ILLINOIS POLLUTION CONTROL BOARD
September 23,2008

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 held in the above-entitled cause before Hearing Officer Marie Tipsord, called by the Illinois Pollution Control Board, pursuant to notice, taken before Rebecca Graziano, CSR, within and for the County of Cook and State of Illinois, at the Will County Courthouse, 14 West Jefferson Street, Room 308, Joliet, Illinois, on the 27th Day of October, A.D., 2008, commencing at 9:00 a.m.

A P P E A R A N C E S

ILLINOIS POLLUTION CONTROL BOARD:

Ms. Marie Tipsord, Hearing Officer
Ms. Alisa Liu, P.E., Environmental Scientist
Mr. Tanner Girard, Acting Chairman
Mr. Thomas Johnson
Mr. Nicholas Melas

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY:

Ms. Stefanie Diers
Ms. Deborah Williams
Mr. Robert Sulski
Mr. Scott Twait
Mr. Roy Smogor

THE NATURAL RESOURCE DEFENSE COUNSEL:
Ms. Ann Alexander

ENVIRONMENTAL LAW AND POLICY CENTER:
Mr. Albert Ettinger
Ms. Jessica Dexter

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO:
Mr. Fredric Andes
Mr. David Zenz
Mr. Eric Cockerill
Mr. Charles Haas
Mr. Thomas Kunetz

THE PEOPLE OF THE STATE OF ILLINOIS:
Ms. Susan Headman
Mr. Andrew Armstrong

THE SOUTHEAST ENVIRONMENTAL TASK FORCE:
Mr. Keith Harley

MS. TIPSORD: Good morning. My name is Marie Tipsord, and I've been appointed by the Board to serve as hearing officer in this proceeding entitled Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and Lower Des Plaines River, Proposed Amendment to 35 Ill. Adm. Code 301, 302, 303, and 304. The Docket Number is R08-9. To my far right in the middle is Dr. Girard. To his right is member Melas, and to Dr. Girard's left is member Thomas Johnson, all here today, and I think that's it for right now. This is the sixth set of hearings to be held in this proceeding.

Today's hearing is -- the purpose of today's hearing is to continue hearing testimony from the participants, other than the proponent the IEPA. At the close of hearing on September 25th, we had finished with 12 witnesses from the Metropolitan Water Reclamation District of Greater Chicago, and we will continue with the District starting witnesses day, starting with Charles Haas, then David Zenz, Thomas Kunetz --

MR. ANDES: Kunetz.

MS. TIPSORD: John Mastracchio.

MR. ANDES: Mastracchio.

MS. TIPSORD: Mastracchio -- not even close that time -- and then Thomas Granato . Now I will note that we received a motion to allow Thomas Granato to read his testimony. We will wait and rule on that when we get there. Generally, we will take testimony and mark it as an exhibit, and enter it as if read. We will then go immediately to questions beginning with the Natural Resource Defense Counsel, IEPA, The People of the State of Illinois, Open Land, and the Environmental Law and Policy Center.

Anyone may ask a followup question, and you need not wait until your turn to ask questions. I do ask that you raise your hand, wait for me to acknowledge you. After I've acknowledged you, please state your name and whom you represent before you begin your questions.

Please speak one at a time. If you're speaking over each other, the court reporter will not be able to get your questions on the record. Please note that any question asked by a board member or staff are intended to help build a complete record for the Board's decision and not express any preconceived notion or bias. We will --

did anyone notice downstairs what time the building closes? I noticed it opened at 8:30. Did anybody notice what time it closes?

MS. WILLIAMS: I thought it said 4:30.

MS. TIPSORD: That's kind of what I was thinking too. We will shoot for about 4:15 then and -- so that we can be out of here when they close, because we'll have to move the tables back around. I also, on the record, want to thank the Will County Courthouse for giving us this room and helping us out. They've been very generous with their assistance to me, and so on the record I want to thank them. We will take a lunch break, but remember you have to come back in through security, so we will figure that in when we get to lunch.

Dr. Girard, do you have anything to say this morning?

MR. GIRARD: Yes, good morning. On behalf of the Board, I welcome everyone to another set of hearings in this water rulemaking. The Board really does appreciate all the time and effort everyone is putting into this endeavor. It helps us build a better record so that we can have a better rule, and so we really do appreciate all the time

and effort and look forward to your testimony and questions today. Thank you.

MS. TIPSORD: And with that, Mr. Andes?

MR. ANDES: Yes. Before we get started with testimony, there are a few documents and materials that I want to put into the record. One is we were asked for rain gauge data for October/November of 2006. That was voluminous. I have that on disk, and I have disks for anyone who wants them.

MS. TIPSORD: If there's no objection, we will mark the MWRD's precipitation data CD as Exhibit 139. Seeing none, it's Exhibit 139.

MR. ANDES: Okay. There were questions asked concerning a USGS research project concerning E. Coli levels in the CAWS, so we have two documents. One is the research proposal for that USGS research project just concerning other sources of E. Coli on the CAWS. So we have -- this is the revised proposal titled E. Coli Sources and Microbiological Quality of Water Above and Below the North Side Wastewater Reclamation Plant, NSWRP, Metropolitan Reclamation District of Greater

Chicago, MWRDGC. It does not have a date on it.

MS. TIPSORD: If there's no objection, we'll mark the document as described as Exhibit 140. Seeing none, it's Exhibit 140.

MR. ANDES: And there are preliminary data from that study, and we have -- one, two, three -- four sheets showing data from that study.

MS. TIPSORD: Now, Fred, are these four separate copies or four different graphs?

MR. ANDES: I'm sorry. Four separate sheets, four separate sets of --

MS. TIPSORD: Okay. So what you handed me, though, is that four copies?

MR. ANDES: Oh, I'm sorry. I gave you four copies of the set.

MS. TIPSORD: Okay.

MS. WILLIAMS: It's two pages?

MS. TIPSORD: Two pages. All right. If there's no objection, we'll mark this document as described, the two-page document, as Exhibit 141. Seeing none, it's Exhibit 141.

MR. ANDES: There was also testimony concerning storm water samples and E. Coli levels or coliform levels, and we have three sheets of data

from three separate days showing levels of coliform bacteria in storm sewers.

MS. WILLIAMS: Can you clarify for the record, Fred, which testimony this is related to?

MR. ANDES: I believe it was Dr. Rijal. Those are the three pages.

MS. TIPSORD: Okay. We'll mark these three pages as one exhibit, and if there's no objection we will mark these as Exhibit 142. Seeing none, they're Exhibit 142.

MR. ANDES: And then finally, we have a document concerning sources of energy supplied to the District, titled Electricity Sources and Emissions from Integrys -- I-n-t-e-g-r-y-s -- for the 12 Months Ending March 31st, 2008. There's three copies of that document.

MS. TIPSORD: If there's no objection, this will be marked as Exhibit --

MS. HEADMAN: Madam Hearing Examiner, I'd like to see the document and make an objection. Susan Headman on behalf of the People of State of Illinois from the office of the Attorney General. Is there a copy of that document?

MS. TIPSORD: Okay. Everyone has it

now.

MS. HEADMAN: I'm going to object to this document for lack of foundation. We've had no information tying Integrys to this docket. There's been no testimony.

MS. WILLIAMS: I don't understand what it is. I mean, there's no testimony. This was not something, I don't think, that was specifically requested.

MR. ANDES: During -- it was. During Mr. McGowan's testimony, we were asked about documents provided to the Reclamation District by its energy suppliers. This is an example of a document provided to the District by its energy supplier concerning sources of power.

MS. HEADMAN: We've not had any testimony as to who the source of power for the District is.

MS. TIPSORD: Actually, Mr. McGowan's testimony was -- if I recall right, and forgive me, I didn't review the transcripts before we came -- but his testimony was -- and the questions you specifically asked was how they came up with some of these numbers and where they got their information.

And this is, my understanding, Mr. Andes, is this is one of the sources of information.

MS. WILLIAMS: No.

MS. TIPSORD: Am I missing something?

MR. ANDES: It was by Mr. McGowan. However, Mr. McGowan said if those -- that information was not available to him, but we committed to look for those documents and provide them, and that's what we're trying to do. If we need to provide a basis for that in later testimony today by Dr. Granato from the District, we can certainly do that.

MS. WILLIAMS: I would like to make a suggestion.

MS. TIPSORD: Wait, wait a minute.

MS. WILLIAMS: Can I make a suggestion?

MS. TIPSORD: Yeah.

MS. WILLIAMS: Mr. McGowan's coming back giving very similar testimony on the dissolved oxygen issues. Why couldn't we just enter this later when he comes back to give almost the same testimony focused on a different treatment technology?

MS. HEADMAN: Madam Hearing Examiner, I asked Mr. McGowan whether or not he knew the source of the electricity that the MWRD uses, and his answer to the question was no.

MS. TIPSORD: I think that -- I'm going to overrule the objection and enter the document. I -- I think the District is attempting to be responsive to questions. I don't think any of us are -- the Board can certainly understand that this is not being offered for proof of the matter here. It was offered as here are some examples, and I believe Andes said that when he was doing it -- and certainly anyone who has continued issues with this can raise them in their comments or testimony later.

MS. HEADMAN: So, Madam Hearing Examiner, it would be appropriate for us to also submit electricity sources and emissions for all other utilities and alternative suppliers in this district?

MS. TIPSORD: If you think it's relevant to the rulemaking. Remember, in a rulemaking, anything relevant or -- I mean, there's a pretty wide latitude. This is a legislative

process, not an a adjudicatory process, so we take in a lot of information that can be taken, frankly, for what it's worth.

Mr. Ettinger, you had something?

MR. ETTINGER: I understand that and rely on that indulgence frequently myself, but I'm still asking what this is, is my question. Who is Integrys? Is this a representation as to what the District's sources of power are? I guess my problem is I'd just like to know what we got here. First of all, who is Integrys?

MR. ANDES: An energy supplier to the District. We can certainly provide further detail, and that could be when Mr. McGowan comes back in terms of what percentage of the District's power supply is provided by Integrys. There's also some power that generates for itself. We thought this would be helpful information, and this wasn't intending to be the end of the story. We simply felt that this was something we were requested to provide, were the documents that were provided to the District by its energy -- outside energy suppliers.

MR. ETTINGER: And I'm not criticizing

at all, I'm just asking. I've never heard of Integrys. Are they an energy supplier?

MS. TIPSORD: Excuse me. You have to share it for the record.

MS. HEADMAN: It's the holding company for the People.

MS. TIPSORD: And for the record, as Mr. Williams pointed out, Mr. McGowan will be back. If you have questions specific to this, we can certainly ask them at that time.

MR. ETTINGER: Okay. Thank you.

MS. TIPSORD: Anything further?

MR. ANDES: No.

MS. TIPSORD: Okay. Can we have Mr. Haas sworn in?

(Witness sworn.)

MS. TIPSORD: And do you have a copy of Mr. Haas' testimony for us to mark?

MR. ANDES: I do.

MS. TIPSORD: And gentlemen, there are a couple of chairs up there if you want to take these two. If there's no objection, we will mark Mr. Haas' testimony as Exhibit 143. Seeing none, it's Exhibit 143. Oh, wait, 144. Thank you. I

hadn't entered that on the sheet. Mr. Haas' testimony is Exhibit 144 with no objection. Seeing none, it's Exhibit 144. Thanks, Deb.

MS. WILLIAMS: You're welcome.

MS. TIPSORD: And then I do believe that NRDC does, in fact, Ms. Alexander, have some questions for Mr. Haas?

MS. ALEXANDER: That is correct.

MS. TIPSORD: We will start with your questions.

MS. ALEXANDER: Good morning, Dr. Haas. My name is Ann Alexander from the Natural Resources Defense Counsel. I will be asking you questions this morning, and I'd like to start out by asking when were you first hired by the Water Reclamation District for any purpose?

MR. HAAS: For any purpose?

MS. ALEXANDER: For any purpose, not just this one.

MR. HAAS: Well, if you include as a researcher, it was sometime in the mid-1980s when I was in the faculty IIT and the research project.

MS. ALEXANDER: And prior to being retained in connection with the current proceeding,

did you do additional work for the District?

MR. HAAS: Yes. I've done chairing blue ribbon committees for them.

MS. ALEXANDER: And you've compensated for this work you've done?

MR. HAAS: Yes. Those were -- prior to this, those were done as formal research contracts through my University.

MS. ALEXANDER: Prior to being retained for this proceeding, did you do any other work for the District?

MR. HAAS: I think I did some work, again, in the form of a research contract when I was back here in Chicago in the late 80s, very early 90s, on biosolids.

MS. ALEXANDER: Anything else?

MR. HAAS: That's all that I can recall.

MS. ALEXANDER: The blue ribbon commissions you chaired, when did that occur?

MR. HAAS: May I ask a favor? Since I chaired two committees and I get the names blue ribbon and the other one confused, if we can refer to them as the disinfection committee and the risk

committee --

MS. ALEXANDER: Okay.

MR. HAAS: -- I would appreciate it. I would appreciate it.

MS. ALEXANDER: Okay. When did you serve on the disinfection committee?

MR. HAAS: The disinfection -- they were actually pretty much concurrent. The term was -- had ended about two years ago and started about a year or so before that.

MS. ALEXANDER: What was the -- what was that committee charged with? What were its duties?

MR. HAAS: The disinfection committee?

MS. ALEXANDER: Yes.

MR. HAAS: That was charged with -- that was actually work done formally for CTE, the contract with CTE, and that was to look at available disinfection technologies, rank them in terms of their various pros and cons on attributes that the District was concerned with, and develop a short list for recommendations to CTE.

MS. ALEXANDER: What methods were on this short list that was developed?

MR. HAAS: The short list contained chlorination, dechlorination, UV, and ozone.

MS. ALEXANDER: Did the commission -- the committee -- excuse me -- the disinfection committee make a recommendation as to which of these technologies on the short list was the preferred technologies?

MR. HAAS: No, because we were really charged with making the recommendation for further study in terms of some detailed design that would lead to the District's evaluation of choice.

MS. ALEXANDER: Okay. And I have now already forgotten the name of the second committee.

MR. HAAS: The risk, risk committee.

MS. ALEXANDER: The risk committee.

MR. HAAS: Yes.

MS. ALEXANDER: When did you serve on the risk committee?

MR. HAAS: They were pretty much overlapping in the same period.

MS. ALEXANDER: What was the risk committee charged with?

MR. HAAS: That was charged with evaluating the EPA recreational water standards,

both the 1986 recreational guidelines and the draft guidelines of the early 2000s for application to the CAWS.

MS. ALEXANDER: Outside of your work on this committee, have you done any research or studies specifically concerning the 1986 risk guidelines from EPA that you referenced?

MR. HAAS: The bulk of my professional career has been concerned with microbial risks. So a lot of it, in one way or the other, certainly -- we're doing related work in Philadelphia where we're using 1986 information.

MS. TIPSORD: Let's go off the record for a half second.

(Whereupon, a discussion was had off the record.)

MS. ALEXANDER: Dr. Haas, am I correct that you're on the Board of the Water Environment Research Foundation?

MR. HAAS: That's correct.

MS. ALEXANDER: Has any of your research work been funded by WERF?

MR. HAAS: No.

MS. ALEXANDER: Okay.

MR. HAAS: And, in fact, as a Board member, I'm prohibited to being the PI or co-PI in any work project.

MS. ALEXANDER: Is the Water Reclamation District -- excuse me -- a member of WERF?

MR. HAAS: I believe they are.

MS. ALEXANDER: Were you hired by the Water Reclamation District to do any work with respect to the Geosyntec risk assessment?

MR. HAAS: Strictly speaking, no. But as part of my work on the -- on this matter, they asked me to review an early draft in the Geosyntec report.

MS. TIPSORD: Miss Alexander, for the record, could you please identify the exhibit that the Geosyntec --

MS. ALEXANDER: I'm sorry. The Geosyntec risk assessment that I referenced is Exhibit 71.

MS. TIPSORD: Thank you.

MS. ALEXANDER: I think that's right.

MS. TIPSORD: Just to keep the record clear.

MS. ALEXANDER: When you say an early draft, are you referencing the interim dry risk assessment, or was it an early draft of the dry and wet weather risk assessment?

MR. HAAS: I -- I'm not certain in terms of the way you identified it. You know, I don't know which version it was, but it was a newly drafted document that Geosyntec prepared.

MS. ALEXANDER: Okay. Did you review a draft that included conclusions with respect to risk of contact and wet weather?

MR. HAAS: Yes.

MS. ALEXANDER: Okay. Did you discuss this draft with the District?

MR. HAAS: They -- there was a telephone conference and the District was on that telephone conference.

MS. ALEXANDER: What was the nature of that discussion?

MR. HAAS: It was to summarize my conclusions with respect to the draft for it.

MS. ALEXANDER: And what were those conclusions?

MR. HAAS: The Geosyntec conclusions

or my conclusions?

MS. ALEXANDER: Your conclusions regarding the Geosyntec report.

MR. HAAS: I didn't retain any written notes of the call. I know I -- you know, aside from editorial comments, I know I had some points of clarification with respect to methodology that the report could undertake.

MS. ALEXANDER: Okay. First of all, what were the editorial comments you just referenced? Do you mean typo kind of comments, or what kind of editorial comments?

MR. HAAS: Well, when I use editorial phraseology, it clarifies, you know, possibly rearranging the text, making it clear, that sort of thing.

MS. ALEXANDER: And what were the points of clarification regarding methodology?

MR. HAAS: As I said, I don't -- I didn't retain any notes of the conversation, so I don't recall.

MS. ALEXANDER: Do you recall, as a general matter, that you disagreed in any manner with the methodology?

MR. HAAS: I -- disagree is too strong a word. You know, when two researchers are in the same area, almost no two researchers on every topic are going to read perfectly on everything that can be done. And so I believe I had questions as to why one thing was done and perhaps another thing, but I wouldn't use the term disagreeing to that.

MS. ALEXANDER: Did you receive a response to the concerns you expressed that satisfied or resolved those concerns?

MR. HAAS: The role of the conference call was for me to provide my observations of Geosyntec and the District, and, you know, I don't know what actions Geosyntec took in response to it.

MS. ALEXANDER: Are you familiar with the conclusion of the report that the risk of contact in either dry or wet weather is less than 9 illnesses per 1,000 users?

MR. HAAS: I haven't reviewed the final Geosyntec report. So, you know, I can't comment on any findings that were in there.

MS. ALEXANDER: Are you aware of the comments concerning the reports that were submitted by USEPA?

MR. HAAS: I know there were comments. I haven't reviewed them.

MS. ALEXANDER: Okay. All right. Turning, now, to the pre-filed questions, I'm going to turn to question number one, and ask you what methods of disinfection overall do you understand to be available for wastewater treatment?

MR. HAAS: Chlorine to include hyperchloride, and gaseous chlorine, chlorine dioxide, bromine chloride and related bromine compounds, ozone, UV, peracetic acid, and various combinations of those agents.

MS. ALEXANDER: Did your testimony submitted today and marked as Exhibit 144 concern any method of tests -- of disinfection, other than chlorination?

MR. HAAS: No.

MS. ALEXANDER: Okay. Is it your understanding that ultra violet UV disinfection emits the same type and level of disinfection byproducts as chlorination?

MR. HAAS: No, it does not.

MS. ALEXANDER: Does it create more or fewer?

MR. HAAS: It creates fewer chlorination byproducts and it may create other products not related to chlorination byproducts.

MS. ALEXANDER: When you say it may create other products, what research are you aware of on that?

MR. HAAS: Well, we know that UV creates hydroxyl radicals, and we know that hydroxyl radicals can interact with organic material to produce oxygenated byproducts.

MS. ALEXANDER: Are you familiar with the statement in the Geosyntec risk assessment that the formation of harmful byproducts by UV is negligible at conventional UV doses?

MR. HAAS: I don't recall that, but I would not disagree with that.

MS. ALEXANDER: Okay. Now regarding the discussion at Page 2 of your testimony concerning USEPA water quality criteria for trihalomethanes, in deriving these criteria, do you know what assumptions were made by USEPA regarding exposure in terms of dose and duration?

MR. HAAS: Other than using a typical two liter per capita per day water ingestion factor,

which is standard, I haven't delved into it. I don't hold myself out to be a toxicologist.

MS. ALEXANDER: So just to clarify, in arriving at those criteria, there was an assumption made of an individual consuming two liters every day?

MR. HAAS: Correct.

MS. ALEXANDER: Okay. Does this type of research, in your view, provide any basis to determine the health risks of occasional ingestion of trihalomethanes?

MR. HAAS: You've jumped here. We were talking about the water quality criteria, and now you're asking me about research.

MS. ALEXANDER: Well, what we've established -- correct me if I'm wrong -- is that the criteria for trihalomethanes are based on research that assumes consumption of two liters per day per capita, correct?

MR. HAAS: Correct.

MS. ALEXANDER: So could the conclusion of that research have any substantial meaning in determining the risk of occasional consumption, as in gulping a mouthful on a canoe

trip, for instance, of trihalomethanes?

MR. HAAS: It's not clear.

MS. ALEXANDER: Okay. Do you know what the current MCL is for trihalomethanes?

MR. HAAS: It's 80 microns per liter.

MS. ALEXANDER: And that number is significantly higher than the figures that you cited in your -- from the EPA criteria in your testimony. Is that correct?

MR. HAAS: That's correct.

MS. ALEXANDER: Okay. And MCLs, am I correct, define the highest level of a contaminant that is allowed in drinking water?

MR. HAAS: Correct.

MS. ALEXANDER: Okay.

MR. HAAS: Well, you know, to be strict about it, the MCL per THM is based on a running average. So there could be higher instantaneous levels.

MS. ALEXANDER: Okay. And am I also correct that MCLs are set as close to the health base limits, the MCLGs, as feasible using the best available analytical and treatment technologies? Is that correct?

MR. ANDES: I think you're asking him for a legal interpretation of the regulations.

MS. ALEXANDER: Well, no. I mean, I think that he's -- I mean, he's an expert in understanding what MCLs and MCLGs are. I think that's something he can testify to.

MR. ANDES: I don't think -- you're asking him to restate what the legal requirements for setting MCLs and MCLGs. I don't think he's saying he's an expert on that part, he's an expert on the science.

MS. ALEXANDER: Okay. But you -- you understand, Dr. Haas, what MCLs and MCLGs are. Is that correct?

MR. HAAS: Yes.

MS. ALEXANDER: Okay. And is it your understanding that an MCLG is a maximum goal for zero health risk?

MR. HAAS: The MCLG is a level at which there is believed to be no health risk.

MS. ALEXANDER: Okay. And is it also your understanding that when MCLs are established, the goal -- the idea is to set them as close to the MCLGs as possible?

MR. HAAS: I would -- I would actually stick with your earlier wording in terms of feasibility.

MS. ALEXANDER: Yes. Okay. And that earlier wording, just to be clear, was that they are set using the best available analytical and treatment technologies. Is that correct?

MR. HAAS: Correct.

MS. ALEXANDER: Okay. Chloroform is one type of trihalomethane. Is that correct?

MR. HAAS: That's correct.

MS. ALEXANDER: And what's the MCLG for chloroform?

MR. HAAS: It's at .07 milligrams per liter.

MS. ALEXANDER: Which would be the same as 77 parts per billion.

MR. HAAS: 70 parts per billion.

MS. ALEXANDER: Yeah, I'm sorry, 70 parts per billion. And the MCLGs are also based on an assumption of two liters a day per capita consumption. Is that correct?

MR. HAAS: That's correct.

MS. ALEXANDER: Okay. Are you aware

of any studies specifically concerning the health impacts of trihalomethanes on recreational water users?

MR. HAAS: No, I'm not.

MS. ALEXANDER: Okay. Do you have any basis to believe that those effects would be comparable to the affects from chronic ingestion?

MR. ANDES: I'm sorry. Can you clarify?

MS. ALEXANDER: Do you have any basis to believe that the health effects from -- the health impact of trihalomethanes on recreational users would be any -- in any way comparable to the health impact of chronic ingestion of trihalomethanes?

MR. HAAS: I have no basis for assuming one or the other, assuming the comparability by comparability.

MS. ALEXANDER: Okay. Is chlorine used to disinfect swimming pools?

MR. HAAS: Yes.

MS. ALEXANDER: Okay. Are you aware of research concerning the concentration of trihalomethanes in swimming pools?

MR. HAAS: I am.

MS. ALEXANDER: Okay. Specifically, are you familiar with a study entitled Distribution and Determinants of Trihalomethane Concentrations in Indoor Swimming Pools published in the Journal of Occupational Medicine in 2002?

MR. HAAS: I don't recollect that specific paper, no.

MS. ALEXANDER: I am going to enter that study into the -- I have the study marked. Let's see if that refreshes your recollection at all. You folks need two.

MS. TIPSORD: She doesn't need it. I keep track of all the exhibits for her. They have enough to do in this rulemaking without giving them exhibits to handle. I've been handed an OEM online paper, Distribution and Determinants of Trihalomethane Concentration in Indoor Swimming Pools. If there's no objection, we will mark this as Exhibit 145. Seeing none, it's Exhibit 145.

MS. ALEXANDER: Okay. Are you familiar with the conclusion in this study that the geometric concentration of the trihalomethanes in the swimming pools tested was 132.4 parts per

billion?

MR. ANDES: I think he already testified he hadn't reviewed the report.

MS. ALEXANDER: But he may be familiar with the conclusions.

MR. HAAS: I haven't seen this paper, no.

MS. ALEXANDER: Okay. What is the most common method of disinfection of wastewater effluent currently being used in the US?

MR. HAAS: Chlorination to include DS plus hyperchloride.

MS. ALEXANDER: Okay. Do you have an understanding of what percent of wastewater disinfection is currently achieved through chlorination as opposed to other methods?

MR. HAAS: There's not a good statistical survey done recently. I believe, though, the numbers are in the high 70s to 80s percent.

MS. ALEXANDER: Okay. Are you aware that the Water Reclamation District currently disinfects several of its wastewater treatment plants in suburban areas?

MR. HAAS: Yes, I am.

MS. ALEXANDER: Okay. And that would be the Cary, Hanover, and Egan facilities?

MR. HAAS: Yes.

MS. ALEXANDER: Okay. What type of disinfection is used at those facilities?

MR. HAAS: They're using liquid sodium hydrochloride.

MS. ALEXANDER: Okay. Now regarding the section in your testimony, it had a relative insensitivity of some pathogens, where you state at Page 3 that "attainment of satisfactory indicator levels in disinfected wastewater does not assure a low level of risk from exposure to viruses as well as protozoan pathogens." Am I correct in understanding that your concern here is that the indicators are potentially -- that your concern with falls negatives on the health risks and not positives. Is that correct?

MR. HAAS: That's correct.

MS. ALEXANDER: Okay. And now turning to the first paragraph of Page 4, which is headed Security and Safety Issues, is there any reason that the Water Reclamation District would need to use

gaseous chlorine if it decided on chlorination as its disinfection method?

MR. HAAS: That would be an engineering judge for the District.

MS. ALEXANDER: And you indicated a moment ago that it's, in fact, using liquid chlorine at its suburban facilities. Is that correct?

MR. HAAS: Correct.

MS. ALEXANDER: So do you know of any reason one way or the other why it would not be possible to use liquid chlorine at its three CAWS facilities?

MR. HAAS: It certainly would be possible.

MS. ALEXANDER: Okay. And to your knowledge, do the majority of wastewater treatment facilities in the country that use chlorination use gaseous or liquid chlorine?

MR. HAAS: Here we're really at the -- at the mercy of a lack of good national surveys. I know there's been a movement toward liquid hyperchloride away from gas, but I don't know if we have a sense of the magnitude of the percentage of that shift.

MS. ALEXANDER: Okay. And regarding the second paragraph of that section in which you state that "liquid sodium hyperchloride solution is corrosive and prevents potential worker safety hazard," is sodium hyperchloride solution more commonly known as bleach when sold for household use?

MR. HAAS: Commercial bleach and the sodium hyperchloride used for disinfection both have the same active ingredient as the sodium hyperchloride. However, typically in waste treatment plants -- and this is the case of the District -- the concentration of sodium hyperchloride is greater than it is in commercial bleach.

MS. ALEXANDER: Would I be correct in understanding that the disinfection solution of sodium hyperchloride is approximately 12.5 percent?

MR. HAAS: At the District, that's right.

MS. ALEXANDER: At the District. Okay.

MR. HAAS: That's my understanding as well.

MS. ALEXANDER: Would I be correct in understanding that the solution for household bleach is 5.25 percent?

MR. HAAS: That's correct.

MS. ALEXANDER: Okay. Would it be fair to say that any dangers you site that would attend shipping and consumer use of sodium hyperchloride for purposes of disinfection would also attend shipping for a consumer use?

MR. HAAS: To a major degree, although with our concentration there is a bit more hazard in the spill.

MS. ALEXANDER: Okay. And would you say that other types of chemical shipments commonly used in industry pose similar types of risks?

MR. HAAS: Well, that -- to me that's an overly-broad question because of the number of chemicals.

MS. ALEXANDER: Well, would you say that shipping a tank car of gasoline poses some risk?

MR. HAAS: Oh, some risk, yeah. You used the word "similar."

MS. ALEXANDER: Oh, okay.

MR. HAAS: I think the word similar was problematic.

MS. ALEXANDER: Okay. Is it your view that the risk of shipping a tank car of gasoline is unacceptable?

MR. HAAS: Spending a lot of time in the world of risk, when I hear the word "unacceptable" -- and my apologies for being a bit too pedantic here, perhaps -- when I hear the word "unacceptable," to me that incorporates some element of social judgment and equity that's beyond the realm of science. So the only way I can answer that question is to say by the fact that those shipments remain permitted, society has deemed that risk to be acceptable. I -- I don't believe it's appropriate to express a psychic opinion on that matter.

MS. ALEXANDER: Okay. All right. I have no further questions for this witness.

MS. TIPSORD: With that, I think we move, then, to the IEPA.

MR. ANDES: If I can just get up for one moment and get a very quick bathroom break and be right back.

MS. TIPSORD: Sure. All right. Let's

take five minutes.

MR. ANDES: Thank you.

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

MS. TIPSORD: And I think we're ready to start with the IEPA.

MS. DIERS: Stefanie Diers of Illinois EPA. I'm going to start with our pre-filed question number one. On Page 5 of your pre-filed testimony, opinion one states "If chlorine, either as gaseous chlorine or hyperchloride, disinfection is used, there is a very high likelihood of producing organic disinfection byproducts, including those that are the subject of water quality guidelines, and those that are regarded as likely carcinogenic." In your opinion, do you think the Board should require all facilities that currently use chlorination to go to using a different disinfection method?

MR. HAAS: I think that disinfection is best approached as a site-specific basis. When disinfection is required, I believe the best policy is to allow the discretion of the utility and its consultants to develop a design that complies with

whatever criteria there are.

MS. DIERS: Okay. On number two, on Page 3 of your pre-file testimony you state, "It has long been known that some pathogens, such as viruses, are more resistant than indicator organisms, such as coliform, to chlorinate disinfection in wastewater." Is it your opinion that chlorinating of effluent should stop?

MR. HAAS: As a general case, again, I don't believe that there should be a single site that sits alone in those considerations. It's a very site-specific basis.

MS. DIERS: What would you look at -- when I said it's site specific, what would I be looking at to make those determinations?

MR. HAAS: The use of the receiving water, potential exposures that might occur, the degree to which the wastewater could be disinfected by particular disinfectants, cost and safety, and ecological effects.

MS. DIERS: Number three, what was your role on behalf of MWRDGC in the Pollution Control Board rulemaking of district disinfect requirements in the early 1980s?

MR. HAAS: Actually, on behalf of the District, I had no role. In fact, in that proceedings in the early 80s I was a witness. My recollection is, in fact, here in Joliet against the district.

MS. DIERS: Can you explain what you did in that?

MR. HAAS: That was a rulemaking in which disinfection was proposed to be eliminated, and I testified opposing that recommendation, citing the need for disinfection.

MS. DIERS: And what was your reasoning for taking that position?

MR. HAAS: Based on public health, potential exposure or recreational users.

MR. ANDES: And to follow up with that, specifically as to the District and these waterways, or more generally?

MR. HAAS: More generic.

MR. ANDES: As to secondary contact or primary contact?

MR. HAAS: Primary contact.

MR. ANDES: Thank you. So that was a statewide rulemaking, and you were discussing health

risks for primary contact recreation?

MR. HAAS: That's my recollection, yes.

MS. DIERS: What statewide rulemaking? Do you recall?

MR. HAAS: Well, again, to go back in history, in the very inception of the definition of secondary treatment at the federal level, the coliform standard was included in the definition of secondary treatment. In, I think, 1974 the feds removed the coliform criteria from the definition of secondary treatment, and so this was a rulemaking in response to that change of definition on the federal part.

MS. DIERS: Okay. Number four. Is the problem of chlorinated disinfection byproducts an issue when using UV radiation or ozone as a disinfectant?

MR. HAAS: No.

MR. ANDES: And to follow up, our -- so your answer is as to chlorinated disinfectant byproducts?

MR. HAAS: Correct.

MR. ANDES: Are there other

disinfection byproducts for UV?

MR. HAAS: There could be. As I indicated earlier, you can produce hydroxyl radicals, which can result in organic alterations from UV, and from ozone you can produce brominated and bromine-contained byproducts.

MS. DIERS: I'm going to skip five and go to six. Do such byproducts exist at a level that poses risks to humans dermal contact?

MR. HAAS: Which byproducts are you --

MS. DIERS: I think we're talking about UV radiation in the ozone from the prior question, sorry, chlorination disinfected byproducts. I'm sorry.

MR. HAAS: Chlorinated byproducts. Since there are no chlorinated byproducts being produced, then they would pose no risk.

MR. ANDES: Let me see if I can clarify. Are we talking about chlorinated byproducts from chlorination, or we're talking about chlorinated byproducts from UV?

MR. HAAS: You're talking about your pre-filed question four, right?

MS. DIERS: Yes.

MR. HAAS: Yeah.

MS. DIERS: Yeah. We're answering six, but I was referring to the byproduct. Chlorinated disinfection byproducts, I think, is what we're using on six.

MR. HAAS: From UV or ozone?

MS. DIERS: Well, we'll start with UV.

MR. HAAS: Okay. Well, since -- in both cases, since there are no chlorinated byproducts, then there's no issue resulting from the byproducts produced.

MS. DIERS: So they're using chlorine as a risk through dermal contact?

MR. HAAS: I don't think we know that well enough. We know that there can be human exposure to the chlorinated byproducts. We don't know directly whether there can be a health risk.

MS. DIERS: We have no further questions. Thank you.

MS. TIPSORD: Is there anything else, then, for Mr. Haas? Thank you very much.

MR. ETTINGER: Wait a minute.

MS. TIPSORD: Oh, sorry. I didn't see your hand come up. I apologize.

MR. ANDES: You need to be a little faster, Albert.

MR. ETTINGER: You're quick.

MS. TIPSORD: We're moving right along, finally.

MR. ETTINGER: We're just starting to get warm here, literally. Are there -- are you aware of any studies of the effects of chlorinated byproducts on fish or other aquatic life?

MR. HAAS: I believe I am, yes.

MR. ETTINGER: And what do you -- what do we know about that?

MR. HAAS: Well, it's been a long time since I reviewed that literature. I certainly am aware that that body of knowledge exists, but I'm not prepared to summarize it.

MR. ETTINGER: Does dechlorination take out any of the THMs or other byproducts for chlorination?

MR. HAAS: Can you repeat that again? THMs or any of the other byproducts?

MR. ETTINGER: I'm not very good at repeating myself.

(Whereupon, the record was read as requested.)

MR. HAAS: There's not good evidence that it takes out THMs. There is evidence, certainly, that it takes out other byproducts, including, for example, chlorines.

MS. ALEXANDER: So the dechlorination takes care, in part, of the chlorinated byproducts problem?

MR. HAAS: I have to do a yes, but -- strictly speaking yes, but it doesn't take care of the THMs and the stable organic carbon chlorinated byproducts, which are the ones that appear to be a greater health concern.

MR. ETTINGER: Now would it be fair to say that in general the literature has focused on creation of chlorinated byproducts from the disinfection of drinking water?

MR. HAAS: That's the case recently, although, in fact, some of the earliest work on this, if you go back to the 70s and 80s, there's a lot of work done on wastewater.

MR. ETTINGER: Okay. Well, going back to the 70s and 80s, were there -- what, in general,

was the concern about chlorination of wastewater with regard to human health?

MR. HAAS: The concern in that era was primarily understanding the chemistry of what happens when you add chlorine to an organic container of liquid, such as wastewater, and also some level of concern with respect to bioconcentration in aquatic life.

MR. ETTINGER: What bioconcentration in the aquatic life?

MR. HAAS: Many of the organic byproducts are hydrophobic, and hydrophobic materials of any kind are in the aquatic life.

MR. ETTINGER: And then they would be a problem to people who ate the fish?

MR. HAAS: They could be.

MR. ETTINGER: And what specific would be the chemicals in the fish that would be bad for you to eat?

MR. HAAS: Well, just generically, I would, you know, refer you to the various EPA water quality guidelines in terms of aquatic use that have been generated. These include the THMs.

MR. ETTINGER: Regarding THMs and

other chlorinated byproducts of chlorination, do these break down in the environment?

MR. HAAS: Anything breaks down in the environment. The question is of rates, and, you know, when you use the word "break down," I'm also interpreting it to be volumination of the water because the significant loss of water is volumination.

MR. ETTINGER: Well, how long does that take?

MR. HAAS: You know, I don't know that they -- we have a large enough body of knowledge to give typical values, but, you know, people have measured loss rates and we know it occurs.

MR. ETTINGER: Well, if we have THMs in the water in Chicago and a drinking -- the nearest drinking water source was in Peoria, should we be concerned about that?

MR. HAAS: In what context? In terms of the drinking water supply in Peoria?

MR. ETTINGER: Yes.

MR. HAAS: You know, first of all, I mean, without doing measures on the specific body of water, you can't predict how much tabulation will

occur of the THMs from one point to another. But in general, what THMs produce within a drinking water plan by chlorination of the water far exceeds whatever might be left in the source water from an upstream wastewater treatment.

MR. ETTINGER: Are you aware whether the city of Chicago chlorinates its drinking water?

MR. HAAS: They do.

MR. ETTINGER: Is the -- does that process create chlorination byproducts?

MR. HAAS: Undoubtedly, yes, it does. I haven't seen any recent data on THMs, but I'm sure it does.

MR. ETTINGER: And the city of Chicago does not dechlorinate, does it?

MR. HAAS: To my knowledge, no.

MR. ETTINGER: In fact, isn't it generally considered beneficial to release the chlorine in they system because of the bacteria and other things in the pipes?

MR. HAAS: That's the typical US practice.

MR. ETTINGER: Does the -- do the wastewater treatment plants take the chlorine -- I'm

sorry. Strike that. Do the wastewater treatment plants take the chlorinated byproducts out of the water that come to them from the drinking water plants?

MR. HAAS: There's certainly nothing in typical design that's done deliberately to do that. On the other hand, most wastewater treatment plans, and all wastewater treatments plans of the District, have stages where there is heavy addition of oxygen or air to the water, and that heavy aeration acts -- many of the materials, including THMs.

MR. ETTINGER: So your understanding, then, would be that some, but probably not all, of the chlorinated byproducts in the drinking water plants are taken out by the wastewater treatment plants?

MR. HAAS: Correct.

MR. ETTINGER: Do you have any idea what percentage that would be, most, some?

MR. HAAS: It really -- it really depends on the -- on the design, the mechanically -- the aeration. So, you know, again, without site-specific measurements I wouldn't hazard a

guess.

MR. ETTINGER: And you don't have any site-specific measurements regarding --

MR. HAAS: No.

MR. ETTINGER: I'm sorry, Mr. Haas. I understand my brain moves slower than yours, but you got to let me finish my question before you answer.

MR. HAAS: I'm sorry, I'm sorry.

MR. ETTINGER: I believe the -- could you just read back what we had there?

(Whereupon, the record was read as requested.)

MR. ETTINGER: Okay. And my question was: Do you have any specific information about the Metropolitan Water reclamation District plants?

MR. HAAS: In general?

MR. ETTINGER: No, about how well they take out chlorination byproducts.

MR. HAAS: No.

MR. ETTINGER: What factors cause more or less dechlorination byproducts to be formed in the disinfection process?

MR. HAAS: Again, we're talking about wastewater?

MR. ETTINGER: Either.

MR. HAAS: Okay. Dose of disinfectant, contact time, type of nitrogen that's present, whether it's ammonia versus nitrite, level of organic material that's present, PH. Those would be the major variable. And also a level of bromide as well.

MR. ETTINGER: How does the ammonia versus nitrate issue affect it?

MR. HAAS: Well, if you have -- if you have a high level of ammonia -- which is typically not the case in drinking water, and in wastewater would be the case if you do not nitrify -- then the chlorine can combine with the ammonias for combined chlorine, and combined chlorine generally does not form organic chlorinated or organic halogenated disinfectant byproducts.

MR. ETTINGER: So you're actually better off with ammonia in terms of avoiding byproducts?

MR. HAAS: In terms of byproducts alone, yes. Avoiding ammonia? No, you're better off with ammonia. You're better off with ammonia in terms of avoiding byproducts.

MR. ETTINGER: I think that's what I said.

MR. HAAS: Okay.

MR. ETTINGER: I think we're clear now.

MR. HAAS: Okay.

MR. ETTINGER: What would cause you to add more or less chlorine in the disinfection process?

MR. HAAS: Well, you're adding chlorine to meet, typically, some biological standard, and so the chlorine dose and time are designed to achieve that biological standard.

MR. ETTINGER: Would you generally add more chlorine in a drinking water plant, or in a sewage treatment plan, per gallon?

MR. HAAS: It's really going to depend on what effluent criteria you're trying to meet on the wastewater side. There are wastewater plants that are designed to achieve high level treatment that uses doses far in excess of the drinking water.

MR. ETTINGER: And why would you do that?

MR. HAAS: You know, the examples I

have in mind are in the water reuse plants in the west and the southwest that have tried to achieve very high level of reduction of contaminants.

MR. ETTINGER: For the plants that we see in Illinois, which typically do not have a reuse situation, would you expect them to use more chlorine or less chlorine per gallon than you do in a drinking water plant?

MR. HAAS: On average, at this point my guess is that -- and I haven't seen specific data -- but my guess is the wastewater side may use slightly more because of the greater demand of the organic material.

MR. ETTINGER: The greater demand of the organic material, meaning the pollutants that are remaining in the water of the secondary treatment?

MR. HAAS: Well, it's -- you know, pollutant, to me, has a very specific meaning, pollutant plus natural organic material that's present in the wastewater. You may give a chlorine demand that has to be overcome to get good disinfection.

MR. ETTINGER: So basically having to

kill the BOD in order to get the disinfectant?

MR. HAAS: Well, you're not killing the BOD. The BOD and the other organic material consume the chlorine and prevent it from acting against the target microorganisms.

MR. ETTINGER: I think that's it for me.

MS. TIPSORD: Mr. Harley?

MR. HARLEY: Keith Harley, Southeast Environmental Task Force. You've testified about different technologies that are presently in use in order to achieve disinfection. Are there any emerging technologies that may be available five, ten years in the future to achieve disinfection at wastewater treatment plants?

MR. HAAS: Well, I think in my initial list I mentioned one that I would class as emerging. That's peracetic acid. Beyond that, I'm not sure that there's anything on the horizon that I would mention. In this particular context, we're dealing with a very, very large utility plant.

MR. HARLEY: And could you describe the peracetic acid disinfection process?

MR. HAAS: Peracetic acid is a

dissolved chemical. It's -- basically vinegar is a acetic acid, and peracetic acid has extra oxygen compared to peracetic acid. So it's a highly-oxidized species, and it can be applied in solution like you would any other liquid chemical and wastewater. So it's a direct application of the solution and the mixing.

MR. HARLEY: And what are the advantages and disadvantages of uses peracetic acid as opposed to ozonization, or chlorination dechlorination?

MR. HAAS: Well, you know, since it's emerging, we don't have a full spectrum of the pros and cons. Its advantage relative to UV and ozone in particular are that UV and ozone are highly capital intensive processes, and peracetic acid, being a solution that can be directly applied, doesn't need the level of capital equipment that you would need with UV or ozone.

MR. HARLEY: Thank you.

MS. TIPSORD: Mr. Ettinger?

MR. ETTINGER: Your testimony indicates that some of the indicator species are less resistant to chlorination than some of the

pathogens in your view. Is that correct?

MR. HAAS: Correct.

MR. ETTINGER: Do you believe in using indicator species in order to determine the effectiveness of disinfection?

MR. HAAS: Our historical evidence is that indicators have been helpful. I think the world of environmental microbiology is in transition, and in some timeframe in the future we'll probably no longer be relying on indicators because it's becoming easier to measure the pathogens. But we're not there yet.

MR. ETTINGER: Thank you.

MS. TIPSORD: Anything further? Thank you very much, Mr. Haas. We'll move on to Dr. Zenz. And can we have Dr. Zenz sworn in?

(Witness sworn.)

MR. ANDES: I'm sorry. I should also mention that there may be some issues where we may need to refer them to Eric Cockerill, who is also here from CTE who participated in the development of Dr. Zenz's report.

MS. TIPSORD: Okay.

MS. WILLIAMS: Should we swear him in

then?

MR. ANDES: Sure.

MS. TIPSORD: All right. Let's go ahead and do that then.

(Witness sworn.)

MS. TIPSORD: And do you have a copy of Dr. Zenz's testimony, please?

MR. ANDES: Sure do.

MS. TIPSORD: Thank you. If there's no objections, we will mark the pre-filed testimony of David R. Zenz as Exhibit 146. Seeing none, it's Exhibit 146. And I believe that IEPA was the first of the group to file questions, and RDC had none, so we'll begin with IEPA.

MS. WILLIAMS: Good Morning Mr. Zenz. It's Mr. Zenz, right, not Dr. Zenz?

DR. ZENZ: It is Dr. Zenz. I have a PHD.

MS. KATZ: There's so many witnesses to keep track of. My name's Deborah Williams with Illinois EPA. I'm going to start with question one from our pre-filed questions. Can you explain the difference between the Level 3 cost estimate and the Level 4 cost estimate?

DR. ZENZ: I can. The Level 3 and Level 4 cost estimates, which appear in my testimony, are definitions which are -- have been put together by the Association for the Advancement of Cost Engineering, and they produced a recommended practice Document, 18R-97, and it classifies different types of cost estimates.

MS. TIPSORD: Dr. Zenz, you're going to have to speak up. We're having a hard time.

DR. ZENZ: There are five levels of estimates, Level 5 being the least detailed, and Level 1 being the most detailed. In my testimony, I talk about two different types of cost estimates according to this classification system. A Level 4 estimate represents a study -- or feasibility estimate with an expected deviation range of actual cost of minus 20 percent or plus 40 percent. A Level 3, which is a more detailed cost estimate, represents a budget estimate with an expected deviation range of actual cost of minus 15 percent plus 30 percent.

MS. WILLIAMS: Thank you. You testified on Page 10, Paragraph 3, that, quote, "The total estimated schedule for implementation is

approximately eight years to operate for the North Side and Calumet facility, and ten years for the Stickney facility." Explain why eight years is necessary to construct this infection at the North Side and Calumet plant and why ten years is necessary for the Stickney plant.

DR. ZENZ: The difference between the North Side and Calumet plant schedules and the Stickney schedule is related to larger size and scope of the potential Stickney project. Stickney is much larger than these other two plants, and the issues include the relocation of railroad tracks, there's much longer lengths of conduits, the conduits are much larger, and there will have to be construction of a new wall, all of which will lengthen both the designing construction periods for the Stickney plant.

MS. WILLIAMS: I think I was intending also -- I mean, that's a good answer, I think, to the question that was asked, but I was also trying it get at generally the eight-year length of time for even the smaller plants, and what is the cause for such a long schedule for those plants?

MR. ANDES: Well, I think that the

specific time lines within that were in his testimony. Are you asking about specific parts of that eight years?

MS. WILLIAMS: I find eight years to be a very long schedule, so I would like you to explain why eight years -- why, even for the shorter scheduled plants, we have such a long schedule.

DR. ZENZ: Well, I can assure you there's no cushion in these schedules, and by the way, it's been my experience most schedules put together by engineering firms usually take longer than what they do. So no cushion to these, I assure you. Well, first of all, we have a pilot plant study, and we think the pilot plant study is absolutely mandatory for the size of these particular facilities. Now if you're going to go ahead and construct that pilot facility, you need a design, you need to design it, and it has to be constructed. We think it's going to take at least 18 months, and that includes the design, regulatory view, construction, and startup, and then we need another year to run the pilot plant, and if we need the pilot plant we think is necessary we might want to look at things like --

MS. TIPSORD: Dr. Zenz, slow down as well. Speak up and slow down.

DR. ZENZ: We need information about bulb life. The system is going to -- we're looking at automatic cleaning systems for the UV disinfection system. We're going to look at just the geometry and the design of the facility. We want to get most efficient and cost effective design that we can possibly put together. You have to realize that the UV disinfection system for the Stickney plant could be -- could be one of the largest ever constructed in North America, and probably one of the largest constructed in the entire world. So the pilot plant facility, we think, is absolutely necessary. So we think the two and a half years is, you know --

MS. WILLIAMS: The pilot plant --

DR. ZENZ: -- a good schedule for that particular part. Now to go on --

MS. WILLIAMS: Can I propose -- let's talk about this a little bit.

DR. ZENZ: Sure.

MS. WILLIAMS: And I'm not recalling from your testimony, is there a pilot plant facility

at each -- are you doing a pilot at each facility or one pilot?

DR. ZENZ: No, at each particular facility.

MS. WILLIAMS: All right. Go ahead. You can move on.

DR. ZENZ: Well, so the next part of the schedule is a design period, okay? We want to get into -- we've constructed and reviewed our pilot plant data, and now we're getting the construction. Well, again, we have to review the pilot plant data, we have to construct the preliminary design, the final design, the regulatory review, there's a bidding period, and we're finally going to award contractors. Now we -- CP has done a lot of work for the District over the years, and we have extensive experience in what this whole process, design process, would be, and recent at -- a recent project of the District at the Calumet plant, similar magnitude and complexity, estimated construction cost of excess of $240 million. The total design period from notice to award a design contract, the advertisement of bid was 30 months, which is exactly what is the proposal.

MS. WILLIAMS: DR. ZENZ --

DR. ZENZ: And that does not include -- that does not include the bidding period or contract negotiations. Again, there's no cushion here, no cushion.

MS. WILLIAMS: So in your experience with the District, do you feel that the bidding and contract stage takes longer than other publicly owned treatment works?

DR. ZENZ: My experience, other municipal organization go through this extension period. It's certainly no better, no worse, than other places.

MS. WILLIAMS: So you think it's about the same?

DR. ZENZ: About the same.

MS. WILLIAMS: So let's review. So the 30 months --

DR. ZENZ: 30 months.

MS. WILLIAMS: -- is that -- that would be a typical period?

DR. ZENZ: For a large contract like -- again, you have to look at the size of these facilities. The Calumet plant was about a

$250 million contract. Actually these contracts would be larger than this. But yes, I would say two and a half years is a reasonable number for a schedule with no cushion. And again -- I'll repeat what I said before -- most schedules put together by engineering firms take longer than what they -- that's typically what happens.

MS. WILLIAMS: And have you worked on other UV designs for other municipalities?

DR. ZENZ: I have -- yes, I have.

MS. WILLIAMS: And on those projects, I would assume you're using your same philosophy of wanting to give an accurate schedule --

DR. ZENZ: Yes.

MS. WILLIAMS: -- unlike other engineering firms?

DR. ZENZ: Yes, yes.

MS. WILLIAMS: Can you tell us what the schedules were for some of those other projects?

DR. ZENZ: The projects -- in fact, it's actually only one. The project I worked on was much smaller in scale --

MS. WILLIAMS: Right.

DR. ZENZ: -- than this. So there's

no comparison.

MS. WILLIAMS: And for a smaller -- but I would like to understand for a small project about how long would the schedule be.

DR. ZENZ: You know, I can't honestly remember.

MS. WILLIAMS: You don't recall?

DR. ZENZ: No.

MS. WILLIAMS: It was probably smaller than this -- shorter than this, obviously?

DR. ZENZ: You know what, I'm not sure.

MS. WILLIAMS: Okay. Did you have anything else you wanted to explain about what went into the construction schedule? We talked about the 30 months and the two years for the pilot. Did you want to move on to the rest of it?

DR. ZENZ: Well, I would just say that, you know, adding the schedules together, the construction of these facilities, you'd have to relocate railroad tracks, you'd have to enlarge conduits, got to put in large pumping facilities. Each one of these facilities requires a pump station in addition to the disinfection. I think, you know,

our -- and again, I think our schedule is a reasonable one to put forward at this particular point in time. That's all I can say.

MS. TIPSORD: Mr. Harley, you have a followup?

MR. HARLEY: Dr. Zenz, my name is Keith Harley. Doctor, although you can't remember the specifics of the previous UV project that you worked on, can you tell us where that was?

DR. ZENZ: Yeah. It was the Hanover Park facility, not the District's Hanover Park, but the DuPage County site. A small, 1.5 MDG facility. And again, the comparison to the district, not at all.

MR. HARLEY: And although you can't recall the specifics of that project, can you tell us approximately when you worked on that installation?

DR. ZENZ: It was the later part of the 90s.

MR. ANDES: So that's the one UV project you've worked on, but you've worked on a number of other treatment projects --

DR. ZENZ: Yes, yes.

MR. ANDES: -- for municipalities?
DR. ZENZ: Yes.
MS. WILLIAMS: Did Mr. Cockerill work on the Hanover Park project as well? Am I pronouncing your name properly, Mr. Cockerill?
DR. ZENZ: No, did he not.
MR. ETTINGER: Can I follow up on Mr. Andes question? What other disinfection plants have you worked on?
DR. ZENZ: Well, most recently, the -- I worked with the Urbana-Champaign sanitary districts, their northeast plant and their southwest plant. I designed a disinfection facility for them.
MR. ETTINGER: Okay. Well, what did they do?
DR. ZENZ: Well, they had an existing chlorination facility, which had been not used for many years because of the permit from the Illinois EPA, which exempted them from year-round disinfection.
MS. TIPSORD: Dr. Zenz, you're fading.
DR. ZENZ: They were exempt from year-round disinfection, and so a new permit came through from the Illinois EPA, and they had to put

their disinfection system back in operation again. So it's a matter of rehabilitation and some redesign work, and it was not an extensive engineering and design project.

MR. ETTINGER: It was not extensive?

DR. ZENZ: No, because they already had -- they already had an existing chlorine contact chamber in each of the facilities. They had remnants of the chlorine dosing system, but it hadn't been used in over 25 years, and so it was a necessity to rehabilitate and rejuvenate the old system.

MR. ETTINGER: Is there an existing chlorination facility at the Calumet plant at the Water Reclamation District?

DR. ZENZ: There is an existing chlorine contact, yes.

MR. ETTINGER: Other than the Champaign Urbana -- or Urbana-Champaign plant and the Hanover Park plant, do you have any other experience on disinfection systems?

DR. ZENZ: We -- CT did a planning study for Genesee County, which included working on various disinfection alternatives for the Anthony

Ragnone Plant, which is outside Michigan. So I was involved in that in late 90s, maybe, that area.

MR. ETTINGER: And that -- what did they do?

DR. ZENZ: They -- there was some rehabilitation and reworking of the existing chlorination, so it was mainly a planning study looking at different alternatives.

MS. TIPSORD: Excuse me, Dr. Zenz, we're going to have to try the microphone because you are fading away.

DR. ZENZ: Okay.

MS. TIPSORD: I don't know if they're on, but could we move it over and see if it on?

DR. ZENZ: I'm sorry.

MS. TIPSORD: Because we -- either that or you're going to have to really work at speaking up.

DR. ZENZ: I'll try speak up louder. I'm sorry.

MS. TIPSORD: Okay.

MR. ETTINGER: Okay. I'm sorry. So we have -- Genesee County, that was very much different from this project, too, right? And

Hanover Park was different from this project, and Urbana-Champaign was very different from this project. You're nodding. Do you mean to say yes in response to those questions?

DR. ZENZ: Yes, that's correct, yes.

MR. ETTINGER: Okay. So do you have any relevant experience with regard to this project?

DR. ZENZ: Well, I don't know what you mean by relevant experience. I --

MR. ANDES: Well, let me clarify. Are there any projects in the country as big as this project?

DR. ZENZ: No.

MR. ANDES: Okay. Do you have experience as to disinfection requirements that you think is helpful for this project?

DR. ZENZ: Yes.

MR. ETTINGER: Have you worked on any project similar -- that you believe is similar to this project?

DR. ZENZ: No.

MS. WILLIAMS: Dr. --

MR. ANDES: You're speaking in terms of size?

DR. ZENZ: We're talking about size. I assume that in terms of the size, the magnitude of the project, the cost of the project. The answer is I don't think -- I'm not sure anybody has such memory. Now I must say, you have to realize -- and maybe you didn't look at my resume -- I was a 30-year employee of the Metropolitan Water Reclamation District of Greater Chicago, and when I joined the District in 1968, they were chlorinating at all three of the major treatment plants. I was involved in the troubleshooting and working with that existing disinfection system until it was finally eliminated in the late 70s. So I have experience with that.

Also, when I was with the Water Reclamation District, there were two of its, what I would call, smaller plants, which were put online in the 70s and 80s, the John E. Egan plant, and the Cary plant, both of which were being planned, designed, and took place during that period. As a member of the RMD department I participated in the planning and in design meetings that we had with consulting engineers on those two projects. These plants are now in full operation and have been

chlorinated for many years. And again, I was involved in troubleshooting those, you know, and working with the MNL department to make sure that those chlorination facilities were operating and meeting their permit. So, I mean, I have -- my 30 years with the District, I think I have extensive experience with these plants and working with them and their disinfection systems in general.

MR. ETTINGER: I'm not quibbling with your experience as an engineer. I'm asking whether you had worked on any project that you consider to be similar to this one in whatever you -- or I think your term at one point was relevant when discussing Hanover Park. Have you worked on any other project that you consider relevant to this project?

DR. ZENZ: Well, other than what I just told you about in terms of my experience with the District, that's the only thing I can offer at this point.

MR. ETTINGER: Okay.

MS. TIPSORD: Actually, I have a followup. Dr. Zenz, I have looked at your resume, as a matter of fact, which was attached to your pre-filed testimony, and you have -- under your

project experience, you have a Hanover Park landfill study. Is that the same study that you've been talking about here, or is that a different one?

DR. ZENZ: Well, it's for the same client, the Village of Hanover Park and DuPage County, but it had nothing to do with their disinfection system at the wastewater treatment plant.

MS. TIPSORD: Thank you. Mr. Harley?

MR. HARLEY: When you say that there's nothing been done on this scale before, do you mean cumulatively among all three facilities in terms of capacity?

DR. ZENZ: I would say that just the facility at the Stickney plant alone is enough to make this, you know, a project that's somewhat unique, and the Stickney plant is often referred to -- and again, I can't give you a study or a survey which ranks treatment plants in terms of their relative size in North America, but it's my understanding that the Stickney plant is the largest plant in North America. And so I would just say that that alone, that plant alone, is a 1,200 MGD design plant, and any engineer would tell you that

that far dwarfs any project that they probably have worked on. In my profession, working on a 50 MGD plant, we consider that to be a very large plant.

MR. HARLEY: Putting aside Stickney --

DR. ZENZ: 1,200 is just outside the realm of most engineers.

MS. WILLIAMS: Dr. Zenz, that plant had previously been chlorinating. So when you talk about no one having experience like this, are you referring specifically to the UV aspect of the project, to whatever type of disinfection it's chosen?

DR. ZENZ: I'm saying that this plant is unique because of its large size.

MS. WILLIAMS: Well, we know that, but --

MR. ANDES: Well, let me follow up. When was chlorination put in at Stickney initially? Do you recall that?

DR. ZENZ: No, I do not.

MR. ANDES: But that was in operation for years --

MS. WILLIAMS: Objection. He said he doesn't know.

MR. ANDES: Okay.

MS. WILLIAMS: If you want to testify you can.

MR. ANDES: Would you say that the requirements of putting chlorination or UV now are somewhat different than they were, say, back in the 60s in terms of the requirements that would apply, the various things you would have to look at in terms of designing a new system, anatomy, and all the regulatory requirements?

DR. ZENZ: Oh, sure.

MR. ANDES: Thank you.

MS. TIPSORD: Mr. Harley?

MR. HARLEY: Putting aside Stickney for one moment, are you familiar with any projects equivalent in size to the Calumet facility where UV or chlorination have had to be installed at that facility?

DR. ZENZ: I can't give you any plant of that size that's practicing UV disinfection anywhere in the United States. I don't know of any.

MR. HARLEY: How about the North Side, same question.

DR. ZENZ: Same answer.

MR. HARLEY: So there are no facilities similar in size to Calumet or North Side where their disinfecting wastewater anywhere in the United States?

DR. ZENZ: Well, I thought your question was on UV disinfection, but I'll stick with my answer as far as UV disinfection for those size plants. I don't know of any. I don't know of my plant that large that's used for disinfection. I don't know of any. But as far as chlorination is concerned, I'll make the same statement. I don't -- I can't give you a specific answer for a specific plant that size that's using for chlorination in the United States. I'd be guessing. I know of plants that are that large, but I don't know for a fact what exact disinfection method they are or are not using.

MR. HARLEY: So then you also would not be able to be prepared to testify today about how long construction schedules may have been for any other facility of that size?

DR. ZENZ: Well, as I testified earlier, we were comparing -- and I spoke about a design schedule two and a half years for a project

at the Calumet plant across the -- about $250 million, and I feel that that is a good example of terms of the cost of the construction project and the magnitude of the project for a facility like Calumet, that it was a good comparison.

MR. HARLEY: But that was the disinfection plant?

DR. ZENZ: No, it was not.

MR. ANDES: We see that the timelines for other types of projects at these wastewater treatment facilities would be similar to disinfection, that there wouldn't be a fundamental difference?

DR. ZENZ: No, I do not see why this comparison wouldn't be appropriate.

MS. TIPSORD: Ms. Williams?

MS. WILLIAMS: Dr. Zenz, I know you feel pretty good about your timeline, and I just wanted to ask this in a different, more specific way. Based on your opinion and your experience at both other facilities and at the District, do you believe these construction schedules represent the earliest reasonable date MWRDGC could achieve compliance with the disinfection requirements?

MR. ANDES: Can I ask, since you put those terms --

MS. WILLIAMS: I would like him to try to answer the question as was asked.

MR. ANDES: Well, I'm asking if you're asking about a legal term, or are you asking his technical judgment? Because you --

MS. WILLIAMS: I am certainly asking his technical judgment.

MR. ANDES: -- put that statement in quotation marks.

DR. ZENZ: Well, I would just repeat what I said before, is that these schedules took some time. And by the way, you have to understand that this is a collective process. When I give a schedule out that's contained in a District report, that is a CTU report. That's not a Dave Zenz report, and it involves the judgment of other engineers putting that together. And so again, I'm going to repeat myself. There's no cushion here.

MS. WILLIAMS: But would you agree it's the earliest reasonable date?

DR. ZENZ: Well, our schedules don't have any dates in them. Only time periods.

MS. WILLIAMS: Correct.

DR. ZENZ: We cannot predict or know when a design contract would begin or when a construction contract would begin. So I'm not prepared to give any dates.

MS. WILLIAMS: So assuming it began today, eight years from today and ten years from today, would that be the earliest reasonable date?

DR. ZENZ: If the design contract was signed on the desk with a consulting engineer, it would be eight years from now.

MS. WILLIAMS: Thank you.

DR. ZENZ: Correct.

MR. ANDES: But do you think that it could easily go beyond that?

DR. ZENZ: Very easily.

MR. ANDES: Thank you.

MS. WILLIAMS: Did you receive comments from USEPA on the cost estimates that CTE developed?

DR. ZENZ: Well, CTE as you saw in my testimony, we actually -- for UV disinfection, we presented a Level 3 cost estimate and a Level 4 cost estimate. A Level 4 cost estimate is prepared as

part of the UAA process at the request of, actually, IEPA, and that report was submitted prior to the UAA process, our Level 4 cost estimate, and the USEPA did prepare comments on that report.

MS. WILLIAMS: Do you know if those comments are the same as the document included in that record as Exhibit 12?

DR. ZENZ: I'm afraid I don't. He tells me yes, it is.

MS. WILLIAMS: And the date on the document you're looking at?

DR. ZENZ: April 26th, 2006.

MS. WILLIAMS: Okay. Did you agree or disagree with their comments?

DR. ZENZ: Well, the District asked us to review that document, and as a result of our review and working with the District, comments on the report were prepared, and a letter was issued by the general superintendent of the District that contained some of this -- CTE's comments, and comments from the District. So it was a collective process. That document was then sent over to USEPA and it was presented to me.

MS. WILLIAMS: And do you know what

date that letter was sent to USEPA?

DR. ZENZ: See my -- he just corrected me. I thought it was sent to USEPA. It was not. It was sent to Illinois EPA on June the 22nd, 2006.

MS. WILLIAMS: Are you --

MR. ANDES: We can certainly provide that if it's not already in the record.

MS. WILLIAMS: Okay. I don't recall that being in the record, but can I take a look at it, I guess?

MR. ANDES: Sure. It was sent to Mr. Freevert (phonetic) on June 22nd, 2006.

MS. TIPSORD: Let's go ahead and put it in the record even if it's there already. I've been handed a document that is a letter to Mr. Freevert, dated June 22nd, 2006, from the District, which we will mark as Exhibit 147 if there's no objection. Seeing none, it's Exhibit 147.

MS. WILLIAMS: Without going through and reading the whole letter -- I don't believe it's in the record at this point. I could be wrong -- can you summarize for us generally was the -- was your response an explanation of why you disagreed

with USEPA's comments, basically?

DR. ZENZ: Yes.

MS. WILLIAMS: Do you -- did you make any changes to your process as a result of USEPA's comments?

DR. ZENZ: We did not make any changes to our Level 4 cost estimate file report.

MS. WILLIAMS: But later you prepared a Level 3 report?

DR. ZENZ: Later at the request of the District, we prepared a more detailed cost estimate. That cost estimate, the Level 3 cost estimate, is in my desk.

MS. WILLIAMS: And did you take any other new factors into account when preparing the Level 3 estimate as a result of the UAA process?

DR. ZENZ: Yes. Now I can just briefly summarize?

MS. WILLIAMS: That would be great.

DR. ZENZ: I'm not going to give you all the nuts and bolts, but there were three major comments which came out of this USEPA review of our Level 4 cost estimates, and of course when we got this new contract with the District, the Level 3

cost estimate, we wanted to make sure that we were cognizant of these comments from USEPA and that we reviewed them carefully, and the first comment they made was they said they were very skeptical that tertiary treatment may not be needed, and you'll recall from my testimony that we actually had a Level 4 cost estimate. We presented costs for UV disinfection plus filtration, and UV disinfection without filtration. So the comment was why, you know, they questioned the need for tertiary filtration as an additive process to UV disinfection.

Well, when we began our Level 3 cost estimate, we decided that we needed more data on turbidity of the waters at three major plants. We did our Level 3 cost estimate, and we did very little work on this area, and based on this more recent data, we concluded that actually tertiary filtration did not appear to be necessary. And actually, if you look at our cost estimates that are in my testimony, those cost estimates do not include tertiary filtration. But however, we must say the final decision should be made during preliminary design based on additional sampling, including the

pilot plant study which we recommend. So obviously we feel that the additional data indicates the issue of filtration is something we think is probably not necessary. Again, this points to the need for a pilot plant.

Next issue that they brought up, and they said, "Why are you providing pump stations in combination with each of the UV disinfection facilities?" So we did, at the request of the District, more detailed hydraulic analysis than we originally did for our Level 4 cost estimate. And based on this more extensive review of the hydraulics of each plant, we concluded exactly the same thing as we have done before. We feel that a pumping station is used at each of the three stations. It is necessary to -- in order to get the water through a UV disinfection facility with the number of bulbs and hydraulic resistance of the facility and supporting structures that you would need a pumping station.

Lastly, one of the major comments they made is, "Why are you putting your UV disinfection facility in a building," and they felt that it could be out in the open. It didn't

necessarily have to -- did not have to be in a building. We reviewed this issue quite extensively, and I can give you more detail about it. It's going to take a little time, but if you want to go through it I can do it.

MS. WILLIAMS: Sure.

DR. ZENZ: Well, if we haven't all realized, these are huge facilities, and there's going to be multiple maintenance activities that would be required to replace the lamps on the periodic basis. Both lamps -- slowly, UV lamps slowly lose their ability to produce UV rays, and they have to be periodically replaced whether they burn out or not, and then other lamps just burn out. So they have to be replaced, you have to inspect the leads, there's going to be some -- although we included in our cost estimate an automatic bulb cleaning system based upon surveys that we did, telephone surveys, other facilities that have online cleaning systems -- inline cleaning systems, but they still practice manual cleaning, and we felt that was going to be necessary.

MS. WILLIAMS: Do you recall who you talked to?

DR. ZENZ: Yes. Give me a minute here. I talked to Racine, Wisconsin, Sutton, Georgia, Grand Rapids, Michigan, Jacksonville, Florida, and Valley Creek, Alabama. Those were surveys. What we did was we asked them about the quality of their water that was used for bulb cleaning and other issues, and all said that some type of manual cleaning was still necessary in addition the use of the inline cleaning systems. So that is another issue for the maintenance people to deal with.

They also have to deal with the balance and electrical components at the same time. These maintenance facilities would be conducted daily from March to November, and periodically during the winter because they would be replacing bulbs. We think it's reasonable to expect that the reason we would continue to expect normal weathers, is that Chicago has very bad winters, hot summers. In order to protect the safety of the MNO staff and the operational maintenance is recommended, and UV equipment is expensive.

If you look at the cost estimates, the costs are in the millions, and there's sensitive

electrical equipment. And considering weather patterns in this area, we think having it in the building is necessary. And by the way, there are UV systems in the local area, which are enclosed. The Village of Hanover Park, for example, which I worked at, even though it's a small facility, the UV facility is enclosed. The Glenbard Wastewater Treatment Plant, the Racine Water Facility, among others, are all enclosed indoors. So we disagree with them, so our cost estimate includes a building.

MS. WILLIAMS: Is there a third issue that we're missing?

DR. ZENZ: No, that's the three. The three issues were the issue of tertiary filtration, the second issue is the issue of low lift pump stations, and the third is the building. Those are the three major issues which we tried to address when we did our Level 3 cost estimate.

MS. TIPSORD: Mr. Harley?

MR. HARLEY: You mentioned that you consulted with other operators, Racine, you said Sutton, you said Jacksonville. What were the others?

DR. ZENZ: Grand Rapids, Michigan.

MR. HARLEY: Grand Rapids.
DR. ZENZ: Jacksonville, Florida, and Valley Creek, Alabama.
MR. HARLEY: Valley Creek, Alabama.
DR. ZENZ: These all have UV facilities, and we were inquiring about routine maintenance that they would -- could do.
MR. HARLEY: Did you also inquire how long it took those facilities to install their UV systems?
DR. ZENZ: No.
MR. HARLEY: So in developing their estimate for what would be necessary, for example, at the Calumet facility, you didn't take into account the length of time from initial decision to install UV to a final installation in any one of these other --
MR. ANDES: He already answered, and he said he couldn't answer the question. Asked and answered.
MR. ETTINGER: Well, he was asking a broader question.
MR. HARLEY: Why not?
MS. TIPSORD: Mr. Harley asked a

followup point on why didn't you ask.

DR. ZENZ: That was -- our intention was to inquire about maintenance of UV systems. That was our only intention.

MR. HARLEY: Thank you.

MS. WILLIAMS: Back to me? Okay. On question seven of my pre-filed question, it's states on Page 5, Paragraph 1, "You mention that disinfection alternatives, such as UV, have lower environmental and health impacts." Can you just briefly explain what you mean by lower environmental and health impacts?

DR. ZENZ: Well, it's just the simple fact that -- I'm sure many witnesses, including Dr. Haas, has testified to the same thing, that other disinfection systems use chemicals, and those chemicals produce known disinfection byproducts. And UV disinfection alone, you know, further research is needed to check into this, but it's generally believed that they produce fewer disinfection byproducts than any other ones. That was what I was referring to.

MS. WILLIAMS: You testify on Page 6, Paragraph 2, that, quote -- that you, quote, "Assume

that the effluent standards were those outlined in the UAA study, 2740, E. Coli."

DR. ZENZ: Well, when we did our Level 4 cost estimate as part of the UAA process, the standards that were being proposed was approximately the 2740 and another number that was slightly over 1,000 E. Coli per 100 ML.

MS. WILLIAMS: Were those ambient standards or effluent standards?

DR. ZENZ: Those were water quality standards. So what we did in our cost estimate, we assumed that those water quality standards would have to be met in the pike of the treatment plants, that there would be no -- we assume no pollution factor or any other factor to get a lower target. So we assume that those numbers apply in the treatment.

MS. WILLIAMS: And you use those in both the Level 4 and Level 3?

DR. ZENZ: No.

MS. WILLIAMS: Okay.

DR. ZENZ: In the Level 3 cost estimate, because the -- at that point of the Level 3 cost estimate, things had progressed past the UAA

process, and IEPA produced a 400 fecal coliform count for a 100 ML standard, so our Level 3 cost estimate is based on that.

MS. WILLIAMS: Can you explain how the costs -- because those are two different analysis, right, it's hard to make a link how costs may or may not have changed as a result of the changed standard. Can you explain to us what impact that had on your level of the cost estimate?

DR. ZENZ: Well, let me try to give you a few facts to bear on. When we contacted manufacturers and began our Level 4 cost estimates, which we're looking at the -- meaning these UAA standards, the E. Coli standards that we just talked about, we talked to the manufacturers about this issue, and all of them said that they really had no significant experience in dealing with numbers in that range, that they -- their experience was dealing with fecal coliform concentrations of 400, and they had mentioned the opinion that they didn't think there was any significant difference, that they would not design the system with any significant difference between -- to meet any of those particular target values.

MS. WILLIAMS: So actually --

DR. ZENZ: Let me finish my answer.

MS. WILLIAMS: Sorry.

DR. ZENZ: Also another fact to remember is that when operators are disinfecting their effluent, you would go and look -- if you ever look at the actual bacteria counts that come out of the plants that are disinfected, they're usually far below the permit numbers. The reason for that is fairly simple. There are major fluctuations that occur in wastewater treatment plants through organic concentration and numerous other factors, and you're always involved -- when you're involved in disinfection, you're always getting the data after the fact. 24 hours, 48 hours later, microbiology gives you an answer. So you never -- you can't exactly track your performance.

So there's a tenancy to overdose chlorine or change other factors to make sure that you're meeting the standards under a variety of solutions. So we put those two facts together, the fact that there's really -- we at CTE really had no experience in these so-called higher numbers, and I should explain. When I say -- I know there's an

issue between E. Coli and fecal coliform, so the UAA standards were E. Coli, but the District did a fairly extensive study where they took samples, and then on the same sample ran both fecal coliform and E. Coli, and they were pretty close numerically, pretty close. Even though, you know, E. Coli is a subset of fecal coliform, they were pretty close. In the District effluent, they were pretty close.

So when I say a higher number at 400, I think I'm on pretty safe ground to say that the E. Coli numbers would translate to hire fecal coliform. So anyway, the manufacturers just don't have much experience, and they didn't think the difference was that much. Plus you have the issue of disinfecting to meet a standard where you're almost always greater than. To be honest with you, I don't think there really is any significant difference in terms of the two targets in terms of the cost either --

MS. WILLIAMS: Now wait --

DR. ZENZ: -- in design or in maintenance operation.

MS. WILLIAMS: When you say two targets, though, I'm confused now whether you mean

E. Coli versus fecal, or whether you mean 2,000 numbers per --

DR. ZENZ: Well, I was trying to collaborate the two targets. You know, the UAA standards was approximately 1,000 E. Coli or 2740 E. Coli, and 400 is fecal coliform. But what I was trying to say those E. Coli numbers are higher. They're higher, it's a less stringent standard, maybe is a better way to say it. So that's why I meant the two targets. A more stringent standard, and a lesser --

MS. WILLIAMS: And I just --

DR. ZENZ: I don't think -- you know, to be honest with you, I can't give you an absolute answer. Because again, I think this would be the issue for the pilot's next study, and you're asking me, sort of, a theoretical question the difference between these two, and the answer is I don't really know. I really don't know. But the fact that I just gave to you makes me think that there probably isn't that much difference. Long answer, sorry.

MS. WILLIAMS: No, it's okay. So basically, would you say we'd mischaracterize what you just said to say that really in your Level 4

cost estimate you actually designed it, sort of, more for a 400 type number than a 2,000 number, correct?

DR. ZENZ: That's correct.

MS. WILLIAMS: Okay. Now I just want to wrap up one thing because there was some confusion at our last set of hearings when Mr. McGowan testified, and he was asked in his testimony -- he stated that a 400 E. Coli number was what he relied on.

DR. ZENZ: That -- I'm sorry.

MS. WILLIAMS: So, I mean, I think what you're also saying -- but he relied on you, so basically he was relying on these lower numbers, whether they were fecal or E. Coli -- it's pretty much the same -- but if I had said 400 fecal, would that -- was that really what you targeted at? I'm not making this clear. I'm sorry.

DR. ZENZ: The information he relied on to give that answer, that was a typographical error on our part, okay? So that's why he said what he said.

MS. WILLIAMS: He should have said 400 fecal?

DR. ZENZ: We used 400 fecal.

MS. WILLIAMS: Thank you.

DR. ZENZ: I guarantee it. Read our report.

MS. TIPSORD: Mr. Harley, you have a followup?

MR. HARLEY: You said that you consulted with manufacturers in assessing the comparison between E. Coli and fecal coliform. Could you elaborate, please? Manufacturers of what?

DR. ZENZ: Well, that's somewhat mischaracterized. Manufacturers are not telling us anything about the relationship between E. Coli or fecal coliform or anything like that. We were telling them. But what they were saying was these are manufactures of UV equipment. I mean, it's no secret when a consulting engineer is going to do a cost estimate, we contact the manufacturers to get the latest pricing. We don't -- we don't have, you know, an independent means of assessing the cost of UV disinfection. We have to go to the manufacturers, and so the issue was -- and they asked us when giving us cost estimates for the equipment "What's the target," and we explained what

the target was, and again, they were -- they were -- they knew less about E. Coli and fecal coliform relationships than we did.

MR. ANDES: I'm sorry to interrupt. The target -- there was 2740 E. Coli --

DR. ZENZ: Right.

MR. ANDES: -- that you provided to the manufacturers?

DR. ZENZ: And there was another standard, and I have to admit there was another waterway target which was approximately 1,000 E. Coli, and it applied to, I think, the North Side plant, but I don't remember. It's been awhile. They had two targets, depending on which waterway the plant was discharging to, so I don't remember which is which now. But there were actually two targets in the UAA water quality standards that were being processed.

And so we presented those targets to the manufactures so that we could get the best cost estimate for them for their equipment, and they basically said "We don't have any real experience in dealing with numbers less stringent than the typical 400 count per IML," and they basically said, "And we

don't think there's any equipment that we provided would be anything significantly different."

MR. HARLEY: How many manufactures did you consult with?

DR. ZENZ: I don't recall. More than one.

MR. ETTINGER: Can I just follow up on this, because I'm hopelessly confused. Let's just -- part of the problem is we're shifting between fecal, and fecal E. Coli, and fecal. Are there any breakpoints that any of the manufacturers identified between zero and 2,000 fecal? Does it kill them all, or you kill none? Could you just characterize the way the equipment works in terms of this?

DR. ZENZ: I can only repeat what I said before, is that the manufactures all said that they didn't think -- again, they all said, "We don't have experience in dealing with less stringent standards than the typical 400 count per 100 ML, so please explain to us what these E. Coli numbers mean," so we did. I explained what I said before, that the District had done studies and numerically they're very similar. Okay. I understood that,

then they said, "Well, we don't have any experience in that, but we think -- we think -- there's probably no difference in the design and the cost of the equipment involved to meet that particular standard."

MR. ETTINGER: Between the E. Coli standard and the fecal standard?

DR. ZENZ: That's correct, the less stringent standard.

MR. ANDES: But there wasn't -- so, in essence, if I can restate for clarifying, so the numbers that you were given should also suffice to meet a 400 fecal standard?

DR. ZENZ: That's correct.

MR. ANDES: And you did not ask about a lower more stringent standard than that, because that wasn't part of the proposal?

DR. ZENZ: Correct.

MR. ETTINGER: And if we were to look at an ambient standard that was higher than 400 in the water that would allow you to, say, discharge 1,000, would that effect the cost of the District at all?

DR. ZENZ: I would give the same

answer, and the answer is I don't really know. I don't know. Because I don't think, you know, there is a lot of experience with this. I would just say based on the fact that people generally operate their systems at very low bacterial counts to make sure that they don't violate permit standards, and the fact that the manufactures said that they didn't think there was any difference, I don't think -- I don't think you're -- I don't think there'd be any difference in the capital cost and the MNO cost between the two, but that is somewhat of a guess on my part. Again, the pilot study would show whether that was true or not. I mean, there's so many variables involved here, I just don't -- I don't have a good answer.

MR. ETTINGER: So a looser voting standard would not really affect the engineering?

DR. ZENZ: I don't think so, but I'm not -- you know, that's not a definitive statement.

MR. ANDES: And you're talking there in terms of a -- when we're talking a looser standard, you're talking about an effluent standard that they would have to meet for their discharge?

DR. ZENZ: Correct.

MS. WILLIAMS: And I -- I mean, I think you've just answered this question, but I had flagged Question 15 to Mr. McGowan that he was unable to answer that's quite similar to this. If a water quality standard were available that appropriately represented the highest level of indicator bacteria in the CAWS that would protect existing recreational uses, could MWRDGC's disinfection process be adjusted to reduce power consumption?

DR. ZENZ: I think that was the same question I was just asked and answered.

MS. WILLIAMS: As far as you --

DR. ZENZ: And the answer is I really don't have a definitive answer, but my best guess is there would not be any difference.

MS. WILLIAMS: Are there any other design changes of the proposed UV disinfection system that could reduce power consumption?

DR. ZENZ: Well, in our cost estimates, we included costs for systems to keep the power cost as low as possible. The District is very, very conscious of the high electrical charges that are coming out, and even worse, the potential

for significant increases in power cost in the future. So for example, there's a -- in the costs for the UV disinfection system, we included a complex instrumentation control system to operate the system. There's available frequency drives on the lower pump stations that can conserve power, or -- I'm trying to think of some of the other things that -- we have an automatic bulb cleaning system, which I already mentioned. So in the cost, we've tried to include as many features to the system to reduce power costs as possible.

MR. ANDES: If I can follow up. I assume -- just to follow up on that question and Mr. Ettinger's -- if an ambient standard were set such that the District could meet -- such that those things could be met without disinfection, obviously we'd be talking about something very different.

MS. WILLIAMS: Is that a question?

MR. ANDES: So are you assuming -- you're assuming that some standard is set that would require disinfection. Am I right?

DR. ZENZ: That's correct.

MR. ANDES: Okay.

MR. ETTINGER: Just a followup on

Fred's question. Are you -- it's all or nothing on disinfections is the impression that I'm getting. Is that correct?

DR. ZENZ: I'm not sure I understand what you mean by all or nothing.

MR. ANDES: Either you install a system or you don't.

MR. ETTINGER: Either you install a system and you have all of these costs, or you don't install a system and you have none of these costs.

DR. ZENZ: I agree with that, yes.

MR. ETTINGER: I'm sorry. I don't know -- we're all out of order here if there was one, but I had -- well, I said all or nothing in terms of capital cost, I guess. There are different cost depending on how much you run the system, right?

MR. ANDES: You mean seasonal?

MR. ETTINGER: Seasonal.

DR. ZENZ: Oh, yes.

MR. ETTINGER: You would save money by not running in March, for example?

DR. ZENZ: I want to make sure it's clear that our maintenance operational cost assumes

the seasonal disinfection would take place, so the system is not operating year round.

MR. ETTINGER: Right. And how -- sorry. How much work to turn this thing on and off? Can you flip a switch that makes significant savings right away, or is it something that --

MR. ANDES: Savings as compared to what, because his costs were based on seasonal, not annual.

MR. ETTINGER: I understand, but say you decided to turn it off for a couple of days for some reason, would you save any money?

DR. ZENZ: Sure.

MR. ETTINGER: Okay.

MS. TIPSORD: Mr. Harley, you have a followup?

MR. HARLEY: Again, we're out of order, and I apologize for that. When you were talking to these manufactures of UV equipment, more than one as you testified, did you talk to them at all about how long it took for them for UV installations to take place on projects that they worked on?

DR. ZENZ: Yes, we did.

MR. HARLEY: And could you describe to us some of the range of -- the range that they described in terms of the time it took to install the UV system?

DR. ZENZ: Well, none of them had any experience or the size that we were talking about.

MR. HARLEY: But in terms of what they had experienced, in terms of --

DR. ZENZ: I can't recall.

MR. HARLEY: How long ago were these conversations?

DR. ZENZ: They were in 2005, maybe 2004. Three, four years ago.

MR. HARLEY: Thank you.

MS. TIPSORD: Back to Ms. Williams then.

MS. WILLIAMS: Okay. I have one more area of questions that Mr. McGowan deferred me back to you on, and I think you've answered some of it, and this is my pre-file question number 23, and the question that he didn't know the answer to was: Did you consider using a UV disinfection system design that includes automatic online cleaning?

DR. ZENZ: Well, yeah. I've answered

that question. Our cost estimate assumes automatic online cleaning.

MS. WILLIAMS: That's what I thought. I wanted to just make sure. And then the following -- the next question was whether UV lamps can be replaced during the non-disinfection season, rather than on an ongoing basis year-round.

DR. ZENZ: Well, it's true --

MR. ANDES: I'm sorry. So the question was about whether you could simply clean and replace after disinfection season.

MS. WILLIAMS: Yes, replace, primarily, is the issue, I think, but yeah. Now that we know there's online cleaning, I'm asking it more focused on the bulbs to be replaced.

DR. ZENZ: Well, I mean, it's a well-known fact that bulb cleaning and replacement schedules, they vary at different plants, and some plants do replace their bulbs principally during the winter season when the disinfection system is not being used. But our feeling was that that was not an effective way to run the maintenance on these particular facilities.

MS. WILLIAMS: Did you ask the other

plants this question that you talked to?

DR. ZENZ: Yes, yes. Those -- that was one of the issues that we talked about with these plants on their schedule.

MS. WILLIAMS: Can you tell us how many of them did it that way in the off season?

DR. ZENZ: I cannot. I can't give you an exact date.

MR. ANDES: Can you say whether the smaller systems tended to do that offseason?

DR. ZENZ: Yes. The smaller systems tended to, but the smaller systems typically do not use self-cleaning bulb systems. They use manual cleaning systems. Plus there are a much smaller number of bulbs involved. Again, the bulb replacement schedule, you have to periodically replace bulbs because they -- they're at the end of their useful life, but there's bulbs that typically burn out. Plus, there's manual cleaning facilities that -- manual cleaning has to take place from time to time.

So because we follow up the magnitude of the potential -- for the systems of pure size, we assume that the bulb replacement -- we

had ongoing operation to replace bulbs that reach their typical life span, and bulbs that fail prematurely, and we'd do this throughout the year. We want to optimize the number of personnel. We don't want to have an accumulative number of personnel. We didn't think that was smart to have a huge number of personnel in an intensive maintenance schedule during the winter and have, you know, a relatively small force during the actual disinfection season.

Typically in municipal organizations, they like to have a fairly stable labor force throughout the year. They don't like to have to bring people in for certain periods, you know, of intensive operations, and this coupled with the fact that we would have a building -- we talked about having a building place. So during the winter season, and summer season, the personnel could have access so they could perform all these functions. So our MNL costs assume a stable labor force, which is doing maintenance on the system throughout the year.

MS. WILLIAMS: So you actually think it would be a higher cost for ONM in order to do it

the other way, to do it in the offseason?

DR. ZENZ: Yes. I think it's just the more practical way to approach it.

MS. WILLIAMS: Okay.

DR. ZENZ: I think you also have a better operating system this way by having, you know, maintenance throughout the year.

MS. WILLIAMS: Okay. Last question from Mr. McGowan: Did you consider using a UV disinfection system designed with the programmable logic control system?

DR. ZENZ: Yes. Again, as I explained, you know, the District, of course, is intentionally interested in saving labor costs as much as possible. So yes, we got PLCs and all the major control points and an integrated system to integrate the whole system and touch screens and everything. So there's a substantial cost for instrumentation and control in PLCs in our cost estimate.

MS. WILLIAMS: But in theory, those also were reflected as reducing the number of personnel?

DR. ZENZ: Yes, yes.

MS. WILLIAMS: Okay. The last -- I think you answered my question nine when you discussed your response to USEPA about the tertiary filtration, so I'm going to move on to the question number 11. I don't know what happened to number ten, but number 11, "Have you calculated those costs on a unit basis, such as cost per million gallons treated or cost per household?"

DR. ZENZ: No. We were not asked to do that. We did not do that.

MS. WILLIAMS: What about the cost compared to the median income of the population?

DR. ZENZ: We were not asked to do that.

MS. WILLIAMS: I think that's all I have.

MS. TIPSORD: Mr. Harley, followup?

MR. HARLEY: Just to make sure the record is clear on this point, you testified that you did talk to manufacturers of UV about how long it took to do installations, but you don't recall the answers that they gave you.

DR. ZENZ: We talked to various manufacturers to get some idea of what the

construction schedule would be for UV disinfection facilities. All the facilities that they talked about with us were not of comparable size. We didn't think the information was useful for our schedule. So we did not -- we didn't think the information that gave us was helpful at all.

MR. HARLEY: So to tie this in, then, to the cost estimate report that you actually did, did you not include information from manufacturers in developing your estimate of how long it would take to do the installations of UV equipment at Water Reclamation District facilities?

DR. ZENZ: That's correct.

MR. HARLEY: Thank you.

MS. TIPSORD: Anything further as followup? All right. It's 11:30, and I think we're ready --

MR. ANDES: I think Albert may have --

MS. TIPSORD: Oh, I'm sorry.

MR. ETTINGER: Wait a minute. I'm sorry. I have -- I've not asked even my pre-filed questions yet.

MS. TIPSORD: That's correct. You follow the People.

MR. ETTINGER: Oh, we're breaking for lunch. I'm sorry. I misunderstood.

MS. TIPSORD: Having reached 11:30, and since the next group is the People, why don't we go ahead and break for an early lunch and try and keep it to an hour, and get back at about 12:30.

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

MS. TIPSORD: We will begin the People's questions. Ms. Headman?

MS. HEADMAN: Thank you. Dr. Zenz, my name is Susan Headman.

MS. TIPSORD: You're going to have to speak up.

MS. HEADMAN: My name is Susan Headman. I represent the People of the state of Illinois. I'd actually like to start with the letter that was introduced as Exhibit 147 during the questioning this morning. Now that letter is dated June 22nd, 2006. Is that correct?

DR. ZENZ: Yes.

MS. HEADMAN: And it's a -- your analysis of an EPA report that was issued on April

26th, 2006. Is that correct?

DR. ZENZ: Well, as I said earlier, this is a -- this is a document which CTE prepared some of the comments that are in here, and the District prepared some of the other comments in there. So some of the comments were by the District, and some were by CTE, and maybe even others I don't necessarily know about. So this was a compilation of comments from at least two sources, the District and CTE, and maybe others. I don't know.

MS. HEADMAN: But the comments are dated June 22nd, 2006?

DR. ZENZ: They are.

MS. HEADMAN: And they related to a report that was prepared for USEPA dated April 26th, 2006.

DR. ZENZ: It was comments on that report. Yeah, comments on that report.

MS. HEADMAN: Yes. And do you know did USEPA subsequently revise that report in response to your comments?

DR. ZENZ: I don't know.

MS. HEADMAN: I'd like to have a

document marked.

MS. TIPSORD: First, for the record, let's be clear that what you're -- the report you're referring to, Ms. Headman, is Exhibit 12 in the record.

MS. HEADMAN: It's Exhibit 12 in the record. That's correct.

MS. TIPSORD: Go ahead. I've been handed review of Technical Memorandum 1WQ Disinfection Evaluation Prepared on behalf of the Metropolitan Water Reclamation District of Greater Chicago, the filing of the report, October 26, 2006, prepared by the USEPA, and you want this marked as Exhibit 148?

MS. HEADMAN: Yes, please.

MS. TIPSORD: If there's no objection, then we'll mark this as Exhibit 148.

MS. HEADMAN: And in it, the --

MS. TIPSORD: Excuse me. Seeing no objection, it's Exhibit 148. Go ahead.

MS. HEADMAN: In that the witness has testified that he has no knowledge of this document, I would ask that the Board take judicial notice of this document, which is a final report of the US

Environmental Protection Agency. Dr. Zenz, in our pre-filed questions, we asked that the Metropolitan Water Reclamation District provide the revised cost study that CTE prepared to estimate the cost of disinfection at the North Side, Calumet, and Stickney plants. Is that correct, that we asked for that?

DR. ZENZ: Yes, you did.

MS. HEADMAN: And do you have a copy of that study with you today?

DR. ZENZ: No, I don't.

MR. ANDES: But we filed those in the docket.

MS. HEADMAN: They are filed in the docket. We do have copies. It's not clear to me that they have been given an exhibit number yet. They were filed on Monday of last week.

MS. TIPSORD: They were probably, then, given a public comment number when they were filed, or should have been. If they weren't given a public comment, then they should have been given a public comment.

MR. ANDES: I believe they were.

MS. WILLIAMS: I don't know if that's

how they were entered as a public comment. It was more like a filing motion.

MS. TIPSORD: Right, but John instructed that anything that comes in a rulemaking that is not a response to a motion gets a public comment number. So if it didn't, it should have.

MR. ANDES: Okay. They are listed on the docket, I know that.

MS. TIPSORD: Yeah, they're there. But I, frankly, have not had a chance to check the docket to know.

MS. HEADMAN: In any event, would it be appropriate to submit a portion of that report --

MS. TIPSORD: That's fine.

MS. HEADMAN: -- as an exhibit today?

MS. TIPSORD: If you would like to do that, that's fine. I really don't want to repeat the entire document if we can avoid it. They should be given public comment numbers. If they weren't, they will be for the ease of all of you to site them. I'll check that tonight, and I can actually email John with regard to taking that off. I do know that was a particular heavy docket name as well with pre-filed testimony and a couple of other

hearings as well.

MR. ANDES: Question, I don't have any reason to doubt that this is an EPA document, but I do have reason to doubt whether the eighth District actually received a copy.

MS. TIPSORD: Okay. Noted for the record. All right. Ms. Headman, could you tell me exactly what I'm being handed here?

MS. HEADMAN: You're being handed volume one of two of the cost study report prepared by MWRD for the Stickney plant, and volume one of two prepared by MWRD, a cost study report for UV disinfection for the North Side.

MS. TIPSORD: Are these complete copies of those two documents?

MS. HEADMAN: Yes. And in it they also include Appendix A.

MS. TIPSORD: Okay.

MR. ANDES: And when we -- for the record, when we filed all these documents on October 20th, it looks like they don't have numbers assigned yet in the system. They're classified as other.

MS. TIPSORD: Okay. All right.

MR. ANDES: And that included the documents and various appendices.

MS. TIPSORD: All right. Well, for ease of today's record, we'll go ahead and mark the North Side as Exhibit 149, and Stickney as Exhibit 150 if there's no objection. Seeing none, they're Exhibit 149 and 150.

MS. HEADMAN: Now this study is a 2008 study that updates the cost studies that you prepared originally in 2005. Is that correct?

DR. ZENZ: Well, I wouldn't refer to them as an update. I would not refer to them that way. These were separate studies. As I explained earlier in my testimony, these were Level 3 cost estimates, so they involved much more detailed -- especially in some cases with some design work, which we did not do for a Level 4 cost estimate. So they're not updates. These are separate studies under separate contract with the District that are much more detailed.

MS. HEADMAN: And so these numbers have a higher degree of accuracy --

DR. ZENZ: That's correct, as I explained earlier.

MS. HEADMAN: -- than the 2005 testimony? Now the 2008 study answers many of the questions that were in my pre-filed questions, but they also raise some additional questions. So I'd like to start with my first refiled question, 2A and D.

DR. ZENZ: Okay.

MS. HEADMAN: And I'd like to have -- to discuss your assumptions in the 2008 disinfection studies regarding average flow and electricity usage for UV disinfection plants.

DR. ZENZ: Okay.

MS. HEADMAN: Let's start with the North Side.

MR. ANDES: If I can help in this, we have a set of the assumptions printed, and we can enter that as an exhibit.

MS. TIPSORD: And I thought we weren't going to get to 150 today.

MR. ANDES: Sorry to disappoint you.

MS. TIPSORD: Oh, no I'm excited. I want to set a record.

MS. WILLIAMS: Have you figured out what we're shooting for to get a record?

MS TIPSORD: I understand that other than the landfill regs, I think I already own it -- or I should say we already own it. I think we have now surpassed Mercury.

MR. ETTINGER: Well, what do we need to do to hit the landfill record?

MS. TIPSORD: Ten years.

MR. ETTINGER: Ten years?

MS. TIPSORD: Ten years of rulemaking.

MR. ETTINGER: Fred can.

MS. WILLIAMS: We're on our way.

MS. TIPSORD: Okay. I've been handed pre-filed of the People of the State of Illinois of David R. Zenz to -- with David -- Dr. Zenz' response. We'll mark that as Exhibit 150 if there's no objection. Seeing none, it's Exhibit 150.

MS. DIERS: 151. Shouldn't we be on 151 now?

THE COURT: Oh, yes. I have my pages all messed up.

MS. DIERS: Sorry.

MS. TIPSORD: Thank you. No, no, thank you.

MS. HEADMAN: All right. So then

started with the flow rate, average flow of the North Side plant, I take it that would be 333 million gallons per day. Is that correct?

DR. ZENZ: That's correct.

MS. HEADMAN: And I believe daily electricity usage for the plant, you have here 3,182 kilowatts per hour.

DR. ZENZ: Again, just a point of clarification, that was for the disinfection.

MS. HEADMAN: For the disinfection. And could you tell me, then, how many gallons of effluent would be disinfected per kilowatt hour of electricity? Did you do the math on that?

DR. ZENZ: Not in my head. I mean...

MS. HEADMAN: And the reason I ask you to do that is that we actually worked through these numbers, but these numbers are a little bit different than the ones that appear in the report. So maybe we should just go to the report.

MR. ANDES: Which report?

MS. HEADMAN: Right now we're talking about North Side, so I believe that would be Exhibit 149. I believe that if we go to Appendix F, the page that is -- these pages are kind of oddly --

this would be page one of one, and the title on the page is "NSWRP Annual ONM Costs for UV Disinfection System and Low Lift Pump Station."

DR. ZENZ: We're at Appendix F, and page one of four?

MS. HEADMAN: One of one.

MR. ANDES: What was the title at the top again?

MS. HEADMAN: NSWRP Annual ONM Costs for UV Disinfection.

MS TIPSORD: I'm not finding that still. What was the title again?

MR. ANDES: Go to Appendix F. First there is a four-page table.

MS. TIPSORD: Right and then there's a one-page table. The four-page capital cost labeled on one page, ONM Cost Table.

THE COURT: Okay. Thank you.

MS. HEADMAN: So when you say that the electricity usage in your smaller table here means electric uses just for disinfection, you're not including any of the electricity usage associated with the lift pump or the general site usage. Is that correct?

MR. COCKERILL: That's correct.

MS. HEADMAN: Okay. So now let's look at the Calumet plant, which I believe the similar data can be found two pages later in Appendix F, the average flow.

DR. ZENZ: We're trying to find a correct page.

MS. HEADMAN: CWRP Annual ONM Costs for UV Disinfection in Low Lift Pump Stations.

DR. ZENZ: Yes, we found it.

MS. HEADMAN: Okay. And there --

DR. ZENZ: Page one of one?

MS. HEADMAN: Page one of one.

DR. ZENZ: All right.

THE COURT: And on that page, what does it show for the average flow. I believe in the left hand column under B it gives an average flow number.

MR. ANDES: Hold on.

DR. ZENZ: 305 billion gallons per day average.

MS. HEADMAN: Okay. And so that's a little different than what you show on your summary chart where you have 319, right?

DR. ZENZ: Well, they're two different numbers.

MS. HEADMAN: They're two different numbers?

DR. ZENZ: If you look at the title, it says "design average flow." That is the capacity of the plant that it was designed for, but it may operate and flow less than that, so we're calculating cost here. We looked at the actual flow data for the plant, and the actual flow which is typical at a municipal wastewater plant. So we tried to estimate the cost -- the actual cost for the existing flow at the North Side treatment plant. That's the difference between the two numbers.

MS. HEADMAN: Okay. And the electricity usage at the Calumet facility for the disinfection system is shown on Exhibit F as 69,672 kilowatt hours per day. Is that correct?

MR. ANDES: I'm sorry. Where on the form are you looking?

MS. HEADMAN: In the column entitled "Power Usage in the Cells for Disinfection Systems."

DR. ZENZ: Yeah the kilowatt hours per day are shown as 69. You are correct.

MS. HEADMAN: And how does that compare with the figures that you've given in your Exhibit 151?

DR. ZENZ: Yeah. We -- it's a different number. It's per hour.

MS. HEADMAN: Can you tell me if they are the same?

DR. ZENZ: Multiply this times 24. I don't know if they are the same or not. Do you want me to get my calculator out of my briefcase?

MS. HEADMAN: I think we're going to do one of two things. We're either going to have to work from the numbers that you filed in the report, or we're going to work from this summary sheet that you've presented to us today. And given that this was your formal report, I would be more comfortable working with these numbers.

MR. ANDES: Fine.

DR. ZENZ: Okay.

MS. HEADMAN: All right. So why don't we then start over again.

DR. ZENZ: Okay.

MS. HEADMAN: The North Side plant, I think we established that the average flows was 333

million gallons a day. Is that correct?

DR. ZENZ: Again, that's the capacity of the plant that it was designed for. Flows entering the plant may be considerably less than that, or they could be considerably more than that at any particular time. So if you also notice on that same sheet, the maximum flow is 450. That's the maximum flow the plant can handle, but only get to treat effectively for a short period time at that maximum flow. The 333 flow is -- when I say design flow, that means the plant can consistently meet permit standards and that flow, basically, forever. So I'm just trying to explain what the numbers mean.

MS. HEADMAN: Well, so the average flow is 300 million gallons per day, correct?

DR. ZENZ: Design flow is 333.

MS. HEADMAN: And the average flow would be more likely to be lower than that?

DR. ZENZ: Yes.

MS. HEADMAN: And what would that be likely to be?

DR. ZENZ: 305.

MS. HEADMAN: 305.

MR. COCKERILL: That's for Calumet.

DR. ZENZ: Oh.

MR. COCKERILL: The 333 is for North Side.

DR. ZENZ: I'm sorry.

MR. ANDES: We're going back and forth.

DR. ZENZ: We're going back and forth. I apologize for that. The design flow for the Calumet plant, as stated in my table here, is actually 319, and the number we recorded here was 305. I'm sorry.

MS. HEADMAN: Madam Hearing Officer, I wonder if we can take a short recess and see if we can do this more efficiently, just have a brief conversation amongst ourselves to see if we can -- I didn't know that they were going to be presenting new numbers today. I thought we'd work with these, and I think that it might be useful if we just took about ten minutes.

MS. TIPSORD: I'll give you five off the record.

MS. HEADMAN: Okay. Thank you.

(Whereupon, a discussion was had off the record.)

MS. TIPSORD: I'm not sure that there was a question pending. I think the request was to go off the record. So Ms. Headman, do you have a question that you can formulate?

MS. HEADMAN: I do. I believe that you just calculated the relationship between gallons of water disinfectant and electricity usage for the three plants. Is that correct?

MR. COCKERILL: Yes.

MS. HEADMAN: And that the North Side and Calumet plants were roughly -- you came up with essentially the same number, they were about equally efficient in terms of energy efficiency for disinfection?

MR. COCKERILL: That's right.

MS. TIPSORD: Could we have those numbers? If you've calculated them, let's go ahead and get those on the record.

MR. COCKERILL: Sure. I calculated for all three plants. The numbers I calculated for North Side was 0.0023 kilowatts per gallon disinfectant. Calumet was the same number, 0.0023 kilowatts per gallon. Stickney was 0.00018 kilowatts per gallon disinfectant.

MS. HEADMAN: And what was the flow rate you used for the Stickney plant?

MR. COCKERILL: 1,250 million gallons per day.

MS. HEADMAN: And what was the electricity usage that you used for the Stickney plant?

MR. COCKERILL: 9,225 kilowatts per hour. That was provided by the manufacturer.

MS. HEADMAN: All right. Let's talk about lamps. In the 2005 Level 4 study, is it correct that MWRD estimated that 1,152 lamps would be needed for the North Side facility?

DR. ZENZ: We have the advantage -- I don't recall that number. That was the -- I shouldn't be referring to our Level 4 cost estimate.

MS. HEADMAN: Yes.

DR. ZENZ: I don't -- I don't have that number in my head.

MS. HEADMAN: Mr. Andes, may I refresh the witness' recollection?

MR. ANDES: Sure. This document is -- I believe it already has an exhibit number.

MS. HEADMAN: This is attachment NN to

the Statement of Reasons.

MR. ANDES: Okay. Is there a page we're referring to here?

DR. ZENZ: You were asking me about which plant again?

MS. HEADMAN: North Side.

DR. ZENZ: North Side.

MS. HEADMAN: Page 46.

DR. ZENZ: Yes. Page 46 of the report, the 2005 report indicates 1,152 lamps, correct.

MS. HEADMAN: And in the 2008 study, is the number of lamps for the North Side plant listed at 1,680?

DR. ZENZ: Yes, it is.

MS. HEADMAN: That's about a 46 percent increase in the number of lamps. Is that correct?

DR. ZENZ: Well, sounds about right, yes.

MS. HEADMAN: How much does each lamp cost?

DR. ZENZ: I have no idea.

MR. COCKERILL: The manufacturer

quotes approximately $200. That was in 2007. That's for a replacement bulb.

MS. HEADMAN: And how often --

DR. ZENZ: Would you like me to explain why the number went up?

MS. TIPSORD: I would. I would like you to explain what the difference between what was filed with the proposal and this Exhibit 149.

DR. ZENZ: Well, as I explained earlier in my testimony, this is a Level 3 cost estimate, and --

MS. TIPSORD: Which is a Level 3?

DR. ZENZ: It's a more detailed --

MS. TIPSORD: No, I mean which document was the Level 3?

DR. ZENZ: The Level 4 estimate contains the number --

MR. ANDES: No, no, no. Tell her which one is which.

MS. TIPSORD: Attachment NN is the Level 3?

MR. ANDES: Four.

DR. ZENZ: Four.

THE COURT: Level 4. And the one for

-- Exhibit 149 is the Level 3?

DR. ZENZ: Yes.

MS. TIPSORD: Thank you.

DR. ZENZ: You guys got all the exhibit numbers memorized, I don't. But anyway, so you have to understand that we took more time and effort, more engineering time and more effort, and we actually did an actual preliminary design of the UV system. So it's a more --

MR. ANDES: For the --

DR. ZENZ: For the Level 3 estimate with the higher number of bulbs. So we gathered more information, took more information from the manufacturers. We started to look at the bulb geometry and the rest. Well, in the other estimate we didn't do that.

MS. TIPSORD: Thank you.

DR. ZENZ: You're welcome.

MR. ETTINGER: These were dated January 2008?

MS. TIPSORD: Yes. Exhibit 149 is January 2008.

MR. ANDES: Yes.

MR. ETTINGER: But the thing you filed

later, was it August, right? When did we file all these exhibits?

MR. ANDES: Testimony --

MS. TIPSORD: Attachment -- I'm sorry. Attachment NN came in with the proposal.

MR. ANDES: It was years ago.

MS. TIPSORD: With the proposal.

MS. WILLIAMS: October 26th, 2007.

MR. ETTINGER: Sorry. I'm lost in space and time yet again.

MR. ANDES: The earlier study done in 2005 was part of the rulemaking.

MR. ETTINGER: And this just came out this year?

MR. ANDES: This year.

MS. TIPSORD: Sorry for that little detour, Ms. Headman.

MS. HEADMAN: Well, actually -- so just do clarify, the Stickney Level 3 report came out September 9th, 2008, and the North Side report came out in January 2008. Is that correct?

MR. COCKERILL: That is correct.

MS. HEADMAN: Now this morning we talked about the replacement rate for these lamps,

and I believe you were projecting that they needed to be replaced once a year, and that's what's reflected in the study. When you talked about --

MR. ANDES: You got to say yes.

DR. ZENZ: Yes.

MS. HEADMAN: And when you talk about once a year, do you mean once every 365 days that the bulbs operate, or do you mean once every calendar year?

DR. ZENZ: Once every calendar year.

MS. HEADMAN: Now you also increased the number of bulbs at the Stickney and Calumet plants. Isn't that correct?

DR. ZENZ: If you don't mind, could I just double check that? I'm questioning that, and I want to make sure that that's -- you're correct.

MS. HEADMAN: And so those also increased around 40 percent?

DR. ZENZ: Yes.

MS. HEADMAN: Now are the UV lamps that you looked at in the Level 3 study the same type of lamp that you looked at in the Level 4 study?

MR. COCKERILL: Yes.

DR. ZENZ: Yes.
MS. HEADMAN: So they were medium pressure --
DR. ZENZ: Yes.
MS. HEADMAN: -- high intensity lamps.
DR. ZENZ: Yes.
MS. HEADMAN: Same wattage?
MR. COCKERILL: I don't know the answer. I don't know the answer to that. The manufacturer relied on it, but I would assume they would be the same -- same bulbs.
MS. HEADMAN: Now I'd like to focus on MWRD's Capital Cost Estimates for UV Disinfection.
MR. ANDES: Is this an exhibit?
MS. HEADMAN: Yes.
THE COURT: I've been handed a table, UV Disinfection Capital Cost Estimates. There's a Page 6 at the bottom of this. I'll mark this as Exhibit 152 if there's no objection. Seeing none, it's Exhibit 152.
MS. HEADMAN: Dr. Zenz, at the top of Exhibit 152, you'll see two sets of numbers. The first set of numbers are labeled MWRD 2005. That would be for your Level 4 study. Is that -- do

those numbers look familiar to you?

DR. ZENZ: Yes. I guess the only thing I'm not sure if -- do those include tertiary filtration, or they do not? I'll have to go back. Yeah, those costs are without filtration, yes.

MS. HEADMAN: And if you compare those numbers with the MWRD numbers in 2008, do those numbers include tertiary filtration?

DR. ZENZ: No, the numbers in 2008 do not.

MS. HEADMAN: No. Now going back to the 2005 numbers, the Level 3 numbers --

MR. ANDES: I'm sorry. 2005 or Level 4?

MS. HEADMAN: I'm sorry, the Level 4 numbers. If we would compare the North Side estimates provided by MWRD with the USEPA estimates -- and I should ask you -- are you familiar with those? You've looked at that report?

DR. ZENZ: It's been a long time since we reviewed this report. It's in 2006, so I don't exactly recall what they included in those costs, and I'm -- I strongly suspect it did not include the cost of the low lift pump station, because that was

one of the issues they were contentious about. I would really wonder what was included in their cost and what isn't.

MR. ANDES: Can you refer us to a specific number in Exhibit 12 that we're talking about?

MS. HEADMAN: If you look at Page 9, I believe.

DR. ZENZ: Yeah. They did not include pumping.

MS. HEADMAN: And --

DR. ZENZ: It says right above the table, "UV cost estimates assume that no pumping is required at any of the plants." And I've said before, this issue is addressed in both of our cost studies, and the second cost study in much greater detail. The did, actually, a hydraulic analysis, which they did not do. They did not do hydraulic analysis at our plant. They just assumed that there was no pumping required. So their cost estimate did not -- that caused a major difference in cost.

MS. HEADMAN: And in your 2008 cost estimate, what was the estimate for the cost of the lift station at the North Side plant?

DR. ZENZ: Well, let's do it on an apples and apples basis. Since they were looking at our Level 4 cost --

MS. HEADMAN: Actually, you've told us already that your Level 4 number is a better number -- I mean your Level 3 number is a better number.

DR. ZENZ: It is a better number, but we --

MS. HEADMAN: Let's use your 2008 number.

DR. ZENZ: Oh, boy. I'm going to defer to Eric. He can probably find it faster than I can. He has an inquisitive look on his face, and I think he could find it.

MS. HEADMAN: I think your summary table may provide --

MR. COCKERILL: The summary answer to that question is about the pumping methods --

MR. ANDES: It also analyzes capital.

DR. ZENZ: Yeah. In your pre-filed question, we assumed you wanted to know the cost of the pump. So that didn't include, like, the wet well and other things that go with the pump station.

MR. COCKERILL: I found it.
DR. ZENZ: Good.
MR. COCKERILL: The -- these are in June 2007 dollars. The cost for the low --
MR. ANDES: Can you tell us what page on the --
MR. COCKERILL: It's page three of four of Appendix F of the UV Disinfection Cost Study for North Side, line one of two.
MS. TIPSORD: Exhibit 149.
MR. COCKERILL: 149. The cost in June of 2007 dollars is approximately $27 million.
MS. HEADMAN: And how about -- and let's, then, look at the -- your estimate for the North Side plant, the capital costs in 2005 was $83 million. Is that correct? And that was including the lift pump?
MR. ANDES: The -- including the whole lift station assembly?
MS. HEADMAN: Yes.
MR. COCKERILL: It included all costs.
MS. HEADMAN: All costs, all capital costs to the North Side plant in your Level 4 study were $83 million?

DR. ZENZ: Yes.

MS. HEADMAN: And USEPA estimated that the costs without the lift station was $23 to $47 million. Is that correct?

DR. ZENZ: Yeah. They did it using two different methodologies. And by the way, those methodologies come from the literature.

MS. HEADMAN: And one methodology showed that the cost was $23 million, and the other showed that the cost could be as high as $47 million. Is that correct?

DR. ZENZ: Yes.

MS. HEADMAN: So that was your range they reported. And your results in the 2008 study suggest that the cost of adding a lift station to that would be $27 million?

MR. COCKERILL: That the cost of a lift station is $27 million, yes. There are other costs.

DR. ZENZ: Yeah.

MS. HEADMAN: And so even if the lift station were added to the USEPA number, it would still be lower than your 2005 cost, I assume. Is that correct?

MR. COCKERILL: Yes.

MR. ANDES: What is -- I'm sorry. If you add $27 to $47 you come up with what? Is that $74 million?

DR. ZENZ: Yeah.

MR. COCKERILL: $74 million, and it doesn't include all the costs.

MR. ANDES: Thank you. So there are other issues that also account for the difference?

MR. COCKERILL: Yes.

MS. HEADMAN: What costs are those?

MR. COCKERILL: General work costs, including the conduit and junction structures to the flow to the lowest pump stations --

MS. TIPSORD: We're losing you.

MR. COCKERILL: In addition to the lift pump station facility and the UV disinfection facility, there are also site work in other related structures to convey the flow to and from those facilities, including large flow conduits and junction chambers.

MS. HEADMAN: All right. Now let's go to the Calumet figures for 2005. You estimated the capital costs for disinfection at Calumet would be

$100 million in 2005. Is that correct?

DR. ZENZ: Yes.

MS. HEADMAN: And USEPA estimated that the cost would be $25 to $45 million. Is that correct?

MR. ANDES: Just a minute. We're getting there.

DR. ZENZ: Yes, you're correct.

MS. HEADMAN: And how much would the lift station for the Calumet facility be in -- according to your 2008 report?

MR. COCKERILL: I don't think we have an exact number for that, because we use -- because the two facilities are so close in size, we used the ratio of the flow rate. So the number we quote you back would be the 480 MGD for Calumet divided by the 450 MGD for North Side multiplied times the North Side low lift pump station cost.

MS. HEADMAN: And subject to check, would you accept that that number might be $28 to $48 million?

MR. COCKERILL: That's probably accurate.

MS. HEADMAN: Just slightly higher

than the amount for the North Side plant?

MR. COCKERILL: Yes.

MS. HEADMAN: So once again, even if we add the cost of the lift station to the Calumet plant, the USEPA number is still significantly below your estimate in 2005, correct?

MR. COCKERILL: That is true. Though again, it doesn't include the other related psyche work that we required.

MS. HEADMAN: Now again, going to Stickney, your 2005 estimate for Stickney was $358 million, is that correct, for disinfection capital costs?

DR. ZENZ: Yes.

MS. HEADMAN: And USEPA estimated that capital costs would be somewhere between $70 and $150 million. Is that correct?

DR. ZENZ: That's correct.

MS. HEADMAN: And --

DR. ZENZ: I want -- I just want to remind everybody here what I said earlier about cost estimates and the range of cost estimates. You're splitting hairs between what our cost estimates said, and what their cost estimate said. So our

cost estimate has a plus or minus, and so does theirs. So actually they're pretty close. I mean, within a range of -- we already stated -- and I don't know what the range of accuracy of their cost estimate is. We used accepted standards, and our level cost estimate -- let me find the exact number -- maybe you remember.

MS. HEADMAN: Well, do you have any reason to believe that USEPA's contractor would use methods that were not substandard?

DR. ZENZ: I have no idea what standards they would use.

MR. COCKERILL: I would say that use the Level 5 estimate. They use an equation, which is by definition, a Level 5 estimate.

MR. ANDES: And what is the -- and describe how a Level 5 differs from a Level 4 or Level 3.

MR. COCKERILL: It's basically related to the amount of information you have available to make the estimate. So if you determine an equation, you're generally using an equation based on previous work based solely on the flow rate in this case, which is what they usually have attached to the end

of their report. I would also state that because of that fact, they are using -- they have to extrapolate the cost to our larger facility -- proposed facilities.

DR. ZENZ: I want to add something, which is a direct quote right out of their report on page 60. "SAIC's estimates for UV disinfection show general agreement with those done by the MWRD, given the accuracy of cost estimates at a preliminary design costing stage."

MS. HEADMAN: But SAIC had the information available to them that you had to you at that time. Isn't that correct?

DR. ZENZ: They were doing a Level 5 cost estimate. They were not using the level of information that we were using. We were doing a Level 4 cost estimate, which I think by definition, it contains more information. We used a greater volume of information than what they used.

MS. HEADMAN: So let me understand. You were asked to share your 2005 cost study with USEPA so that they could look at it, but you did not share with them the information that they would need to assess it?

DR. ZENZ: They reviewed our report, and through -- and they did an independent cost estimate based upon like Eric said, using these equations. So they did an independent cost estimate completely different from ours that did not -- they had our information, and they chose not to use it.

MR. ANDES: Did you deny them any information they asked for?

DR. ZENZ: No.

MR. ANDES: Thank you.

DR. ZENZ: They never asked for that information.

MS. HEADMAN: Now I'd like to look at your 2008 cost estimates. Your 2008 cost estimates for the North Side plant have increased from $83 million to $103,700,000. Is that correct?

DR. ZENZ: Yes.

MS. HEADMAN: And how do you account for that difference?

DR. ZENZ: Well, again, we were asked by the District to do -- to do a more detailed cost estimate than we originally did.

MS. HEADMAN: And what did --

DR. ZENZ: And so they asked

specifically instead of doing a Level 4 cost estimate, which we did for the UAA study -- which by the way is a considerably less expenditure on their part as an engineering cost -- and the Level 3 cost estimate is a considerably greater cost. Eric, what was the total cost of the contract for doing the Level 3 cost estimates, just offhand?

MR. COCKERILL: For the North Side report, I believe it was $250,000.

DR. ZENZ: Do you recall the others?

MR. COCKERILL: Well, for Stickney, are approximately $150,000, but I'm not as familiar with those numbers.

MR. ANDES: And are those partly because they involve doing the actually building design for the facilities?

MR. COCKERILL: I would describe it as conceptual design, but yes, that's correct.

MR. ANDES: And that's not involved in a Level 4 estimate?

MR. COCKERILL: No.

DR. ZENZ: So based on that, you would expect changes in the cost estimate. But if you look at the range of accuracy of the Level 4 cost

estimate plus or minus 100 percent, when you look at the level of accuracy of our Level 3 cost estimate, they're actually -- they're within the range of the accuracy. So that actually when you say yes, $83 million is different than $103 million, but given the range of the accuracy, all the two cost estimated processes, Level 4 and Level 3, they're actually --

MR. ANDES: And isn't it a little different -- I'm sorry -- with Stickney where actually estimate is a lower cost?

MR. COCKERILL: That's right.

MR. ANDES: Stickney went from $358 down to $260.

MR. COCKERILL: Yes, that's right.

MS. HEADMAN: And what about Calumet?

DR. ZENZ: Well, your figures are correct. I mean, numerically the Calumet facility is estimated $100 million in our Level 4 cost estimate, and in our Level 3 cost estimate it was almost $110.

MR. ANDES: So that was in a margin of error?

DR. ZENZ: Yes.

MR. ETTINGER: Can I just clarify that? You say margin of error. Does your study have a particular margin of error, or is there a margin of error study done?

DR. ZENZ: Yes, yes. See, the society -- if society cost estimators, they establish criteria for a Level 5, Level 2, Level 3, and as I've said before, the difference between a Level 5 is and a Level 1 is the amount of information that's available. I can give you a much better cost estimate -- if I have a set of plans and specifications in front of me -- and this is what consulting engineers do, is have a set of plans and specifications, go to the client and say, "This is what the contractor is going to probably bid on," and even then you'll get prices higher or lower than that.

But that is a much more accurate cost estimate than any of the other levels. Why, because you have more information. I can actually look at the pipe and tell you how many feet of pipe. I can tell you how many yards of concrete, so forth and so on. So I give you a more accurate testimony. So as we go from a Level 5 estimate to a Level 1,

the accepted range of accuracy diminishes.

MR. ETTINGER: So, like, the 95th percentile of your Level 3 would be how wide?

DR. ZENZ: Well, I'll give you the definition that we use for the -- and this, again, it's not our definition. We try to correspond to the -- a Level 4 cost estimate, which is our very first cost estimate, it's called a study or feasibility estimate. Again, by advancements of cost engineering, and as an exacted deviation Range of minus 20 to plus 40. Now a Level 3 -- minus 20 to plus 40. The Level 3, because we have more information that has a range of minus 15 to plus 30. So you see, the range has narrowed because we have more information. As we go down and get more information, we finally get to, you know, plant specification. Unfortunately, I don't remember what a deviation range for a Level 1 is.

MR. GIRARD: I have a quick followup question. Dr. Zenz, looking again at Calumet, if your 2005 estimate was $100 million, and then your 2008 estimate was $109 million, wouldn't that essentially be about the same amount of money if you assume a three percent inflation rate per year?

DR. ZENZ: Yeah.
MR. GIRARD: Okay.
DR. ZENZ: Yes.
MS. HEADMAN: Now returning, finally, to the Stickney plant where the cost estimate went down considerably, can you explain the major components that caused that to go down?
DR. ZENZ: I'm going to defer to Eric here.
MR. COCKERILL: Sure. Stickney largely was related to -- the cost difference was related to the cost for the pump station going down. The method that was used in the original Level 4 estimate was closer to, you know, parametric equation-type committee, and over estimated the cost for that pump station. So when we did more detail, we found it to be considerably lower, which is true for the other two plants as well. But as those -- that equation became less accurate, the higher the flow rates became. So obviously with Stickney having a flow rate significantly more than the other two, it's error was greater.
MS. HEADMAN: I think that's all I have.

MS. TIPSORD: Okay. I have a couple of questions about Exhibit 152 before it goes on. And Ms. Headman, I'm going to have to have you sworn in to answer these. But first, let's ask the question, the -- on Exhibit 152, the MWRD 2005 numbers for North Side, Calumet, and Stickney, those come from what is attachment NN to the proposal, correct?

MR. ANDES: You're talking about the MWRD 2005 numbers?

MS. TIPSORD: Yes. Those came from attachment NN, correct? Those are your --

DR. ZENZ: Yes.

MS. TIPSORD: -- Level 4 studies?

DR. ZENZ: Yes.

MS. TIPSORD: The numbers across from those, then, USEPA 2006, are numbers from Exhibit 12, which is what -- the USEPA's review of the UAA. Is that correct?

DR. ZENZ: Yes.

MS. TIPSORD: Okay. And then the next line down, the MWRD 2008 numbers, those are from what has been admitted today as Exhibit 149 and 150? I was given to the --

DR. ZENZ: Yes.

MS. TIPSORD: Thank you. And then the USEPA in 2008 dollars, those numbers are -- do you know?

MR. ANDES: We don't.

THE COURT: Thank you. Ms. Headman, I'm going to have to have you sworn in, and you're going to have to explain what those numbers are.

MS. HEADMAN: I didn't end up asking any questions about them.

MS. TIPSORD: I understand that, but they are a part of your exhibit that you put in here so -- I and I want to know what they are. So could we have you sworn in, please?

(Witness sworn.)

MS. TIPSORD: Ms. Headman, can you tell me what those numbers are?

MS. HEADMAN: Those numbers are the numbers that were reflected in the USEPA 2006 report that has been marked as Exhibit 12, and also the same numbers that have been in the USEPA report that has been marked as Exhibit 151, I believe.

MS. TIPSORD: No.

MS. HEADMAN: Exhibit 148?

MS. TIPSORD: Yes, okay.
MS. HEADMAN: Updated using what our cost consultant described as a standard construction cost inflator from 2006 to 2008 dollars.
MS. TIPSORD: Thank you. And you were done with questions, then, of Dr. Zenz?
MS. HEADMAN: I am.
THE COURT: That moves us, then, to ELPC.
MR. ETTINGER: Well, looking at my questions here, I've got 12 listed. I've got some followup beyond that, but the first nine, I think, have been answered. So we're going to go to ten, and say in calculating the capital cost of disinfection at three plants, when is it assumed that construction will begin at each plant?
DR. ZENZ: We assume no construction date. We just give -- the dollars are given at a certain period of time. In our particular case they were June of 2008, was my testimony. So there's no start of construction date. It's just -- we're telling you if you want to purchase a UV disinfection system, with today's dollars, that's how much it would cost. Now that system might be

constructed in 2020, and you want to know how much it's going to cost in 2020. Use the engineering -- use the record index and figure out what it's going to cost you in 2020. We don't -- with we did not assume a construction date, did not.

MR. ETTINGER: Okay. Well, would it not be normal practice with present value a figure for an investment in the future?

DR. ZENZ: Yes. We presented it in my testimony present worth cost. Present worth cost assumes then that you're paying for the capital costs in June 2008 dollars, plus you're paying for -- I think it was 20 years. Was the present worth factor 20 years? I don't remember. But anyway, there's also MNL costs for every year out into the future, and we bring those all back to single payment this year and give you what we call present worth dollars, which is a very large number.

MR. ETTINGER: Wouldn't it make a difference if your plant were getting an opening in 2020 versus 2010?

MR. ANDES: Well, in the sense that the dollar value for capital costs would be higher and the dollar value for the MNL cost would be

higher for the inflation and other factors.

MR. ETTINGER: But the number would have to be present value with an interest rate to make it lower?

MR. ANDES: We wouldn't be spending.

MR. ETTINGER: No, you wouldn't be spending it then, you'd be spending it in 2020.

DR. ZENZ: Well, if the plant is constructed in 2020, you'll have to pay for it in 2020 dollars, and you'll have to also pay for the MNL costs, and we usually figure -- well, Eric and I can't exactly remember, but we think -- usually it's the annual MNL costs for electricity, labor, and all the rest.

MR. ETTINGER: Right.

DR. ZENZ: So we usually assume that that MNL cost in 20 years out in the future after the plant is constructed, and then we bring it all back using the present worth factor to give you a present worth number. So we do -- and if you'd like, you can just -- if that's confusing to you, we also can give you capital dollars, 2008 dollars, and we can give you an annual MNL cost of 2008 dollars as well.

MR. ETTINGER: So you're saying it would make no difference to your figures whether you began the plant -- or whether the plant went online in 2015 or 2025?

DR. ZENZ: Well, the numerical numbers we changed based upon inflation factors, constructions costs, and other things. But that's an absolute number, you're right. Except that we adjust it -- you know, as engineers we adjust -- we adjust numbers based upon economic realities. So if something is going to happen --

MR. ETTINGER: Someone does, but I'm still questioning how does your calculation take into account the time value of money?

DR. ZENZ: Through the use of the present worth factor and getting your present worth costs.

MR. ANDES: There are capital and ONM cost numbers --

MS. WILLIAMS: Objection. If Fred wants to testify -- I mean, I don't understand why --

MR. ANDES: I can ask a clarifying question. Are you presenting two sets of

information, capital, ONM, and present worth costs?

DR. ZENZ: Yes.

MR. ETTINGER: Well, let's -- all right. Let's -- Ms. Headman?

MS. HEADMAN: I'm just following up on your --

MR. ETTINGER: Yeah, I've got some other problems. Go ahead.

MS. HEADMAN: Dr. Zenz, did I understand you to testify to Mr. Ettinger's question that it makes no difference whether the project starts in 2015 or 2025? In terms of -- your present value calculation wouldn't be affected if the project started in 2015 versus 2025?

DR. ZENZ: The answer is of course it would change, because money -- the amount of money that you spend today is different in a numerical sense than what you spend later on --

MR. ETTINGER: Furthermore.

MS. TIPSORD: Let him finish.

DR. ZENZ: -- with what they call time value of money. I mean, this is a simple concept to understand in terms of numeric data changes.

MR. ANDES: Well, let me ask a

question for just a moment. Given that the compliance deadline in this proposal is 2011, would there be any reason for you to assume that a date 14 years out from there would be relevant? In terms of compliance, wouldn't you need to assume that, in fact, compliance would be required sometime in the near future?

MR. ETTINGER: I'm not trying to make a rhetorical question here. Let me ask -- I mean, we all agree that if I have $100 million now -- should I be -- were I so lucky -- I could put it in the bank, assuming I pick the bank carefully, I would --

MR. ANDES: Albert, are you testifying now? Because this isn't a question.

MR. ETTINGER: This is a question.

MR. ANDES: Okay.

MR. ETTINGER: I'm setting a little background, which I think we can all agree on, which is that under normal circumstances, you get interest when you put money in the bank, correct?

DR. ZENZ: (Nodding).

MR. ETTINGER: So if I put money in the bank now and waited for ten years, I would have

more than $100 million.

DR. ZENZ: (Nodding).

MR. ETTINGER: You're not denying that. Okay. So it may make a difference in terms of the total cost of the plant, whether you are to build it in 2011 or 2031. Is that correct?

DR. ZENZ: Yes, it could make a difference.

MR. ETTINGER: And getting the interest rate right would be an important factor in doing that, in making that calculation?

DR. ZENZ: That's correct.

MR. ETTINGER: Okay. Now then, I am looking at your testimony, and I'm just a little confused. On Page 8 of your testimony, you say "All costs are in June 20, 2008 dollars based on a 30-year life, a three percent interest rate, and a three percent inflation rate." Could you explain that?

DR. ZENZ: Well, you just helped us remember what the present worth value is. It's a 30-year present worth factor.

MS. WILLIAMS: It says 20.

MR. ETTINGER: Did I misstate? I'm

sorry.

DR. ZENZ: Well, I guess I was right after all. It was 20 years. Yeah, I mean, you know, when we -- you know, when you're trying to bring dollars to present time, what you have to assume is that -- as you stated previously, that that money could have been invested in an interest rate. So that's one -- why the numbers change, because you could've gotten a better -- you could've -- instead of building a UV system, you could invest it in a bank and get money back. The second issue is inflation. That's why we use the inflation factor. I mean, just -- prices go up, gas goes up, labor goes up.

MR. ETTINGER: Well, and this is -- did you assume that the inflation rate would be the same as the interest rate?

DR. ZENZ: No. The interest rate was -- we had -- you know, when we -- we don't make these decisions on a willy-nilly basis. The District typically gets three percent on short-term investments, and three percent is typical number that engineers use, so we felt that that number was correct. Inflation rate, we looked at -- there's a

variety of inflation indices which are out there, and actually for the period that we were looking at, they were actually a little bit less than three percent. So we actually -- I can give you the exact quote here if you're interested in the details. Give me a minute to find it.

MR. ETTINGER: Well, let me throw something out on the table -- well, go ahead.

DR. ZENZ: Yeah. Just to close the loop on it, we looked at three common inflation indicators, gross domestic product equator, consumer price index and producer's price index. And for the last ten years, they've been 2.6 percent, 2.9 percent, and 2.6 percent. We use three percent because we thought this was a reasonable yet conservative number. So that's what we used. That's how we arrived on it. And again, repeating most -- for most District calculations, we use an interest rate of three percent, and that's their typical actual rate that they usually receive on short-term investments, and that, of course, changes depending on the investment market. So that's how we reach a decision on those two numbers.

MR. ETTINGER: Okay. Well, I'm

confused further. If we look at Exhibit 149 on Page 44 --

MR. ANDES: Is that the North Side?

MR. ETTINGER: This is the North Side.

MR. ANDES: Page 44?

MR. ETTINGER: Right.

MR. ANDES: Okay.

MR. ETTINGER: In the first paragraph, is states "In order to develop a net present worth value for comparison to other alternatives with different MNL costs, a present wort factor of 23.17 was used for all present worth calculations based on a nominal 4.375 percent interest rate for 20 years with a 3 percent inflation factor." So could -- frankly, could you --

DR. ZENZ: I'm going to let Eric answer that.

MR. COCKERILL: Sure. I can answer that. When we first developed the reports, we didn't have information from the District on their actual investment rates. So we used the Water Resources Act rate, which at that time was the 4.375 that was -- subsequent to that, the District, in some of their other cost estimates, provided the

number for their actual investments return, which is 3 percent. So that was why this has been changed.

MS. TIPSORD: Go ahead, Ms. Headman.

MS. HEADMAN: In your 2005 study, I take it that you used an entirely different --

DR. ZENZ: I don't honestly recall.

MS. TIPSORD: And this is attachment NN?

MS. HEADMAN: NN.

DR. ZENZ: We used -- oddly enough, we used exactly -- we used a 3 percent interest rate and a 3 percent inflation factor for our Level 4 cost estimate. I found that on Page 44 of our report.

MR. ETTINGER: Wait a minute. Which would --

MS. TIPSORD: Attachment NN.

DR. ZENZ: NN. Yes, thank you.

MR. ETTINGER: So they -- the old one used 3 percent, 3 percent, the new one uses 4.8 and 3 percent?

MR. COCKERILL: That's -- that's correct. And then the testimony went back to the 3 percent to make it consistent with that previous

support and the actual --

MR. ETTINGER: Help me out, guys. What numbers do you want to use?

MR. COCKERILL: Three percent.

MR. ETTINGER: What is your testimony, 3 percent and 3 percent?

MR. COCKERILL: Yes.

DR. ZENZ: Three percent is what my testimony is.

MR. ETTINGER: So your testimony is that the Water Reclamation District gets no real earnings on any of this money? Once you take inflation rates into account, the Water Reclamation District is breaking even on this.

MR. ANDES: I don't think --

DR. ZENZ: Well --

MR. ANDES: He stands by the numbers he gave you.

MR. ETTINGER: Okay. Great. Thank you.

MS. TIPSORD: Go ahead, Ms. Headman.

MS. HEADMAN: So Dr. Zenz, do I understand, then, that you stand by both numbers, the 3 percent interest rate that's stated in your

testimony and the 4.875 percent rate that is in the study on which your testimony is based?

MR. COCKERILL: For the calculation of present worth value, which should only be used to compare alternatives, and not as an actual value of facility. Depending on which basis you want to discount your future valued money, they're both correct. The District -- the more accurate number for the District, I would say, is the 3 percent discount factor, or interest rate, because that's the value they get for their investments.

MR. ANDES: And that was used in the testimony?

MR. COCKERILL: That was used in the testimony. That was reported in the testimony.

MR. ETTINGER: Okay. Are you done, Ms. Headman?

MS. HEADMAN: Yes, I am.

MR. ETTINGER: Okay. Now for something completely different, pilot plants. What's a pilot plant?

DR. ZENZ: Well, it can be something as small as plexiglas reactors in the laboratory where you bring in wastewater effluent that you put

through a tester, or as big as a facility which is big as a full scale facility that's being operated at some small treatment plants in the suburbs someplace. So it really depends on -- it depends on site-specific factors in terms of, you know, what -- you know, how much money is at stake in the capital cost and in other factors. Scale -- you know, how well can you scale up from a laboratory to a full scale unit for this particular type of process. There's always issues like that.

MR. ETTINGER: Okay. For the money we're talking here, we're not contemplating an HL model, are we?

DR. ZENZ: No.

MR. ETTINGER: So the -- what do you contemplate building as a pilot plant?

DR. ZENZ: Well, you know, quite honestly, we have not been asked to look at any -- look at that issue in any detail whatsoever. So, I mean, I would be sitting here speculating wildly as to what should or should not be done in terms of a pilot plant facility. I'm sure when the District -- when it embarks on -- it would take some great care to figure out an answer to your question. But I'm

not going to speculate here what that would be.

MS. WILLIAMS: May I ask a followup?

MR. ETTINGER: I'm going to be playing with the pilots for a little while.

MS. WILLIAMS: I just want to understand how you know it's been two and a half years.

DR. ZENZ: I'm sorry. I didn't hear.

MS. WILLIAMS: How do you know it's going to take two and a half years if you really don't know what you're going to do?

DR. ZENZ: Well, we know that it's going to be a large scale facility because of the amount of dollars here which we've been talking about, which is hundreds of millions of dollars. So it's going to be a large-scale facility. As I went through in my previous testimony, we figured they're going to have to hire a consultant to design it, and then it's going to be a -- it's going to take some construction time to build this full-scale facility. And I think 18 months to design and construction is a fairly short time for a full-scale power facility. Again, there's no cushion.

MR. ETTINGER: I'm sorry. What's a

full-scale pilot facility?

DR. ZENZ: Well, I have no idea how big this would be, but it would be something -- in the order of an MGD size, million gallons per day -- it would be at least probably one MGD.

MR. ETTINGER: How big is the Hanover Park plant?

DR. ZENZ: 1.5 MGD.

MR. ETTINGER: Can't you just look at it?

DR. ZENZ: No, no. There's more to it. You know, I don't want to get into all the details, but you're trying to get information for design and operation, so you have to think about what type of flow rates are you going to look at, what's the range of flow rates you're going to look at, and the size of the facility accordingly. You also have to -- in power plant facilities, you have to plan much more flexibility in terms of what you can do, because you don't know -- you know, what is the -- what is this UV facility going to -- you know, how much flow can it really take and meet the effluent disinfection targets. We really don't know the answer to that.

That's the idea of why you're doing the pilot plant. So you want to have -- you want to have the ability to -- for the pilot plant to operate under a range of flow rates. UV geometry, of all places -- well, you can make a decision up front exactly what the geometry is going to be without knowing. So you're going to probably want to be able to change the geometry. You want flexibility, so you're going to move some things around.

You know, so you know there's a lot of issues that have to be addressed in a pilot plant design. It's not an easy facility. You don't just call a manufacturer and say give me a 1 MGD facility and I'm going to test it. No. It's going to be something that's going to allow, you know, some range, you know, try different configurations, different UV dosage rates, and then number of bulbs and configuration of bulbs. So that's a fairly complex issue, and to have to be addressed and designed is not a simple matter.

MR. ETTINGER: Did they build a pilot plant before they built the Grand Rapids plant?

DR. ZENZ: I have no idea.

MR. ANDES: Do you know what size Grand Rapids is?

MR. ETTINGER: Do you know if they built a pilot plant before they built a plant in Dublin, 250 million gallons per day?

MR. ANDES: Is that smaller than any of the ones we're talking about here?

MR. ETTINGER: Not much.

MR. ANDES: Really?

MS. TIPSORD: Wait a minute. You can't ask Albert the question. You can ask the witness the question.

MR. ANDES: He's providing the evidence about Dublin.

MR. ETTINGER: I asked him whether he'd study the Dublin plant --

DR. ZENZ: No.

MR. ETTINGER: -- and his answer is no. And why did you decide you needed three pilot plants?

DR. ZENZ: Well, in the wastewater treatment business, each plant has its own unique wastewater. I don't think -- if there's anything that I've learned in this business over the years is

it's difficult to make predictions from what one guy does and from what you do. And because wastewaters are so unique and they have different metal concentrations and different BOD concentrations, they go on, and on, and on. And again, we're talking about some of the, probably, largest facilities that will probably ever be constructed in the United States. And so you -- if you're going -- if you want to get the most cost effective facility that's going to do the job at the lowest cost and do the job, then you want to do each individual treatment.

MR. ETTINGER: Do you generally build a pilot plant before you build a sewage treatment plant?

DR. ZENZ: No.

MR. ETTINGER: I had a few other questions here. These -- I'm sorry. This'll overlap a little into the other testimony relating to other costs and studies, but there's no good way to break these down, so I'm going to have to, kind of, deal with them the best they can, because they are, sort of, linked issues. On Page 1 of -- I'm looking at Exhibit 149. I like the North Side plant

study because it's shorter.

MR. ANDES: We can give you some other ones that are shorter.

MR. ETTINGER: No, no. It says, "However, the exclusion of --

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

MR. ETTINGER: Page 1 of the executive summary. It says "The exclusion of tertiary filters from this report should not suggest that tertiary filters would not required in the future to move stricter suspended solids or phosphorus limits." Are you anticipating stricter suspended solid levels?

DR. ZENZ: We have been involved doing planning studies for the Water Reclamation District, and these studies go out, to some cases, as far as 2040, and we have to make predictions on what we think might happen in the future. And yes, we go out that far. We do sometimes -- and we have assumed that an existing suspended solid limits will be lower in the future than they are now.

MR. ETTINGER: Now same question as to phosphorus limits. Do you anticipate phosphorus limits will be stricter?

DR. ZENZ: In our planning studies for the District, we assume that phosphorus limits will be imposed in the future.

MR. ETTINGER: If you put these tertiary filters on the plant to help you with your UV, would it help you meet a phosphorus plant in the future?

DR. ZENZ: Yes.

MR. ANDES: Do you know -- I'm sorry. Do you know if that would be sufficient, phosphorus --

DR. ZENZ: Well, you used the word "help," so I assume that -- no, no. By itself, no.

MR. ETTINGER: Well, we don't know what the phosphorus limits would be, do we?

DR. ZENZ: No. Fair enough.

MR. JOHNSON: One rulemaking at a time.

MR. ETTINGER: That's the next proceeding. I'm just trying to find out the language.

MS. WILLIAMS: I don't think it's next.

MR. ANDES: I'm just going to ask if

we can use your position as to a level.

DR. ZENZ: To a more direct answer to your question, certain low phosphorus limits can only be met by having filtration in addition to other limits.

MR. ETTINGER: Actually, it looks like more of my questions are already answered than I anticipated. Would people want to take a five-minute break here and then I can conclude almost immediately?

MS. TIPSORD: I was hoping to finish with Dr. Zenz.

MR. ETTINGER: All right.

MS. ALEXANDER: But if you need to if you need to look through some stuff -- no, no, no. That's okay. If you need to look through some stuff, let's go ahead and take ten minutes now and we'll do that then. Go ahead. Take ten minutes.

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

MS. TIPSORD: Mr. Ettinger, we were with you.

MR. ETTINGER: Yeah. I want to get

back to these pilots just a little bit more. Where do you expect the pilots to be built?

DR. ZENZ: Well, they would be built right at the plants themselves to make easy access to the effluent.

MR. ETTINGER: So you'd have a separate pilot of about one million gallons per day at each of the plants?

DR. ZENZ: I -- that's just a guess on my part as to what the size would be. But yes, I would think it would be in that order.

MR. ETTINGER: And it would be taking the particular sewage that's currently going to that particular plant?

DR. ZENZ: The effluent from that particular plant.

MR. ETTINGER: I'm sorry. The effluent from that particular plant.

DR. ZENZ: We'd have to find out a spot where there was access to the effluent conduit. I'm making some assumptions here, but probably a pumping facility would be required.

MR. ETTINGER: I have one last thing. On Page 42 of Exhibit 149, you have a basis of

opinion of capital costs. It has down here "UV disinfection. UV transmission, 65 percent minimum for IEPA standard."

MR. ANDES: We're getting there. Okay. We're there.

DR. ZENZ: We're there.

MR. ETTINGER: Okay. How did that affect your cost estimates?

DR. ZENZ: Well, as I stated before earlier in my testimony, one of the issues was the UV transmission. When we did our Level 4 cost estimate, we had laboratory tests, but a very limited amount, and we only did tests for, I think, two weeks. We found that some of the transmissions were less than 65 percent, hence, we thought that effluent filtration might be a good idea. So that's why we included cost for effluent disinfection -- effluent filtration in the Level 4 cost estimate, which was done earlier.

But here -- and this is a correct statement -- the -- you would have a very difficult time getting approved for a UV disinfection system for effluent that had a transmission below 65 percent. But we found that, based on more testing

that was done, this did not seem to be the issue we thought it originally was. Therefore, we did not include effluent filtration in our Level 3 cost estimate, which was our most recent cost estimate. So this is why this is presented the way it is.

MR. ETTINGER: Okay. It wouldn't affect your cost if that number were 55 or 70 instead of 65?

DR. ZENZ: If it was lower than that, if the -- we would -- we'd have to do something in addition to UV disinfection. We'd have to put in some kind of proprietary process, probably effluent filtration, and that cost would have to be added on. It if it was -- if it was if the 65 percent minimum was not met, then the cost would go up.

MR. ETTINGER: So if a higher minimum were set, then the cost would go up?

MR. ANDES: I'm sorry. If the Agency set a higher minimum?

MR. ETTINGER: Right.

MR. ANDES: If the Agency said you had to meet 70 percent?

DR. ZENZ: I don't recall the laboratory data enough to say whether its -- the

70 percent would effect the numbers consistent above 70.

MR. COCKERILL: I don't think they were consistently above 70 percent.

DR. ZENZ: So to answer -- we -- our recollection of the data is that they were not consistently above 70 percent. So if the Agency should raise the number, we'd probably have to start looking at effluent filtration as an addition to a system and considerable costs.

MR. ETTINGER: And lowering the number to 60 percent wouldn't affect things, or would it?

MR. COCKERILL: I think you have it reversed. Lower is worse. So lower as the filtration.

DR. ZENZ: Oh, yeah, yeah, yeah. Thank you, Eric. We got our --

MR. ETTINGER: I'm probably confused too.

MR. ANDES: Eric do you want to go ahead?

MR. COCKERILL: Sure. This is --- UV transmission -- or UV transmissivity is essentially a measure of how much of the light passes through a

certain amount of the water. So it's how much of the UV radiation penetrates the water. So a higher percentage is better. More of the radiation is hitting -- is getting through the water and hitting the target. So, hence, the lower the number the worse. That means you have to increase the amount of energy you're putting in the water in the equivalent UV dose to the target organism. So I think the train of your question was if this number was differed, would it change the cost estimate. If the number is lower, it increases the cost.

MR. ETTINGER: And if it were higher?

MR. COCKERILL: I believe that IEPA requires you to design 65 percent.

MR. ETTINGER: Thank you. That's all.

MR. ARMSTRONG: A few quick questions. Andrew Armstrong for the People of the State of Illinois. Still on Exhibit 149, I had a question about Page 45 at the bottom, the definition of contingency, and the first sentence reads "Consistent with AACE guidelines and District policy, the contingency factor of 30 percent has been added to the OPCC to cover unknown costs associated with the project," and I assume AACE is

the Association for the Advancement of Cost Engineering?

DR. ZENZ: That's correct.

MR. ANDES: Can you site any specific document that would have AACE guidelines on contingency?

MR. COCKERILL: I think -- I believe it's the same document that we referenced before with the guideline classifications.

DR. ZENZ: Eric is saying that he thinks it would be in this document, the Association for the Advancement of Cost Engineering, recommended practice number 18R-97.

MR ARMSTRONG: Is there a title for that?

MR. ANDES: Yeah. We can provide it for the record.

MR ARMSTRONG: That would be great. Thank you. Just one more question then. On Appendix F, the second page of Appendix F on the North Side, the estimate at the bottom under subtotal, there are several line items.

MR. ANDES: It says on capital cost?

MR. ARMSTRONG: Yes, yes. This

capital costs for the general site work. There is GC markup on subs of five percent, effluent of 7.5 percent. Contractor overheaded profit of 15 percent, a plain level contingency of 30 percent, legal and fiscal fees of 50 percent, and then engineering fees of 20 percent. My question is: Are all these line items consistent with AACE guidelines?

MR. COCKERILL: I believe that the AACE doesn't go into detail on -- if you go through them one at a time, the GC markup on subs, that's dependant on your method of estimating. That is the industry standard. The effluation for the midpoint of construction, again, this is depending on your method of estimation, but I don't believe the AACE provides a standard of that. And the same issue with the contractor overhead and profit markup is, there's not a guideline that recommends that, but it is an industry standard for this type of cost estimate. The plan level contingency we just discussed, and then the legal and fiscal fees and the engineering, are again, are not an AACE guideline, but they're more what I would call an industry standard practice to include those in the

estimate.

MR. ALEXANDER: When you say an industry standard of practice, is there any document you could site to me that would show the industry standard?

MR. COCKERILL: Well, it's not a published standard, is what I'm trying to differ from the Agency recommended practice document. There's numerous cost estimating textbooks and other literature that would reflect those same types of markups.

MR ALEXANDER: Could you give me an example of one of the textbooks?

MR. COCKERILL: Not off the top of my head.

MR. ANDES: We can provide further information on that as well.

MS. TIPSORD: Mr. Harley?

MR. HARLEY: You described pilot projects that could run even -- almost in a laboratory setting. To your knowledge, has the Water Reclamation District commenced any pilot projects on any scale to evaluate different disinfection options?

DR. ZENZ: I have a very informal knowledge --

MR. ANDES: Let me stop you there. I know that they have, and we can have people from the District testify to that. I don't think that's an issue to him, but this has -- is going on disinfection, and we can have a District witness talk about that further if you'd like.

MS. WILLIAMS: Do you mean, like, Mr. Granato?

MR. HARLEY: Who would that be? I'm not sure I saw that --

MR. ANDES: I think Dr. Granato could speak about those, and he'll be up tomorrow.

MR. HARLEY: I believe your witness was about to start answering that question, and because we've already been speaking about pilot projects and how that would add 30 months to the front end of any execution of installation and cost as well, I would like to hear what this witness has to say about how what may be going on in the District right that now may have influenced the way he then evaluated pilot projects for purposes of his cost estimate.

DR. ZENZ: All I know is -- and I hope I'm stating this accurately -- is that there is a pilot study, which has not commenced yet and is still under construction. The pilot plant is still under construction at the Hanover Park plant.

MR. HARLEY: And that's a UV?

DR. ZENZ: Yes. That's as much as my knowledge as I can testify to.

MR. HARLEY: Just one more question, if I may. Assuming that it does take eight years, and hypothetically Mr. Andes succeeds in this rulemaking beyond his wildest dreams, and the Board concludes that there's no requirement at this time for disinfection at all.

MR. ANDES: I don't even know where to object to that. No comment.

MR. HARLEY: And then it's time for another review in 2012, and based on significantly greater recreational use of these waterways, we now then, again, face the prospect that the District will have to disinfect, and then we would be facing eight years from 2012 before we would be able to see actual limitation of disinfection in District facilities?

MR. ANDES: I -- I lost the train on that.

MR. HARLEY: He -- I think your witness is prepared to answer the question. I'm not asking you to answer, Mr. Andes.

DR. ZENZ: Well, I mean, you know, you -- the premise in the question was that the Board would pass an order which required some kind of effluent disinfection standard for the District, and he said "Well, if you add eight years to that, our schedule, it would turn out to be 2020," and your math is correct. I would only go on further to state that the issue is when -- you know, when does this -- all this regulatory requirement kicks in and when would the process begin to meet that new standard. But in terms of your math, I think it's correct.

MR. HARLEY: And just one other clarifying question for the record. If a pilot project were not necessary -- and I do believe it is -- the Illinois EPA filed a proposal rule in 2007, which anticipated compliance by the conclusion of 2011, which is an '07, '08, '09, '10, basically a four to five-year period. If you eliminated your

pilot project, wouldn't you basically be in a four to five-year period for installing UV equipment at your facilities?

DR. ZENZ: Well, you know, subtracting, you know, two and a half years from our estimate, the other math that you did is all correct. I think the issue, then, is when did the -- would there be an effect -- not having the pilot project information, would there be an effect on the design time, and the answer is I'm not sure. There's a possibility that that -- that not having pilot plant information may lengthen the design process, simply because you have more unknowns and there'd be more study time required in the initial design process to come up with a design, especially if that -- especially if that standard was different than the standard 400 count per 100 ML standard, which is typically in the industry.

MR. ANDES: If I can ask a followup, would it ordinarily be a recommended practice to start designing a facility when you don't know what the final standard is going to be or if, in fact, the Board will be adopting it?

DR. ZENZ: Well, I mean, you know, the

client starts the whole design process, and he'll make a decision, then, when that process would begin, and I would think he would expect all the -- all the decisions that have been made, and there's no other -- no shoes are going to hit the floor and then start the process to begin that design. So I would think that there would be some delay.

MR. HARLEY: Thank you.

MS. TIPSORD: Anything further for Dr. Zenz? Thank you very much.

DR. ZENZ: Thank you.

MS. TIPSORD: Your next witness, Mr. Andes. Could you pronounce your last name for me one more time? I promise I'll get it better.

MR. KUNETZ: Kunetz.

MS. TIPSORD: Kunetz.

(Witness sworn.)

MS. TIPSORD: And do we have a copy of his testimony?

MR. ANDES: I do.

MS. TIPSORD: If there's no objection, we will mark the pre-filed testimony of Mr. Kunetz as Exhibit 153. Seeing none, it's Exhibit 153. And I believe we start again with IEPA.

MS. WILLIAMS: Good afternoon, Mr. Kunetz. I guess first I would like to ask you to explain briefly your role in the master planning process for the District.

MR. KUNETZ: Okay. I am the assistant chief engineer in the engineering department. I participated in the interview panel to select the consultant to prepare the in infrastructure and feasibility studies from which the master plan was derived. I was also, at the time, supervisor of the project manager who served as the direct liaison to the engineering consultant who prepared the studies. I participated in workshops, and participated in the decision making process.

MS. WILLIAMS: And is a master plan being prepared for the District's Lemont facility?

MR. KUNETZ: There is not.

MS. WILLIAMS: Can you tell us why?

MR. KUNETZ: The -- there is a study being done now, actually preliminary design, to turn the Lemont plant into a pumping station.

MS. WILLIAMS: Is the District's master planning process subject to public notice and comment? This is pre-filed question number two now.

MR. KUNETZ: It is not. These are internal planning tools.

MS. WILLIAMS: And were the use attainability studies for the Chicago Area Waterway and Lower Des Plaines River underway when these master plans were being developed?

MR. KUNETZ: I'll answer that request by telling you the dates that the master plans were under development, since I don't know the dates of the UAA studies. The master plan study for the Stickney Water Reclamation Plant was in progress from approximately April 2003 to February 2005. The master plan study for the Calumet plant was in progress from approximately October 2003 to April 2006. The master plan study for the North Side plant was in progress from approximately November 2004 to July, 2007.

MR. ANDES: Can I follow up? Can you tell me, Mr. Kunetz, when did the whole master planning process start?

MR. KUNETZ: Initial discussions within the District for the need to develop such master plans started in the 2000/2001 timeframe.

MR. ANDES: And can you explain a

little bit about -- you talk about these documents in internal tools, I believe, in the engineering department. Can you explain a little bit about what they are, how they're used, and also how they tie in eventually to the publicly available for the District?

MR. KUNETZ: We use the master plan as a planning tool to determine what the treatment plants need to look like in -- within the term of the planning horizon. We chose the year 2040 as our planing horizon, and it gives us a roadmap on how to get to that point, what are the projects that need to be done, and what order do they need to be done in, and then approximately what is going to be the cost of these projects.

So it is used as a planning tool for us to know which projects need to be done in the particular order, because some processes need to be in place before another process can be rehabbed or built, and it also gives us a budgetary planning tool so that the finance people within the District can have some sort of long-term sense in how much money we need to spend in the future.

MS. WILLIAMS: So when DR. ZENZ

testified earlier about looking into the future towards 2040 and believing that the District needed to look at the possibility of total suspended solids limits or phosphorus limits, is that part of what you're talking about?

MR. KUNETZ: It is. We looked at the year 2040 planning horizon. The base plan was established assuming that the regulations -- the effluent limitations would stay the same, but we looked at what would be the potential flows and loads at that time, how would population or commercial use change in the future that the loads or the flows coming to the treatment plant may change, and what we would need to do to meet current effluent standards. That was our base.

In order to be prudent with our planning, we also took out a crystal ball and said "Well, what if the IEPA makes more stringent effluent standards, what if the IEPA decides that we need to have a certain amount of nutrient removal. What if?" And we used that as a tool so we could establish within the real estate of our plants where such processes would have to be placed so that they could effectively be inserted into the flow train so

as not to take a valuable real estate with the current process only to know that in the future possibly something would come up.

MS. WILLIAMS: So the crystal ball did not anticipate that the Agency would want to see bacteria water quality standards or effluent disinfection requirements out in that, right?

MR. KUNETZ: It looked into to the extent of if we needed to do disinfection, where would we need to locate this within the plant property. So we did block out an area for potential future disinfection.

MS. WILLIAMS: But not from a financial standpoint, just from a physical standpoint. Is that what you're saying?

MR. KUNETZ: That is correct.

MS. WILLIAMS: And then how did you come up with this list of non-master plan projects? That's Attachment 4.

MR. KUNETZ: There's two ways that we look at as we're planning and determining what projects will be needed at our treatment plants, and one of them -- one of the steps is to form a study, which the master plan process was part of that

study. The other way we do it is through routine and normal communications internally with their maintenance and operation staff and the engineer department. Discussions of issues that are raised, we have where we discuss potential issues, projects, that may come up or that need to be addressed, and so through internal discussions we generate an annual list.

MS. WILLIAMS: I think that's all I have for this witness. Thank you.

MS. TIPSORD: Okay. Then we move to the People. Ms. Headman?

MS. HEADMAN: Thank you. Susan Headman. I represent the People of the State of Illinois in this proceeding. In our pre-filed questions, we requested copies of all of the master plans for the Stickney, Calumet, and North Side plants, and I believe that you provided those to us. Is that correct?

MR. ANDES: I believe those have been provided.

MS. HEADMAN: And have those been put on the record?

MR. ANDES: I don't recall.

MS. HEADMAN: I don't believe those have been put on the record.

MR. ANDES: I know we have them in electronic format.

MS. HEADMAN: Let me ask you Madam Hearing Officer, would you like the entirety of the master plans placed in the record, or I have some selected portions that I would be presenting as exhibits. Would that be sufficient?

MS. TIPSORD: What does everyone else think?

MS. WILLIAMS: Did we reference the website? Is that how we handled that?

MR. ANDES: The budget books are on the website. The master plan is not. I do have a disc.

MS. TIPSORD: Let's go ahead and --

MR. ETTINGER: We can give a higher exhibit number if we let her introduce them individually.

MS. TIPSORD: Well, why don't we admit the disc as an exhibit, and then we'll also admit your portions as exhibits as well, and that way -- because we are trying to get those numbers up, right

folks? We really want to set a record that'll never be met.

MS. WILLIAMS: Is there just one disc? Is there some -- oh, is there more than one disc?

MR. ANDES: I have several. We can burn more if you want.

MS. WILLIAMS: No. One is good.

MS. TIPSORD: I've been handed a CD ROM, Metropolitan Water Reclamation District of Greater Chicago, September 9th, 2008, North Side master plan.

MR. ANDES: I believe it has the other information on it, too, though.

THE COURT: And the other information as well. And we'll mark as Exhibit 154 if there's no objection. Seeing none, it's Exhibit 154. I've been handed Executive Summary, and this is for the Stickney MWRP. We will mark this as Exhibit 155 if there's no objection. Seeing none, it's Exhibit 155.

MS. HEADMAN: Mr. Kunetz, do you recognize the document that's been marked as Exhibit 155?

MR. KUNETZ: I do.

MS. HEADMAN: Is that the executive summary for the Stickney plant master plan?

MR. KUNETZ: It is.

MS. HEADMAN: Could you read the first several sentences that are highlighted in yellow?

MR. KUNETZ: "The master plan is the final report prepared by Black and Beach Corporation and Greeley and Hanson, LLC, in connection with the infrastructure and prophecy and feasibility study for the Stickney MWRP."

MR. ANDES: Slow down.

MS. TIPSORD: Thanks.

MR. KUNETZ: "It is a prioritized master plan that includes a summary of all the documents presented during the study. It presents the consultant team's conclusions regarding existing conditions, future needs, and recommended improvements, including opinions of construction costs for budgeting purposes and a staging and scheduling plan for implementation."

MS. HEADMAN: Now could you turn to the next page, please, and could you please read the highlighted section through the bulleted items?

MR. KUNETZ: "In the initial report,

the consultant team confirmed" -- I'm sorry. Do you want me to read that or the --

MS. HEADMAN: All the material highlighted in yellow.

MR. KUNETZ: "In the initial report, the consultant team confirmed that the eight areas identified at the onset of the project are the areas in greatest need for improvement. These areas of concerns are preliminary primary treatment, treatment of the pump vac from TARP, sludge thickening, digester gas utilization, blowers and processed air supply systems, nutrient control, biosolids processing, effluent disinfection."

MS. HEADMAN: So the consultants identified effluent disinfection as one of their concerns. Is that correct? That's the last item on that list.

MR. KUNETZ: According to this list, it says it was one of the areas of concern.

MS. HEADMAN: Now in my pre-filed questions, I ask whether or not you've been involved in the MWRD's capital improvements planning process. Have you been involved in that process?

MR. KUNETZ: Yes.

MS. HEADMAN: And when did you first get involved in that process?
MR. KUNETZ: You're asking a different question than what's in your pre-filed question.
MS. TIPSORD: She's on question three.
MS. HEADMAN: I'm on question three.
MS. TIPSORD: She skipped two and went to three.
MS. HEADMAN: In response to IEPA's questions, I think you've covered the material in Item 2.
MR. KUNETZ: Okay.
MR. ANDES: If I can -- I'm sorry. It's okay. I'll have a followup question after that.
MR. KUNETZ: Okay. Here we go. Yes, I have been.
MS. HEADMAN: And when did you first get involved in that process?
MR. KUNETZ: 2005.
MS. HEADMAN: And what was your role in the capital improvements planning process?
MR. KUNETZ: As the assistant engineer, I evaluate and gather information on

various projects that may be of need for improvements at our treatment plants, and determining which projects need to be done to budget and approximate year for implementation.

MR. ANDES: Then to follow up, I'd like to bring back, Mr. Kunetz, to the executive summary document you were just referring to with the areas of concern, including effluent disinfection, and I wonder if you could read the paragraph about effluent disinfection on page ES13.

MR. KUNETZ: "Depending on the final outcome of the use attainability analysis for the Chicago Area Waterways, disinfection may be required at one or more of the MWRDGC's largest water reclamation plant, North Side, Calumet, and Stickney. An assessment to determine the disinfection technology that would be the most appropriate for application at the District's three largest water reclamation plants is underway as part of the master planning study for the North Side water reclamation plant."

MR. ANDES: Thank you.

MS. HEADMAN: Now, Mr. Kunetz, I'd like to direct you back to the second page of that

summary. Now just to review again, the consultant team identified areas of concern that included effluent disinfection. Is that correct?

MR. KUNETZ: That's what the statement says.

MS. HEADMAN: And then what does the next sentence say?

MR. KUNETZ: Please point out where you are at.

MS. HEADMAN: The sentence that begins with "The District's management team."

MR. KUNETZ: Yes. "The District's management teams confirmed that these were the primary area of concern, and authorized the consultant team to provide further evaluation."

MS. HEADMAN: I think -- actually, please continue reading the next sentence.

MR. KUNETZ: "Concept design reports, CERs, or in one case, a concept overview report, COR, were prepared and submitted as separate volumes to address each area of concern with the exception of effluent disinfection. Effluent disinfection is currently being --

MS. HEADMAN: That's -- that's far

enough.

MR. ANDES: Would you please read the next sentence?

MR. KUNETZ: "Effluent disinfection is currently being evaluated for the District's three largest plants, Stickney, North Side, and Calumet, as a part of the master plan study for the North Side walker reclamation plan."

MR. ANDES: And if you can explain to me a little bit about when the District management team confirmed that these were primaries of concern, does that mean as a planning matter or as a public health matter?

MR. KUNETZ: As a planning matter.

MR. ANDES: Thank you.

MR. HARLEY: And so the District confirms that all of the areas except effluent disinfection were areas of concern. Is that correct?

MR. KUNETZ: For the purpose of the planning, yes.

MS. HEADMAN: Thank you.

MR. ANDES: And if I can follow up, they prepared new reports for the other areas of

concern, but already had reports being prepared for disinfection. Is that correct?

MR. KUNETZ: Could you rephrase that question?

MR. ANDES: I'm sorry. Were these all identified, including effluent disinfection, as areas of planning concern? All eight that are listed here were all identified as areas of planning concern?

MR. KUNETZ: Yes.

MR. ANDES: Okay. And did they authorize new reports to be developed for seven out of the eight areas, again, concept design reports, concept overview reports? I believe they prepared new volumes for each of the other seven years.

MR. KUNETZ: Yes.

MR. ANDES: Okay. As to the effluent disinfection, was it not necessary to do that because they were already doing reports?

MR. KUNETZ: It was determined that this would be handled under the North Side master plan, because at that time it was determined that we were best served by pulling together the blue ribbon disinfection panel, the panel on disinfection, which

I believe testimony was provided on earlier. So we believe that was a more appropriate way to handle looking at effluent disinfection for Stickney.

MR. ANDES: Thank you.

MS. HEADMAN: How often is the capital improvement plan updated?

MR. KUNETZ: Annually.

MS. HEADMAN: And you may have already answered this question, but if you could review it for me again, is the -- is the non-master -- master plan project list also prepared annually?

MR. KUNETZ: Yes.

MS. HEADMAN: And I believe your testimony appends a list of non-master plan projects for the 2008 budget year. Is that correct?

MR. KUNETZ: Yes.

MS. HEADMAN: And was a similar list prepared in 2007?

MR. KUNETZ: No.

MS. HEADMAN: No. Why was that?

MR. KUNETZ: This list was prepared for my testimony for this process.

MR. ANDES: So there may be some confusion. Is the list of non-master plan projects

prepared annually?

MR. KUNETZ: A list of all projects that are needed is provided -- is prepared annually as part of our budgeting process, yes.

MR. ANDES: Oh, okay. I think that's a separate question.

MS. HEADMAN: Let me ask it to you this way: Would it be accurate to say that some items listed in Attachment 4 are not included in the master plan, but may, nonetheless, be included in the budget?

MR. KUNETZ: Yes.

MR. ANDES: Can you explain a little bit about how is it decided what projects go in the master plan versus the non-master plan project?

MR. KUNETZ: The projects which are identified by the master planning project are, by and large, large capital projects, and projects which affect the treatment plant process, and need to be established in some sort of prioritized fashion or scheduling fashion so that they can be accomplished in a particular order. Some of the projects that were identified in the master plan, as an example, may have already been known by District

staff even before we started the master planning process, that these were areas of concern that may need to be addressed.

Once we started the master planning process, then these known projects became incorporated into that process. Projects that are non-master plans are projects that are, nonetheless, required to keep the treatment plan operating functionally, and may not necessarily fall within this prioritized schedule to maintain the process.

MR. ANDES: So they can still find their way into the budget?

MR. KUNETZ: Yes, they do.

MS. HEADMAN: So if we were to take, for instance, from your Attachment 4 the -- from the second page of your Attachment 4, the storage building at the North Side Water Reclamation Plant, that's a $4.2 million budget. Would we expect to see that in the budget?

MR. KUNETZ: Yes.

MS. HEADMAN: You have just been handed a document that I would like to have marked as, I believe, Exhibit 156.

MS. TIPSORD: I've been handed a

document. The front page is 2007 Budget, Metropolitan Water Reclamation District of Greater Chicago. If there's no objection we will mark this as Exhibit 156. Seeing none, it's Exhibit 156.

MS. HEADMAN: Now I would -- Madam Hearing Officer, I would note for the for the record that Mr. Andes previously submitted an electronic link to the 2007 and 2008 budget books. I believe in the transcript those were identified as Exhibit 66, but on the exhibit list they are identified as Exhibit 67. So for purposes of recordkeeping, I think we should say that these are pages from Exhibit 67.

MS. TIPSORD: Okay.

MS. HEADMAN: So following up on my previous question to you, if we were to go to the last page of the document that I handed out, does that show the construction budget for the North Side service area for 2007?

MR. ANDES: And this is Page 334 of the 2007 budget?

MS. HEADMAN: Right. It would be Page 334 of the 2007 budget.

MS. TIPSORD: Which is the last page

of the Exhibit 156?

MS. HEADMAN: Right.

MR. KUNETZ: Yes, that appears to be the 2007 budget for North Side.

MS. HEADMAN: And so would the storage building, the $4.2 million storage building that shows up in Attachment 4 of your testimony be the same storage building that shows up under project development on that page?

MR. KUNETZ: Yes.

MS. HEADMAN: Now I noticed that on the same page of the 2007 budget, the last item listed under projects under development for the North Side reclamation plant is labeled "North Side WRP Master Plan." Can you please tell me what the estimated construction cost is for that item in the 2007 budget?

MR. KUNETZ: $225 million.

MS. HEADMAN: Would it be accurate to say that the total estimated construction cost for the North Side service area in the 2007 budget for the master plan and non-master plan projects was in excess of $650 million?

MR. KUNETZ: No, that would not be

accurate.

MR. ANDES: Can you rephrase the question? What was the --

MS. HEADMAN: The question is whether the sum of the construction projects on Page 334 of the master plan projects and the non-master plan projects adds up to something just above $650 million.

MR. KUNETZ: That's not correct. Would you like me to clarify?

MS. HEADMAN: Yes.

MR. KUNETZ: This list also includes projects which are involved in our interceptor system, and the interceptors are not considered part of our treatment plants when we categorize projects for improvements at the water reclamation plants, whether they are master plan or not master plan.

MR. ANDES: So this is for the whole North Side service area?

MR. KUNETZ: Correct.

MS. HEADMAN: So the sum total of the inception budget for the North Side service area in 2007 was around $650 million?

MR. KUNETZ: Correct.

MS. HEADMAN: Now I'd like to look at an earlier page in the 2007 budget. It's actually the second page in Exhibit 156.

MR. ANDES: Page 1 or Page 2?

MS. HEADMAN: It's actually Page 2. It's labeled as Page 2. There's a diagram there that shows MWRD's master plan recommendations, circa 2007, for the North Side WRP. Do you see that?

MR. KUNETZ: I do.

MS. HEADMAN: Now the legend for that diagram shows the master plan projects sorted into various phases delineated by color, and could you tell me what those -- what those faces are and what colors those are?

MR. KUNETZ: I can tell you generally what this is about, but I don't have the legend to tell me what the particular colors are.

MS. HEADMAN: The legend is --

MR. KUNETZ: Well, I don't --

MS. HEADMAN: If you could just read to me what the legend says.

MR. KUNETZ: Okay. The green color is for infrastructure improvements, the yellow color is for what's called phase two, the orange color for

phase three, the blue color for phase four.

MS. HEADMAN: And is the -- is the disinfection unit yellow, in other words, in phase two on this diagram?

MR. KUNETZ: It is.

MS. HEADMAN: Now I'd like for you to look at the 2008 budget.

MS. TIPSORD: We've been handed the Metropolitan Water Reclamation District 2008 Budget, Lockport powerhouse and dam, 100 years, 1907 to 2007, which we will mark as Exhibit 157 if there's no objection. Seeing none, it's Exhibit 157.

MS. HEADMAN: Now, Mr. Kunetz, I'd like to direct your attention to Exhibit 157, and is that, again, the construction budget for the North Side service area for the 2008 budget year?

MR. KUNETZ: It is.

MS. HEADMAN: And what's the total amount of the construction budget for the North Side during -- in the 2008 budget?

MR. KUNETZ: $365,380,000.

MS. HEADMAN: And that's significantly less than the $605 million in the 2007 budget. Isn't that correct?

MR. KUNETZ: It is less.

MS. HEADMAN: Would you agree that the main reason for that difference is that the line item for master plan projects has been removed? You can compare it.

MR. KUNETZ: I do see that the line North Side Water Reclamation Plant master plan for $225 million is not in the 2008 budget.

MS. HEADMAN: Thank you. Now I'd like to the return to the master plan docket. I take it during the preparation of the master plan that MWRD's consultants looked initially at a long list of disinfection alternatives, which was narrowed down to a short list. Is that correct?

MR. KUNETZ: Correct.

MS. TIPSORD: I've now been handed Selected Plan Technical Memorandum 12 Master Plan, Metropolitan Water Reclamation District of Greater Chicago, North Side Water Reclamation Plant and Surrounding Chicago Area Waterways. I will mark this as Exhibit 158 if there's no objection. Seeing none, it's Exhibit 158.

MS. HEADMAN: Mr. Kunetz, exhibit -- is Exhibit 158 technical memorandum one to the North

Side master plan?

MR. KUNETZ: It is.

MS. HEADMAN: And if you could look through that, are those the -- do those diagrams depict the alternatives that were examined on the short list?

MR. KUNETZ: Your previous question was about alternatives for disinfection. Are you now talking about alternatives in general, or specifically alternatives in disinfection?

MS. HEADMAN: Alternatives. I guess these were the alternatives for these dates.

MR. KUNETZ: These are the alternatives for that site, not specifically alternatives for disinfection.

MS. HEADMAN: Thank you. And could you take a look at the legend for these diagrams, which was, I think, the same for each of those diagrams, and tell me what the various colors mean?

MR. KUNETZ: The green color indicates infrastructure improvements. The yellow color indicates if there were to be put forth effluent limitations for total phosphorus at 1.0 milligrams per liter and a bacterial limit for E. Coli at 1,030

CFUs per 100 milliliter. The orange color is if there were to be effluent limitations for total phosphorus as 0.5 milligrams per liter, total nitrogen at 6 milligrams per liter, and E. Coli at 400 CFUs per 100 milliliters. The blue color is if there were to be regulations put forth for effluent limitations of total phosphorus, and 0.5 milligrams per liter, total nitrogen at 5 milligrams per liter, and E. Coli at 400 CFUs per 100 milliliters.

MS. HEADMAN: So that would mean that the items that are shown in yellow would be necessary to achieve an E. Coli effluent standard of 1,030 CFUs per 100 milliliters. Is that correct? Is that what the legend shows?

MR. KUNETZ: And a total phosphorus of 1.0 milligrams per liter.

MS. HEADMAN: And could you look at alternative one and tell me whether or not the disinfection unit is included in that yellow phase?

MR. KUNETZ: It is.

MS. HEADMAN: And could you look at alternative two and tell me whether or not the disinfection unit is yellow?

MR. KUNETZ: It is.

MS. HEADMAN: So it would be necessary to achieve even the 1,000 CFUs for 100 milliliters for bacteria?

MR. KUNETZ: Correct.

MS. HEADMAN: And is the same true for alternative three?

MR. KUNETZ: It is.

MS. HEADMAN: And is the same true for alternative four?

MR. KUNETZ: It is.

MS. HEADMAN: And for alternative five?

MR. KUNETZ: It is.

MS. HEADMAN: And alternative six?

MR. KUNETZ: It is.

MS. HEADMAN: And for the site plan that was actually selected from all the alternatives, is the disinfection unit also depicted in yellow, indicating that it would be necessary to meet a standard -- the bacterial standard of 1,300 CFUs per 100 milliliter?

MR. KUNETZ: 1,030. It is.

MS. HEADMAN: 1,030.

MS. WILLIAMS: Can I ask a followup

here, Susan?

MS. HEADMAN: Certainly.

MS. WILLIAMS: So can you explain -- you were here for Dr. Zenz's testimony, correct?

MR. KUNETZ: Yes.

MS. WILLIAMS: And it was his testimony that designing for 1,030 CFU per 100 milliliter E. Coli and 400 CFU E. Coli would be the same design. Do you agree with that testimony?

MR. KUNETZ: I'm not equipped to make that decision. I'd have to refer to Dr. Zenz.

MS. WILLIAMS: Okay. But can you explain -- I mean, each of these charts lists an alternative different -- the first alternative -- or the yellow color -- I'm sorry -- lists one E. Coli value, while the other -- the orange and the blue listed a different one, right?

MR. KUNETZ: Yes, they do.

MS. WILLIAMS: Can you point us to where in orange and blue there are any capital projects marked that would be necessary for treating for E. Coli as opposed to phosphorus and nitrogen? Do you understand my question?

MR. KUNETZ: I do. To answer your

question, there are no additional facilities besides what you see in yellow to meet the 400 CFU per 100 milliliter limit.

MS. WILLIAMS: Thank you. That's all I wanted.

MR. ANDES: So in other words, if I can clarify the --

MS. WILLIAMS: I don't think it needs clarifying. It was very clear.

MR. ANDES: I need to make sure I understand.

MS. TIPSORD: He can certainly ask a followup, Ms. Williams.

MS. WILLIAMS: He can ask a followup, of course.

MR. ANDES: So what arrow points at disinfection unit, that's basically where the disinfection unit would be in all of these scenarios, depending -- regardless of what the E. Coli limit is, whether it's 1,030 or 400. Am I right?

MR. KUNETZ: Yes.

MR. ANDES: So the other differences between the various colors are based on what the

phosphorus limits is?

MR. KUNETZ: Phosphorus and/or nitrogen, yes.

MR. ANDES: Thank you.

MS TIPSORD: Ms. Headman, go ahead.

MS. HEADMAN: But to be clear, the disinfection unit would be necessary to achieve the bacterial effluent limitation of 1,030 per 100 milliliters. Is that correct?

MR. KUNETZ: That's correct.

MS. HEADMAN: So am I correct to say that the master plans for the Stickney, North Side, and Calumet plants have been completed?

MR. KUNETZ: Correct.

MS. HEADMAN: And is there a schedule for updating those plants?

MR. KUNETZ: The master plans will be updated if major changes occur during the process, but there is not a planned schedule for update.

MS. HEADMAN: I think that's all I have.

MS. TIPSORD: That takes us to Environmental Law and Policy Center.

MR. ETTINGER: Somehow when I wrote

those questions, I was already obsessed with interest rates.

MR. ANDES: We knew that about you.

MR. ETTINGER: Yeah. Well, what -- how is the value of money taken into account in calculating the various costs that are provided in your testimony?

MR. KUNETZ: My testimony costs are given in current dollars. There's no adjustment made for the timed value of money.

MR. ETTINGER: When do you assume that these -- does it make no difference to your analysis, then, when the various capital improvements are made?

MR. KUNETZ: These dollar values, these capital costs, are for budgeting purposes, and we do that in current dollars because that's the simplest known information. As you pointed out earlier, we don't know what the costs are going to be. We can predict in 2015, 2020. But for budgeting purposes, we do them in current dollars.

MR. ETTINGER: Okay. Well, some of these things you know we're not going to be building any time soon. That doesn't affect your budgeting

at all?

MR. KUNETZ: I can't answer that. I would have to defer to our budgeting people who make the determination that they refer thighs in current dollars.

MR. ETTINGER: Okay. I guess that answers question number two. For your purposes, you assume everything's going to be constructed instantly in one year?

MR. KUNETZ: Correct.

MR. ETTINGER: And so then as far as question number three, you don't need to consider an interest rate because you're not taking into account the timed value of money?

MR. KUNETZ: Right, because we're not comparing alternatives here.

MR. ETTINGER: And you don't need to think about an inflation rate, because you're assuming it's all going to built?

MR. KUNETZ: Correct.

MR. ETTINGER: Okay. How -- well, number six, does the MWRDGC also have plans for work on the tunnel and reservoir plan?

MR. KUNETZ: I would like to preface

my response to that by stating that the TARP system doesn't fall under my area of expertise and the treatment plants. But in order to answer your pre-filed questions, I have written answers, if I may read them, from the staff who does work on our TARP system. They prepared the answers for them.

MR. ETTINGER: Please do.

MR. KUNETZ: "The District does have ongoing work with the tunnel and reservoir. These plants mainly consist of completing the McCook reservoir and Thornton composite reservoir, which, along with the O'Hare pump reservoir, make up phase two, the flood control portion of TARP. Other plans for TARP include hydraulic modeling work, additions of louvers on drop shafts, repair of back flow gates, completion of the Calumet TARP pumping station valve chamber and replacement of the pumps, and rehabilitation of mainstream pumping station pumps."

MR. ETTINGER: How much has MWRDGC invested in the TARP?

MR. KUNETZ: "$2.33 billion was spent on phase one. $555 million has been invested in phase two so far. These numbers are in actual

dollars spent over the life of the project. If these numbers were to be updated to 2000 dollars, the cost would be higher."

MR. ETTINGER: How much does MWRDGC intend to invest in the future in TARP?

MR. KUNETZ: Approximately $660 million is needed to complete phase two.

MR. ETTINGER: What are the yearly operating and maintenance costs of running TARP?

MR. KUNETZ: The 2008 budgeted costs are $12.3 million. This includes the cost to operate pumps, clean the reservoirs, inspect, maintain, and repair facilities, and cleaning of the screens.

MR. ETTINGER: This wasn't on my pre-filed questions, so you may not be able to answer this, but is there also a master plan for TARP?

MR. KUNETZ: From my understanding, the TARP system is coming to fruition with the completion of phase two. So I don't know that a master plan would be in order.

MR. ETTINGER: So you don't -- well, I guess the answer to my question is you didn't design

a master plan that covered TARP for the way you have for the three treatment plants?

MR. KUNETZ: I'm going to have to say that I don't know the answer to that question, since I'm not an expert at TARP.

MR. ETTINGER: Thank you. No more questions.

MS. TIPSORD: Anything else for Mr. Kunetz? All right. Thank you very much. Given that it's 3:20, and the building closes at 4:30, and we only have two more witnesses that we plan to get to in this stretch, I think we can finish both of them tomorrow, don't all of you? Why don't we go ahead and end for the day, then, a little early, which is unique with us. And we'll start again -- and we'll shoot for 9:00 o'clock, and we'll wait and make sure that everybody can get in. Thank you.

STATE OF ILLINOIS)
) SS
COUNTY OF COOK)

REBECCA A. GRAZIANO, being first duly sworn on oath says that she is a court reporter doing business in the City of Chicago; that she reported in shorthand the proceedings given at the taking of said hearing and that the foregoing is a true and correct transcript of her shorthand notes so taken as aforesaid and contains all the proceedings given at said hearing.

_____

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SUBSCRIBED AND SWORN TO
before me this 27th day
of October, A.D., 2008.

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Notary Public