; Soil, Water, and Environmental Science; and Epidemiology and Biostatistics at the University of Arizona in Tucson, Arizona. I have authored more than 500 articles, including several books in environmental microbiology and pollution science. I actively conduct research on the development of new disinfectants, new methods for the detection of enteric pathogens in the environment, occurrence and fate of pathogens in the environment, fate of pathogens during wastewater reuse and land application of biosolids, microbiology of domestic

environments and microbial risk assessment.

For the last three years, I have participated in the District's microbial risk assessment (MRA) study as a member of Geosyntec team

senior advisory committee. In that role, I've worked closely with the project team providing direction and peer review in all aspects of the MRA study, which evaluated the human health impacts of disinfection versus non-disinfection at the District's three largest water reclamation plants, all of which discharge into the Chicago Area Waterway System (CAWS). In addition, at the onset of the study I provided on-site training to the District personnel on sample collection procedures.

The MRA study focused on microorganisms typically present in the feces of humans and other warm-blooded animals as indicators of fecal pollution, including the following indicators and pathogens:

Enteric viruses: i)total culturable viruses, ii) viable adenoviruses, and (iii)

norovirus.

Infectious Cryptosporidium and viable Giardia Lamblia.

Salmonella species.

Pseudomonas aeruginosa.

Fecal coliforms.

E. coli.

Enterococci.

This list was taken to be representative of the largely -- Excuse me. Let me repeat that. This list was taken to be representative of the likely universe of disease-causing organisms and indicators that are used to assess fecal contamination. The indicators selected are those which have been traditionally used and those recommended by the United States Environmental Protection Agency and the World Health Organization for assessment of recreational water quality. Salmonella was also selected as it was one of the more hardy enteric bacterial pathogens and can always be found in wastewater and would be expected to be representative of the risks from other enteric bacterial pathogens.

Pseudomonas aeruginosa was selected because it can be commonly isolated from sewage and causes recreationally associated eye, skin, and ear infections. Fecal coliforms, E. coli, enterococci were included in the list of organisms studied because of its use as an indicator of recreational water quality. The test did not detect pathogenic E. coli. Non-pathogenic forms of E. coli occur in much greater concentrations than pathogenic forms in

wastewater, and their behavior would be expected to be similar to that of pathogenic strains of E. coli. Cryptosporidium is the protozoan pathogen most commonly associated with recreational waterborne disease outbreaks in the United States today. Giardia is also associated with recreational waterborne disease outbreaks. Total culturable virus assays have been used by the Environmental Protection Agency in the information collection rule to assess risks from enteric pathogens in water and will largely detect the enteroviruses (Coxsackie virus, echo virus) one of the most common groups of enteric

viruses found in wastewater. Norovirus and adenovirus are the viruses most commonly associated with recreational waterborne disease accounting for more than 90 percent of all reported outbreaks of viruses associated with recreational water. Norovirus is the most common cause of viral diarrhea in the United States. Adenoviruses are a cause of ear, nose, throat, and respiratory infections associated with recreational waters. They're also the second leading cause of viral diarrhea in children. Adenoviruses have been detected in greater concentration in wastewater than any other enteric

virus. Thus, they may pose the greatest risk of infection in recreational waters of any enteric pathogen. Enteric viruses and protozoan parasites were included in this study because they have a much lower infectious dose than the bacteria. That is, it takes fewer to cause infection. And they survive much longer in surface waters than the enteric bacteria pathogens.

I directed the operation of the Environmental Virology Laboratory, Department of Soil, Water, and

Environmental Science at the University of Arizona that performed the analysis of the adenovirus and norovirus for this study using University of Arizona standard operating procedures(SOP's). There are no US EPA-approved methods for norovirus. The University of Arizona method estimates the virus concentration, but does not determine or confirm viability or infectivity. Thus, this method is a conservative estimate of the number of infectious virus present in the water. That is, it detects both non-infectious (dead) and infectious viruses (live.) Adenoviruses are believed to be more common in sewage than enteroviruses and have been a cause of recreational waterborne illness. There are no

US EPA-approved methods for adenovirus. A University of Arizona SOP was used for the analysis of adenoviruses that includes cell culture and DNA confirmation.

The occurrence and concentration of protozoan parasites, total culturable viruses, adenoviruses, and norovirus were generally equal to

or lower than observed in other studies by me and others on wastewater discharges and surface waters in general during dry weather conditions. These studies involved both disinfected and non-disinfected treated wastewater and streams into which they were discharged. Some of these studies were conducted in Europe where disinfection of treated wastewater discharge is generally not practiced. The concentration of Cryptosporidium was lower than observed in studies in which I have been involved in previously and other studies reported in the scientific literature in which there are no known sewage discharges. This is because cattle and other animals can be a greater source of Cryptosporidium in surface waters than sewage discharges. The Giardia was also generally lower than that observed in several other sewage discharges from previous studies

conducted by me and reported in the literature by others. These studies were conducted in various locations across the United States. The total culturable viruses were also lower than observed in a study of a recreational stream in Arizona conducted

by my laboratory in which bathers were the only source.

It is my expert opinion that decisions regarding the need for effluent disinfection must be made on a site-specific basis. Disinfection is warranted in situations where direct human contact in the immediate vicinity of an outfall is possible or where effluent is discharged to areas involving the production of human food. Disinfection is warranted in situations where its application leads to a reduction in the risk of disease transmission. As illustrated by post-disinfection regrowth of bacteria, relatively poor virucidal behavior and general persistence of disinfection by-products is not clear that wastewater disinfection always yields improved effluent or receiving water quality.

There is a great variability in the performance and uncertainty in the efficiency of disinfection. There are many unanswered questions

with respect to disinfection efficiency data for microbial indicators and pathogens. The available

data for the evaluation of disinfection technologies are bench-scale or pilot-scale experiments and not full-scale operations. Therefore, it is uncertain if disinfection designed to remove indicators can be effective in the removal of pathogens and in the reduction of pathogen risk. In applying any disinfectant, it is important to strike a balance between risks associated with microbial pathogens and those associated with DBP's. DBP's are persistent chemicals, some of which have relevant toxicological characteristics. The inventory of DBP's that have the potential to cause adverse health effects is largely and highly variable among publicly-owned treatment works (POTW) effluents. The human health effects associated with chemical contaminants that are influenced or produced as a result of disinfection operations tend to be chronic in nature. Therefore, the development of a risk assessment for exposure to chemical constituents, including DBP's, is far more complex than the microbial risk assessment. Risk assessments of wastewater disinfection should consider microbial and chemical

quality.

Thank you.

ARBITRATOR TIPSORD: Mr. Tolson?

MR. TOLSON: Thank you.

My name is Keith Tolson. I'm a risk assessment and statistical specialist working with Geosyntec Consultants. My educational background includes an honors in interdisciplinary science degree in statistics and chemistry from the University of Florida, a master's degree in food science and human nutrition, and a doctorate degree from the College of Medicine at the University of Florida. I hold an adjunct faculty position and serve on the faculty at the Center for Environmental and Human Toxicology where I teach graduate courses in statistics, toxicology, and risk assessment. Prior to joining Geosyntec, I spent eight years working for the State of Florida as a consultant to the Florida Department of Environmental Protection and am co-author on the Department's technical guidance for Brownfields, Drycleaning, Petroleum, Soil & Groundwater Cleanup Targets, and Surface Water Rules. I hold a gubernatorial appointment to the Pesticide Review Council, which is charged with advising the Governor

on the sale, use, and registration of pesticides in the State of Florida. My professional practice involves the quantification of human health and ecological risks and quantitative cost-benefit analysis as it relates to public policy and regulatory action.

For the last three years, I served as the risk assessment leader for the Metropolitan Water Reclamation District of Greater Chicago microbial risk assessment study. I was responsible for the calculation and interpretation of risks summarized in the April 2008 Geosyntec report entitled Dry and Wet Weather Risk Assessment of Human Health Impacts of Disinfection versus Non-Disinfection of the Chicago Area Waterway System April 2008.

Today I will provide you with a brief description of the risk assessment inputs and methods used in the study and a summary of the results leading to our conclusions. Namely, that risks for gastrointestinal illness associated with recreational use of the Chicago area waterway are low and mainly due to secondary loading of the waterway under wet weather conditions from CSO's and other discharges, which would not be improved by disinfection of the

effluent from the District's water reclamation plants.

Microbial Risk Assessment Methodology. The process used to reach our conclusions is called quantitative microbial risk assessment. It starts with an understanding that certain microbial pathogens cause gastrointestinal illness. We know this from outbreak and case reports along with carefully controlled feeding studies where volunteers ingest different concentrations of organisms and are monitored for development of symptoms. The key observation from these studies that allow us to make predictions is the dose-response relationship. That is, higher levels of pathogens correspond to a higher incidence of illness. Because we have measured the levels of pathogens in the waterway and can estimate the dose based on the type of recreational activity, we can use the mathematical relationship between dose and response to calculate a probability that an individual might develop illness.

In order to capture the range of different exposure conditions, including weather, type of recreation, and activity intensity, we utilized a

technique called probabilistic microbial risk

assessment. This technique involves performing a large number of simulations using combinations of all potential inputs derived from distributions that reflect the true variability in exposure by recreators. For example, we assume that incidental ingestion by individuals canoeing on the waterway will vary over a range and calculations that are performed account for all users, even those that might capsize.

The goal of the study was to determine the expected number of illnesses associated with designated usage of the waterways both with and without disinfection of water reclamation plant effluent. Risks were estimated for recreational users participating in activities involving different levels of exposure in dry, wet, or a combination of weather events over the course of the recreational year.

Risk assessment inputs were drawn extensively from site-specific data and were developed using state-of-the-science methodology to

accurately represent recreational user exposure conditions and risks. Recreational survey studies were used to provide insight on the type and

frequency of recreational exposure expected in the waterway. For quantitative risk analysis, the UAA study was the primary source for exposure use data for the CAWS. As a part of the UAA, the CAWS was divided into three major waterway segments each associated were a single reclamation plant, Stickney, North Side, and Calumet. Recreational use was divided into high (canoeing), medium (fishing), and low (pleasure boating) exposure activities. UAA survey data were used to estimate the proportion of recreational users participating in each receptor scenario along each waterway segment.

Exposure parameters, such as the length of time spent on the waterway and the amount of water that is incidentally ingested per unit of time spent on the waterway, were developed to reflect the variability of each receptor scenario as inputs to the exposure model. Selection of input distribution

relied on literature-derived sources, site-specific use information, and professional judgment.

As stated previously, dose-response parameters define the mathematical relationship between the dose of a pathogenic organism and the probability of infection or illness in exposed

persons. Dose-response data are typically derived from either controlled human feeding studies or reconstruction of doses from outbreak incidents. In human feeding trials, volunteers are fed pathogens in different doses, and the percentage of subjects experiencing the effect (either illness or infection) is calculated. While feeding trials can provide useful dose-response analysis data, studies are usually performed in healthy individuals given high levels of a single strain. Epidemiological outbreak studies provide response on a larger cross-section of the population, but dose reconstruction is often problematic. Does-response relationships for this study were developed from regulatory documents, industry-wide papers, and peer review literature.

Concentrations of pathogens in the waterway

were selected for each simulation from the entire dataset of dry and wet weather samples collected. The proportion of dry and wet weather samples utilized were weighted to account for the proportion of dry and wet weather days in a typical Chicago recreational season.

The methodology used in conducting this study and evaluating the risk of recreational illness

reflect the current state-of-the-science in performing quantitative microbial risk assessment. Similar techniques have been used by the US EPA and other public entities to support decision making. Components of the methodology and results of this study have been presented at four national technical conferences, and three manuscripts are currently in preparation for submission to peer review journals.

Results of the risk assessment demonstrate that risks to recreational users under various weather and use scenarios is low and within the US EPA recommended risk limits for primary contact exposure. The highest rates of illness were

associated with recreational use on the Stickney and North Side waterway segments and the lowest illness rates on the Calumet waterway segment. Illness rates were higher under wet weather conditions than under dry weather conditions.

It is important to note that the US EPA has not developed any secondary contact water quality standards. However, the US EPA has proposed a range of primary contact acceptable risk thresholds and currently has primary contact water quality criteria protective of immersion activities that is based on

an acceptable risk threshold of 8 illnesses per 1,000 swimmers. This is the lowest or more -- most stringent of the acceptable risk thresholds used to base water quality criteria currently adopted by EPA. The results of this study demonstrate that the expected illness rates for receptors were all below the US EPA's most conservative acceptable risk threshold illness rate of 8 illnesses per 1,000 swimmers in primary contact recreational waters.

Risks were also calculated individually for each of the three different classes of recreational

use that span the range of exposures reported in the UAA survey in proportion to the frequency of use for each waterway segment. The recreational activity that results in the greatest number of affected users depends on both the proportion of users engaged in that activity and the pathogen load in that waterway segment. For example, in the North Side segment 33.7 percent of the gastrointestinal illnesses are predicted to result from canoeing, but canoeing accounts for only 20 percent of the users of the North Side waterway. In the Stickney and Calumet segments, the predicted illnesses were predominantly from fishing and boating due to the low frequency of

canoeists in these waterway segments. To further evaluate the risk stratified by the recreational use activity, risk per 1,000 exposure events were computed separately for canoeing, boating, and fishing recreational uses. As expected, the highest risks were associated with recreational use by the highest exposure group (i.e. canoeing). However, for each waterway the risks associated with the highest

exposure use are below US EPA's illness rate of 8 per 1,000 swimmers in primary contact recreational waters.

For the North Side and Stickney waterway segments, the majority of predicted illnesses were the result of concentrations of viruses, E. coli, and Giardia. For the Calumet waterway, the risks are generally lower with multiple organisms contributing to the overall risk.

Effect of Effluent Disinfection on Pathogen Microbial Risks. The goal of the study was to estimate the effect of disinfection of the effluent from the water reclamation plants on microbial risk. This was accomplished by evaluating risk under dry weather conditions when the plant effluent is the major microbial source to the waterway in addition to

wet weather conditions when non-plant inputs are a significant source of microbial load to the waterway. The plant effluent pathogen loads are similar in both dry and wet weather conditions such that the dry weather sampling data can be used to estimate the waterway load that could be affected by disinfection.

Wet weather sampling data was assumed to encompass both plant effluent loading (attenuated by disinfection) and non-point discharges to the waterway (e.g., CSO's, pumping stations, and stormwater outfalls).

Disinfection of the effluent outfall was predicted to result in a decrease in effluent pathogen loads from the water reclamation plants, but have little effect on pathogen -- overall pathogen concentrations in the waterway. This is because the sampling data shows that a large proportion of the pathogen load results from sources other than the plant effluent. Disinfection results in effluent pathogen risk decreasing from a low level to essentially zero from the water reclamation plant but has little impact in waterway pathogen concentrations affected by current or past wet weather conditions. The results are presented in the table on Exhibit 1.

There are a lot of numbers here, so let me walk up here to break this down a little bit more.

ARBITRATOR TIPSORD: Mr. Tolson, to be clear,

that's an exhibit to your testimony, correct?

MR. TOLSON: It is an attachment to my testimony, yes.

This table here presents the numbers that are the actually predicted risk estimates. So this number, for example, for North Side for no disinfection, 1.53, would be -- we would expect no more than 1.53 people per 1,000 -- Obviously for 1,000 we'd have to go to a million or something in order to get that many people. So it's less than two people per 1,000 we would predict to develop illness from recreational activity on the North Side segment. It's higher, 1.74 in the Stickney and very low, 1.2, in the Calumet. So this is the baseline, no disinfection, overall risk of illness from recreational users that are there in wet and dry weather conditions.

If we evaluate this, again, by taking the effluent discharge from the District and attenuating that, but including the dry and wet weather inputs that are still there, we can look at UV radiation and

see that the North Side number drops from 1.53 to

1.32. So there's still significant risk, and this risk is not due to the effluent. It's due to the other sources that are there because the effluent went essentially to zero.

The same thing with ozonation and chlorination. These numbers are different because those different disinfection techniques affect different organisms -- pathogenic organisms differently. Again, for Stickney, you can see that, although there was a decrease based on the disinfection techniques, the decrease was not very significant. Again, for Calumet there was a decrease, and there it was not significant at all.

Therefore, these results suggest that disinfection of effluent will have little impact on the overall illness rates from recreational use of the CAWS.

Conclusions. The results presented in my testimony are based on weather and waterway sampling representative of the entire recreational year. Results demonstrate that, although indicator levels are relatively high at the water reclamation plant effluents and at locations downstream of the plants

and the North Branch Pumping Station and Racine Avenue Pumping Station, pathogen levels are generally low. Low pathogen levels correspond to a low probability of developing gastrointestinal illness, even for the most highly exposed recreational users in areas of the CAWS in close proximity to non-disinfected effluents from the Stickney, Calumet, and North Side plants. For the designated recreational uses evaluated, the risks of developing illness were less than the US EPA's illness rate of 8 illnesses per 1,000 swimmers in primary contact recreational waters. Results further demonstrate that disinfection of WRP effluent will have minimal effects on overall recreational illness rates.

Respectful submitted.

ARBITRATOR TIPSORD: Thank you.

With that, we'll move to the questions, and we'll start with Natural Resources. And we'll let you ask all your questions for all three of the witnesses before we move on.

MS. ALEXANDER: Good morning. My name is Ann Alexander. I'm Natural Resources defense counsel.

Just for clarity, given that your testimony has been presented as a panel, I have changed

somewhat the order of the prefiled questions. I will do my best to reference which question for each witness I'm asking. In some cases I have had to modify the questions given the format. If I do not specify who I am asking the question to, I am asking it to all of you and any of you may answer. In a few cases where one of you have made a statement in your prefiled testimony or a few other limited circumstances, I may direct a question to one of you, in which case I would like that one of you to answer the question. Then, of course, any of the others of you may chime in with additional information if you see fit.

So let me start out with what was -- I've heard your name about three times, and I hope I don't butcher it. Petropoulou. Question number one, which I am going to ask each of you to answer individually. These go to various roles in the risk assessment study. I'd like to ask each of you just to describe briefly for me what specifically your role was in the conduct of this risk assessment study.

MS. PETROPOULOU: I have been the project manager for the microbial risk assessment study, and in that role I had many responsibilities. I

assembled the project team -- the Geosyntec project team. That includes Geosyntec, myself, Dr. Tolson, and other -- and other staff from Geosyntec. Also, I assembled the senior scientific advisor committee. That includes Dr. Charles Gerba, Dr. Jim Patterson, Dr. Cecil Lue-Hing. I also selected and retained specialized laboratories to perform the work. And I had overall responsibility for every aspect of the work in terms of completing the work within schedule and budget and providing the deliverables to the District.

MS. ALEXANDER: When did you first commence working on the risk assessment?

MS. PETROPOULOU: From the proposal stage. I submitted the proposal to the District, and at that stage I assembled the project team.

MS. ALEXANDER: Next Mr. Tolson, please?

MR. TOLSON: Yes. I served as the lead risk assessor on the project, calculations of the risks, pulling together the information on exposure inputs.

MS. ALEXANDER: And when did you commence work on this project?

MR. TOLSON: From the proposal stage.

MS. ALEXANDER: Okay. And Dr. Gerba?

MR. GERBA: Yeah. I was on the senior advisory committee, although I was the youngest member of that committee. I had input on basically the types of pathogens that we might be looking for for the risk assessment, the analytical methods that might be appropriate to look for these various pathogens, and I also had input on the risk assessment. I did perform -- My laboratory did perform the adenovirus assays and the norovirus assays for the project.

MS. ALEXANDER: And when did you commence work on this project?

MR. GERBA: In the proposal stage.

MS. ALEXANDER: And is it possible for you to estimate for me about how many hours you have spent working on this?

MR. GERBA: To this date? Up to right now?

MS. ALEXANDER: Up to right now from the proposal stage. Just a general sense.

MR. GERBA: Over a hundred.

MS. ALEXANDER: Okay. And now I just want to get a little bit more specific about the tasks involved in the risk assessment. I'm asking this to all of you and each of you who was responsible for each of the following tasks and responsibilities.

Who developed the sampling protocol?

MS. PETROPOULOU: We did not develop the sampling protocol. We consulted with Dr. Gerba to select EPA-approved protocols.

MS. ALEXANDER: And what about situations -- I should ask you, were there EPA-approved protocols for all types of sampling that you did?

MS. PETROPOULOU: There were. Yes, correct.

MS. ALEXANDER: Who physically collected the samples?

MS. PETROPOULOU: The samples were collected by staff from the District. The sampling staff were people -- samplers that the District has that they routinely do this type of sampling. For viruses and protozoan, Dr. Gerba and his assistant trained the District staff during the first week of sampling for the collection of the samples.

MR. ANDES: I'd like to follow-up for a second.

On neuroviruses, was there an EPA-approved process, or do you need to use an SOP from the university?

MS. PETROPOULOU: We used an SOP from the university.

MR. GERBA: Can I add to that?

We followed the guidelines provided by EPA on their web page for microbiology. EPA does have guidelines for molecular methods based on PCR for detecting viruses and --

ARBITRATOR TIPSORD: Dr. Gerba, you need to speak up and speak this way.

MR. GERBA: I'm sorry.

MS. ALEXANDER: I just want to make sure I'm understanding the topics. There was the cell culture and PCR for which you pulled your SOP's from various places. And my question actually had to do just with the sampling and procedures followed for that. So it's just to break that down a little bit. And that's my next question.

In terms of establishing and selecting protocols for analysis of the samples, I think you've answered my question. Did that come from your lab, Dr. Gerba, those protocols?

MR. GERBA: For the protocols for --

MS. ALEXANDER: Protocols for analysis of the samples.

MR. GERBA: No. They came from various sources, EPA-approved methods, methods for which EPA provided guidance for the methods, and a protocol for the

adenoviruses -- for the laboratory analysis was SOP from our laboratory, which we'd used in previous studies.

MS. ALEXANDER: Okay.

ARBITRATOR TIPSORD: Excuse me. Is that included as a part of the -- The actual piece from your laboratories, is that included or the website included in the report?

MR. ANDES: Is it in the overall report?

MS. PETROPOULOU: It's in the sampling --

ARBITRATOR TIPSORD: I'm sorry. You have to answer so we can hear.

MS. PETROPOULOU: It's in the sampling and analysis plan, and that is referenced in the report. I don't know if the District has posted that on their web page.

ARBITRATOR TIPSORD: I guess what I'm asking is, is there a direction either here in the report or somewhere else in the record that tells us where we can go look at the SOP that you used? If not, can we get a copy of that?

MR. ANDES: We'll check on that. One way or another we'll get a copy.

ARBITRATOR TIPSORD: Thank you.

MR. RAO: May I ask a follow-up for Dr. Gerba?

I just wanted to clarify, for the record. This University of Arizona method that you used, has it been peer reviewed, or is it accepted in the field as a method that can be routinely used for measuring concentrations of viruses? Can you tell us a little bit more about it?

MR. GERBA: This only referred to the adenovirus part of the assay. The total culturable virus or we

also call it enteric virus, we used the EPA method for that. The method that we used has appeared in the peer review literature, and it has been used for detection of adenoviruses in sewage in wastewater discharges. And that has appeared in the peer review journal. We only use -- Maybe I should leave it at that.

MS. ALEXANDER: Just to be complete, would I be correct in saying that there is also no US EPA-approved SOP for norovirus?

MR. GERBA: That's correct. US EPA only provides guidance for molecular methods involving PCR for virus detection in water. They have a guidance document for that available, and we use that -- follow that guidance document.

MS. ALEXANDER: Who was responsible for physically performing the analysis of the samples? Who actually did the work with the test tubes?

MS. PETROPOULOU: The staff of the selected labs. We had three labs that performed the analysis. Hoosier Microbial Laboratory did the analysis for all bacteria types and also total culturable viruses.

Clancy Environmental Consultants did the analysis for protozoan. That includes both Cryptosporidium and Giardia. And the University of Arizona laboratory did the analysis for adenovirus and Calicivirus.

MS. ALEXANDER: And who actually performed the risk calculations? Was that you, Dr. Tolson?

MR. TOLSON: Yes, that's correct.

MS. ALEXANDER: And who wrote up the initial draft of the report?

MS. PETROPOULOU: I compiled the report with contributions from every member of our team. I utilized the laboratory reports and inputs from Dr. Gerba and Dr. Tolson. And I co-authored sections of the reports as well.

MS. ALEXANDER: After you wrote up the initial draft, was that draft then reviewed by others involved in the project?

MS. PETROPOULOU: The draft was reviewed internally by our quality assurance manager and the peer review panel in our senior advisor committee.

MS. ALEXANDER: I'm sorry. I didn't quite catch

that last question. It was reviewed by the QA and by --

MS. PETROPOULOU: The senior advisor committee within our group.

MS. ALEXANDER: Of which Dr. Gerba is a member.

Okay. Who made the decisions overall as to the scope of the study? What I'm including in that by way mostly of example is the number and identity of the pathogens studied and the types of illnesses studied.

MS. PETROPOULOU: The Geosyntec team.

MS. ALEXANDER: And who are you including when you say the Geosyntec team?

MS. PETROPOULOU: Geosyntec, our senior advisory committee, and our subcontractor laboratories.

MS. ALEXANDER: In other words, the three of you, among others, collaborated on those decisions?

MS. PETROPOULOU: Correct.

MS. ALEXANDER: Dr. Gerba, in your role on the advisory committee, did you at any point disagree

with decisions or proposals made concerning the study methodology or its scope or any other significant

aspect of the risk assessment study?

MR. GERBA: No. We were always involved in robust scientific discussions, but I don't think we had any disagreement.

MS. ALEXANDER: Now, this is originally from Tolson question number one, but I will direct it to all of you.

I would like to know the role of the following groups. The first is Patterson Environmental Consultants. I don't believe they've been mentioned yet. What did they do?

MS. PETROPOULOU: They have been mentioned. Dr. Patterson was one of the members of the three members of the senior advisory committee.

MS. ALEXANDER: Cecil Lue-Hing & Associates?

MS. PETROPOULOU: Correct. He has been mentioned as well. He was a member of the senior advisory committee.

MS. ALEXANDER: Are there any other members of the senior advisory committee that you have not yet mentioned? So far I have Dr. Gerba, Dr. Patterson, Cecil Lue-Hing. Who am I missing on that list?

MS. PETROPOULOU: Originally during the proposal stage we had Dr. Jack Colford. He informed me that he was overcommitted and he wasn't able to serve on the committee. So he is -- He did not serve in that capacity.

ARBITRATOR TIPSORD: Could you spell that name for the record?

MS. PETROPOULOU: C-o-l-f-o-r-d.

MS. ALEXANDER: Did Dr. Colford perform any work or provide any advice or input with respect to the risk assessment?

MS. PETROPOULOU: During the proposal stage, he was involved in the planning of the project. And that was the extent of his involvement.

MS. ALEXANDER: During that proposal stage, did Dr. Colford have any disagreements with the methodology or any other aspect of the study as you were developing it in the proposal?

MS. PETROPOULOU: He did not.

MS. ALEXANDER: Okay. A question directed to Dr. Tolson and Petropoulou.

Do either of you have any formal training in microbiology?

MS. PETROPOULOU: I have limited training in

microbiology as part of my environmental engineering training, but I am not an environmental microbiologist.

MS. ALEXANDER: When you say limited training, what does that include?

MS. PETROPOULOU: I took classes and I did labwork in environmental microbiology as an integral part of the curriculum to become an environmental engineer.

MS. ALEXANDER: Those classes were as an undergraduate?

MS. PETROPOULOU: No, they were not. They were part of my Ph.D program.

MS. ALEXANDER: How many classes did you take in environmental microbiology?

MS. PETROPOULOU: I took two classes.

MS. ALEXANDER: Dr. Tolson?

MR. TOLSON: Yes. I hold a graduate degree in food science and nutrition. Microbiology and food safety are obviously important components of that. Within that curriculum, I took two microbiology-focused classes. One of them was a food safety class. I'm not sure how microbiology -- It wasn't completely a microbiology class, but that was at least half of the curriculum.

MS. ALEXANDER: Okay. This question is derived from what was originally Gerba question 12 and Tolson question 3, but I'm directing it really to each of you to answer, if you could.

Are you familiar with a review of the interim version of the risk assessment that was prepared by Tim Wade of US EPA?

MR. ANDES: Is there a particular document you're referring to?

MS. ALEXANDER: Yes. I am going to present a document. Let me ask the question generally. If they're not familiar, I can clarify it quickly.

MS. PETROPOULOU: I have never received a document from Tim Wade.

MR. TOLSON: My answer is that I'm familiar with some responses we got from EPA. I'm not sure that Tim Wade was the lead author on this.

MS. ALEXANDER: I would like to have this document marked as an exhibit. This is entitled Dry Weather Risk Assessment of Human Health Impact of Disinfection versus No Disinfection of the Chicago Area Waterway System, Review Conducted for US Region V, Office of Water, Review Conducted by US EPA

Office of Research and Development. Unfortunately, I

have limited copies.

MR. ANDES: What's the date of that document?

MS. ALEXANDER: This document I do not believe has a date on it.

ARBITRATOR TIPSORD: I'm not seeing a date.

I've been handed the document Dry Weather Risk Assessment of Human Health Impact of Disinfection versus No Disinfection of the Chicago Area Waterway System, Review Conducted for US EPA Region V Office of Water, Review Conducted by US EPA Office of Research and Development. As noted, there is no date on this document. I'm going to mark this as Exhibit 72.

Is there any objection?

MR. ANDES: No. I would only add that I believe there are other questions concerning communications between -- communications from EPA -- to EPA regarding the risk assessment. There are a number of other documents, all of which have specific dates. In fact, I believe that this document is attached to

an EPA letter that we have and that we have copies of. And we actually also have them burned on to a disk.

ARBITRATOR TIPSORD: Which you're going to

present to the record?

MR. ANDES: Yes.

MS. ALEXANDER: Would you like to present it to the record now for clarity? That would be fine by me.

MR. ANDES: Sure.

ARBITRATOR TIPSORD: Seeing no objection, this is marked as Exhibit 72.

(WHEREUPON, said document was marked Exhibit No. 72, for identification, as of 9-9-08.)

MR. ANDES: I have a disk which includes all the documents.

ARBITRATOR TIPSORD: Okay.

MS. ALEXANDER: All of which documents?

MR. ANDES: I will provide those in a moment.

MS. ALEXANDER: Okay.

ARBITRATOR TIPSORD: I've been handed a disk

marked US EPA Correspondence.

MR. ANDES: I have four documents that are included on the disk, and the first one is actually attached to an MWRD e-mail of March 22, 2007, which transmits a message from Linda Holst of EPA March 20, 2007. And I believe the attachment to that e-mail is

the document that Ms. Alexander is referring to. There are two documents attached. That is one of them.

Then there is a letter of May 31, 2007, from Louis Kollias at MWRD to Allen Melcer, M-e-l-c-e-r, at EPA with attachments. There is a letter of July 12, 2007, from Allen Melcer at EPA to Louis Kollias at MWRD. And there is a letter with attachments July 31, 2008, from Andrew Tschampa, T-s-c-h-a-m-p-a, of EPA to Louis Kollias at MWRD with attachments. I'm just trying to make sure we have everything that we -- I'm sorry. One more document. This is May 28, 2008, and this is a letter from Louis Kollias from MWRD to Allen Melcer at EPA with attachments. All of those documents are on that

disk.

ARBITRATOR TIPSORD: If there's no objection, we'll mark the disk as Exhibit 73.

Seeing none, it's Exhibit 73.

(WHEREUPON, said document was marked Exhibit No. 73, for identification, as of 9-9-08.)

MS. WILLIAMS: I just want to be clear. We're just marking all the documents as one exhibit?

ARBITRATOR TIPSORD: I don't have all those documents. I have the CD-ROM. So I would say that, for purposes of the record, if you need to cite to them, you would cite to Exhibit 73 letter and date.

MS. WILLIAMS: Do we have any copies?

MR. ANDES: I can provide paper copies as well.

MS. WILLIAMS: Or electronic?

ARBITRATOR TIPSORD: Yeah. You need to either give a CD or a paper copy at least to the Agency.

MR. ANDES: Okay. So, yeah. For purposes of the record, any reference to these would have to be to Exhibit 73 and then by date -- I would say letter date.

MS. ALEXANDER: All right. I will point out that this is essentially the first time I am having the opportunity to review this correspondence which I was not aware previously existed. I will -- It will disorganize my testimony -- my questions slightly in the sense that I may follow up with questions after lunch concerning these documents. So I apologize in advance if things sound a little bit spotty. But I will review these when given the opportunity and return to them.

For now I just want to clarify. The

document that I identified as being from Tim Wade is, in fact, attached in the set of exhibits that I was just handed from the disk to a cover e-mail which is from Richard Lanyon to Kollias dated March 22, 2007, essentially as a transmittal.

Returning to my question, are you -- I mean -- I'm asking each of you -- familiar with this document? Have you seen it before? I'm referring to the one attached to the e-mail.

ARBITRATOR TIPSORD: Exhibit 72?

MS. ALEXANDER: Exhibit 72,

MS. PETROPOULOU: I have.

MR. TOLSON: Yes.

MR. GERBA: Yes.

MS. ALEXANDER: All right. Now, did any or all of you have any discussions specifically with Mr. Wade regarding his concerns?

MR. TOLSON: Yes. We actually had a meeting with EPA, and I believe Tim Wade was at that meeting by phone. I don't recall a lot of his input into it except for an acknowledgment by him that respiratory risks were something that were not amenable to evaluation within this risk assessment. And we came to an agreement that we could not quantify

respiratory risks. That was really the only portion of his conversation that strikes me.

I am looking at -- If this is the letter from him, his initial comments here say that, "Microbial sampling and characterization seems thorough and adequate. World-renowned experts were consulted and retained to conduct the analysis for pathogenic microorganisms and details of the sampling

scheme, rationale, and methods are well described. The general approach described in quantitative microbial risk assessment also seems appropriate. The authors do a thorough job of explaining and justifying their selection of dose-response functions and the parameters. Generally citations and peer literature are provided to support their decisions."

Based on my conversations with him at that meeting, he seemed to be okay with a number of sort of the issues that we derived -- or inputs that we derived for our risk assessment.

MS. ALEXANDER: You say that -- Okay. Actually let me back up a little bit. I don't want to overcharacterize this document because it says what it says.

Would you generally agree that following

the language that you read the remainder of the document includes criticisms and/or pointing out of omissions that he perceived from the risk assessment? Is that accurate?

MR. TOLSON: There were a number of points and a

number of good points that EPA brought up that we tried. We responded to those, and we tried to incorporate those within those responses. I think we have the response letters that are attached. Yes, following from that, there were a number of points that he brought up that we could clarify.

MS. ALEXANDER: Okay. So is it your position -- Is it your recollection that you resolved all of the issues set forth in this document in that meeting with Tim Wade and others?

MR. TOLSON: I would not characterize it during the course of that meeting we resolved all the issues. We certainly had a better understanding of EPA's positions there. I believe we went back after that and drafted responses and submitted them to EPA for their consideration.

MS. ALEXANDER: Following that, did US EPA tell you that they were satisfied with your responses to the concerns they raised?

MR. TOLSON: Unfortunately, I don't remember the paper trail after that.

MR. ANDES: Well, I would refresh your

recollection. The letter of July 12, 2007, which we've provided, if you can -- you can review that. I believe the second paragraph discusses some of the issues that were raised.

ARBITRATOR TIPSORD: And that's a part of Exhibit 73?

MR. ANDES: Yes.

MR. TOLSON: Okay. So that second paragraph says, "In your May 31, 2007, letter you described the steps the District is taking to address our comments. We appreciate the effort you are making to ensure that our concerns are heard and addressed based on descriptions and modifications you are making to the report in response to our comments. Most of our concerns will be addressed. However, we do have a few comments on your plans to modify the report." So it seems that EPA was -- liked our responses to those comments and addressed those concerns.

Is that your question?

MS. ALEXANDER: My question is, as of today, is it your understanding that EPA's concerns have been

resolved?

MR. ANDES: The concerns raised in this memorandum?

MS. ALEXANDER: I'm asking the question more generally. The concerns I would characterize as including those raised in this memorandum, but, as reflected in the other exhibits we'll get to, include additional concerns as well.

Is it your belief or understanding -- and I address this to all of you -- that EPA's concerns have been resolved?

MR. TOLSON: Based on EPA's comments letter, I would say that most of them have been resolved.

MS. ALEXANDER: And just to get specific, I'm looking at the -- what I've characterized as the Tim Wade document, which does not have page numbers, but page 2. I highlight these as examples for purposes of discussion. Mr. Wade said, "In nearly every case where simplifications and assumptions were made in such a way" -- I'm sorry. "In nearly every case when simplifications and assumptions were made in such a way to ultimately minimize the estimated risks." And then he goes on to provide examples.

Did you address those specific examples and

essentially, I would say, fix the problem that he identified?

MR. TOLSON: We actually responded to EPA. If I can get that response letter.

ARBITRATOR TIPSORD: One moment.

For the record, you were reading from Exhibit 72?

MS. ALEXANDER: Yes. This is the attachment to --

ARBITRATOR TIPSORD: It's Exhibit 72?

MS. ALEXANDER: It's Exhibit 72, yes.

ARBITRATOR TIPSORD: I'm, sorry, Dr. Tolson.

MR. TOLSON: I apologize. We actually have a written response to that. I want to make sure that we have the right ones for you.

MS. ALEXANDER: Which one are you identifying as the written response?

MR. TOLSON: It's in, I believe, Exhibit 73, which is the package of the EPA response letters. I'll get the date here in a second.

The District followed up with a letter back to EPA on May 28, 2008. That would be Exhibit 73, May 28, 2008, letter.

ARBITRATOR TIPSORD: And the letters from the

District -- Who at the District? The author of the letter?

MR. TOLSON: Louis Kollias to Allen Melcer, EPA. And attached to that is a May 23, 2008, letter from Geosyntec Consultants, Dr. Petropoulou, to Dr. Granato. In there we have responses to the EPA comments.

Now that we're on the right page, you had a question on the specific comment from Tim Wade?

MS. ALEXANDER: Okay. Let's see where you're going with this. I'll cover specifics to the extent necessary later. Let me just ask regarding the meetings.

You described a meeting in which Mr. Wade was present on the phone. When did that meeting take place? Do you recall?

MR. TOLSON: April 2007.

Dr. Petropoulou, do you know the date?

MS. PETROPOULOU: April 10.

MS. ALEXANDER: And who was present at that meeting besides Tim Wade?

MS. PETROPOULOU: In one of the letters from Mr. Kollias to Linda Holst, I think he has a memo like the minutes of the meeting and he has a listing

of all participants.

MS. ALEXANDER: Can you perhaps point that out to me, please?

MS. PETROPOULOU: Yes. It's the May 31, 2007, letter from Mr. Kollias to Allen Melcer. And he has attached the minutes of the meeting. And he --

MS. ALEXANDER: I found it. Thank you.

MS. PETROPOULOU: And then you can see the meeting participants there.

MS. ALEXANDER: Give me one second.

ARBITRATOR TIPSORD: Is that a lengthy list of participants? Perhaps we can read it into the record because you two are the only two that actually have hard copies of the stuff you're looking at. If you could read the participants into the record.

MS. PETROPOULOU: Okay. Meeting participants: Mr. Allen Melcer, Ms. Linda Holst, Ms. Janet Pellegrini, Dr. David Pfeifer, and Mr. Edward Hammer from US EPA Region V, Mr. Lou Kollias, Dr. Thomas Granato, Catherine O'Connor, and Geeta Rijal from the District, and Drs. Chriso Petropoulou and Keith

Tolson from Geosyntec Consultants, Dr. Charles P. Gerba from the University of Arizona, Dr. Cecil Lue-Hing from Leu-Hing -- Cecil Leu-Hing &

Associates, Dr. James Patterson from Patterson Environmental Consultants were present in the meeting. Also, Ms. Cindy Roberts, Dr. Mary Rothermich, and Timothy Wade from US EPA Office of Research and Development, and Mr. John Ravenscroft and Ms. Samantha Fontenelle from US EPA Office of Science and Technology joined the meeting via conference call.

ARBITRATOR TIPSORD: Thank you.

MS. ALEXANDER: Thank you.

Were there any meetings held at which US EPA was present and you were present to discuss the risk assessment after this meeting?

MS. PETROPOULOU: No.

MS. ALEXANDER: I include phone meetings in that.

MR. TOLSON: No, there was not.

MS. ALEXANDER: Other than the correspondence, which is included in Exhibit 72, is there any

additional correspondence you were aware of between Geosyntec -- or contributed to by Geosyntec and US EPA?

MS. WILLIAMS: Do you mean Exhibit 73?

MS. ALEXANDER: 73 is the disk?

MS. WILLIAMS: Yeah.

MS. ALEXANDER: I'm sorry. I meant 73.

MR. TOLSON: Just to clarify, that's in addition to the responses to Exhibit 72 from Tim Wade?

MS. ALEXANDER: Yes.

MR. TOLSON: Okay.

MS. ALEXANDER: In addition to all the documents in Exhibit 73 that we have before us now, is there anything else out there that you know of?

MS. PETROPOULOU: Not that I'm aware of.

MR. TOLSON: No.

MS. ALEXANDER: So there are no other meetings and no other correspondence other than this, to your knowledge?

MS. PETROPOULOU: Right.

MS. ALEXANDER: I'd like to turn now to the

letter dated July 31, 2008, from Kollias to -- I'm sorry -- to Kollias from Andrew Tschampa, acting chief of the US EPA water quality branch in Region V, which attaches something entitled EPA Review of Dry Weather -- I'm sorry -- EPA Review of Dry and Wet Weather Risk Assessment of Human Health Impact of Disinfection versus No Disinfection of the Chicago Area Waterway System. And the first line of that

states, "This document provides EPA's comments on MWRDGC's dry and wet weather risk assessment.

Do you have that?

ARBITRATOR TIPSORD: Excuse me. Let's go off the record for just a second.

(WHEREUPON, discussion was had off the record.)

ARBITRATOR TIPSORD: Let's take a break and get some copies made.

(WHEREUPON, a recess was had.)

MR. ANDES: I thought the last substantive question was concerning the March 27 document.

MS. ALEXANDER: Could the reporter read back my last substantive question, please.

(WHEREUPON, the record was read by the reporter as requested.)

MS. ALEXANDER: I'd like to turn first, if I could, to the May 28, 2008, letter to Mr. Allen Melcer of EPA from Kollias. And I just want to make sure I understand what is attached to it first. I see the EPA -- The first document attached is EPA Review of Dry and Wet Weather Risk Assessment. That does not appear to be the document that I initially presented, but this is the document attached to --

Actually I take that back.

The document attached here is an EPA review that does not appear to be the same document as the one attached to the transmittal letter dated March 27, 2007, from Lanyon to Kollias. It is a different document. Am I right about that? It appears to be a different document than the one that is attached to the transmittal letter, which is part of Exhibit 73, from Lanyon to Kollias dated March 27, 2007. Both of them are entitled Dry Weather Risk Assessment of Human Health Impacts of Disinfection

versus No Disinfection. The first one, the one attached to the transmittal letter, appears to be the one I initially presented and characterized as the Tim Wade letter or the Tim Wade memo. And the other one is an additional assessment on EPA letterhead, but I don't know its genesis. It's attached --

MR. ANDES: I think we're talking about a copying error. I believe the first document attached to the May 28 document is actually the attachment to the July 31, 2008, EPA letter.

MS. ALEXANDER: Okay. Let me just fix that.

MR. ANDES: If you take that off, then I think the first thing you would find after the May 28,

2008, letter would be the Geosyntec letter of May 23 --

MS. ALEXANDER: I see that.

MR. ANDES: -- to Dr. Granato.

MS. ALEXANDER: Okay. I'm sorry to make you repeat yourself. But this document that I just pulled off with the attachment to --

MR. ANDES: It's a duplicate of the attachment to the July 31 EPA letter, so I would just discard

it.

MS. ALEXANDER: Oh, I get it.

MR. ANDES: It's attached to the wrong document.

MS. ALEXANDER: So I will set that aside. Now I appear to have everything. Okay.

MS. WILLIAMS: Can I ask that we fix this for the official copy, or are we going to enter it with the miscopying?

ARBITRATOR TIPSORD: The exhibit is Exhibit 73. What we're bringing downstairs is hard copies of what we're talking about. To ease the record, I was not going to reenter those into the record.

MS. WILLIAMS: It just sounds like there was a copying error in his hard copy, right? Did I understand, Fred, right? Not having the documents in

front of me, it's a little hard to follow. Is there a mistake in the hard copy?

MS. ALEXANDER: The only mistake was a duplicate of the attachment. The July 31, 2008, letter was mistakenly included under cover of the May 23, 2008, letter. When the duplicate is removed, you have --

The pieces of the document are a transmittal from Melcer -- I'm sorry -- to Melcer from Kollias dated May 28 transmitting a letter from Geosyntec to MWRD, Thomas Granato, dated May 23. And then the attachments to the May 23 letter enclosure says, "Responses to EPA's technical review comments regarding the interim phase one," et cetera, et cetera.

MR. ANDES: If needed, we can submit a corrected copy of the disk. But it's simply a duplicate copy of an attachment that was put in the wrong place.

MS. ALEXANDER: The first question regarding -- I'm jumping now to the May 23, 2008, letter to Granato from Petropoulou and the enclosures. I'm trying to understand the enclosures.

There are two documents that are essentially purporting to be -- appear to be responses interspersed with the comments from

Geosyntec to the critiques from US EPA. As you'll note on the document, there will be a summary -- correct me if I'm mischaracterizing any of this -- of the US EPA critique in regular type followed by a

bold, italicized response from Geosyntec; is that correct?

MS. PETROPOULOU: It's not a summary. It's verbatim the comments that we see from EPA.

MS. ALEXANDER: In preparing this response document, did you include every word that was in the EPA critiques, or did you select out what you considered to be the gist of that?

MS. PETROPOULOU: No. I took the document -- It came in in Word via e-mail. So I took that document in Word, and I inserted the responses below each of the comments.

MS. ALEXANDER: Okay. My question then is, there appear to be two different sets of responses, which as far as I can tell are non-identical. And they have the same title, so I can't differentiate them. But the first one is a five-page document, and then there is a -- they're clearly not duplicates -- a 15-page document.

Could you please explain to me which EPA

document each of these is responding to?

MS. PETROPOULOU: There are two EPA documents that came through, and I responded to each one of them. They are not identical.

MS. ALEXANDER: Which are the two? Are those contained in Exhibit 72, just so I can match the documents with the responses?

MS. PETROPOULOU: It's --

MR. MELAS: Do you mean 73?

MS. ALEXANDER: 73. Sorry.

MR. MELAS: I'm paying attention.

MS. ALEXANDER: I'm glad someone is.

MS. PETROPOULOU: Yes, they are part of that exhibit.

MS. ALEXANDER: Okay. Turning to this first five-page document, which other document in Exhibit 73 is that responding to?

MS. PETROPOULOU: There's an e-mail from Mr. Lanyon to Mr. Kollias, and that e-mail has two sets of comments -- two documents attached.

MS. ALEXANDER: Okay.

MR. ANDES: And that reflected transmittal of the message from Linda Holst of March 20, 2007, from EPA which attached two EPA documents, which are the

ones that are being responded to.

MS. ALEXANDER: Okay. So the first one under that transmittal letter dated March 22, 2007, in Exhibit 73 is an unnumbered document, but it appears to be the same document that I initially presented to you as the Tim Wade memo; is that correct?

MS. PETROPOULOU: It appears to be the same. I haven't checked it word for word. And I don't know if it's -- Our document doesn't say that it came from Tim Wade.

MS. ALEXANDER: Okay. So we will need to check that at some point.

And then there is a second document which also identifies itself as a review conducted by EPA Office of Science and Technology. Can you tell me which of these documents you saw first, or did you see them together? I'm just trying to understand the history of how these came to be in your possession.

MS. PETROPOULOU: I saw them together.

MS. ALEXANDER: Okay. Why -- Do you have an understanding as to why there are two separate documents from essentially the same source, that being EPA Office of Research and Development, critiquing the same document in some similar and

overlapping ways, but not entirely identical ways? I mean, why are there two documents of this nature is my question?

MS. PETROPOULOU: I believe there are two different branches of EPA. One of the documents explains that actually in a note.

MR. ANDES: I would also note, for the record, that the first one says the review is conducted by the Office of Research and Development. The second document says it is --

MS. ALEXANDER: I just saw that. Thank you. They're two different branches.

Okay. Let's turn to the first one, the one that states that it was prepared -- the review was conducted by the Office of Research and Development.

Do any of you have any knowledge as to who specifically at the Office of Research and Development prepared this?

MS. PETROPOULOU: I don't.

MR. GERBA: No.

MR. TOLSON: Nor do I.

MS. ALEXANDER: With regard to the second one, the same question. Do you know who at the Office of Water, Science, and Technology prepared this?

MS. PETROPOULOU: I don't.
MR. TOLSON: Nor do I.
MS. ALEXANDER: In the meeting that you described for which we read the participants in April of 2007, were you at that time in possession of both of these documents?
MS. PETROPOULOU: I was.
MS. ALEXANDER: Okay. And you've discussed both of these documents with persons from EPA who were there?
MS. PETROPOULOU: Correct.
MS. ALEXANDER: Okay. Who prepared the responses that are in bold, italicized text in the attachments to the May 23, 2008, Geosyntec letter?
MS. PETROPOULOU: I did.
MS. ALEXANDER: Okay. Drs. Tolson and Gerba, did either of you contribute to those responses?
MR. TOLSON: Yes. I contributed to those responses.
MS. ALEXANDER: What was your role or contribution in preparing those?
MR. TOLSON: I believe there were some specific

questions that Dr. Petropoulou had asked for me to look at and respond to, and I responded to those

specific questions.

MS. ALEXANDER: Dr. Gerba, did you have any role?

MR. GERBA: Yeah. I responded verbally at the meeting.

MS. ALEXANDER: I'm sorry. You responded --

MR. GERBA: Verbally.

MS. ALEXANDER: But, Dr. Petropoulou, do I understand correctly that you actually drafted these responses?

MS. PETROPOULOU: That is correct.

A lot of the responses to EPA refer to specific sections of the report where we explained how and where we have addressed their comments to make it easier for them to follow through the final report, and those sections were not necessarily prepared exclusively by me. So I refer back to the final report. In that sense, I compiled the document, but I relied on the report which we prepared together collectively.

MS. ALEXANDER: Okay. I understand.

Now, would it be fair to say, as a general matter, in your responses to EPA's comments, you do not in every instance make a change in response to

that comment, but in at least some instances you explain to EPA why you decided to do what you did?

MR. TOLSON: That is correct. There are some things that clearly it was a clarification or we pointed out within the document where that information existed.

MS. ALEXANDER: Okay. And just to get to a few specifics there, I'm looking at the first document. Let me make sure I'm not confusing things before I go citing page numbers. Yes. The first enclosure, page 4, in toward -- about two-thirds of the way up the page, there's a bullet point, "GI" -- meaning gastrointestinal -- "illness is the sole end point of risk." The statement is made -- or by US EPA. "This is a major weakness in the risk assessment." And then there's some text that follows that. And then in your response essentially you provide a reason why

you only consider gastrointestinal illness quantitatively; is that correct?

MR. TOLSON: That is correct.

MS. ALEXANDER: And then on page 4, again toward the bottom, EPA has raised a concern concerning exposure to water users through fish intake. In other words, consumption of fish from these

potentially bacterially contaminated waters. And your response is essentially to give a reason why you did not include that specifically, that fish consumption is typically regulated with fish advisories, et cetera; is that correct?

MR. TOLSON: That is correct. And both of those comments were addressed verbally in the meeting. The fish consumption comment, I can't remember exact resolution there. But the first point on the GI illness as the end point is one where I specifically remember conversations with Tim Wade at EPA. I mean, we point blank asked him, "How would you recommend that we would evaluate this quantitatively?" He recognized that there was not a way in which we could do that and agreed -- We came to an agreement that GI

illness was the most appropriate way to sort of quantitatively evaluate risk for recreational users.

MS. ALEXANDER: Now, just a point of clarification. When you say, "We came to an agreement," you're referring to your discussion with Tim Wade. Was it your understanding that the statements he made reflected the position of the Agency or just him? Did you have an understanding at the meeting? I guess the question would be, was it

sufficiently informal that it really was a conversation between you and Mr. Wade trying to reach agreement?

MR. TOLSON: Correct. There were a number of EPA people on the phone. I'm not sure I could characterize it one way or the other. I'm sorry.

MS. ALEXANDER: So on this particular point, for instance, do you recall any discussions, agreement, disagreement by anyone else at EPA concerning that point?

MR. TOLSON: No. I do not recall anybody objecting and saying that, you know, "You're right,"

and pointing out alternative methods that we could have applied. I think it was pretty clear from the participants in the room that we had kind of closed the loop on respiratory illness as a quantitative end point within the assessment. I think they were satisfied with our response and our position on how we conducted the risk assessment.

MS. ALEXANDER: Moving on to page 5 of that same document, the comment as summarized from US EPA, "Overall this risk assessment does not do an effective job at presenting the actual risk of exposure to undisinfected sewage effluent present in

the CAWS. More transparency would aid the reader in the confidence of the conclusions."

Am I correct in summarizing the response here as, rather than indicating that additional data was provided, essentially explaining why the data was provided and the report was, in fact, adequate? Would that be accurate.

MR. ANDES: Can you restate that question?

MS. ALEXANDER: Okay. Give me one second before I restate it.

Would I be correct in summarizing your response as not specifically identifying changes that were made to fix the problem that I just embodied in the text that I just read from EPA, but rather explaining why you do not consider it to be a problem?

MR. TOLSON: I see what your point is here now.

I wouldn't concur with that completely. In fact, I, you know -- I appreciated EPA's input on this, and we did make changes throughout the document to enhance the transparency and presentation of our risks. While the discussion as presented in this response details points within the document as it existed, I think there was additional changes that

were made in the document so that we could further the transparency and presentation of those risks.

MS. ALEXANDER: Do you have any knowledge one way or the other as to whether those changes were sufficient to satisfy EPA's concern reflected in that text that I read initially?

MR. TOLSON: I believe, based on their response

July 12, 2007, that those were adequately addressed. If you'd like, I can read that --

MS. ALEXANDER: July 12, 2007. Hold on one second.

MR. TOLSON: That was an Exhibit 73 package of correspondence between the Agency and the District.

MR. ANDES: You read that second paragraph into the record earlier.

MS. ALEXANDER: Hold on one second.

Is this a document that was attached to the -- No. I'm sorry.

The July 12, 2007, letter, is that what you're referring to?

MR. TOLSON: Yes, ma'am.

MS. ALEXANDER: Okay. That's the basis for your conclusion they were satisfied with that -- that they were satisfied with the response that you provided

here to their concern that the risk assessment does not do an effective job presenting the actual risk of exposure, et cetera?

MR. TOLSON: Yes, that is correct.

MS. ALEXANDER: Okay. And then turning, by way

of additional example, to page 3 of the second document that is attached to that May 23 letter, about two-thirds of the way to the top there's a bullet point stating, "Conservative assumptions were not made in nearly every case when simplifications and assumptions were made in such a way to ultimately minimize the estimated risks," which is text I also read earlier.

Would it be fair to characterize your response as not so much responding to the specific examples -- or changing, I should say, the specific examples that were made by EPA, but pointing out ways in which you consider yourself to have made other conserve assumptions?

MR. TOLSON: My opinion is that the comment is misdirected. Our response to this was really to clarify it. It's my opinion that we made multiple conservative assumptions here, not unconservative assumptions. If anything, I believe our risk

estimates are biased high. Our evaluation of the effectiveness of disinfection probably underestimates

that impact -- Sorry. It would underestimate the impact of the total waterway. What we've listed here are specific examples within the document that demonstrate -- that employ conservative assumptions throughout the entire assessment. If you'd like, I can read through them. We've have listed eight specific instances.

MS. ALEXANDER: That won't be necessary.

MR. TOLSON: Those are is pretty much the litany of inputs that we could put in there. We were conservative on almost every one of our selections.

MS. ALEXANDER: My point being though, with respect to the specific assumptions that were identified by US EPA as nonconservative, you did not, in fact, change those assumptions in your final report; is that correct?

MR. TOLSON: Within the comments that we got, we did not get a specific assumption here that was considered nonconservative.

MS. ALEXANDER: Well, let me perhaps clarify with what I'm referring to.

On page 4, for instance, I understand that

you responded to this, so I'm not, you know, seeking a reiteration of your response. But they stated, "High infectivity parameters for adenovirus were dismissed because they usually cause respiratory illness." And you provided a response which didn't, in fact, change that method or that assumption. You explained why you thought it was fair; is that correct?

MR. TOLSON: I believe that their assumption is incorrect. You know, we pointed out the rationale why. I think Dr. Gerba can probably speak to that further.

MR. GERBA: Yeah. We dealt with that in a qualitative fashion because it was agreed there was no exposure model available for assessing the risk from aerosols. That was one big problem with inability to do that. How much does -- How much do you actually aerosolize from the waterway or any body of water like that? So that already made it -- You had to totally guess on that.

MS. ALEXANDER: I'm actually going to cover later the nature of the purported qualitative, as opposed to quantitative, risk assessments. I'm more trying to understand the nature of your responses to

US EPA's concerns and the trajectory of that and how it ended up.

MR. ANDES: Let me follow up on that.

Dr. Gerba, if I can refer you to the May 31, 2007, District letter, which included the responses to issues raised in the April 2007 meeting. If you can -- If you have that document.

MR. GERBA: I don't have it.

MS. ALEXANDER: What was the date of the letter?

MR. ANDES: The May 31, 2007, letter from Kollias to Melcer.

And I believe on the -- in the attachment the third bullet talks about the plan to conduct a qualitative assessment; is that right?

MR. GERBA: Right. The reviewers were concerned that a risk assessment did not consider non-gastrointestinal -- non-GI illness. The non-GI organism Pseudomonas and adenovirus were detected in the Chicago waterway system, but the rate of illness was not analyzed. To our knowledge, there are no dose response data for these organisms to qualify the risk of illness due to dermal and inhalation exposures.

MR. ANDES: You might want to slow down for a

second for her.

DR. GERBA: I'm sorry.

MS. ALEXANDER: So, in other words, this was your assessment of Pseudomonas as the qualitative assessment of respiratory --

MR. ANDES: He's not done with the statement.

MS. ALEXANDER: I'm sorry.

MR. GERBA: The meeting participants also recognize that non-GI illness can only be considered for qualitative risk assessment. We plan to conduct a qualitative risk assessment of non-GI illness with special emphasis on dermal contact and inhalation exposure. In our analysis, we will include comparison of concentrations found in water reclamation plant effluent and the CAWS to concentrations found in other environmental matrixes. The finding of those qualitative risk assessments would be included in the final report. That's kind of where we left it because of the lack of ability to do that.

MR. ANDES: And then in the July 12, 2007, letter from Melcer to Kollias, which responds to that letter and says, "Most of our concerns will be

addressed," is it your understanding that this was

addressed and everybody was agreed?

MR. GERBA: Yeah.

MR. ANDES: Thank you.

MS. ALEXANDER: All right. Turn now to the July 31, 2008, letter, part of Exhibit 73, to Mr. Kollias from Mr. Tschampa of Region V. Do you have that in front of you?

MR. TOLSON: Yes, we do.

MS. ALEXANDER: Have any or each of you seen this letter and the attachment previously to today?

MS. PETROPOULOU: I have.

MS. ALEXANDER: When did you see it?

MS. PETROPOULOU: Two weeks ago.

MS. ALEXANDER: Okay. And who sent it to you?

MS. PETROPOULOU: The District sent it to me.

MS. ALEXANDER: Okay. Have either of the other of you two seen this letter -- this letter and the attachment?

MR. TOLSON: I believe I have, yes.

MS. ALEXANDER: You have, you said?

MR. TOLSON: I believe I have, yes.

MS. ALEXANDER: When did you see it?
MR. TOLSON: You're pressing my memory. I don't recall. If Dr. Petropoulou only got it two weeks

ago, it would be sometime after that.
MS. ALEXANDER: Okay. Have you read it, Dr. Tolson?
MR. TOLSON: I believe I have, but I don't recall the details of it right now.
MS. ALEXANDER: What about you, Dr. Gerba?
MR. GERBA: Not that I can recall.
MS. ALEXANDER: Have you seen it before?
MR. GERBA: Not that I can recall.
MS. ALEXANDER: Okay. Would it be fair, in your view -- and I address this specifically to Dr. Petropoulou because I believe that you have most closely focused on it -- to characterize this document as critical of the risk assessment?
MS. PETROPOULOU: I haven't studied the document. I plan to do that, and we plan to respond to these comments.
MS. ALEXANDER: Okay. In your limited review --

and I understand it was limited -- would it be fair to say that at least some of the issues addressed in this document are close to or, in some cases, almost identical to the issues raised in the earlier critique submitted by US EPA?

MS. PETROPOULOU: I can't express an opinion on

that, no.

MS. ALEXANDER: Okay. Have you at any point discussed with US EPA the initial concern raised, which is -- and I'm looking at page 1 under the heading Risk Assessment versus Risk Management and Policy Setting -- the critique? And I'm going to select out a few lines here. "This report confuses the purposes of risk assessment with risk management and policy setting. The lack of clear delineation between these two various functions severely hampers the importance of transparency of the risk assessment process," et cetera, et cetera. "However, the main stated objective of the MWRDGC dry and wet weather risk assessment was to evaluate the human health impact of continuing the current practice of not disinfecting the effluents from the District's

wastewater treatment plants. The subjective is clearly a policy and/or risk management decision that should be informed by the risk assessment," et cetera.

Is that a topic of discussion that you have ever had in your conversations with US EPA?

MS. PETROPOULOU: Not that I recall.

MS. ALEXANDER: Okay. Moving on to page 2 under

the heading Need for Clear Problem Formulation. Just to summarize, again, another major criticism of this report is the lack of a coherent problem formulation and development of a transparent conceptual model. To get to the specifics --

Well, first I should ask you, is that a general issue that you have ever discussed, any of you, with US EPA at any point?

MR. GERBA: No.

MR. TOLSON: I don't recall those conversations from the meetings.

MS. ALEXANDER: Specifically, in the midst of the second paragraph under that same heading, there's

a reference to, "The approximately 30 percent of the annual flows in the waterways that are unspecific EG urban runoff, CSO overflows, direct precipitation." Then there's a statement, "The significant component is mostly ignored by the risk assessment other than to make a qualitative attempt to discuss Cynomonads. The approximately 230 CSO's on the waterways were not covered, nor sampled, during wet weather events."

First of all, I'd like to ask, is that, in fact, accurate that the 230 CSO's specifically were

not sampled?

MR. TOLSON: I haven't evaluated this to formulate a response to the Agency. Just looking at it here and giving my responses, that's inaccurate. Our wet weather sampling was conducted within the waterways sometimes during CSO -- immediately after CSO events. I believe we've captured concentrations in the waterway for which recreators would be exposed that captured the effect of this 30 percent CSO events.

MS. ALEXANDER: I understand that position.

However, the statement here is, I believe, that specifically the CSOs, as in the CSO outfalls, were not sampled; is that accurate?

MR. TOLSON: It is accurate that we do not have samples at every CSO outfall through that.

MS. ALEXANDER: Do you have samples of any, specifically of the outfall effluents from CSO's?

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

Was that ever the purpose of the risk assessment?

ARBITRATOR TIPSORD: He needs to answer. He needs to answer the question.

MR. ANDES: I thought he did. I'm sorry.

Go ahead.

MR. TOLSON: We did take samples at the pumping station outfall, which we believed to be the most extreme or the highest risk of -- or highest pathogen concentration flowing to the water.

MS. ALEXANDER: When you say at the outfall, do you mean the outfall effluent or immediately downstream?

MS. PETROPOULOU: The pumping station discharge point, not the outfall of the District's plants.

MS. WILLIAMS: Can I ask a follow-up?

Which pumping station?

MS. PETROPOULOU: We sampled each one of them, the 125th Street Pumping Station in Calumet, the North Branch Pumping Station at the north side, and the Racine Avenue Pumping Station for Stickney.

MR. TOLSON: So the implication is that we haven't captured the CSO's. We believe we've captured the worst case inputs into the waterway and accounted for those within our analysis.

MS. ALEXANDER: Just to correct that a little bit, I don't believe the implication is so much that you didn't capture the effect of CSO flows. Although that may be encompassed. But I think that the

conclusion is the last sentence there, "This component could have been identified and discussed had a coherent problem formulation, including a transparent and clear conceptual model, been employed in the risk assessment process."

MR. ANDES: Is there a question?

MS. ALEXANDER: The question is, is that a topic that you ever discussed with US EPA, the formulation of, as they've put it, a transparent and clear conceptual model that would encompass the 230 CSO's?

MR. TOSON: I believe on earlier correspondence that we had concurrence with our model that we developed for our approach. And, more generally, these comments fit very well with EPA's philosophy of how to conduct a surplus risk assessment where these are the components. And what we were doing falls outside the surplus risk assessment. And I believe this is being reviewed in the context of the surplus risk assessment. This risk assessment had very different goals than typical risk assessments that may have been reviewed by the Agency.

MS. ALEXANDER: What is the basis for your statement that this is consistent with a surplus risk assessment?

MR. TOLSON: I say that in terms of risk management not being included within the risk assessment with problem formulation as a component --

a conceptual site model as a component. Those come from the surplus sort of arena. It would be -- Those were comments that I would expect within this sort of risk assessment. This risk assessment had very specific purposes that were laid out within our document, and they don't really fit within that mold.

MS. ALEXANDER: Why would one include sampling of the 230 CSO's in a problem formulation that included that in a surplus-type risk assessment, but not in the type of risk assessment you purported to be conducting here?

MR. TOLSON: You're misinterpreting what I'm saying. I'm saying the philosophy in isolation of risk management with a problem formulation that considered a lot of other pathways it might be extraneous to what we were looking at within this assessment, which was recreational use within the waterway.

MS. ALEXANDER: So -- I'm sorry. I just need to ask clarifying questions.

You're saying that the surplus risk

assessment would logically include more exposure

pathways than the risk assessment that you were conducting here?

MR. TOLSON: There are transport components within that that are just not considered within our microbial risk assessments. It's a different arena here. We have a very specific objective that we stated within our document. We've laid out a problem formulation because we were interested in -- laid out specifically what we were interested in, all of our inputs, and we've developed our model from there.

MS. ALEXANDER: Okay. I believe I understand that. However, the specific criticism here has to do with failure to incorporate the 230 CSO's, specifically their discharge, into the problem formulation. Isn't it the case that the CSO discharges were part and parcel -- or the impact of the discharges were part and parcel of the risk that you purported to be analyzing?

MR. TOLSON: In addition to those CSO outfalls, there are hundreds of other outfalls that are potential sources to the waterway. Every bird who poops on the waterway is a potential source. You can't evaluate everything. What you can evaluate is

finding out what the concentration is within the waterway from which the receptors are going to be exposed.

MS. ALEXANDER: And I'm not asking about everything. I'm asking about the CSO's.

Isn't it the case that the impact of the CSO's was part of the risk that you purported to be assessing here?

MR. TOLSON: We are purporting to assess the risk of microbial contamination within the waterway during wet weather events, which includes CSO's. It includes pumping stations. It includes storm water discharges. It includes effluent discharges from the District. In that case, yes.

MS. ALEXANDER: Do you have any basis to believe, with respect to this specific waterway, that there are significant microbial contributions from sources other than the plant effluent and the CSO's?

MR. TOLSON: I believe that's the case.

MS. ALEXANDER: That there are other significant sources?

MR. TOLSON: That there are other sources to the waterway, yes.

MS. ALEXANDER: The question I asked was other

significant sources. And I am asking you to characterize whether you believe they're significant.

MR. TOLSON: I am -- I don't understand what significant would be. If it's in terms of overall risk, the concentrations within a waterway were below the EPA risk threshold for recreators even under wet weather conditions. So they were not significant under any cases. Whether they were higher than CSO's, that's not true. CSO's were probably higher than the other ones for some pathogens, but not all.

MS. ALEXANDER: Is it your position that -- I'm going to have to use somewhat soft terms here because I don't think we can talk about percentages. But you mentioned a couple of other sources, such as, for instance, bird excrement.

Do you have any basis to believe that that even -- that that approaches the level of contaminants that come from the CSO's? I mean, microbial contaminants.

MR. TOLSON: I really wanted you to get poop on the record.

MS. ALEXANDER: I have a 3-year-old. I was tempted, but I refrained.

MR. TOLSON: There are some organisms for which

birds could be a significant contributor to the waterway actually.

Actually, Dr. Gerba?

MR. GERBA: Campylobacter.

MS. ALEXANDER: My question really was more specific than that though. It was whether you have any reason to believe specifically in the case of this waterbody that these non-CSO and non-effluent sources of pathogens are significant. I mean, I understand you have a general body of knowledge.

Do you know anything specific about this waterway that would lead you to believe that there are other significant sources?

MR. TOLSON: Dr. Gerba?

MR. GERBA: We're characterizing this as CSO's, as combined sewer overflows?

MS. ALEXANDER: Yes.

MR. GERBA: Yeah. There could be runoff from the sides of the banks, from animal fecal material, or any other type of runoff from land surfaces, residential areas that may flow in there. So it doesn't have to be necessarily a sewer overflow, but

direct flow into the waterway.

MR. ANDES: We also have --

MR. GERBA: It could be stirred-up sediments, too. That's a possibility.

MS. ALEXANDER: I understand these things that it could be. My question was just -- The only thing I really want to know at this stage is whether you have any particular knowledge of the Chicago area waterway system that's being addressed in this hearing that would lead you to have -- that would give you specific knowledge of the contribution to that waterway system as distinguished from your general knowledge of things that can sometimes contribute to microbial contamination other than CSO's and effluents.

MR. GERBA: Specifically, no.

MS. ALEXANDER: Okay. That's really what I wanted to hear.

MR. ANDES: If I can add, we will have at least one other witness who will talk about those other sources.

MS. ALEXANDER: Okay. I want to move on to page 2, the heading Need for Peer Review. Just to summarize it again, the statement is made, "For the report and its conclusions to be scientifically defensible, we strongly recommend that it be subject

to the same type of external peer review that you are conducting for your secondary contact epidemiological study," referring to Dr. Dorevitch's CHEERS study.

I take it from this question that the microbial -- the risk assessment has not been peer reviewed?

MS. PETROPOULOU: Internally it has been peer reviewed. And the EPA -- It's the first time they brought this issue up. Perhaps the District would follow up with that.

MS. ALEXANDER: When you say it's been internally peer reviewed, are you referring to the review by this -- I'm sorry -- the advisory committee, as you refer to it, Dr. Gerba and the others?

MS. PETROPOULOU: That is correct.

MS. ALEXANDER: Would I be correct in stating

that Dr. Gerba and the others on the advisory committee are being paid for their work in the review?

MS. PETROPOULOU: That is correct.

MS. ALEXANDER: And who are they being paid by?

MS. PETROPOULOU: From the District.

MS. ALEXANDER: Okay. So other than this review

by the scientists under the employ -- or, I should say, being paid by the District, there has been no other peer review beyond that?

MS. PETROPOULOU: I believe the District has submitted the report to Dr. Charles Hass from Drexel University, and I am not sure on the process where we're going to receive -- when we were going to receive comments on that.

MS. ALEXANDER: Do you have any understanding as to whether Mr. -- Dr. Hass is being paid by the District for his review?

MS. PETROPOULOU: I have not asked that question to the District.

MS. ALEXANDER: Do any of the others of you

have any understanding on that point?

MR. GERBA: No.

MS. ALEXANDER: Has Dr. Hass, in fact, provided any comments on the risk assessment, to your knowledge?

MS. PETROPOULOU: He has provided verbal comments on the risk assessment.

MS. ALEXANDER: What was the nature of those comments?

MS. PETROPOULOU: He was complimentary of our

study. He says this is a very well done study. He plans to provide more specific comments.

MS. ALEXANDER: Okay. So he only provided that general reaction; is that correct?

MS. PETROPOULOU: Correct.

MS. ALEXANDER: Moving on to the last item on section 2, the Purpose of the Disinfection chapter. The statement is made, "The disinfection section of this report serves only to obfuscate the purpose of this risk assessment." I don't believe I need to read the rest.

Did you ever have any discussions with EPA

concerning the inclusion of this section or the specifics that are included there regarding disinfection byproduct, et cetera?

MR. TOLSON: Well, this gets to the point that the goal of the study was really to determine the effect of disinfection versus non-disinfection. So that was the main goal of the study. Not including disinfection within it doesn't seem reasonable.

MS. ALEXANDER: But you have not, in fact, resolved this issue raised here with US EPA; is that correct?

MR. TOLSON: To my knowledge, this is the first

time EPA has offered this up. You can see that there's a pretty substantial paper trail of comments back and forth.

MR. ANDES: I'd like to follow up on that.

Would you read the first clause of the second sentence in that chapter?

MS. PETROPOULOU: "While the discussion of disinfection efficacy indicator organisms and pathogens was relatively accurate" --

MR. ANDES: Thank you.

MS. ALEXANDER: I'm sorry. What did you just read from? I didn't follow.

MR. ANDES: The second sentence of that same paragraph.

MS. ALEXANDER: I'm sorry. That same --

MR. ANDES: Under Purpose of Disinfection chapter notes that it was relatively accurate.

MS. WILLIAMS: Can we read the whole sentence into the record?

MR. ANDES: Sure.

Go ahead.

MS. PETROPOULOU: "While the discussion of disinfection efficacy indicator organisms and pathogens was relatively accurate, it seems

tangential to the actual purpose of estimating the potential for human disease associated with exposure to waterborne pathogens or a medium in which the microbes occur."

MS. ALEXANDER: Okay. I'm going to cover the subject matter of this later, so we'll move on.

Refer to page 3, General Issues, in

Chapter 5. Just reviewing the first part, Use of an Outdated Risk Assessment Model; e.g., Chapter 5. "Further hampers transparency and confidence in this report's conclusions."

Do you have an understanding of what the issue being raised here is? Which risk assessment model was being recommended as opposed to what's been characterized as outdated?

MR. TOLSON: I do not. I would be very interested to hear from them on their comments on which model they would consider not to be outdated because I believe the one that we've presented is pretty much the state of the science.

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

Did they ever raise this issue with you before and say that you're whole risk assessment model was outdated?

MR. TOLSON: No. As a matter of fact, within the comment response letter we got from the Agency it says that the model is a good model. I can read it again. This says, "The general approach described in

the quantitative microbial risk assessment also seems appreciative. The authors do a good job" -- "do a thorough job of explaining and justifying their selections of dose response functions." I won't read the rest.

ARBITRATOR TIPSORD: And where were you reading from?

MR. ANDES: The attachment to the March 20, 2007, Lanyon e-mail.

ARBITRATOR TIPSORD: Thank you.

MS. ALEXANDER: All right. I am going to refrain from going through the entire document at this point along these lines because I think that the issues become gradually more technical and specific, and I'm going to be reviewing this document and asking more specific questions in the context of my other questioning.

MR. ANDES: Can I have one follow-up?

MS. ALEXANDER: Sure.

MR. ANDES: Dr. Gerba, back to the July 31,

2008, letter and the discussion of the outdated risk assessment model. I notice that there's a revised

framework for microbial risk assessment that's enclosed. Are you familiar with that document?

MR. GERBA: Yeah. I attended that meeting and helped write it.

MS. ALEXANDER: What are you reading from? I missed that.

MR. ANDES: The paragraph that starts, "General issues in chapter 5," the first sentence.

MS. ALEXANDER: What page?

MR. ANDES: Page 3. It references Revised Framework for Microbial Risk Assessment, and I asked Dr. Gerba if he's familiar with that document.

MR. GERBA: I was involved in helping put that together. I was involved in some of the discussions on that and the workshops related to that. This is the model that was used here. Just the way you put it on a flow chart I think is what the difference is, and somebody probably didn't understand it, that it's really the same thing. It just looks different when you present it on a flow chart. That's all it is.

MS. ALEXANDER: So it's your position that there is really -- just based on what's here, that there is

no substantive difference between what is in the ISLI document referenced here and the risk assessment model that was used in the risk assessment?

MR. GERBA: Oh, absolutely.

MR. ANDES: And I'll add -- I'm sorry. The attachments to the EPA July 31, 2008, letter, we did not have time to make copies of all of those. I do have a set of those attachments, which we can certainly provide for the record. We can make copies and put them on another disk, but they were fairly voluminous.

ARBITRATOR TIPSORD: And they are not on Exhibit 73?

MR. ANDES: They are not on Exhibit 73.

ARBITRATOR TIPSORD: I think we need to have them as part of the record.

MR. ANDES: We will get that accomplished.

MS. ALEXANDER: So I'll just ask one last question before moving on.

Do you -- and I ask all or any of you -- believe it's fair to say that, in fact, not all concerns of the US Environmental Protection Agency with the risk assessment have been successfully resolved at this stage?

MR. ANDES: Can -- Are you saying is it true that not every -- that there's something left that hasn't been addressed?

MS. ALEXANDER: Based on this July 31, 2008, document and everything else that we've been discussing, there remain outstanding concerns of US EPA that have not yet been addressed?

MS. PETROPOULOU: I can't answer that question. I haven't studied the comments.

MS. ALEXANDER: That's fair.

MR. JOHNSON: Not knowing what you're moving on to, let me ask just a question of you, Dr. Tolson, and correct me if I'm wrong.

You testified, did you not, that disinfection -- it's your opinion that the disinfection of effluent outfall would have little overall effect on pathogen concentrations primarily due to the pathogen load from sources other than the plants?

MR. TOLSON: That is correct. Today is a sunny, nice day, and you would think that it's a dry weather day and it would be reasonable to go out there. But we had a CSO yesterday and the pathogen levels are high in the waterway. So the effect on the waterway

is not the plant today. It was the CSO events that happened yesterday.

MR. JOHNSON: And you are going to have someone else testify as to what those other sources are?

MR. ANDES: Yes. And I think also -- The other ancillary point, I believe from Dr. Tolson, was that even during the wet weather events the risk is still low?

MR. TOLSON: That is correct.

MR. JOHNSON: Thanks.

Mr. ETTINGER: May I just ask a question along that line? My name is Albert Ettinger, E-t-t-i-n-g-e-r.

Is there someplace in this report in which you actually define dry weather or wet weather for purposes of your calculations?

MS. PETROPOULOU: There is, yes.

MR. ETTINGER: So, for instance, looking at these charts, when I see something is dry weather, how many days after the rain is it that you consider dry weather?

MS. PETROPOULOU: All the dry weather events that we did in 2005, they were days preceded with at

least three dry days. There was one exception to that. It was, I think, the first sampling event that we did. There was rain the day before, but it wasn't what we define in the report as a significant rain event. And that was defined as .5 inches of rain in the rain gauges that the District has in the waterway. It did rain twice during the dry weather, but that was after we completed the sampling. So there was no rain immediately before -- two or three days before the sampling and there was no rain during the actual sampling event.

MR. ETTINGER: And then wet weather is?

MS. PETROPOULOU: We had established the protocol. It's reported in the report. We define wet weather as -- a significant wet weather event as an event that happens after three days of dry water. There is an expectation or a forecast of at least .5 inches of rain. Also, we didn't initiate the sampling until the alarms on the gates at the pumping stations were activated. So we collectively considered these three major factors, the days of dry

weather before, the expectation or the forecast of .5 inches of rain, and the high possibility to have pumping station discharges in the waterway.

MR. ETTINGER: I'm confused. If you had been

doing this study today, would this be a dry day or a wet day or neither?

MS. PETROPOULOU: It depends on the level of rain last night. If it was greater than .5 and there was a pumping station discharge.

MR. ETTINGER: Then this would be a wet day, and it would continue for two more days?

MS. PETROPOULOU: All the wet days that we conducted during the study took place when there was actual rain in the waterway.

MR. TOLSON: If I can clarify, there's a difference between when we sampled, whether it was a wet or dry day, and how we conducted the simulations, whether we expose a person to the waterway. We wanted to capture the variability -- the high variability between dry and wet. That's why we set up this stratification, as Dr. Petropoulou has described.

However, a person out in the waterway would assume that this was a dry weather day. In fact, there are pathogens that are lingering within the waterway that we needed to consider. In the purposes of the risk assessment, there was a numerical calculation of an estimated pathogen concentration in

the waterway that considered the die-off from the wet weather day attenuating down to a dry weather day.

Did that clarify?

MR. ETTINGER: It clarified. I'm still just -- I can only -- I can only do my calculations if I know what a dry or a wet day is. Then I can make estimates based on days after that, so to speak. I'm still trying to figure out if yesterday was a wet day. It was actually raining. We all agree on that, I guess. Today is a sort of wet day in your studies, or is it a wet day? What is it?

MS. PETROPOULOU: All the sampling events took place when there was actually rain in the waterway.

MR. ANDES: You can refer to that figure.

MR. TOLSON: I'm going to refer to an attachment

in our testimony. It's figure 5.4.

ARBITRATOR TIPSORD: Is that in the report?

MR. TOLSON: Oh, I'm sorry. It's the report.

ARBITRATOR TIPSORD: So it's Exhibit 71?

MR. TOLSON: 71.

If you look at 5-4, there is a --

ARBITRATOR TIPSORD: Tell us what page that's on approximately.

MR. TOLSON: It's right at the end.

MR. ANDES: It's figure 5-4. Is there a page number?

MR. TOLSON: The last page before the first appendix, Attachment A. So it's, like, ten pages from the end.

MR. ETTINGER: Where are we? Page what?

MR. ANDES: Figure 5-4. It's a the very end of chapter 5 immediately before Appendix A. So about ten pages from the end of the whole document.

ARBITRATOR TIPSORD: It looks like this. If you have a two-sided copy, Attachment A is on the other side.

ARBITRATOR TIPSORD: Here. You can have this.

MR. ETTINGER: I'll work it out. That's good for me.

MR. TOLSON: Dr. Ettinger, did that address your question?

MR. ANDES: He's not a doctor.

MR. TOLSON: I'm sorry.

MS. ALEXANDER: And I just want to follow up to Albert's follow-up.

MR. ANDES: Was there -- I'm not sure if he got a chance to respond.

MS. ALEXANDER: I'm sorry. I didn't realize

there was a question pending?

MS. WILLIAMS: Can I ask a real basic --

MR. ANDES: I think there was. Frankly, I think we've lost it, so why don't we just go on. I do think there is a question pending, and some day we'll discover what it was.

ARBITRATOR TIPSORD: Actually I believe the question that was pending was whether this was a sort of wet weather day.

MR. ETTINGER: As I understand this chart, this

is an attenuation day?

MR. TOLSON: That is correct. The concentrations would not be as high as they were yesterday during the CSO event, but they would not be as low as they would be during the dry weather.

MR. ETTINGER: Okay. When I look at your charts at Tables 3(b)(a) and 3 -- I'm sorry -- 3.2(b), you have two tables here of data on various critters in the water. Is this the same concept or not? I was afraid we were mixing -- I think wet means different things for different purposes in the report.

MR. TOLSON: You've got it exactly right.

MR. ETTINGER: Thank you.

MR. TOLSON: Under the sampling analysis, we

captured the blue bars, if you had this color, on figure 5.4, which are the actual measured concentrations. And then on the intervening days we've got the hatched bars, which are the estimated concentrations.

MR. ETTINGER: Well, looking just at Table 3.2(b), it says Wet Weather Geometric Mean. Do you see where I am? You have sampling dates. I'm

just reading here. It's on the top. The North Side, June 26, '06, 9-23-06. The weather's sometimes bad in Chicago, but it normally doesn't rain for two solid months. What does that mean? I don't understand. Is that wet or dry, or what's going on here?

MS. PETROPOULOU: No. What you see here is -- In order to calculate the geometric mean, we used the data exclusively only of the wet weather days that we sampled on. We sampled, for example, at North Side between June 26 and September 23, '06. But we only sampled wet days. So the average, the geometric mean, was based on actual wet weather results. It's not all days during that period.

MR. ETTINGER: And then to get back to our concept though, wet weather days on this, are these

days on which it was actually raining or days -- or does it include some of these attenuation days?

MR. TOLSON: Day zero is a wet weather day. The 24 or the 48 hours are days after the wet weather event.

MR. ETTINGER: Would they be included in this chart?

MR. TOLSON: The data that went to form that first day zero comes from data collected within the wet weather days in our analysis.

MR. ETTINGER: But I'm just saying, looking at this chart, wet weather means the day it rained?

MR. TOLSON: Correct.

MR. ETTINGER: Or does it include the days after?

MR. TOLSON: The day it rained.

MR. ETTINGER: I guess I understand.

MR. RAO: I just have a point of clarification. You originally mentioned in your simulations you used the dates after also?

MR. TOLSON: Correct. It's very important to try to capture that also because today the pathogen levels are higher than they will be in a couple of days from now when there are no CSO events that may

be impacting the waterway.

MR. RAO: Now, looking at one of the charts that you had pointed out earlier, it goes up to 72 hours

after that day zero.

MR. TOLSON: And the reason that the 72 hours is there is because when we did the dry weather data there was a 72-hour antecedent dry period prior to our collection of data.

MR. RAO: In your simulation, you included three days after?

MR. TOLSON: Well, we included the entire recreational year. If you go through and look at the meteorological data in Chicago, it rains for a couple of days. Then you have a few days of dry weather. It rains one day. Then you have a few days of dry weather. We used the data from the wet weather on the wet weather days, the dry days, which had three days of antecedent dry weather, for the dry weather days, and filled in the gaps with the other ones for our simulations.

MR. RAO: Thank you.

ARBITRATOR TIPSORD: Okay. We have several people asking about follow-up.

Mr. Harley, you raised your hand. Do you

have a question?

MR. HARLEY: Yes. I would like to ask a follow-up to Board Member Johnson's question.

He talked about the quantitative measures which you took. Those are related, in your report, to gastrointestinal illness?

MR. TOLSON: That is correct.

MR. HARLEY: But gastrointestinal illness is not the only potential health end point that could result from exposure to the pathogens in the water; is that correct?

MR. TOLSON: That is correct.

MR. HARLEY: And we've spoken about respiratory illness through exposure to aerosols. That would be a potential health end point?

MR. TOLSON: That is one. But that one is probably not as prominent as GI illness from recreational exposure.

Dr. Gerba, you might want to --

MR. GERBA: I mean, you can also use death as an end point. I was thinking of that, too. You could calculate that.

But, yeah, I think you're talking about the illness outcome. In these studies, the risks were

initially counted as infections because not everybody who's infected goes on to be ill in actuality. That depends, again, not only on the exposure, but also preexisting immunity wasn't really considered here either, which would be another factor that would lower those results. But you could also -- Those are really -- Illness is and potential symptoms associated with the illness on it. So you have -- Different types of illnesses could be used, respiratory, skin infections, ear infections. So there's a range that could be used.

MR. HARLEY: Eye infections?

MR. GERBA: Eye infections, too.

But currently recreational water quality is regulated basically on gastrointestinal illness rates at least related to the indicators that are used.

MR. HARLEY: So gastrointestinal illness is not the only potential indicator that we would have. It's the one for which there's the most fully developed protocol to assess; is that correct?

MR. GERBA: There's a relationship between the numbers of certain indicators like Enterococci and E. coli and risk of gastrointestinal illness. We don't have that relationship for any type of other

illness or symptom associated with recreational use currently.

MR. HARLEY: Even though those other health indicators may actually occur for recreational users?

MR. GERBA: Yes.

MR. HARLEY: So we could have, in addition to the gastrointestinal illness that you've quantified, other health outcomes for users of the waterways who are exposed to these pathogens?

MR. GERBA: Yes.

MR. HARLEY: Thank you.

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

Is it accurate to say that the most significant risk of illness or infection would be with respect to gastrointestinal?

MR. GERBA: Yes.

MR. HARLEY: To follow up, when you say significant, do you mean significant in terms of its negative impact on the person who experiences that illness?

MR. GERBA: The illness they're most likely to develop over again. Unlike a lot of other illnesses -- Let's say a respiratory illness. Typically you'll -- You'll develop an immunity to it,

where gastrointestinal illnesses you don't. You usually develop a long-life immunity. You can get ill with the same norovirus, for example, again and again as many times as you would like to get diarrhea. You can become infected with norovirus. Basically if I get a norovirus by swimming one year, a year later I have the same risk of getting infected by the norovirus again. Generally, for that reason, gastroenteritis is the most likely illness you'll probably get because other forms of illnesses you probably develop a longer term immunity.

MR. HARLEY: On that point, if you have someone who is using a waterbody where that particular pathogen is present for which an immunity cannot be developed, that individual every day that they would use that waterway would be at risk of a recurrence of an illness that they may have already experienced?

MR. GERBA: Yes.

MR. HARLEY: So if you have someone participating in the rowing club or canoeing every day on the river, then they would have every day an

equal risk of developing?

MR. GERBA: Can you explain that? It's not an additive risk.

MR. HARLEY: It's not an additive risk, right. It's frequency of use?

MR. GERBA: Yes.

MR. HARLEY: I have another question about this. We've been talking about gastrointestinal illnesses as if we all know exactly what that means. I assume there are gastrointestinal illnesses and then there are gastrointestinal illnesses in terms of their severity on the human receptors.

What are the range of gastrointestinal illnesses in terms of their actual impacts on people who develop those illnesses?

MR. GERBA: Usually when we're referring to that, it's diarrhea that we're referring to. It can be mild or severe depending on the individual organism.

MR. HARLEY: Could there be more severe outcomes than diarrhea?

MR. GERBA: With different agent there could be,

for example.

MR. HARLEY: And people who have compromised immune systems, I suspect, might be subject to a greater severity of health outcome?

MR. GERBA: Yeah. The severity would be

greater, but not the risk necessarily of getting infected.

MR. HARLEY: And did you take into account susceptible sub-populations in assessing gastrointestinal quantitative outcomes?

MR. GERBA: Of potential types of illnesses. The risk of infection, of course, we would use is conservative, so that would take that into account. This group has never been shown. It takes fewer organisms to infect. Just the severity of the outcome is greater. Most of those outcomes are -- are small children, people over 65 generally fall into that group, and generally immunocompromised individuals to give you a rough group on that -- the group that's involved.

MR. TOLSON: If I could follow up.

Within our -- Particularly in our secondary attack rate dose response assessments, we did consider sensitive individuals because those data were mostly from nursing homes or daycare centers. So we actually skewed the data and biased it to be a little more conservative there because we used attack rates that are intended to come from outbreaks that were associated with those individuals.

MR. HARLEY: May I ask a couple more follow-up questions, but I don't want to distract either from Ann's line of questioning or from other questions that people may have?

ARBITRATOR TIPSORD: If they're follow-ups, then it wouldn't be a distraction, correct? Go ahead, Mr. Harley.

MR. HARLEY: Did the total number of potentially exposed individuals enter into your risk assessment, or is that more of a risk management exercise?

MR. TOLSON: You hit it right on the nose. We developed risks per 1,000 illnesses --1,000 events. Excuse me.

MR. HARLEY: Gastrointestinal --

MR. TOLSON: Gastrointestinal illness per 1,000 events.

MR. HARLEY: So it's not the full range of possible outcomes?

MR. TOLSON: That's correct.

MR. HARLEY: If you have a waterbody where you have a very high level of pathogens but you have five people a year using it by comparison to a waterbody where you have maybe lower levels of pathogens but a million people a year using it, did that type of

variable enter into the way you looked at the CAWS?

MR. TOLSON: Well, we didn't find a waterbody with high levels of pathogens is really the first point at least on the CAWS. But the only difference that it would make there is that you might consider population immunity if you had a large number of people interacting with the waterbody. So having a large population would actually tend to lower your overall risk because you'd have more immunity within the population. We considered that nobody had immunity. Everybody was naive going to the waterway,

so our estimates are probably biased high in that respect.

MR. HARLEY: I guess my question has a little bit different emphasis.

In the sense that you were talking about 1 in 125 or 8 in 1,000 as being a threshold, if you have 100,000 people using the water, that would mean acceptable would be 8,000. Did you ever try to estimate in terms of total numbers of users of the CAWS how many people would likely be affected by gastrointestinal illness as a result of exposure to pathogens in the CAWS?

MR. ANDES: That math wasn't quite correct.

MR. GERBA: That's more of a dynamic risk assessment or a community risk assessment. Generally -- I'll just give you a professional opinion. I don't like using those because then it makes the risk seem insignificant. If you say 8,000 people get Salmonella from using the CAWS, I can tell you there's 80,000 that are going to get ill from eating food contaminated with Salmonella. So I think we use the more conservative risk estimate of the

individuals using the CAWS rather than looking at the community. I think that -- It mediates the risk of what it truly is because you're comparing the community risk. The amount of people who get infected from the waterway is insignificant compared to the amount that are going to get gastroenteritis from the food supply, for example, or other exposures in your environment. That's why I think the risk aiming it for the individuals on the waterway was the way to do it, to make it conservative.

MR. HARLEY: I just have one other follow-up question. Then I will exit to give other people a chance at least for now.

Dr. Gerba, on that point in your testimony -- your prefiled testimony, you counsel a

site specific approach as opposed to a one-size-fits-all approach to deal with pathogens in a waterway like we find in the CAWS; is that correct?

MR. GERBA: Yes.

MR. HARLEY: One of the factors that you say that's key in that site specific regulatory approach

would be is direct human contact in the immediate vicinity of an outfall possible? Have I misstated that, or is that correct?

MR. GERBA: I think that's generally the statement in the immediate vicinity of an outfall.

MR. HARLEY: Do you know if direct human contact in the immediate vicinity of the outfall from the Calumet Wastewater Treatment Plant is possible?

MR. ANDES: Let me clarify first what "direct human contact" is.

MR. HARLEY: Whatever his meaning was when he made the statement in his prefiled testimony.

MR. GERBA: You mean at the outfall primary contact is it possible?

MR. HARLEY: Yes.

MR. GERBA: At the Stickney facility I don't see how it was because the land was --

MR. HARLEY: What facility?

MR. GERBA: At Stickney.

MR. HARLEY: I was asking about Calumet

MR. GERBA: Oh, Calumet.

MR. ANDES: Is the primary contact --

MR. GERBA: Could you restate the question?

MR. HARLEY: I don't think you used the word "primary." I think you used the word "direct human contact"

MR. GERBA: Was it possible?

MR. ANDES: Explain your term "direct human contact."

MR. GERBA: Direct human contact means swimming in it -- purposeful swimming.

The reason I was hesitating is I don't know what the access was at that plant -- or I don't recall. I remember at the Stickney plant that the land was owned by the District and on the other side there was an industrial facility. So I don't think it was even possible from the shore. Maybe somebody could go out in a boat and jump in it. Then it might be possible.

MR. HARLEY: A capsized watercraft?

MR. GERBA: Yes.

MR. HARLEY: But capsized recreational --

MR. GERBA: Well, I won't consider that primary

because primary is purposeful swimming in the water to me.

MR. HARLEY: Thank you for clarifying. I'm sorry. Thank you.

MR. ETTINGER: Can I follow up on that?

What do you mean by "in the vicinity"? Swimming in the outfall? Ten feet from the outfall? What would you consider to begin the vicinity of the outfall?

MR. GERBA: A particular outfall, you mean, or any outfall?

MR. ETTINGER: Any outfall. Yours was a general statement, I believe, in your testimony. I'm just asking what generally.

MR. GERBA: It's so site specific. I couldn't give you a specific answer on it. It depends a lot on the hydrology of the situation. If you have an outfall in the middle of the ocean -- a mile off the ocean and it's 200 down feet, that's a different situation than flowing into an area where there's a recreational beach. So it's very site specific.

MR. ETTINGER: Are you basically saying that we should not disinfect anywhere in the country except

with discharges that are immediately upstream of a beach?

MR. GERBA: No. I said it's a site specific issue in the situation of what is being discharged to the waterway.

MR. ETTINGER: What would lead -- What would lead you to decide to disinfect? Give me an example of where you would disinfect from a discharge that wasn't immediately upstream of the beach.

MR. GERBA: In the marine environments, certainly trying to protect shell fish areas.

MR. ETTINGER: Shell fish?

MR. GERBA: Yeah.

MR. ETTINGER: Other than that -- Except for protecting shell fish, we only have to disinfect immediately upstream of a beach?

MR. ANDES: Are you asking his personal opinion?

MR. ETTINGER: I guess that's what I'm asking.

MR. GERBA: This is just personal opinion. It depends on the hydrology of the situation, the level of pathogens in the water, the types of disinfects that might be utilized, and the use of the beach. Is the beach really used? What are the management goals for use of that beach?

MR. ETTINGER: So then we wouldn't even disinfect immediately above all beaches if the beach wasn't used enough?

MR. GERBA: Typically, for example, in Europe they don't disinfect sewage discharges to rivers. It's a management decision there that those waterways are not going to be used for primary recreational contact. In that situation, no.

MR. ETTINGER: Do you know that?

MR. GERBA: Yeah. I actually have been to Europe a lot, and I verified that in an e-mail with a colleague just last week.

MR. ETTINGER: Do you know about the sewage treatment plant in Dublin?

MR. GERBA: Dublin I do not know.

MR. ETTINGER: Do you know about the sewage treatment plant in Munich?

MR. GERBA: No.

MR. ETTINGER: Thanks.

ARBITRATOR TIPSORD: If there's no other further follow-up along that line, let's take lunch and come back in about an hour.

(WHEREUPON, the matter was adjourned.)

STATE OF ILLINOIS)
) SS:
COUNTY OF K A N E)

I, MARGARET R. BEDDARD, a Certified Shorthand Reporter of the State of Illinois, do hereby certify that I reported in shorthand the proceedings had at the hearing aforesaid and that the foregoing is a true, complete, and correct transcript of the proceedings of said hearing as appears from my stenographic notes so taken and transcribed by me.

IN WITNESS WHEREOF, I do hereunto set my hand at Chicago, Illinois, this _____ day of September, 2008.

_____
Certified Shorthand Reporter

CSR Certificate No. 84-3565.

23

24