

ILLINOIS POLLUTION CONTROL BOARD

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

R08-09
 (Rulemaking-
 Water)

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STATE OF ILLINOIS
Pollution Control Board

REPORT OF PROCEEDINGS held in the

above-entitled cause before Hearing Officer Marie
 Tipsord, called by the Illinois Pollution Control
 Board, taken before Laura Mukahirn, CSR, a notary
 public within and for the County of Cook and State
 of Illinois, at the Thompson Center, Chicago,
 Illinois, on the 5th day of May, 2009, commencing at
 the hour of 10:00 a.m.

A P P E A R A N C E S

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MS. MARIE TIPSORD, Hearing Officer
MR. THOMAS JOHNSON, Member
MR. ANAND RAO, Member
MS. ALISA LIU, Member
DR. SHUNDAR LIN, Member
 appearing on behalf of the Illinois
 Pollution Control Board

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
(217) 782-5544
BY: MS. DEBORAH WILLIAMS
 MS. STEPHANIE DIERS

BARNES & THORNBURG
One North Wacker Drive
Suite 4400
Chicago, Illinois 6606-2833
(312) 357-1313
BY: MR. FREDRIC P. ANDES
 Appearing on behalf of the Metropolitan
 Water Reclamation District

1 HEARING OFFICER TIPSORD: Good
2 morning, everyone. My name is Marie Tipsord,
3 and I've been appointed by the Board to serve
4 as hearing officer in this proceeding
5 entitled Water Quality Standards and Effluent
6 Limitations for the Chicago Area Waterway
7 System and Lower Des Plaines, proposed
8 amendments to 35 Ill. Admin. Code 301, 302,
9 303, and 304. The docket number is R08-9.
10 With me today to my immediate right is board
11 member Thomas Johnson, and to his immediate
12 right board member Dr. Shundar Lin.
13 Dr. Girard is attending business in
14 Springfield today and tomorrow, so board
15 member Johnson has agreed to act in his
16 absence. To my immediate left is Anand Rao
17 and to his left Alisa Liu from our technical
18 staff.

19 Before I begin today, I want to
20 note that I received an e-mail from
21 Miss Frisbie that Thomas Bamonte will not be
22 able to appear today, so he will be
23 testifying tomorrow. So we'll go from
24 Miss Yates to -- is it Dr. Yates?

1 THE WITNESS: Doctor.

2 HEARING OFFICER TIPSORD: Dr. Yates, I
3 apologize. I thought so. We'll go from
4 Dr. Yates to Miss Frisbie and as time permits
5 we'll go from there. We are continuing to
6 hear testimony from members of the public,
7 and today the purpose of the hearing is to
8 hear the testimony of two witnesses,
9 Dr. Marilyn Yates and Margaret Frisbie. The
10 testimony will be marked as an exhibit and
11 entered as if read. And after marking the
12 exhibit -- after marking the prefiled
13 testimony as an exhibit, we will then proceed
14 to the questions beginning with the
15 Metropolitan Water Reclamation District of
16 Greater Chicago and then the IEPA. Anyone
17 may ask a follow-up question. You need not
18 wait until your turn to ask questions. I do
19 ask that you raise your hand, wait for me to
20 acknowledge you. After I have acknowledged
21 you, please state your name and whom you
22 represent before you begin your questions.
23 Please speak one at a time. If you are
24 speaking over each other, the court reporter

1 will not be able to get your questions on the
2 record. Please note that any question asked
3 by a board member or staff are intended to
4 help build a complete record for the board's
5 decision and not to express any preconceived
6 notion or bias. I also want to just give you
7 all a heads up that on Thursday the board
8 continued its closed deliberative session on
9 the record until today at 3:00 o'clock. If
10 we are not concluded by 3:00 o'clock, we will
11 have to take about a half an hour break at
12 that time for the board members to attend the
13 closed deliberative session.

14 And with that, Mr. Johnson?

15 ACTING CHAIRMAN JOHNSON: Thanks. I
16 want to welcome you and tell you that Tanner
17 asked me to apologize for his absence today.
18 I think this makes him 27 for 28, so that's
19 pretty good. He's in front of the House
20 Appropriations Committee both today and
21 tomorrow. With that, we can start.

22 HEARING OFFICER TIPSORD: Thank you.
23 Mrs. Alexander?

24 MS. ALEXANDER: Yes. I would like to

1 present Dr. Marilyn Yates and I have her
2 testimony to be marked as I believe it's
3 Exhibit 249.

4 HEARING OFFICER TIPSORD: That is
5 correct. Let's have her sworn in before I
6 mark it.

7 (Witness sworn.)

8 D. R. M A R I L Y N Y A T E S,
9 called as a witness herein, having been first duly
10 sworn, was examined and testified as follows:

11 Examination

12 By Mr. Andes

13 HEARING OFFICER TIPSORD: All right.
14 If there's no objection, will mark Dr. Yates'
15 testimony as Exhibit 249.

16 Seeing none, it is Exhibit 249.
17 And with that, we'll begin with -- did you
18 have anything else or should we begin with
19 questions?

20 MS. ALEXANDER: We can begin with
21 questions.

22 HEARING OFFICER TIPSORD: Mr. Andes?

23 MR. ANDES: Good morning, Dr. Yates.

24 THE WITNESS: Good morning.

1 BY MR. ANDES:

2 Q. Let me start off with question one.
3 It concerns a statement on Page 1 of your testimony
4 that dry weather pathogen contamination comes from
5 wastewater treatment plants. Isn't it true that the
6 actual measure concentrations of pathogenic
7 microorganisms described in the risk assessment
8 range from nondetect to very low numbers in
9 downstream locations and were similar to the
10 concentrations in the upstream locations?

11 A. Well, I wouldn't exactly characterize
12 them as similar. As I pointed out later in my
13 testimony on, I believe, Page 7, there are many
14 cases where the concentrations of the pathogens are
15 much higher in the downstream locations than they
16 are in the upstream locations. I would also point
17 out that only a fraction of the samples -- of each
18 of the samples was analyzed for the different
19 pathogens; and, therefore, it's very difficult to
20 conclude when you've only analyzed a cup out of 75
21 gallons and found nothing in it. It's very
22 difficult to conclude that the entire sample
23 contained no microorganisms.

24 Q. Well, we always sample some subset,

1 correct? You wouldn't expect to sample the whole 75
2 gallons, right?

3 A. It is entirely possible to analyze the
4 sample of a size of 75 gallons, sir.

5 Q. And do you have any reason to believe
6 you would have found something different in terms
7 of --

8 A. I can't exactly speculate. But when
9 you analyze less than one tenth of a percent of a
10 sample that was collected, I think that
11 extrapolating to the entire sample certainly has the
12 potential to provide information that may not be
13 correct.

14 Q. Now, in terms of the example you
15 provided on Page 7 of your testimony, you indicated
16 as to the enteric viruses, it actually -- most dates
17 there were no measurable concentrations to detect,
18 correct?

19 A. I'm sorry. Can you --

20 Q. You only specify two dates in which
21 measurable concentrations were detected of the
22 enteric viruses. I assume that means on most dates,
23 the levels were not detected?

24 A. I drew two examples from the north

1 side sampling location to illustrate the fact that
2 there are occasions when the downstream
3 concentrations are higher than those upstream.
4 There certainly were occasions when there were no
5 detects.

6 Q. Well, in fact, on your testimony you
7 say those two dates were the only dates on which
8 measurable concentrations of enteric viruses were
9 detected, correct?

10 A. At the north side location, yes, sir.

11 HEARING OFFICER TIPSORD: Just for the
12 record, Mr. Andes, when you refer to the risk
13 assessment, you're talking about what is
14 Exhibit 71?

15 MR. ANDES: Yes.

16 BY MR. ANDES:

17 Q. You have evidence to demonstrate that
18 disinfection absent from the district would result
19 in reduction of all human pathogens in the effluent?

20 A. Well, sir, I did not say that you
21 would get elimination of all pathogens in the
22 effluent through disinfection. I believe what I
23 said was that the disinfection would substantially
24 reduce the numbers of pathogens being contributed to

1 the CAWS during dry weather situations.

2 Q. And would some methods of disinfection
3 deal with some pathogens and not others?

4 A. Every disinfectant has a different
5 capability of reducing the numbers of different
6 pathogens to different extents. That is certainly
7 the case, yes.

8 Q. So chlorination, for example, is
9 effective against some pathogens and not others?

10 A. The degree to which chlorine reduces
11 the concentration varies based on different micro
12 organisms certainly; but chlorination will reduce
13 the concentration of essentially any pathogen. That
14 certainly that I am aware of. The degree to which
15 it reduces the concentration does vary by organism.

16 Q. And as to ultraviolet treatment as
17 well?

18 A. The same thing is true. The
19 effectiveness of any disinfectant is going to vary
20 depending on what micro organism it is that you're
21 talking about.

22 Q. You say as to viruses and protozoa,
23 are those particularly susceptible to some forms of
24 treatment and not others?

1 A. Again, it varies by micro organism.

2 Q. So to achieve complete -- to deal with
3 the whole range of pathogens, would you have to
4 apply chlorination and ultraviolet?

5 A. The types of disinfectants that one
6 would apply would really depend on what the
7 organisms were in the effluent that you were trying
8 to remove, the levels of reduction you were trying
9 to achieve, the intended location, where you were
10 going to discharge that effluent, and the use of the
11 water where the effluent was going to be discharged.
12 So you might end up, depending on all of those
13 different factors, you might end up having to apply
14 a range of different treatment processes.

15 Q. So then you might have to apply two
16 different treatment trains: Chlorination and
17 ultraviolet to all these plants?

18 A. I would not want to say specifically
19 what disinfection methods one would use. As I just
20 said, depending on all the factors I just mentioned,
21 you might end up using more than one treatment
22 process.

23 Q. Let me go on to the second question.
24 The statement you made is the dangerous human

1 pathogens are very likely present in the CAWS. What
2 data suggest that the levels of indicator bacteria
3 in the CAWS downstream of the reclamation plant
4 outfalls are very strong evidence, as you state, of
5 the presence of high levels of fecal material which
6 likely contains human pathogens?

7 A. If I could, I would like to, and this
8 is just a technical question, I wanted to refer to
9 one of the references that I cited in my testimony
10 which is the National Research Council Report on
11 Indicators For Waterborne Pathogens. And I would
12 point out that this committee was convened by the
13 National Research Council which is a council of the
14 National Academy of Science specifically to look at
15 the question of indicators for waterborne pathogens.
16 I was a member of that committee as was Dr. Charles
17 Haas who has also, I understand, testified in these
18 hearings. And I would quote from one of the pages
19 of this document, specifically Page 97, where it
20 states that it is generally but not always the case
21 that the greater the number of indicator organisms
22 in the water, the greater the number of pathogens.
23 This was, as I said, this was a report of the
24 National Academies of Science.

1 MS. ALEXANDER: I have a copy with the
2 excerpt that was just read by Dr. Marilyn
3 Yates that I'd like to introduce as an
4 exhibit. This would be, I believe, 250.
5 This document is the title page, and the
6 excerpt that Dr. Yates --

7 HEARING OFFICER TIPSORD: I need two
8 or three copies. How many do you have? If
9 there's no objection, we will mark this
10 excerpt from Indicators For Waterborne
11 Pathogens Committee on Indicators For
12 Waterborne Pathogens Board on Life Sciences,
13 Water Science of Technology Board, Division
14 on Earth and Life Studies as Exhibit 250.

15 Seeing no objections, it's
16 Exhibit 250.

17 BY MR. ANDES:

18 Q. And the statement you're referring to
19 is on Page 97?

20 A. Ninety-seven, yes, sir.

21 Q. That it is generally but not always
22 the case?

23 A. Correct.

24 Q. The greater the number of indicators,

1 the greater number of pathogens. Let me ask you
2 about a number of studies and reports on that issue.
3 The first one, which I believe was cited in our
4 questions -- I'll provide you with a copy.

5 HEARING OFFICER TIPSORD: You were
6 hoping to get Exhibit 250, weren't you, Fred?

7 I've been handed Validity of the
8 Indicator Organism Paradigm For Pathogen
9 Reduction and Reclaimed Water and Public
10 Health Protection.

11 MS. ALEXANDER: I would point out for
12 the record that this was not cited, I don't
13 believe, in the prefiled questions. So this
14 is the first time our witness has had the
15 opportunity to review it. So I request a few
16 minutes for her to look this over.

17 HEARING OFFICER TIPSORD: All right.
18 It's by Harwood, et al, and it's marked June
19 2005. If there's no objection, we'll mark
20 this as Exhibit 251.

21 Seeing none, it's Exhibit 251.

22 BY MR. ANDES:

23 Q. Dr. Yates, there were a couple
24 statements made in this report that addresses a

1 particular issue that I wanted to see if you agree
2 with. On Page 3168, on the second column, it states
3 that the imperfect relationship between coliform
4 bacteria and pathogens such as viruses and protozoa
5 through wastewater treatment has been known for some
6 time. Is that an accurate statement?

7 A. I'm not finding exactly where that is,
8 sir.

9 MS. ALEXANDER: Where is that?

10 THE WITNESS: 3168. I see the page.

11 I'm not --

12 MR. ANDES: Right-hand column.

13 THE WITNESS: Okay.

14 MR. ANDES: First paragraph.

15 THE WITNESS: First of all, what I
16 would say is that this is one study that was
17 conducted at, I believe, if I read this
18 correctly very quickly just now, at six
19 different wastewater reclamation facilities.
20 And the results that they're presenting are
21 based on those six facilities. I would also
22 say that the statement that was made
23 regarding the imperfect relationship between
24 coliforms and pathogens, specifically viruses

1 and protozoan, I don't think anybody has ever
2 said that it was a perfect relationship. We
3 know that there are exceptions to every rule,
4 but we -- and one of the reasons, actually,
5 that EPA is extending so much energy at this
6 point in time in their studies to establish
7 new ambient water quality criteria is because
8 we know that there are many, many, many
9 occasions on which pathogens are present in a
10 particular water body where we can't find the
11 coliform bacteria. So their concern that
12 there is underprediction of risk, pathogens
13 are there, people are getting ill, and yet
14 there are no coliforms present. And so, like
15 I said, that's why EPA is expending so much
16 energy in the studies that they're currently
17 doing. And not just EPA, but many other
18 individuals and agencies are also doing that.

19 Having said that, it is very,
20 very, very well known that there are
21 pathogens present in sewage. And we know
22 that we can reduce the levels of those
23 pathogens through treatment, especially
24 disinfection. So, again, depending on the

1 different treatment process that's used, and
2 I did not have time to read that, and this is
3 the first time that I'm reading this
4 particular document, I can't speak to what
5 kinds of disinfection processes they may have
6 used in these that lead to their results.

7 BY MR. ANDES:

8 Q. I should note for the record that this
9 report was cited in the risk assessment document, so
10 it was a reference in there.

11 Now, the statement that you just
12 talked about talked about the relationship being
13 imperfect, and that's been known for some time. But
14 there's also a statement on the first page of the
15 document at the bottom of Page 3163 which seems not
16 specific to this study. Said it's been widely
17 demonstrated that coliform bacteria do not
18 adequately reflect the occurrence of pathogens and
19 disinfected wastewater effluent. Due to the
20 relatively high susceptibility of chemical
21 disinfection and failure to correlate with protozoan
22 parasites such as cryptosporidium and enteric
23 viruses. That's a general finding, right?

24 A. And, actually, that agrees with the

1 statement I just made a moment ago, which was that
2 typically the problem is that we find pathogens in a
3 particular water body. So, therefore, there is a
4 potential for disease, and yet the coliforms aren't
5 there. So the coliforms are actually
6 underpredictive of the potential risk because, as it
7 states here, depending on the kind of disinfectant
8 that's used, the coliforms can be more easily
9 inactivated than can the pathogens.

10 Q. Haven't the studies shown both
11 overprediction and underprediction?

12 A. It would -- Again, it's going to
13 depend on the specific circumstance. And the other
14 thing that I would like to indicate -- I shouldn't
15 have used the term indicate. I'm sorry. The other
16 thing I'd like to point out is we use the term
17 indicator for a variety of different purposes. And
18 so we need to be very clear that we understand the
19 context in which we're using that term. We can use
20 indicators to indicate how well a treatment process
21 is working. We can also use them to indicate
22 potential risks. So we need to be really clear
23 exactly what context we're talking about indicators
24 in.

1 Q. Well, in that regard, in fact, have
2 you reviewed the testimony of Dr. Blatchley, Ernest
3 Blatchley?

4 A. Yes, I did briefly review
5 Dr. Blatchley's testimony.

6 Q. And he spoke at length about whether,
7 in fact, conventional disinfection with the 400
8 limit proposed here would do much to address
9 pathogens at all, correct?

10 A. I believe that was the substance of
11 his testimony, yes.

12 Q. And, in fact, to remove pathogens to a
13 significant level would require more like the
14 reclaim water standards in California?

15 MS. ALEXANDER: Objection, vagueness.

16 What do you mean by significant level? I
17 mean --

18 MR. ANDES: I will refer back --

19 MS. ALEXANDER: There are different
20 levels that one can reduce them. Reclaimed
21 water is a radically different standard.

22 What do you mean by significant?

23 BY MR. ANDES:

24 Q. Well, I believe Dr. Blatchley defined

1 that in his testimony. I'm wondering whether you
2 disagree with any of the conclusions he made based
3 on studies which related to the relationship between
4 reducing indicators and reducing pathogens?

5 A. I guess that's too general of a
6 question for me to be able to answer, sir.

7 Q. Okay. Well, Dr. Blatchley's -- in
8 Dr. Blatchley's testimony --

9 HEARING OFFICER TIPSORD: Excuse me,
10 Mr. Andes. That's Exhibit 93.

11 MR. ANDES: Thank you.

12 BY MR. ANDES:

13 Q. I'll just ask some general questions
14 about the statements he made. One was that coliform
15 bacteria are poor indicators of disinfection
16 efficacy?

17 HEARING OFFICER TIPSORD: I'll ask
18 that you tell us exactly was page you're
19 reading from.

20 MR. ANDES: I'm sorry. Page 3 of
21 his --

22 HEARING OFFICER TIPSORD: Exhibit 93.

23 MR. ANDES: Testimony, yes.

24 THE WITNESS: I'm sorry. I didn't

1 THE WITNESS: Again, depending on what
2 you mean by significantly. As -- The
3 statement that you read is very general in
4 that, I believe if I remember, if I can
5 recall the beginning of that statement, you
6 said that disinfection would remove -- I mean
7 I'm going to paraphrase it, but disinfection
8 would remove coliforms to a greater extent
9 than pathogens. And, as I've already said,
10 depending on the kind of disinfectant that
11 you use, indeed, that may be the case. And,
12 therefore, again, the problem is that
13 coliforms are underpredicting the presence of
14 potential pathogens in the water, and,
15 therefore, underpredicting what public health
16 risk might be associated with exposure to
17 that water.

18 BY MR. ANDES:

19 Q. The question is if, as Dr. Blatchley
20 says, conventional disinfection will lead to minimal
21 improvements on viruses and protozoa, will be
22 subject to the ability of microbes to repair and
23 recover, whether -- even if you took the measure of
24 conventional disinfection at these facilities and

1 spent all that money, whether -- do we have any idea
2 what levels of pathogens would still be remaining
3 such that the level of risk reduction would not be
4 as much? We're trying to get a sense of how much
5 are we really going to reduce risk by doing this
6 disinfection?

7 A. Again, as we've already discussed, it
8 depends on what type of disinfection you employ that
9 will determine the amount of reduction of pathogens,
10 of different pathogens that you would get.

11 Q. Okay. I'll move on to Question 2 Sub
12 C. This refers to your statement on Page 2 of your
13 testimony. There are hundreds of different types of
14 pathogens that can be present in sewage contaminated
15 wastewater. What evidence exists that there are
16 hundreds of different types of pathogens in the CAWS
17 which could cause multiple types of serious illness
18 to sensitive users? And, in particular, do you have
19 any evidence that waterborne diseases like cholera
20 are common or exist at all in Illinois?

21 MS. ALEXANDER: Two objections: First
22 of all, that's compound. Those are two
23 connections. Secondly, there's no foundation
24 for the second part. I don't believe that

1 Dr. Yates ever testified that cholera is
2 common in Illinois. Can you please break the
3 question apart first?

4 BY MR. ANDES:

5 Q. Surely. What evidence do you have in
6 terms of the types and numbers of pathogens present
7 in the CAWS?

8 A. The sampling that was conducted as a
9 part of the risk assessment study that was done
10 detected a number of different types of pathogens
11 present at various locations downstream of the
12 wastewater treatment plants in the CAWS. Do you
13 want me to -- you know what those pathogens were. I
14 can certainly enumerate them.

15 Q. And one of the pathogens you have
16 listed on Page 11 of your testimony is cholera?

17 A. Certainly, yes.

18 Q. But cholera is not present in
19 Illinois, right?

20 A. I did not state that cholera was
21 present in Illinois. This is a list -- the table,
22 as you can see, is entitled human pathogens
23 associated with fecal material. And nowhere did I
24 state that these pathogens were present in Illinois.

1 The point was that these organisms are present in
2 fecal material, and that, therefore, because they're
3 present in fecal material, they can also be present
4 in sewage.

5 HEARING OFFICER TIPSORD: And, if I
6 might, as a follow-up, in that table don't
7 you also indicate that it's relatively rare
8 in the U.S.?

9 THE WITNESS: Yes, it is, actually.
10 One of the reasons that I did choose to
11 include this organism is, first of all, there
12 are outbreaks and cases of illness associated
13 with vibrio cholera and certainly in other
14 countries. But there also are cases in the
15 United States. I did not say in Illinois.
16 There are cases associated with exposure to
17 vibrio cholera that -- in recreational water
18 that results in disease. But one of the
19 things about this particular organism is that
20 there is sufficient concern about its
21 potential to cause health effects that the
22 Environmental Protection Agency has put it on
23 their contaminant candidate list for
24 potential organisms to regulate in drinking

1 water.

2 HEARING OFFICER TIPSORD: And that is
3 the United States Environmental Protection
4 Agency?

5 THE WITNESS: Yes. I'm so sorry.
6 Yes. It's the United States Environmental
7 Protection Agency.

8 BY MR. ANDES:

9 Q. That's a drinking water list. Is
10 there --

11 A. That's correct.

12 Q. Can you refer to studies showing
13 outbreaks of cholera in recreational waters?

14 A. There --

15 Q. In the U.S.?

16 A. There is a report from the Centers For
17 Disease Control on recreational outbreaks of
18 waterborne disease that I believe, I believe has
19 been introduced into testimony. This is the most
20 recent report that came out in 2008 and talks about
21 the 2006 -- excuse me -- 2005, 2006 outbreaks that
22 occurred in recreational water. And there are --
23 there is at least -- there is a report in there that
24 there are outbreaks associated with various types of

1 vibrio including vibrio cholera from recreational
2 waters.

3 HEARING OFFICER TIPSORD: Would that
4 be report that's Exhibit 239, CDC MMWR
5 September 12, 2008 surveillance --

6 THE WITNESS: Correct, correct. That
7 is the one.

8 MS. ALEXANDER: And just a quick
9 follow-up question. Dr. Yates, are there
10 pathogens listed on Exhibit 6 other than
11 cholera that you do believe pose a risk of
12 illness to recreators when found in water?

13 THE WITNESS: Certainly. And some of
14 those -- some of the pathogens that are
15 listed in Table 1 actually were found during
16 the course of sampling the CAWS. For
17 example, the adeno viruses were found in the
18 CAWS. The viruses that are listed here
19 called coxsackie A and B viruses and the echo
20 viruses are members of the group of
21 enteroviruses that there was sampling and
22 detection of enteroviruses in the CAWS.
23 There was no further analysis to determine
24 exactly which of those enteroviruses were

1 present. But the coxsackie A and B viruses
2 and the echo viruses are members of that
3 large group of enteroviruses.

4 In addition, noroviruses were
5 found in the CAWS during the course of the
6 sampling. Giardia cryptosporidium, all of
7 these pathogens were found during the course
8 of sampling the CAWS that are reported in the
9 risk assessment document.

10 BY MR. ANDES:

11 Q. I'm looking at a page regarding vibrio
12 in the CDC document. It seems to indicate that it's
13 primary a marine issue, outbreaks in marine venues,
14 and the most common exposures are through surfing
15 and swimming?

16 A. And I, as I said, my point in bringing
17 up vibrio was that, indeed, there are cases in the
18 United States where vibrio cholera has been
19 contracted through recreation, and that it is a
20 significant enough concern to the Environmental
21 Protection Agency that they have placed it on their
22 list of potential contaminants to regulate in
23 drinking water.

24 Q. Would measuring fecal coliform give

1 you a sense of whether, in fact, you're addressing
2 vibrio levels in water body?

3 MS. ALEXANDER: I object on vagueness.

4 What do you mean addressing? Do you mean
5 reducing it all? Eliminating? What do you
6 mean by addressing?

7 BY MR. ANDES:

8 Q. Would it give you any indication of
9 vibrio levels?

10 A. Of vibrio levels? I really couldn't
11 speculate on that, sir.

12 Q. Let me move on to Question 3 where you
13 state that previous research shows risk to
14 recreational users. Can you describe any studies
15 that have shown that water bodies with the kind of
16 concentrations of indicator bacteria as in the CAWS
17 have shown health risks to secondary contact
18 recreational users?

19 A. Well, I will admit there have not been
20 a lot of studies that have been done on secondary
21 contact, that that's just a fact.

22 Q. Are there any?

23 MS. ALEXANDER: I don't believe the
24 witness was finished with the statement.

1 Were you finished?

2 THE WITNESS: I was not.

3 There have been studies that
4 have been done to assess whether or not there
5 is a health risk associated with exposure to
6 water -- now my sentence is getting all
7 screwed up. There have been studies that
8 have been done looking at secondary
9 recreational users to assess whether or not
10 there are health effects associated with
11 exposure to that water during the exposure to
12 those recreational activities. And those
13 studies have shown, not all of them, but
14 there are studies that have shown that there
15 is a risk associated with those activities,
16 yes.

17 BY MR. ANDES:

18 Q. And which studies are those?

19 A. Well, if you would go to my testimony
20 and look at, I believe, pages 16 and 17, I have
21 listed some of those studies.

22 Q. So the first study regards wind
23 surfing. You believe the conditions of exposure to
24 water during wind surfing are comparable to

1 canoeing?

2 A. The point that I believe is relevant
3 is that there is exposure to water during secondary
4 recreational activities. Certainly there is
5 exposure to water during canoeing activities as was
6 shown in the risk assessment that was done. They
7 assumed some level of exposure to water during
8 canoeing. The point is that if you're exposed to
9 water as a -- as a -- while you're recreating, if
10 you're exposed to water and there are pathogens in
11 that water, it can result in illness.

12 Q. My --

13 MS. ALEXANDER: I have a quick
14 follow-up on that.

15 THE WITNESS: Sure.

16 MS. ALEXANDER: Do you believe that
17 studies of primary contact recreation risk
18 are relevant in assessing secondary contact
19 risk?

20 THE WITNESS: Certainly. Again,
21 the -- What's differing between the primary
22 contact recreation and the secondary contact
23 recreation in general is the volume of water
24 to which a person is exposed. So it's very

1 well documented that swimming, which is a
2 primary contact activity, is associated with
3 health risk and disease. So the main
4 difference between the two kinds of
5 activities is the volume of water to which
6 you're exposed; and, therefore, the level of
7 pathogens to which you're exposed about. So
8 we can learn about health risk from even
9 primary contact recreation studies.

10 BY MR. ANDES:

11 Q. Dr. Yates, your statement, though,
12 indicated that there were risks in secondary
13 contact, nonprimary contact situations. So what I'm
14 asking --

15 A. Correct, correct.

16 Q. -- as to each of these studies, is it
17 this, in fact, secondary contact, or is it closer to
18 primary contact in terms of level of exposure. Wind
19 surfing, are you saying the level of contact in wind
20 surfing is not primary contact?

21 A. I really don't believe that it is my
22 job to define what is a primary versus a secondary
23 contact activity. I would point out that in a risk
24 assessment study that was done for the Metropolitan

1 Water District of Southern California on which
2 Dr. Charles Gerba was a member of the project team
3 and Dr. Charles Haas was a member of the scientific
4 blue ribbon panel that reviewed that report, the
5 kinds of body -- or the kinds of nonbody contact
6 recreational activities that were considered
7 included wind surfing, kayaking, jet skiing, water
8 skiing. I can't remember if I said canoeing. And
9 all of those activities were assumed by the experts
10 I just mentioned as well as members of the
11 Environmental Protection Agency, people from the
12 Centers For Disease Control. All of those
13 activities were considered to be activities in which
14 a person would be exposed to water during the course
15 of that recreation; and, therefore, they would be at
16 some health risk as a result of ingestion of water
17 on the contained pathogens.

18 Q. I'll ask first, I don't believe we've
19 seen a copy of that report in the record there.

20 MS. ALEXANDER: All right. I can
21 offer this one.

22 THE WITNESS: I apologize.

23 MS. ALEXANDER: I apologize that,
24 again, I don't have enough copies. But --

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HEARING OFFICER TIPSORD:

Miss Williams also has a follow-up.

If there's no objection, I will mark Predicted Public Health Consequences of Body Contact Recreation on Water Reservoirs, May 2002 journal AWWA as Exhibit 252.

And when you get a chance to take a look, is there any objection? Seeing none, it's Exhibit 252.

MR. ANDES: Since this report is fairly voluminous and wasn't introduced before, I'd reserve the right to ask the witness further questions later after we've reviewed it.

But let me go back to the question at hand, because I'm not sure based on your characterization that this really even relates to the question at hand which was the statement in your testimony concerned secondary -- excuse me -- I'm losing your testimony. It concerned a secondary contact. It said previous studies have demonstrated risk even absent primary contact use. So I'm

1 whether the activities studied are identical
2 or close to identical to what goes on in the
3 CAWS?

4 BY MR. ANDES:

5 Q. Could they be characterized as
6 secondary contact or are they closer to primary
7 contact, the statement and the testimony relates to
8 nonprimary contact. So I'm not sure how the witness
9 is defining that. I'm trying to understand what
10 absent primary contact use there are health risks,
11 and I'm looking at the studies and saying is this
12 absent primary contact. It's wind surfing, it's
13 white water canoeing, whether there are
14 significantly different levels of exposure?

15 A. When I say primary contact, I'm
16 referring to swimming. So nonprimary contact would
17 be things other than swimming. Does that help?

18 Q. And you think the levels of exposure
19 in wind surfing are similar to the levels in
20 canoeing?

21 A. I have not done a study to determine
22 the volume of water that is ingested during those
23 two different activities. However, as I've just
24 said, a scientific panel comprised of experts from

1 across the country, including Dr. Charles Haas,
2 Dr. Mark Sobski from the University of North
3 Carolina, individuals from the Centers For Disease
4 Control and the United States Environmental
5 Protection Agency, all agreed with the
6 characterization of activities other than swimming
7 as noncontact recreational activities, and those
8 included kayaking, canoeing, wind surfing, et
9 cetera.

10 Q. Did this study find a significant
11 health risk from the secondary contact use? And if
12 you can, please point to where that says that in the
13 study?

14 A. The purpose of this particular study
15 was actually not to determine whether or not there
16 was a significant risk to the recreators. The
17 purpose of this study was to determine the risk
18 to -- this -- I apologize that you haven't had an
19 opportunity to review this document. The purpose
20 this study was to determine whether or not allowing
21 noncontact recreational activities on this
22 particular reservoir would result in an increased
23 risk to individuals who drink drinking water that
24 this reservoir was used as a source of. So it was a

1 different context. My point was that the
2 individuals who reviewed this study which included
3 Dr. Haas and the individuals on this review team who
4 did the study who included Dr. Charles Gerba,
5 Dr. Joan Rows (ph.) accepted the definition of
6 noncontact recreation as known for swimming and
7 including the activities we mentioned.

8 HEARING OFFICER TIPSORD: Mr. Andes,
9 Miss Williams has a follow-up that may, I
10 think, talk about the primary contact versus
11 secondary contact.

12 MS. WILLIAMS: I do want to ask a
13 follow-up. With regard to these studies --
14 good morning. I'm Deborah Williams from the
15 Illinois EPA.

16 THE WITNESS: Hi.

17 MS. WILLIAMS: With regard to these
18 studies in Table 2 of your testimony, are you
19 aware of whether the Metropolitan Water
20 Reclamation District of Greater Chicago
21 relied on any of these studies in developing
22 its risk assessment document?

23 THE WITNESS: I am not.

24 MS. WILLIAMS: That's all. Should I

1 ask about this? Let me ask one other
2 question just to clarify. Exhibit 252 that
3 you just entered.

4 HEARING OFFICER TIPSORD: Miss
5 Williams, please --

6 MS. WILLIAMS: I'm trying to figure --
7 it looks like this exhibit may contain
8 multiple papers. Is that correct? There's
9 a --

10 THE WITNESS: We don't have a copy of
11 it. I'm sorry. I thought it looked awfully
12 long. There's more than one document there.

13 MS. ALEXANDER: Yes. I believe
14 there's more than one document. It got
15 miscopied. My apologies. I will fix it
16 during the break.

17 MS. WILLIAMS: That's all. Thank you.

18 MS. ALEXANDER: I have a couple of
19 quick follow-ups if we can do that. First of
20 all, Dr. Yates, have you ever made
21 assumptions in your research as to volumes of
22 water swallowed in connection with canoeing?

23 THE WITNESS: The study that we were
24 just discussing, the one that was published

1 in AWWA, we assumed that the volume of water
2 that we ingested during any of those
3 nonprimary contact recreational activities
4 was 30 milliliters.

5 MS. ALEXANDER: And do you have an
6 understanding as to whether an assumption was
7 made regarding ingestion of water in the risk
8 assessment that is Exhibit 71 in this
9 proceeding?

10 THE WITNESS: Based on my review of
11 that document, indeed, assumptions were made
12 as to the volume of water that would be
13 ingested during the course of different
14 recreational activities including canoeing,
15 boating, et cetera, yes.

16 MS. ALEXANDER: Okay.

17 ACTING CHAIRMAN JOHNSON: Let me ask.
18 So you assumed that a recreator who is
19 windsurfing ingests the same amount of water
20 as someone who's canoeing?

21 THE WITNESS: For the purposes of our
22 studies, yes, we did.

23 MR. ANDES: Do you really think that's
24 true?

1 THE WITNESS: I have not conducted any
2 studies to verify that. Again, this study
3 that I've mentioned, the one -- Exhibit 252
4 was reviewed by a national scientific panel.
5 They reviewed every one of the assumptions
6 that we made including the assumption that 30
7 milliliters of water would be the volume that
8 would be ingested during the course of all
9 the different nonswimming activities that
10 were anticipated to occur on this particular
11 reservoir and they all concurred including
12 Dr. Gerba, Dr. Rows, Dr. Haas, that this was
13 an appropriate assumption to make.

14 MS. ALEXANDER: One quick follow-up.
15 Was it your understanding that that
16 assumption was intended as an average as
17 opposed to a direct representation of --
18 applicable to each activity?

19 THE WITNESS: Certainly it's an
20 average that would occur. One would assume
21 that there'd be some individuals doing some
22 activities that would ingest smaller volumes,
23 there would be some individuals that would
24 ingest lower volumes. And, therefore, when

1 we did our risk assessment, we did take into
2 consideration the fact that these were
3 ranges, that these were just average
4 behaviors that we were modeling.

5 BY MR. ANDES:

6 Q. So your assumption was that for
7 swimming, 30 milliliters was the proper assumption
8 you used for ingestion, right?

9 A. No, sir. No, sir. Nonswimming. I'm
10 sorry if I wasn't clear. Nonswimming.

11 Q. Okay. And is it true -- Isn't it true
12 that in the risk assessment document that that, in
13 fact, is used as one of the assumptions to model the
14 range of distributions of exposure?

15 A. That that was assumed?

16 Q. Thirty?

17 A. Thirty mils was --

18 Q. Used as a conservative projection of
19 exposure in the risk assessment?

20 A. In the current risk assessment, the
21 Geotech --

22 Q. Yes.

23 A. The exposure volumes were varied based
24 on the different kind of activity, and they were

1 not, to my understanding, they were not an absolute,
2 but they varied based on the length of time an
3 individual was exposed to the water. So it was a
4 volume per hour, if I remember correctly.

5 Q. So but 309 was used as a conservative
6 assumption, correct? I mean we can find it, but I'm
7 confident we will.

8 A. I don't recall exactly 30 mills. That
9 may, indeed, be the case. I have no reason to doubt
10 you, and I could look through it and find it, too.
11 Again, I'm recalling in my memory the table that
12 showed the volume ingested per hour for the various
13 recreational activities.

14 MS. ALEXANDER: I have one more
15 follow-up on this if you're about to move on.
16 Are you moving on to the next question?
17 Because I have one follow-up before you do.

18 MR. ANDES: I'm not moving on to the
19 next question yet.

20 MS. ALEXANDER: Okay. So continue.

21 BY MR. ANDES:

22 Q. Okay. Now, one of the studies in the
23 Table 2 on 16, Dr. Yates, that you cited was the
24 Taylor Study from South Africa. And it concerns

1 canoeing.

2 A. I believe this is the same article
3 that you've already handed out.

4 MR. ANDES: I don't believe so.

5 MS. ALEXANDER: This is identical to
6 what you gave us before. You handed me the
7 Harwood article.

8 MR. ANDES: I'm sorry.

9 HEARING OFFICER TIPSORD: I have
10 another one up here if you guys need it. If
11 there's no objection, we will mark this
12 Survey of Waterborne Pathogens Amongst
13 Canoeists in South Africa by M.B. Taylor, et
14 al, from Cambridge University Press, 1995, as
15 Exhibit 253.

16 Seeing no objection, it's Exhibit
17 253.

18 BY MR. ANDES:

19 Q. Dr. Yates, this report concerns
20 canoeing in an area of South Africa?

21 A. Mm-hmm.

22 Q. And I want to raise a question about
23 first whether you agree or how you would react to
24 the findings, and then I'll go back to some of the

1 details. On Page 306 it indicates in this study a
2 significant association between canoeing and
3 antibody response to Schistosoma spp, but not HAV
4 and NV noroviruses has been demonstrated. Now, are
5 you aware of what schistosoma is and how
6 schistosomiasis comes in a risk issue?

7 A. Yes, in general. It's not my
8 specialization, but I am aware of schistosomiasis.

9 Q. Well, let me introduce an exhibit that
10 should help everyone understand that. Simply a
11 chart labeled schistosomiasis?

12 HEARING OFFICER TIPSORD: If there's
13 no objection, we will mark the figure
14 Schistosomiasis as Exhibit 254, if there is
15 no objection. Seeing no objection, it's
16 Exhibit 254.

17 BY MR. ANDES:

18 Q. Is it accurate to summarize this by
19 saying that these particular organisms, I guess
20 worms, penetrate snails, then are released by the
21 snails, penetrate skin, migrate through the body,
22 lay eggs in the bowels and then are excreted, which
23 my daughter characterized as gross when she reviewed
24 this chart.

1 A. You don't want to hear the
2 conversations at the dinner table at my house. That
3 was not gross at all. You know, when you work with
4 sewage, what can I say.

5 I would say that that's a fairly
6 accurate characterization of the figure that you
7 just handed out.

8 Q. And in the report on Pages 304 and
9 305, it indicates that schistosoma is endemic in
10 certain areas of the coastal regions of South
11 Africa. All people using these waters are at risk.
12 And, in fact, on Page 305 that South African
13 canoeists are well aware of these risks and many
14 take anti-schistosomal drugs regularly?

15 A. Yes.

16 Q. So that's a significant risk that was
17 found in this report was for schistosomiasis which
18 is not known to occur in the United States, correct?

19 A. Not correct. Schistosomiasis does
20 occur in the United States, sir.

21 Q. In this area?

22 A. I could not speak to whether or not it
23 occurs in Illinois, but there have been outbreaks
24 associated with schistosomiasis in the United States

1 in the last few years according to the Center For
2 Disease Control.

3 Q. Okay. Well, I'll introduce a document
4 that refers to the CDC which lists areas of the
5 world where this occurs. And I don't see North
6 America anywhere on the list, but I guess we can
7 introduce that document.

8 A. Sure.

9 Q. Is this an issue that we would have
10 significant concern about such that we, by not
11 looking at it in risk assessment, we have
12 underestimated risk for the CAWS recreational user?

13 A. I have, as I've already stated, I have
14 no knowledge as to whether or not schistosomiasis
15 occurs in Illinois.

16 Q. In the final study you have on Table 2
17 regarding fishing, and cryptosporidium levels
18 detected in the -- on the fisherman's hands were
19 significant -- were significant, you can define that
20 however you want, levels of cryptosporidium found in
21 the sampling results taken in the CAWS. Do you have
22 any reason to believe that there are high levels of
23 crypto in the CAWS?

24 MS. ALEXANDER: I'm going to object to

1 the vagueness of high, but you can answer.

2 THE WITNESS: There were
3 cryptosporidiosis found in the CAWS.
4 Characterizing them as high or low is someone
5 else's job, I guess.

6 BY MR. ANDES:

7 Q. In fact, that was laid out in the risk
8 assessment as low levels. So I'm wondering whether
9 you agree with that.

10 A. In my opinion, the finding of any
11 levels of cryptosporidium in the water that is used
12 for recreational purposes because it can result in a
13 public health outcome is cause for concern. So
14 characterizing it as high or low is, I think, more
15 of a policy decision.

16 Q. Are you aware that crypto found in the
17 risk assessment was noninfectious?

18 A. I have to admit that the main focus of
19 my review of this document was on the virus, parts
20 of the document. However, if the assays that were
21 done to look for cryptosporidium found that
22 absolutely none of them was infective, certainly I
23 have every bit of confidence in Dr. Clancy's
24 laboratory and their -- I use that laboratory. So

1 it's an excellent laboratory. They're very good at
2 what they do. I would just mention that because
3 they didn't find any viable -- or I shouldn't say
4 viable, any infectious cryptosporidium in their
5 samples does not mean that there are no infectious
6 cryptosporidia in the water at all. Because they
7 didn't sample every day all over the river, so.

8 Q. Okay. We'll move on to the next.

9 HEARING OFFICER TIPSORD: Miss
10 Alexander had a follow-up.

11 THE WITNESS: Go ahead.

12 MS. ALEXANDER: I'm sorry. I just had
13 one follow-up moving back to the water
14 ingestion issue. I just wanted to ask
15 whether a study of risk associated with a
16 higher likelihood of ingestion can be
17 relevant to determining the risk of an
18 activity with a lower likelihood of
19 ingestion?

20 THE WITNESS: Again, what -- The big
21 difference is in the volume of water, and,
22 therefore, the number of pathogens to which a
23 person is exposed. So if it's shown that
24 during the course of a study of an activity

1 where a larger volume of water is ingested,
2 there is a significant -- there is a health
3 risk, a measurable health risk. Those data,
4 those results can inform a study in which
5 there's a smaller body of water that's
6 ingested. You just adjust for the different
7 exposure levels. Is that responsive?

8 BY MR. ANDES:

9 Q. So you adjust for the different
10 exposure levels. So if you think that the levels of
11 exposure in secondary contact are one-tenth of the
12 levels in the swimming, you would -- you just divide
13 it by ten or multiply it by ten? Aren't they --
14 aren't they different exposure scenarios and you
15 have to look at each one individually?

16 A. What I meant when I said exposure
17 levels, I meant the number of micro organisms in
18 which a person is exposed during the course of the
19 activity. So if during one activity you're exposed
20 to 100 milliliters of water, that contains a certain
21 number of organisms. If during another activity
22 you're exposed to ten milliliters of water, you're
23 exposed to a lower number of organisms assuming that
24 the concentration of organisms -- of the organisms

1 are evenly distributed throughout the water.

2 Q. But if the question is risk, not level
3 of micro organisms or number of organisms you're
4 exposed to, don't you need study the lower levels to
5 actually determine if those levels of exposure, what
6 the risk really is? You can't simply multiply or
7 divide from the higher levels of exposure.

8 A. I don't believe that I said that that
9 is what you would do. I said you would adjust based
10 on the different exposures. And so you would use a
11 different dose in the exposure assessment part. You
12 would assume they were exposed to a different dose,
13 and then use that as you went through the rest of
14 the risk assessment calculation.

15 MS. ALEXANDER: Okay. I have another
16 follow-up on that. Am I -- Were these
17 assumptions regarding likely exposure
18 associated with the certain activity intended
19 to represent across the board an average
20 likelihood in the sense that some individuals
21 might swallow more water, be exposed to more
22 water than others, but you're attempting to
23 come up with one number. Is that correct?

24 THE WITNESS: That's my understanding,

1 yes.

2 MS. ALEXANDER: Would it also be fair
3 to say that if you're looking at a particular
4 individual who, say, fell in the water and
5 ingested some, that their risk or that he --
6 I shouldn't say their risk. The amount they
7 ingested might, in fact, be comparable even
8 to the amount ingested while swimming. Would
9 that --

10 THE WITNESS: That could certainly be
11 the case, yes.

12 MS. ALEXANDER: Okay.

13 BY MR. ANDES:

14 Q. Didn't the risk assessment expressly
15 take that into account in looking at the exposure
16 scenarios to be conservative?

17 A. My understanding of the risk
18 assessment is that they did look at a range of
19 exposures, yes, to take into consideration the fact
20 that there would be a range of exposures based on
21 the different activities that were going on, yes.

22 Q. Okay. I can move on to the next
23 question. On Page 2 of the testimony you made a
24 statement, Dr. Yates, that current efforts to

1 reevaluate pathogen indicator criteria have no
2 bearing on the question of effluent disinfection.
3 Let's put aside the efforts by EPA to reevaluate
4 the -- well, let me first ask. The EPA ongoing
5 effort right now to reevaluate the recreational
6 criteria concerned primary contact, correct?

7 A. It is my understanding that in studies
8 that the EPA is currently doing, they are evaluating
9 primary contact recreation, yes.

10 Q. And as I understand it under the
11 settlement agreement in the case concerning those
12 criteria which was entered into by NRDC, EPA and
13 other parties that specifically called for EPA to,
14 in fact, conduct epidemiological studies, correct?

15 A. That is my understanding. Yes, sir.

16 Q. And I understand, correct me if I'm
17 wrong, that several studies have now been begun in
18 terms of epidemiological studies with regard to
19 beaches?

20 A. That is also my understanding, yes,
21 sir.

22 Q. So you believe that those studies will
23 be relevant in determining recreational water
24 quality criteria for primary contact?

1 A. I certainly hope so.

2 Q. Okay. Whatever the results, they will
3 be relevant, correct?

4 A. They will be one part of the
5 considerations that EPA evaluates and members of the
6 scientific community evaluate as they develop those
7 criteria. They're not just doing risk assessment
8 studies. That's one component of the process.

9 Q. And the epidemiological study being
10 done as to the CAWS, which is the first one being
11 done as to secondary contact, you would agree that
12 that would as well be relevant in determining
13 appropriate water quality standards for the CAWS?

14 A. I would say that the epidemiological
15 study that's being conducted by Dr. Gorovich would
16 certainly be one piece of information that would be
17 relevant to consider when determining what happens
18 with respect to the issues at hand here.

19 MS. WILLIAMS: I'd like to follow up
20 on this question four real quick.

21 Can you explain the statement
22 that Mr. Andes has flagged here from your
23 testimony regarding efforts to reevaluate
24 pathogen indicator criteria have no bearing

1 on the question of effluent disinfection.
2 Could you just explain what you mean by this
3 statement or how you draw this conclusion?

4 THE WITNESS: Sure. The EPA is
5 reexamining the appropriateness of specific
6 indicators that are being used to determine
7 whether or not it's -- one should be allowed
8 to recreate at a particular recreational
9 site. So, in other words, you go out, you
10 measure the water quality at a particular
11 beach, for example, on a particular day, and
12 as a result of whatever that analysis shows,
13 you make a determination as to whether or not
14 you should allow people to recreate at that
15 beach or not. And that's really what the
16 point of their current activity is. That, to
17 me, is a very different situation than making
18 a determination as to whether or not one
19 should disinfect or not disinfect sewage
20 effluent that is being put into a water body
21 that is then going to be used for nonprimary
22 contact recreation. They're just two very
23 very different situations.

24

1 BY MR. ANDES:

2 Q. If I can follow up on that. Can you
3 point to any statement by the District indicating
4 that the EPA reevaluation of the primary criteria is
5 a reason for the board not to require disinfection
6 here? Isn't the District's position that the two
7 are completely separate since this secondary
8 contact?

9 A. I really could not -- I have not, to
10 go back to the first part of your question, I have
11 not seen any statement to the effect of that --

12 Q. Because your statement in your
13 testimony indicates that the revision process
14 shouldn't lead to a conclusion of disinfection is
15 unnecessary. It implies the District was contending
16 that. And I'm trying to find out if there is
17 someplace where the district has said that that
18 criteria revision process has any bearing here?

19 MS. ALEXANDER: I'm going to object to
20 the extent you're asking her to comment on
21 what the district may or may not have
22 contended anywhere. I don't believe that's
23 what she's here to testify to.

24 THE WITNESS: Yeah. I have no

1 knowledge of any such statement.

2 BY MR. ANDES:

3 Q. Okay. We can move on to the risk
4 assessment. And the statements you made on Page 2,
5 but also elsewhere in the report. First, do you
6 know of any other studies that have looked at actual
7 pathogens associated with sewage contaminated
8 wastewater and types of illness?

9 A. I'm sorry. Could you repeat that.

10 Q. Have you seen any other studies that
11 have looked at significant number of human pathogens
12 and assessed risk relative to sewage contaminated
13 wastewater?

14 A. What kinds of studies are you
15 referring to?

16 MS. ALEXANDER: I'm sorry. Are you --

17 BY MR. ANDES:

18 Q. Anything comparable, have you seen
19 anything comparable to this risk assessment?

20 MS. ALEXANDER: Are you on a prefiled
21 question?

22 BY MR. ANDES:

23 Q. Question 5A. I'm sorry.

24 MS. ALEXANDER: Got it. Okay.

1 Continue.

2 THE WITNESS: So you're asking
3 specifically about the risk assessment study?

4 MR. ANDES: Yes. Your statement on
5 Page 2 was regarding the risk assessment.
6 I'm trying to understand if there are other
7 comparable studies that have been done.

8 THE WITNESS: Okay. I believe the
9 question that you asked was whether -- you
10 referred to a significant number of
11 pathogens. I'm not --

12 BY MR. ANDES:

13 Q. Well, I can read the question directly
14 and we can answer that.

15 A. Sure, sure.

16 Q. Please list any other scientific study
17 that evaluated a large fraction of the human
18 pathogens typically associated with the sewage
19 contaminated wastewater with all types of illness
20 generally associated with such pathogens.

21 A. Well, I guess you're characterizing
22 your study as having evaluated a large fraction of
23 human pathogens. And, as Dr. Gerba himself
24 testified before this board, there -- he's -- he

1 quoted between 160 and 200 different pathogens that
2 could be present in sewage. I indicated that there
3 is -- there could be more than 100. The point is
4 that it's very well known that there are -- choose a
5 number. More than 100 different kinds of human
6 pathogens that could be present in wastewater. And
7 this study looked at, I would consider, a handful as
8 opposed to a large fraction of them.

9 Q. And if we refer back to Dr. Gerba's
10 testimony, the first question is didn't he state,
11 and we can go back to his testimony, that a number
12 of pathogens did not need to be evaluated because
13 they weren't associated with sewage?

14 A. He did indicate that there are some
15 pathogens that he didn't feel needed to be studied
16 because they weren't associated with sewage. That's
17 correct. Yes.

18 Q. And, in fact, he explained the
19 rationale for selecting the ones which were analyzed
20 as being the most common?

21 A. He did explain his rationale for why
22 the organisms that he choose to study were studied,
23 yes.

24 HEARING OFFICER TIPSORD: Excuse me.

1 That's Exhibit 69 for the record.

2 MS. ALEXANDER: And what was that
3 rationale? I'd just like to ask a follow-up.

4 THE WITNESS: There were actually two
5 points that were made with -- made in the
6 document and in testimony regarding the
7 rationale for choosing the organisms. My
8 mind just blanked. I know one of them was
9 that there was standard procedures available
10 for the analysis of those organisms and the
11 other one was organisms that are commonly
12 associated with outbreaks in recreational
13 settings. Those are the two rationales.
14 However, as has already been pointed out by
15 others, there are no EPA-approved methods,
16 any generally-accepted standard operating
17 procedures for at least two of the pathogens
18 or groups of pathogens that were studied
19 during the course of this risk assessment.
20 Those would be the adenoviruses and the
21 noroviruses.

22 MS. ALEXANDER: And one other
23 follow-up. Is it your understanding that the
24 risk assessment evaluated all sewage-related

1 pathogens?

2 THE WITNESS: Absolutely not. As I
3 said, there's a handful of sewage-related
4 pathogens that were studied during the course
5 of the risk assessment. But there were
6 others that were not.

7 BY MR. ANDES:

8 Q. And if I can refer back to Dr. Gerba's
9 testimony on September 9, 2008, and this would have
10 been Page 39 of the afternoon transcript, he said,
11 and I quote, we also selected to represent what we
12 figured would be the ones most commonly present,
13 ones that could be detected by methods currently
14 available, because methods weren't available for all
15 of these. And the ones that -- and the ones would
16 be there in the greatest concentration. So they
17 would present the greatest risk based on knowledge
18 of those responses in the occurrence of wastewater.
19 Do you disagree with that?

20 A. That's Dr. -- I don't disagree that
21 that's what Dr. Gerba said.

22 Q. Do you disagree with his statement?

23 A. I would say that there are othe
24 microorganisms that are present in sewage that are

1 responsible for recreational waterborne disease
2 outbreaks that he did not study. And I would also
3 say that the methods that were used for doing the
4 analyses for the neuroviruses and the adenoviruses,
5 as I've said before, there are no standard methods
6 for those particular analyses. So those were
7 methods that are used in Dr. Gerba's lab, but I
8 would say that if you looked at other laboratories
9 that are doing those kinds of analyses, you would
10 find that they use different methods.

11 Q. Well, do you have --

12 A. And these concerns are not just mine.
13 As you know, the EPA has -- the United States
14 Environmental Protection Agency has also expressed
15 these very same concerns.

16 Q. Do you know of specific methods that
17 Dr. Gerba used that were in error that he should
18 have used another method?

19 A. I'm not --

20 MS. ALEXANDER: Another method for
21 what? I'm sorry.

22 BY MR. ANDES:

23 Q. Analytical method.

24 A. For?

1 Q. You just laid out that there were
2 other methods available for some bacteria, for some
3 pathogens. I'm trying to understand if you're
4 saying that his use of one method versus another
5 significantly underestimated the risk. Do you have
6 any reason to believe that?

7 A. What I'm saying is that the methods
8 that were used by Dr. Gerba to do the adenovirus and
9 the neurovirus assay were methods that are in use in
10 his laboratory. I'm not saying that the methods --
11 that there was an error in the actual analysis that
12 was done. What I'm saying is that those are methods
13 that he is using in his laboratory. You could go to
14 another laboratory and they'd be using a different
15 method and you could get very different results.
16 The reason that we -- or how do I say this? To
17 become a standard method, or an EPA method, requires
18 testing, extensive testing across the country in a
19 number of different laboratories in large numbers of
20 different water matrices by a number of individuals
21 so that they can look at how reproducible the
22 results are, look at how these methods work in a
23 variety of different water matrices, et cetera. And
24 so the fact that there are no standard methods for

1 these organisms makes it so it's difficult for us to
2 say that the results that Dr. Gerba got would have
3 been the same results that would have been obtained
4 by someone else doing -- analyzing those same
5 samples in their laboratories.

6 Q. So you don't have any reason to
7 believe that use of Dr. Gerba's methods were, in
8 fact, went beyond -- went into areas where EPA
9 simply had not approved methods yet so used what was
10 available. You don't have any reason to believe
11 that that underestimated the risk in any way?

12 MS. ALEXANDER: I think we need a
13 clarification here. Are we talking just
14 specifically about the narrow question of
15 doing assays, or are we talking about the
16 broader issue of methodology? Because I
17 believe it's clear that Dr. Yates' testimony
18 contains criticisms of methodology such as
19 the assay coupled with the PCR process. But
20 we're talking about something narrower?

21 MR. ANDES: Yes.

22 MS. ALEXANDER: Okay. Making sure.

23 THE WITNESS: And that narrower --

24

1 BY MR. ANDES:

2 Q. I'm trying to figure out why there's a
3 problem with the fact that Dr. Gerba, for pollutants
4 that don't have an EPA approved method, used the
5 method that was in use at his lab? What's the
6 problem with that?

7 MS. ALEXANDER: Okay. I'm going to
8 object on foundation. Because I don't
9 believe that Dr. Yates' testimony was that
10 there was a problem with that. I believe
11 that her testimony had to do with discussion
12 of the stated rationale for choosing those
13 particular pathogens. There was a statement
14 that one of the reasons for choosing to study
15 a particular pathogen was because there was
16 an EPA method. Dr. Yates has made a
17 statement that, no, actually there were not
18 EPA methods for all of the ones chosen. I
19 don't believe that was a criticism of the
20 choice to study those. Only a statement that
21 the rationale provided doesn't match up with
22 the facts.

23 THE WITNESS: That's correct.

24 MR. ANDES: Well, if I can correct the

1 record. I think what you'll find and what
2 Dr. Gerba testified to was he focused on one
3 where there were currently available methods,
4 not only EPA approved. And we obviously know
5 from your own testimony that he did use some
6 methods that -- for pollutants that don't
7 have an EPA-approved method, right?

8 THE WITNESS: But, again, I'm going
9 back to the risk assessment document itself
10 wherein it states that there were two
11 rationales for choosing the organisms that
12 were chosen. And one of them was the
13 availability of U.S. EPA approved laboratory
14 standard operating procedures. And --

15 BY MR. ANDES:

16 Q. So --

17 A. There weren't for the adenoviruses or
18 the norovirus.

19 Q. So, in other words, if he selected
20 them based on either/or, based on either they are
21 ones that are commonly present or they have
22 EPA-approved methods, there are some that you looked
23 at which are commonly present which don't have
24 EPA-approved methods like adenovirus and norovirus

1 and he did test for them, corrects?

2 A. My understanding was that it was not
3 an or situation. It was an and situation; that they
4 were commonly present and that there were SOPs. But
5 I --

6 Q. Well, if I can quote from Page 9 of
7 the risk assessment.

8 HEARING OFFICER TIPSORD: Which is
9 Exhibit 71.

10 MR. ANDES: Yes. The criterion
11 specifically presented there was there are
12 EPA-approved methods or laboratory standard
13 operating procedures available for the
14 measurement of the selected pathogens.

15 THE WITNESS: Okay. That's not what
16 you just said. You said the or was related
17 to CAWS outbreaks. But, if, indeed -- I do
18 believe what you have read. And, yes, it is
19 true that Dr. Gerba has standard operating
20 procedures in his laboratory for the
21 analysis. Either way, the fact is that has
22 been testified to by more than one person,
23 there are more than 100 different pathogens
24 that can be present in fecal material,

1 therefore, present in sewage. We studied a
2 few of them, and is that sufficient to
3 enable one to make a decision with the large
4 potential public health consequences
5 associated with disinfecting or not
6 disinfecting that effluent.

7 BY MR. ANDES:

8 Q. Don't we --

9 A. But we know that disinfecting effluent
10 will reduce the numbers of pathogens that are
11 present, and, therefore, reduce the public health
12 risk.

13 Q. Don't we often use indicators to
14 measure for the presence of a suite of pollutants.
15 Do we usually measure every pollutant in a water
16 body, or do we measure some and use them to make
17 decisions?

18 A. Again, it depends on what the purpose
19 of the sampling and analysis is. But yes, we do
20 frequently use indicators because it's difficult to
21 measure for all pathogens.

22 Q. So you're not saying that the study
23 would only be relevant if it measured all 100
24 pathogens?

1 MS. ALEXANDER: What do you mean by
2 relevant? Do you mean a sufficient basis for
3 a public health determination or relevant to
4 what?

5 MR. ANDES: This proceeding on the
6 water quality criteria?

7 MS. ALEXANDER: But, again, I object
8 to the term relevant. I think it's vague.
9 You can answer it if you understand.

10 BY MR. ANDES:

11 Q. Do you believe that a study that
12 doesn't look at all 100 should be ignored?

13 A. I don't believe that a study that
14 doesn't look at all 100 should be ignored. But I
15 don't believe that it should be the only basis upon
16 which a decision should be made as to whether or not
17 one would disinfect effluent knowing that that
18 disinfection is going to result in an improvement --
19 or is going to result in a reduction in risk to
20 public health.

21 Q. And are you aware of anyone here who
22 is contending it should be the only basis?

23 A. I'm not aware of that, but there might
24 be. I don't really know. I don't want to try to

1 speculate on what people might be thinking.

2 Q. Do you have any reason to believe, to
3 disagree with conclusions by Dr. Gerba that in
4 essence the risk assessment looked at the most
5 important parameters for public health? You talked
6 about the greatest risk, basic knowledge of dose
7 response and the response of wastewater. Do you
8 have reason to believe that there's something they
9 missed that had -- would have significantly changed
10 the risk estimate?

11 MS. ALEXANDER: The parameters by
12 public health, are you still referring to the
13 specific pathogens or is your question --

14 MR. ANDES: Yes.

15 THE WITNESS: Again, there are other
16 pathogens that we know are associated with
17 human fecal material and are, therefore,
18 present in sewage. And if people are exposed
19 to them, they can have some fairly serious
20 health consequences as a result and some of
21 those were not studied. EPA has brought this
22 up as well with respect to the fact that
23 there are other pathogens out there that we
24 know cause waterborne disease and can have

1 serious health consequences and they were not
2 studied.

3 BY MR. ANDES:

4 Q. Well, let's talk for a minute about
5 that. Have you reviewed -- Let me ask this. In
6 your testimony you indicate that you reviewed a
7 number of documents, I'm not sure if this is
8 exclusive. It includes the dry and wet weather risk
9 assessment and the review of the risk analysis by
10 U.S. EPA. There were a number of other documents
11 that went back and forth between EPA and the
12 reclamation district including one that was recently
13 filed which contained the detailed response to all
14 comments submitted by EPA. Have you reviewed all of
15 those documents?

16 A. I have reviewed a number of documents.
17 You'd have to tell me specifically which one you're
18 referring to. I've reviewed several.

19 Q. This document was filed in the record
20 but it wasn't introduced during the hearings.

21 HEARING OFFICER TIPSORD: It's a part
22 of the puzzle.

23 MR. ANDES: No. We filed this
24 document on April 10. So it is in the

1 record. But I'm not sure if it's listed in
2 the exhibits.

3 HEARING OFFICER TIPSORD: It's
4 probably not listed in the exhibits, but it's
5 docketed in the clerk's office.

6 MR. ANDES: Yes.

7 HEARING OFFICER TIPSORD: Was that the
8 CD that you filed? Was that on the CD?

9 MR. ANDES: I don't think so.

10 HEARING OFFICER TIPSORD: Let's mark
11 it as an exhibit. Even though it's
12 repetitious, it would be easier.

13 THE WITNESS: If you can tell me the
14 date of the document to which you're
15 referring, maybe that would expedite matters.

16 MR. ANDES: April 10, 2009, is when we
17 filed it with the Board.

18 MS. WILLIAMS: Was it March 13, the
19 date of the --

20 MR. ANDES: The document itself was
21 dated March 13.

22 THE WITNESS: I do have a copy of
23 correspondence dated March 13, 2009. You
24 realize I have to get on an airplane and I'm

1 not going to be able to carry this.

2 MR. ANDES: Sorry about that.

3 HEARING OFFICER TIPSORD: This is
4 already -- actually, it's got public comment
5 number at the top, so we won't need to mark
6 it as an exhibit. It's Public Comment
7 No. 186. And there are additional copies if
8 anybody needs one. So we won't mark this as
9 an exhibit since it has a public comment
10 number.

11 BY MR. ANDES:

12 Q. Have you reviewed this document?

13 A. I believe I have, yes. This is --
14 there's a lot of it that -- and the only reason for
15 my hesitation is that there appears to be several
16 attachments to this. So, yes, with different dates
17 on them, and I can't state with absolute certainty
18 that I've reviewed every single one of them. But
19 I'd have to compare page by page, so.

20 Q. And we don't necessarily have to go
21 through detail now, but you referred to criticisms
22 made by EPA?

23 A. Correct.

24 Q. And I believe you referred to them

1 later in your testimony. This is the latest
2 document by the district responding to all of the
3 issues raised in the latest comments by EPA. And I
4 wondered if you had reviewed this and assessed the
5 comments and the District's responses?

6 A. Yes, I have.

7 HEARING OFFICER TIPSORD: This is U.S.
8 EPA we're talking about?

9 MR. ANDES: Yes.

10 THE WITNESS: Yes.

11 MR. ANDES: We'll come back to some
12 detailed questions about that later.

13 BY MR. ANDES:

14 Q. So in terms of the various, and this
15 is Question 6, and I'm just rephrasing it, on Pages
16 4 and 5 of your testimony where you laid out the
17 materials you had reviewed, it included, for
18 example, fecal data collected in the CAWS, but it
19 didn't appear after that you had looked at data
20 after 2002. There were other district reports that
21 have been submitted since then which aren't listed.
22 So the first question I had was whether, in fact,
23 you had reviewed all of those materials as well?

24 A. I'm not sure exactly what you mean by

1 when you say all of those materials, sir.

2 Q. In Question No. 6 there were
3 specifics: Fecal coliform data collected after
4 2002, district report on fecal coliform densities,
5 two district reports on fecal coliform densities.
6 And I wondered if those had been reviewed. They
7 weren't listed in your testimony.

8 A. Those studies were not on the
9 District's website when I submitted my testimony. I
10 have since, since they have been made available on
11 the website, I have reviewed those reports, yes,
12 sir.

13 MS. ALEXANDER: And one quick
14 follow-up. Have you reviewed fecal coliform
15 data in any form after 2002 from the
16 district's sampling?

17 THE WITNESS: Yes, I have,

18 MR. ANDES: Okay. Move on to Question
19 No. 7.

20 MS. ALEXANDER: Can I ask another
21 follow-up if you're moving on, which is did
22 you believe that these studies after you
23 reviewed them have had any relevance to your
24 conclusions?

1 THE WITNESS: I didn't find anything
2 in the later studies that contradicted the
3 points that I had made in my testimony, no.

4 BY MR. ANDES:

5 Q. Concerning Question No. 7, Page 5 of
6 your testimony, you state that lingering pathogen
7 contamination from combined sewer overflows could
8 occur for a few days immediately following storm
9 events. Have you reviewed the testimony of
10 Dr. Steven Melching in this proceeding?

11 A. No, sir, I have not.

12 Q. Or Dr. Garcia?

13 A. No, sir, I have not.

14 Q. Are you aware of information
15 indicating that contamination from combined sewers
16 can last up to several weeks after rainfall events?

17 A. Specifically in this particular
18 setting in the CAWS?

19 Q. Yes.

20 A. I'm not aware of that information, no,
21 sir.

22 Q. If disinfection were practiced, do you
23 have a sense of what would be the levels of the
24 pathogens that would be resulting in any way from

1 combined sewer overflows stemming from wet weather
2 events?

3 A. My testimony focussed on dry weather
4 situations, not on wet weather situations or CSOs.

5 Q. Are you aware of testimony concerning
6 how often we have precipitation events in this area?

7 A. The only information I have is what is
8 in the risk assessment report that contains data for
9 the period during which the sampling was done for
10 the purposes of this study.

11 Q. You don't have any reason to doubt
12 that?

13 A. To doubt the information that's in the
14 risk assessment report with respect to how often
15 there's wet weather?

16 Q. Right.

17 A. I have no reason to doubt that, no.

18 Q. I'm going to skip to part D of
19 Question 7. In the testimony -- I may come back to
20 B and C. But in the testimony on Page 7 you talk
21 about the enteric virus levels. On August 18, 2005,
22 and August 25, 2005, and you indicate that the
23 levels downstream were higher than upstream, but --
24 and I believe we have a table here somewhere. You

1 didn't note that the outfall sample found less than
2 1.28 MPN and the upstream, one of the upstream
3 samples had 3.25. So, actually in table -- excuse
4 me one moment. I want to be sure we have the right
5 table.

6 The Table 3-5A indicates one of
7 the upstream samples was significant, 3.25, correct?

8 A. I'm not sure what you mean when you
9 say significant.

10 Q. Well, you cited 1. -- 2.12 at
11 downstream as being a significant level. But we see
12 one upstream sample that's higher than that, 3.25.
13 And we see one sample at the outfall that's less
14 than 1.28. I'm trying to look at the whole
15 collection of data. And those weren't mentioned in
16 your comparison?

17 A. My purpose in citing the numbers that
18 I cited was that there are occasions when the
19 concentration downstream is higher than the
20 concentration upstream. So the occasions that I
21 cited on, for example, on the 25th at north side,
22 the upstream concentration was 1.04 MPN per hundred
23 liters and 16.07 downstream, MPN per 100 liters
24 downstream. My purpose was not to rehash every

1 single thing that was in all of your tables. I was
2 making an example for illustrative purposes.

3 Q. And this is solely focussed on dry
4 weather. You haven't looked at how the
5 concentrations changed wet weather including what
6 the levels are coming in upstream, correct?

7 A. My focus was on the dry weather
8 results, sampling results.

9 Q. Did you review the wet weather report?

10 A. I did. I did review the wet weather
11 report. Yes, sir.

12 Q. Okay. And do you have any conclusions
13 relative to the levels shown from wet weather
14 sources in the wet weather report versus what the
15 changes are during dry weather?

16 A. The results from the wet weather,
17 again, as I said, my focus was really on the dry
18 weather. But the results from the wet weather
19 sampling did show that there were potentially other
20 sources of human pathogens to the CAWS.

21 Q. But you haven't assessed their
22 importance relative to the treatment plants?

23 A. As I've said, my focus is really on
24 the dry weather, whether it's clear that the

1 wastewater treatment plants are putting human
2 disease-causing pathogens into the CAWS. It's known
3 that there are people who are recreating there; and,
4 therefore, because during those dry weather events
5 you are putting those organisms into the water,
6 there is a risk to the people who are recreating
7 there. And that risk can be reduced if, indeed, you
8 reduce the levels of pathogens that are present in
9 the effluent through treatment.

10 MS. ALEXANDER: And just to clarify
11 with a follow-up. When you referenced other
12 sources of contamination, of pathogen
13 contamination, were you referring to other
14 wet weather sources?

15 THE WITNESS: My understanding is
16 that, indeed, it was other wet weather
17 sources such as CSOs.

18 MS. WILLIAMS: Dr. Yates, I'd like to
19 ask a quick follow-up.

20 Are you familiar at all with
21 the location of the sampling point that
22 Mr. Andes is referring to as upstream versus
23 downstream?

24 THE WITNESS: Only as they're shown in

1 the document. I have not physically visited
2 any of the sampling locations, no.

3 MS. WILLIAMS: Do you have an opinion
4 one way or another whether the site is being
5 described as upstream of the north site plant
6 are actually impacted by the discharge from
7 the north side plant?

8 THE WITNESS: I do not.

9 MS. WILLIAMS: Thank you.

10 BY MR. ANDES:

11 Q. Now, I'll ask you a question, Sub E.
12 The overall total culturable enteric virus results
13 show concentrations in the effluent on the north
14 side and Calumet were lower than observed in the
15 study in Milwaukee and Arizona, studies by Sedmark
16 and Rose. Given this data, how do you know that the
17 dry weather contributions from enteric viruses were
18 primarily from the district outfalls?

19 A. I have to admit I'm somewhat confused
20 about you're referencing these two particular
21 articles. I don't understand how they're relevant
22 to the CAWS. The Sedmark article, that was posed in
23 Applied and Environmental in December of 2003
24 examines the influence to sewage treatment plants,

1 and, therefore, would not be at all surprising that
2 you would find higher concentrations of viruses in
3 raw sewage than one would find in treated effluent.

4 The study that you referenced by
5 Dr. Rose that was published in the Journal of
6 Parasitology to in 1987 is focussed specifically on
7 cryptosporidium oocysts. So, again, I don't
8 understand the relevance of that particular article
9 to dry weather contributions of enteric virus from
10 the treatment plants.

11 BY MR. ANDES:

12 Q. Well, let me ask a follow-up based on
13 your statement concerning the raw levels versus
14 treated levels. Since one of the issues here is
15 that most of the water in the CAWS is secondarily
16 treated effluent from the district, are you aware of
17 the statements made by Dr. Orris and Gorelick in the
18 last round of testimony concerning the levels of
19 of pathogens that are removed by secondary
20 treatment?

21 A. I did review their testimony. I could
22 not quote to you what levels of removal they
23 indicated were removed by secondary treatment.

24 Q. Do you have any reason to doubt that

1 there is significant levels of removal by secondary
2 treatment?

3 A. Define --

4 MS. ALEXANDER: Define significantly.

5 THE WITNESS: Sorry. You'd really
6 need to define significantly to me.

7 BY MR. ANDES:

8 Q. We'll I just let it stand based on
9 their testimony.

10 In Question Sub F, you point out
11 that there are more enteroviruses downstream than
12 upstream based on MPM levels, although I guess we've
13 looked at that data, it seems like there are also
14 some high ones upstream and some low ones at the
15 outfall.

16 Are you aware there's probably no
17 difference between these numbers because of the
18 statistical standard deviations for that method?

19 A. Well, it would have been nice to have
20 been provided with the standard deviations
21 associated with the MPM evaluations that were done,
22 so I don't have those. I did look at the data to
23 determine whether or not I could actually calculate
24 those myself. However, the raw data were not

1 provided, so I could not do those calculations.

2 I would say, however, that based
3 on, and this is always a dangerous thing to do so
4 I'm not sure I should even do it, but depending on
5 exactly what the raw data would show, it very well
6 could have been that there would be significant
7 differences between 12.12 and 16.07, for example.
8 Again, I couldn't calculate them and they weren't
9 provided --

10 BY MR. ANDES:

11 Q. Let me correct the record on that.
12 The raw data were an appendices to the report.

13 A. I actually have looked at the
14 appendices, and I did not see any raw data, sir.

15 Q. We gave a disc including all raw data
16 to counsel, so you --

17 MS. ALEXANDER: We'll have to
18 straighten this out because we were not able
19 to locate it.

20 THE WITNESS: Not raw data.

21 BY MR. ANDES:

22 Q. We'll move on. What is your basis or
23 belief in the levels would be constant for fecal
24 coliforms upstream and downstream if animals were

1 the source?

2 A. Well, I, as I've said, I haven't
3 physically visited the sites, so I don't have any
4 reason to believe that there would be any higher
5 probability that an animal would be contributing to
6 the concentrations of indicated organisms upstream
7 than downstream. In other words, I have no reason
8 to believe that there wouldn't -- that there would
9 be any different probability of an animal --

10 BY MR. ANDES:

11 Q. Well, let me ask you a question --

12 A. -- going upstream versus downstream.
13 And as you can see there are significantly different
14 concentrations of these organisms upstream versus
15 downstream. And if animals were the source, I would
16 expect them to be very much more evenly distributed
17 both upstream and downstream.

18 HEARING OFFICER TIPSORD: Okay.

19 Dr. Yates, you are saying as you can see and
20 pointing to documents --

21 THE WITNESS: I am so sorry.

22 HEARING OFFICER TIPSORD: Which the
23 transcript cannot see.

24 MS. ALEXANDER: Allow me to clarify

1 for the transcript that I have in front of me
2 that Dr. Yates is referencing blow-ups of
3 figures that are contained in her testimony.
4 To my far right is the one that is Figure --

5 THE WITNESS: Figure 2 which is the
6 Little Calumet River and Cal-Sag Channel
7 River, May to October 2002 Geometric Mean
8 Fecal Coliform Concentrations. And the other
9 figure we're showing is Figure 1 on Page 6 of
10 my testimony which is the North Shore Channel
11 and North Branch Chicago River Ambient Made
12 to October 2002 Geometric Mean Fecal Coliform
13 Concentrations. Sorry about that.

14 HEARING OFFICER TIPSORD: Thank you.

15 BY MR. ANDES:

16 Q. So, Dr. Yates, those are fecal
17 coliform concentrations?

18 A. Correct.

19 Q. Those are not concentrations of any
20 particular pathogens?

21 A. It is not known whether those fecal
22 coliforms include any pathogenic strings of E. coli,
23 for example, but that's a just a general fecal
24 coliform analysis.

1 Q. Okay.

2 A. But, again, if animals were the
3 source, animals -- well, maybe I didn't quite
4 understand the point of your last question. The
5 point is that the -- if animals were contributing
6 significantly to the concentrations of coliforms in
7 the water, one would anticipate that, again, the
8 concentrations would be relatively stable both
9 upstream and downstream. But also the fact is that
10 we know, as I've already indicated based on the
11 statement in the National Academy Science Report,
12 which I believe was 2 -- Exhibit 250, I believe.
13 That we just introduced this morning. We know that
14 there are correlations --

15 HEARING OFFICER TIPSORD: Yes.

16 THE WITNESS: -- in general that
17 higher levels of indicators correlate with
18 higher levels of pathogens. Here you can see
19 that downstream there are lower levels of
20 coliforms which one could then infer based on
21 that statement there would be lower levels of
22 pathogens downstream of the wastewater
23 treatment plants; there are higher levels of
24 coliforms and one could then infer that there

1 would be higher levels of pathogens as well.

2 BY MR. ANDES:

3 Q. Would that -- Given that there's data,
4 there are data in the risk assessment, looking at
5 specific pathogens and actually indicating levels
6 below both upstream and downstream.

7 A. And I didn't hear the first part of
8 the question that -- I didn't here what made that a
9 question, sir.

10 Q. So wouldn't that say that perhaps in
11 this situation that you're finding low levels of
12 pathogens both upstream and downstream? So the
13 levels of fecal would not really be a good indicator
14 of levels of risk?

15 A. Well, again, I would have to remind
16 you that the risk assessment -- in the risk
17 assessment in the sampling and analysis that was
18 done for the risk assessment, you didn't look at all
19 potential pathogens. You only looked at a handful
20 of the, as we've already agreed, more than -- maybe
21 we don't agree, but as numerous people have
22 indicated the more than 100 different pathogens that
23 are present in the -- potentially present in human
24 fecal material, and, therefore, in sewage. So you

1 only looked at a handful of those potential
2 pathogens. And for those pathogens that you did
3 sample and analyze for, take norovirus as an
4 example. Again, more than 75 gallons, generalizing
5 from the data that I've seen, samples of an order of
6 75 gallons were taken. And yet for noroviruses
7 maybe a cup of that was analyzed, and then
8 inferences drawn to the entire 75 gallons were
9 drawn. So, again, the robustness of the data are
10 not necessarily -- well, we'll just leave it at
11 that.

12 The other thing I would point out
13 is that there are many occasions on which you
14 analyze samples for adenoviruses using cell culture,
15 and you found using your follow-up analysis with PCR
16 that, indeed, the cell culture results that turned
17 out positive were not actually caused by
18 adenoviruses. The PCR results -- the cell culture
19 results said that there were viruses present, the
20 PCR results showed that those positive cell culture
21 results were not caused by the adenoviruses, and,
22 therefore, it was concluded that those cell culture
23 results, which indicate the presence of infected
24 viruses, were actually caused by enteroviruses. And

1 this was explained by Dr. Gerba during his
2 testimony. So the point is that there were a number
3 of samples where you did have enteroviruses present
4 in the sample, you confirmed this using the cell
5 culture assay in Dr. Gerba's laboratory, and yet
6 those samples were counted as a negative for
7 enteroviruses during the risk assessment.

8 Q. We'll come back to that one. I'm
9 going to skip questions I, J, and K. We may come
10 back to those later. I don't know if we're close to
11 taking a break.

12 THE COURT: We can take lunch now and
13 come back about five to 1:00.

14 MR. ANDES: Okay.

15 HEARING OFFICER TIPSORD: Everybody is
16 okay with that?

17 MS. ALEXANDER: I just want to just
18 point out so that everybody knows, Dr. Yates
19 has a plane reservation at 8:00 p.m. tonight
20 which means that she would need to be out of
21 here essentially at 5:00. And, you know, I
22 know we have other witnesses on today, but I
23 just want to say that just to gauge the
24 timing.

1 HEARING OFFICER TIPSORD: Okay.

2 MR. ANDES: I don't know if we'll
3 be -- it's hard to say at this point if we'll
4 be done by then.

5 THE COURT: And if not we'll make
6 arrangements for her to come back.

7 MR. ANDES: Right.

8 HEARING OFFICER TIPSORD: Let's take
9 lunch.

10 (Lunch break taken.)

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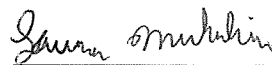
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1 STATE OF ILLINOIS)
2) SS.
3 COUNTY OF COOK)
4

5 I, LAURA MUKAHIRN, being a Certified
6 Shorthand Reporter doing business in the City of
7 Chicago, Illinois, County of Cook, certify that I
8 reported in shorthand the proceedings had at the
9 foregoing hearing of the above-entitled cause. And
10 I certify that the foregoing is a true and correct
11 transcript of all my shorthand notes so taken as
12 aforesaid and contains all the proceedings had at
13 the said meeting of the above-entitled cause.

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LAURA MUKAHIRN, CSR

CSR NO. 084-003592

A				
ability 22:22	activities 30:12	after 4:11,12,20	57:16,20,24	13:17 14:22
able 3:22 5:1	30:15 31:4,5	34:14 74:19,20	60:2,22 62:20	15:12,14 17:7
20:6 73:1	32:5 33:6,9,13	75:3,15,22	64:12,22 65:7	19:18,23 20:10
84:18	33:13 36:1,23	76:16	69:1,7 70:11	20:11,12,20,23
about 5:11 9:13	37:6,7,21 38:7	afternoon 61:10	75:13,20 80:10	21:2 22:18
10:21 14:2	40:3,14 41:9	again 11:1 16:24	83:4 84:17	24:4 26:8
17:12,12 18:23	41:22 43:13	18:12 22:1,12	85:24 90:17	28:10 29:7
19:6 20:14	52:21	23:7 31:20	Alisa 2:3 3:17	30:17 32:10
25:19,20 26:20	activity 32:2,23	33:24 41:2	allow 55:14	34:11 35:14
32:7,8 35:3,14	41:18 42:24	43:11 49:20	85:24	36:4 38:8
38:10 39:1	49:18,24 50:19	66:8 68:18	allowed 55:7	40:23 42:5
43:15 44:22	50:19,21 51:18	69:7 70:15	allowing 37:20	43:18,21 44:4
47:10 58:3	55:16	79:17 82:7	already 22:9	44:8,18 45:17
64:14,15,20	actual 7:6 57:6	84:8 87:2,7	23:7 44:3	48:6 50:8
70:6 71:4 73:2	63:11	88:15 89:4,9	47:13 60:14	52:13 54:22
74:8,12 77:21	actually 8:16	against 10:9	73:4 87:10	56:1 57:2,17
81:20 86:13	16:4 17:24	agencies 16:18	88:20	57:22 58:4,12
90:13	18:5 25:9	Agency 2:6	although 83:12	61:7 62:22
above-entitled	27:15 37:15	21:18 25:22	always 7:24	64:21 65:1,24
1:8 92:9,13	51:5 60:4	26:4,7 28:21	12:20 13:21	66:15 67:10
absence 3:16	65:17 73:4	33:11 37:5	84:3	68:7 69:5,10
5:17	78:3 81:6	62:14	ambient 16:7	70:14 71:3,23
absent 9:18	83:23 84:13	ago 18:1	86:11	72:6,9,16,20
34:24 36:10,12	88:5 89:17,24	agree 15:1 21:16	amendments 1:5	73:2,11 74:9
absolute 43:1	addition 28:4	35:5 44:23	3:8	74:11,13 75:18
73:17	additional 73:7	48:9 54:11	America 47:6	76:4 80:22
absolutely 48:22	address 19:8	88:21	among 21:6	81:10 82:11
61:2	addresses 14:24	agreed 3:15	Amongst 44:12	83:7 84:10,21
Academies	addressing 29:1	35:11 37:5	amount 23:9	85:10 86:15
12:24	29:4,6	88:20	40:19 52:6,8	88:2 90:14
Academy 12:14	adeno 27:17	agreement	analyses 62:4,6	91:2,7
87:11	adenovirus 63:8	53:11	62:9	and/or 21:12
accepted 38:5	66:24	agrees 17:24	analysis 27:23	animal 85:5,9
according 21:18	adenoviruses	ahead 49:11	55:12 60:10	animals 84:24
47:1	60:20 62:4	airplane 72:24	63:11 67:21	85:15 87:2,3,5
account 52:15	66:17 89:14,18	al 14:18 44:14	68:19 71:9	another 44:10
accurate 15:6	89:21	Alexander 5:23	86:24 88:17	50:21 51:15
45:18 46:6	adequately	5:24 6:20 13:1	89:15	62:18,20 63:4
achieve 11:2,9	17:18	14:11 15:9	Analytical 62:23	63:14 75:20
acknowledge	adjust 50:6,9	19:15,19 21:23	analyze 8:3,9	81:4
4:20	51:9	23:21 27:8	89:3,14	answer 20:6
acknowledged	Adm 1:5	29:3,23 31:13	analyzed 7:18	21:24 48:1
4:20	Admin 3:8	31:16 33:20,23	7:20 59:19	58:14 69:9
across 37:1	admit 29:19	35:8,24 39:13	89:7	antibody 45:3
51:19 63:18	48:18 81:19	39:18 40:5,16	analyzing 64:4	anticipate 87:7
act 3:15	aforsaid 92:12	41:14 43:14,20	Anand 2:3 3:16	anticipated
ACTING 5:15	Africa 43:24	44:5 47:24	Andes 2:13 6:12	41:10
40:17	44:13,20 46:11	49:10,12 51:15	6:22,23 7:1	anti-schistoso...
	African 46:12	52:2,12 56:19	9:12,15,16	46:14

anybody 16:1 73:8	58:9	41:5 42:13 51:17	34:17 40:10 42:23 43:2 51:9 52:20 61:17 66:20,20 82:12 83:8,12 84:2 87:10,20	73:24 75:22 77:24 85:4,8 87:12,12
anyone 4:16 69:21	asking 21:15 32:14 35:24 56:20 58:2	attachments 73:16	basic 70:6	below 88:6
anything 6:18 57:18,19 76:1	assay 63:9 64:19 90:5	attempting 51:22	basis 69:2,15,22 84:22	between 15:3,23 20:3 31:21 32:4 45:2 59:1 71:11 83:17 84:7
anywhere 47:6 56:22	assays 48:20 64:15	attend 5:12	beach 55:11,15	beyond 64:8
apart 24:3	assess 30:4,9	attending 3:13	beaches 53:19	bias 5:6
apologies 39:15	assessed 57:12 74:4 79:21	August 77:21,22	bearing 53:2 54:24 56:18	big 49:20
apologize 4:3 5:17 33:22,23 37:18	assessing 31:18	availability 66:13	become 63:17	bit 48:23
appear 3:22 74:19	assessment 7:7 9:13 17:9 24:9 28:9 31:6 32:24 38:22 40:8 42:1,12 42:19,20 47:11 48:8,17 51:11 51:14 52:14,18 54:7 57:4,19 58:3,5 60:19 60:24 61:5 66:9 67:7 70:4 71:9 77:8,14 88:4,16,17,18 90:7	available 60:9 61:14,14 63:2 64:10 66:3 67:13 75:10	before 1:8,10 3:19 4:22 6:5 34:13 43:17 44:6 58:24 62:5	blanked 60:8
appearing 2:4 2:13	associated 22:16 24:23 25:12,16 26:24 30:5,10 30:15 32:2 46:24 49:15 51:18 57:7 58:18,20 59:13 59:16 60:12 68:5 70:16 83:21	Avenue 2:6	begin 3:19 4:22 6:17,18,20	Blatchley 19:2,3 19:24 21:4 22:19
appears 73:15	association 45:2	average 41:16 41:20 42:3 51:19	beginning 4:14 22:5	Blatchley's 19:5 20:7,8
appendices 84:12,14	assume 8:22 41:20 51:12	aware 10:14 38:19 45:5,8 46:13 48:16 69:21,23 76:14 76:20 77:5 82:16 83:16	being 9:24 17:12 54:9,10,15 55:6,20 59:20 78:11 81:4 92:5	blow-ups 86:2
applicable 41:18	assumed 31:7 33:9 40:1,18 42:15	awfully 39:11	behalf 2:4,13	blue 33:4
Applied 81:23	assumption 40:6 41:6,13,16 42:6,7 43:6	AWWA 34:6 40:1	behaviors 42:4	board 1:1,10 2:5 3:3,10,12,14 5:3,7,12 13:12 13:13 51:19 56:5 58:24 72:17
apply 11:4,6,13 11:15	assumptions 39:21 40:11	awfully 39:11	being 9:24 17:12 54:9,10,15 55:6,20 59:20 78:11 81:4 92:5	board's 5:4
appointed 3:3		AWWA 34:6	begin 3:19 4:22 6:17,18,20	boating 40:15
appropriate 35:12 41:13 54:13		a.m 1:14	beginning 4:14 22:5	bodies 29:15
appropriateness 55:5			begun 53:17	body 16:10 18:3 29:2 33:5 34:5 45:21 50:5 55:20 68:16
Appropriations 5:20			behalf 2:4,13	both 5:20 18:10 85:17 87:8 88:6,12
approved 64:9 65:4 66:4,13			behaviors 42:4	bottom 17:15
April 71:24 72:16			being 9:24 17:12 54:9,10,15 55:6,20 59:20 78:11 81:4 92:5	bowels 45:22
area 1:4 3:6 44:20 46:21 77:6			begin 3:19 4:22 6:17,18,20	Box 2:7
areas 46:10 47:4 64:8			beginning 4:14 22:5	Branch 86:11
Arizona 81:15			begun 53:17	break 5:11 24:2 39:16 90:11 91:10
arrangements 91:6			behalf 2:4,13	briefly 19:4
article 44:2,7 81:22 82:8			behaviors 42:4	bringing 28:16
articles 81:21			being 9:24 17:12 54:9,10,15 55:6,20 59:20 78:11 81:4 92:5	broader 64:16
aside 53:3			begin 3:19 4:22 6:17,18,20	brought 70:21
asked 5:2,17			beginning 4:14 22:5	build 5:4

business 3:13 92:6	35:15,18,22 36:3 47:12,21 47:23 48:3 54:10,13 67:17 74:18 76:18 79:20 80:2 81:22 82:15	chemical 17:20 Chicago 1:4,12 2:12 3:6 4:16 38:20 86:11 92:7 chlorination 10:8,12 11:4 11:16 chlorine 10:10 choice 65:20 cholera 23:19 24:1,16,18,20 25:13,17 26:13 27:1,11 28:18 choose 25:10 59:4,22 choosing 60:7 65:12,14 66:11 chosen 65:18 66:12 circumstance 18:13 cited 12:9 14:3 14:12 17:9 43:23 78:10,18 78:21 citing 78:17 City 92:6 Clancy's 48:23 clarification 64:13 clarify 39:2 80:10 85:24 clear 18:18,22 42:10 64:17 79:24 clerk's 72:5 close 36:2 90:10 closed 5:8,13 closer 32:17 35:6 36:6 coastal 46:10 Code 1:5 3:8 coli 86:22 coliform 15:3 16:11 17:17 20:14 21:4,10 28:24 75:3,4,5 75:14 86:8,12	86:17,24 coliforms 15:24 16:14 18:4,5,8 22:8,13 84:24 86:22 87:6,20 87:24 collected 8:10 74:18 75:3 collection 78:15 column 15:2,12 combined 76:7 76:15 77:1 come 51:23 74:11 77:19 90:8,9,13 91:6 comes 7:4 45:6 coming 79:6 commencing 1:13 comment 56:20 73:4,6,9 comments 71:14 74:3,5 committee 5:20 12:12,16 13:11 common 21:6 23:20 24:2 28:14 59:20 commonly 60:11 61:12 66:21,23 67:4 community 54:6 comparable 30:24 52:7 57:18,19 58:7 compare 73:19 comparison 78:16 complete 5:4 11:2 completely 56:7 compliance 21:10 component 54:8 compound 23:22 comprised 36:24 concentration 10:11,13,15	50:24 61:16 78:19,20,22 concentrations 7:6,10,14 8:17 8:21 9:3,8 29:16 79:5 81:13 82:2 85:6,14 86:8 86:13,17,19 87:6,8 concern 16:11 25:20 28:20 47:10 48:13 concerned 34:20 34:22 53:6 concerning 53:11 76:5 77:5 82:13,18 concerns 7:3 43:24 44:19 62:12,15 conclude 7:20 7:22 concluded 5:10 89:22 conclusion 55:3 56:14 conclusions 20:2 70:3 75:24 79:12 concurred 41:11 conditions 30:23 conduct 53:14 conducted 15:17 24:8 41:1 54:15 confidence 48:23 confident 43:7 confirmed 90:4 confused 81:19 connection 39:22 connections 23:23 consequences 34:5 68:4 70:20 71:1 conservative
C	CD 72:8,8 CDC 27:4 28:12 47:4 cell 89:14,16,18 89:20,22 90:4 Center 1:12 47:1 Centers 26:16 33:12 37:3 certain 46:10 50:20 51:18 certainly 8:11 9:4 10:6,12,14 24:14,17 25:13 27:13 31:4,20 41:19 48:22 52:10 54:1,16 certainty 73:17 Certified 92:5 certify 92:7,10 cetera 37:9 40:15 63:23 CHAIRMAN 5:15 40:17 chance 34:8 changed 70:9 79:5 changes 79:15 Channel 86:6,10 characterizati... 34:18 37:6 46:6 characterize 7:11 characterized 36:5 45:23 characterizing 48:4,14 58:21 Charles 12:16 33:2,3 37:1 38:4 chart 45:11,24			
business 3:13 92:6				

42:18 43:5 52:16 consider 54:17 59:7 consideration 42:2 52:19 considerations 54:5 considered 33:6 33:13 constant 84:23 contact 29:17,21 31:17,18,22,22 32:2,9,13,13 32:17,18,19,20 32:23 33:5 34:5,22,24 35:2,6,9,15,17 36:6,7,8,10,12 36:15,16 37:11 38:10,11 40:3 50:11 53:6,9 53:24 54:11 55:22 56:8 contain 21:12 39:7 contained 7:23 33:17 71:13 86:3 contains 12:6 50:20 64:18 77:8 92:12 contaminant 25:23 contaminants 28:22 contaminated 23:14 57:7,12 58:19 contamination 7:4 76:7,15 80:12,13 contended 56:22 contending 56:15 69:22 context 18:19,23 38:1 continue 43:20 58:1	continued 5:8 continuing 4:5 contracted 28:19 contradicted 76:2 contributed 9:24 contributing 85:5 87:5 contributions 81:17 82:9 Control 1:1,9 2:5 26:17 33:12 37:4 47:2 convened 12:12 conventional 19:7 21:21 22:20,24 conversations 46:2 Cook 1:11 92:3 92:7 copies 13:8 33:24 73:7 copy 13:1 14:4 33:19 39:10 72:22 correct 6:5 8:1 8:13,18 9:9 13:23 19:9 26:11 27:6,6 32:15,15 39:8 43:6 46:18,19 51:23 53:6,14 53:16 54:3 59:17 65:23,24 73:23 78:7 79:6 84:11 86:18 92:10 correctly 15:18 43:4 corrects 67:1 correlate 17:21 87:17 correlations 87:14 correspondence	72:23 council 12:10,13 12:13 counsel 84:16 counted 90:6 countries 25:14 country 37:1 63:18 County 1:11 92:3,7 couple 14:23 39:18 coupled 64:19 course 27:16 28:5,7 33:14 40:13 41:8 49:24 50:18 60:19 61:4 court 4:24 90:12 91:5 coxsackie 27:19 28:1 create 35:18 criteria 16:7 53:1,6,12,24 54:7,24 56:4 56:18 69:6 criterion 67:10 criticism 65:19 criticisms 64:18 73:21 crypto 47:23 48:16 cryptosporidia 49:6 cryptosporidi... 48:3 cryptosporidi... 17:22 28:6 47:17,20 48:11 48:21 49:4 82:7 CSOs 77:4 80:17 CSR 1:10 92:18 92:19 culturable 81:12 culture 89:14,16 89:18,20,22	90:5 cup 7:20 89:7 current 42:20 52:24 55:16 currently 16:16 53:8 61:13 66:3 <hr/> D <hr/> D 6:8 77:18 dangerous 11:24 84:3 data 12:2 50:3 74:18,19 75:3 75:15 77:8 78:15 81:16 83:13,22,24 84:5,12,14,15 84:20 88:3,4 89:5,9 date 72:14,19 dated 72:21,23 dates 8:16,20,22 9:7,7 73:16 daughter 45:23 day 1:13 49:7 55:11 days 76:8 deal 10:3 11:2 Deborah 2:8 38:14 December 81:23 decision 5:5 48:15 68:3 69:16 decisions 68:17 define 32:22 47:19 83:3,4,6 defined 19:24 35:9 defining 36:9 definition 35:12 38:5 degree 10:10,14 deliberative 5:8 5:13 demonstrate 9:17 demonstrated 17:17 34:23	35:19 45:4 densities 75:4,5 depend 11:6 18:13 depending 10:20 11:12,20 16:24 18:7 22:1,10 84:4 depends 23:8 68:18 Des 1:4 3:7 describe 29:14 described 7:7 81:5 detail 73:21 detailed 71:13 74:12 details 45:1 detect 8:17 detected 8:21,23 9:9 24:10 47:18 61:13 detection 27:22 detects 9:5 determination 55:13,18 69:3 determine 23:9 27:23 36:21 37:15,17,20 51:5 55:6 83:23 determining 49:17 53:23 54:12,17 develop 54:6 developing 38:21 deviations 83:18 83:20 DIERS 2:9 difference 32:4 49:21 83:17 differences 84:7 different 7:18 8:6 10:4,5,6,11 11:13,14,16 15:19 17:1 18:17 19:19,21 23:10,13,16
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

38:1 40:13	16:24 17:5,21	48:21 54:10,11	Drive 2:11	eggs 45:22
41:9 42:24	19:7 20:15	58:7 63:12	drugs 46:14	either 66:20
50:6,9,14	21:5,21 22:6,7	77:9 83:21	dry 7:4 10:1	67:21
51:10,11,12	22:20,24 23:6	88:18 91:4	71:8 77:3 79:3	either/or 66:20
52:21 55:17,23	23:8 53:2 55:1	dose 51:11,12	79:7,15,17,24	Eliminating
59:1,5 62:10	56:5,14 69:18	70:6	80:4 81:17	29:5
63:14,15,19,20	76:22	doubt 43:9	82:9	elimination 9:21
63:23 67:23	distributed 51:1	77:11,13,17	Due 17:19	elsewhere 57:5
73:16 85:9,13	85:16	82:24	duly 6:9	else's 48:5
88:22	distributions	downstream 7:9	during 10:1	employ 23:8
differing 31:21	42:14	7:15 9:2 12:3	27:15 28:5,7	enable 68:3
difficult 7:19,22	district 2:14	24:11 77:23	30:11,24 31:3	end 11:12,13,21
64:1 68:20	4:15 9:18 33:1	78:11,19,23,24	31:5,7 33:14	endemic 46:9
dinner 46:2	38:20 56:3,15	80:23 83:11	36:22 39:16	energy 16:5,16
direct 41:17	56:17,21 71:12	84:24 85:7,12	40:2,13 41:8	enough 28:20
directly 58:13	74:2,20 75:4,5	85:15,17 87:9	49:24 50:18,19	33:24
disagree 20:2	81:18 82:16	87:19,22 88:6	50:21 60:19	entered 4:11
61:19,20,22	district's 21:11	88:12	61:4 71:20	39:3 53:12
70:3	56:6 74:5 75:9	Dr 2:4 3:12,13	77:9 79:15	enteric 8:16,22
disc 84:15	75:16	3:24 4:2,4,9	80:4 90:1,7	9:8 17:22
discharge 11:10	divide 50:12	6:1,14,23		77:21 81:12,17
81:6	51:7	12:16 13:2,6	E	82:9
discharged	Division 13:13	14:23 19:2,5	E 2:1,1 6:8	enteroviruses
11:11	docket 3:9	19:24 20:7,8	81:11 86:22	27:21,22,24
discussed 23:7	docketed 72:5	21:4 22:19	each 4:24 7:17	28:3 83:11
discussing 39:24	Doctor 4:1	24:1 27:9	32:16 41:18	89:24 90:3,7
discussion 65:11	document 12:19	32:11 33:2,3	50:15	entire 7:22 8:11
disease 18:4	13:5 17:4,9,15	35:16 37:1,2	Earth 13:14	89:8
25:18 26:17,18	28:9,12 37:19	38:3,4,5 39:20	easier 72:12	entirely 8:3
32:3 33:12	38:22 39:12,14	41:12,12,12	easily 18:8	entitled 3:5
37:3 47:2 62:1	40:11 42:12	43:23 44:19	East 2:6	24:22
70:24	47:3,7 48:19	48:23 52:24	echo 27:19 28:2	enumerate
diseases 23:19	48:20 60:6	54:15 58:23	effect 56:11	24:14
disease-causing	66:9 71:19,24	59:9 61:8,20	effective 10:9	Environmental
80:2	72:14,20 73:12	61:21 62:7,17	effectiveness	2:6 25:22 26:3
disinfect 55:19	74:2 81:1	63:8 64:2,7,17	10:19	26:6 28:20
55:19 69:17	documented	65:3,9,16 66:2	effects 25:21	33:11 37:4
disinfectant	32:1	67:19 70:3	30:10	62:14 81:23
10:4,19 18:7	documents 71:7	76:10,12 80:18	efficacy 20:16	EPA 16:5,15,17
22:10	71:10,15,16	82:5,17 85:19	21:5	38:15 53:3,4,8
disinfectants	85:20	86:2,16 90:1,5	effluent 1:3 3:5	53:12,13 54:5
11:5	doing 16:17,18	90:18	9:19,22 11:7	55:4 56:4
disinfected	23:5 41:21	draw 55:3	11:10,11 17:19	62:13 63:17
17:19 21:7,17	53:8 54:7 62:3	drawn 89:8,9	21:7 53:2 55:1	64:8 65:4,16
disinfecting	62:9 64:4,15	drew 8:24	55:20 68:6,9	65:18 66:4,13
68:5,6,9	92:6	drink 37:23	69:17 80:9	70:21 71:10,11
disinfection	done 24:9 29:20	drinking 25:24	81:13 82:3,16	71:14 73:22
9:18,22,23	30:4,8 31:6	26:9 28:23	effort 53:5	74:3,8
10:2 11:19	32:24 36:21	37:23	efforts 52:24	EPA-approved
			53:3 54:23	

60:15 66:7,22 66:24 67:12 epidemiological 53:14,18 54:9 54:14 Ernest 19:2 error 62:17 63:11 especially 16:23 essence 70:4 essentially 10:13 90:21 establish 16:6 estimate 70:10 et 14:18 37:8 40:15 44:13 63:23 evaluate 54:6 evaluated 58:17 58:22 59:12 60:24 evaluates 54:5 evaluating 53:8 evaluations 83:21 even 21:17 22:23 32:8 34:18,24 35:10 52:7 72:11 84:4 evenly 51:1 85:16 events 76:9,16 77:2,6 80:4 ever 16:1 24:1 39:20 every 10:4 16:3 41:5 48:23 49:7 68:15 73:18 78:24 everybody 90:15 90:18 everyone 3:2 45:10 evidence 9:17 12:4 23:15,19 24:5 exactly 7:11 8:8 15:7 18:23	20:18 27:24 43:8 74:24 84:5 Examination 6:11 examined 6:10 examines 81:24 example 8:14 10:8 27:17 55:11 74:18 78:21 79:2 84:7 86:23 89:4 examples 8:24 excellent 49:1 exceptions 16:3 excerpt 13:2,6 13:10 exclusive 71:8 excreted 45:22 excuse 20:9 26:21 34:21 59:24 78:3 exhibit 4:10,12 4:13 6:3,15,16 9:14 13:4,14 13:16 14:6,20 14:21 20:10,22 27:4,10 34:7 34:10 39:2,7 40:8 41:3 44:15,16 45:9 45:14,16 60:1 67:9 72:11 73:6,9 87:12 exhibits 72:2,4 exist 23:20 exists 23:15 expect 8:1 85:16 expedite 72:15 expending 16:15 experts 33:9 36:24 explain 54:21 55:2 59:21 explained 59:18 90:1 exposed 31:8,10 31:24 32:6,7	33:14 43:3 49:23 50:18,19 50:22,23 51:4 51:12,21 70:18 exposure 21:8 22:16 25:16 30:5,11,11,23 31:3,5,7 32:18 35:7,17,22 36:14,18 42:14 42:19,23 50:7 50:10,11,14,16 51:5,7,11,17 52:15 exposures 28:14 51:10 52:19,20 express 5:5 expressed 62:14 expressly 52:14 extending 16:5 extensive 63:18 extent 22:8 56:20 extents 10:6 extrapolating 8:11 e-mail 3:20	<hr/> F <hr/> F 83:10 facilities 15:19 15:21 21:12 22:24 fact 9:1,6 19:1,7 19:12 29:1,21 32:17 42:2,13 46:12 48:7 52:7,19 53:14 59:18 63:24 64:8 65:3 67:21 70:22 74:22 87:9 factors 11:13,20 facts 65:22 failure 17:21 fair 52:2 fairly 34:12 46:5 70:19 familiar 80:20 far 86:4	fecal 12:5 24:23 25:2,3 28:24 67:24 70:17 74:18 75:3,4,5 75:14 84:23 86:8,12,16,21 86:23 88:13,24 feel 59:15 fell 52:4 few 14:15 47:1 68:2 76:8 figure 35:1 39:6 45:13 46:6 65:2 86:4,5,9,9 figured 61:12 figures 86:3 filed 71:13,19,23 72:8,17 final 47:16 find 16:10 18:2 37:10 43:6,10 49:3 56:16 62:10 66:1 76:1 82:2,3 finding 15:7 17:23 48:10 88:11 findings 44:24 finished 29:24 30:1 first 6:9 14:3,14 15:14,15 17:3 17:14 23:21 24:3 25:11 30:22 33:18 39:19 44:23 53:4 54:10 56:10 57:5 59:10 74:22 88:7 fisherman's 47:18 fishing 47:17 five 90:13 fix 39:15 flagged 54:22 focus 48:18 79:7 79:17,23 focused 66:2	focussed 77:3 79:3 82:6 follow 54:19 56:2 following 76:8 follows 6:10 follow-up 4:17 25:6 27:9 31:14 34:2 38:9,13 41:14 43:15,17 49:10 49:13 51:16 60:3,23 75:14 75:21 80:11,19 82:12 89:15 follow-ups 39:19 foregoing 92:9 92:10 form 75:15 forms 10:23 forth 71:11 found 7:21 8:6 27:12,15,17 28:5,7 46:17 47:20 48:3,16 48:21 78:1 89:15 foundation 23:23 65:8 four 54:20 fraction 7:17 58:17,22 59:8 Fred 14:6 FREDRIC 2:13 frequently 68:20 Frisbie 3:21 4:4 4:9 from 3:17,20,23 4:3,5,6 7:4,8 8:24 9:18 12:18 13:10 20:19 26:16 27:1 32:8 33:11 36:24 37:2,3,11 38:14 43:24 44:14 51:7 54:22 66:5
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

76:7,15,24 77:1 79:13,16 79:18 81:6,17 81:18 82:9,16 89:5 front 5:19 86:1 further 27:23 34:14	63:13 73:20 goes 36:2 going 10:19 11:10,11 18:12 22:7 23:5 35:8 47:24 52:21 55:21 56:19 65:7 66:8 69:18,19 73:1 77:18 85:12 90:9 good 3:1 5:19 6:23,24 38:14 49:1 88:13 Gorelick 82:17 Gorovich 54:15 Grand 2:6 greater 4:16 12:21,22 13:24 14:1 22:8 38:20 greatest 61:16 61:17 70:6 gross 45:23 46:3 group 27:20 28:3 groups 60:18 guess 20:5 45:19 47:6 48:5 58:21 83:12 guys 44:10	having 6:9 11:13 16:19 58:22 heads 5:7 health 14:10 22:15 25:21 29:17 30:5,10 32:3,8 33:16 34:4 35:23 36:10 37:11 48:13 50:2,3 68:4,11 69:3 69:20 70:5,12 70:20 71:1 hear 4:6,8 21:1 46:1 88:7 heard 21:15 hearing 1:8 2:2 3:1,4 4:2,7 5:22 6:4,13,22 9:11 13:7 14:5 14:17 20:9,17 20:22 25:5 26:2 27:3 34:1 38:8 39:4 44:9 45:12 49:9 59:24 67:8 71:21 72:3,7 72:10 73:3 74:7 85:18,22 86:14 87:15 90:15 91:1,8 92:9 hearings 12:18 71:20 held 1:7 help 5:4 36:17 45:10 her 6:1,5 14:16 35:24 56:20 65:11 86:3 91:6 hesitation 73:15 Hi 38:16 high 12:5 17:20 47:22 48:1,4 48:14 83:14 higher 7:15 9:3 49:16 51:7 77:23 78:12,19	82:2 85:4 87:17,18,23 88:1 him 5:18 himself 58:23 hope 54:1 hoping 14:6 hour 1:14 5:11 43:4,12 house 5:19 46:2 human 9:19 11:24 12:6 24:22 57:11 58:17,23 59:5 70:17 79:20 80:1 88:23 hundred 78:22 hundreds 23:13 23:16	importance 79:22 important 70:5 impression 21:6 improvement 69:18 improvements 22:21 inactivated 18:9 include 25:11 86:22 included 33:7 37:8 38:2,4 74:17 includes 71:8 including 27:1 37:1 38:7 40:14 41:6,11 71:12 79:5 84:15 increased 37:22 indeed 22:11 28:17 40:11 43:9 67:17 80:7,16 89:16 indicate 18:14 18:15,20,21 25:7 28:12 59:14 71:6 77:22 89:23 indicated 8:15 32:12 59:2 82:23 85:6 87:10 88:22 indicates 45:1 46:9 56:13 78:6 indicating 56:3 76:15 88:5 indication 29:8 indicator 12:2 12:21 14:8 18:17 29:16 53:1 54:24 88:13 indicators 12:11 12:15 13:10,11 13:24 18:20,23 20:4,15 21:5
G				
gallons 7:21 8:2 8:4 89:4,6,8 Garcia 76:12 gauge 90:23 gave 44:6 84:15 general 17:23 20:5,13 22:3 31:23 45:7 86:23 87:16 generalizing 89:4 generally 12:20 13:21 58:20 generally-acce... 60:16 Geometric 86:7 86:12 Geotech 42:21 Gerba 33:2 38:4 41:12 58:23 61:21 62:17 63:8 64:2 65:3 66:2 67:19 70:3 90:1 Gerba's 59:9 61:8 62:7 64:7 90:5 getting 16:13 30:6 Giardia 28:6 Girard 3:13 give 5:6 28:24 29:8 Given 81:16 88:3 go 3:23 4:3,5 11:23 30:19 34:16 44:24 49:11 55:9 56:10 59:11	H			
	Haas 12:17 33:3 37:1 38:3 41:12 half 5:11 hand 4:19 34:17 34:19 54:18 handed 14:7 44:3,6 46:7 handful 59:7 61:3 88:19 89:1 hands 47:18 happens 54:17 hard 91:3 Harwood 14:18 44:7 HAV 45:3		I	
			idea 23:1 identical 36:1,2 44:5 IEPA 4:16 ignored 69:12 69:14 ill 1:5 3:8 16:13 Illinois 1:1,9,12 1:13 2:4,6,7,12 23:20 24:2,19 24:21,24 25:15 38:15 46:23 47:15 92:1,7 illness 23:17 25:12 27:12 31:11 57:8 58:19 illustrate 9:1 illustrative 79:2 immediate 3:10 3:11,16 immediately 76:8 impacted 81:6 imperfect 15:3 15:23 17:13 implication 35:15 implies 56:15	

55:6 68:13,20 87:17 individual 43:3 52:4 individually 50:15 individuals 16:18 37:3,23 38:2,3 41:21 41:23 51:20 63:20 infected 21:12 89:23 infectious 49:4,5 infective 48:22 infer 87:20,24 inferences 89:8 influence 81:24 inform 50:4 information 8:12 54:16 76:14,20 77:7 77:13 ingest 41:22,24 ingested 36:22 40:2,13 41:8 43:12 50:1,6 52:5,7,8 ingestion 33:16 40:7 42:8 49:14,16,19 ingests 40:19 intended 5:3 11:9 41:16 51:18 introduce 13:3 45:9 47:3,7 introduced 26:19 34:12 71:20 87:13 issue 14:2 15:1 28:13 45:6 47:9 49:14 64:16 issues 54:18 74:3 82:14	Joan 38:5 job 32:22 48:5 Johnson 2:2 3:11,15 5:14 5:15 40:17 journal 34:6 82:5 June 14:18 just 5:6 9:11 11:19,20 12:8 13:2 15:18 16:17 17:11 18:1 20:13 21:15 27:8 29:21 33:10 36:23 39:2,3 39:24 42:3 46:7 49:2,12 49:14 50:6,12 54:7 55:2,22 60:3,8 62:12 63:1 64:13 67:16 74:15 80:10 83:8 86:23 87:13 89:10 90:17,17 90:23,23	16:20 17:13 38:6 46:18 59:4 80:2 86:21 knows 90:18	71:4 72:10 91:8 level 19:13,16 23:3 31:7 32:6 32:18,19 35:7 51:2 78:11 levels 8:23 11:8 12:2,5 16:22 19:20 21:20 23:2 29:2,9,10 35:17,21 36:14 36:18,19 47:17 47:20,22 48:8 48:11 50:7,10 50:10,12,17 51:4,5,7 76:23 77:21,23 79:6 79:13 80:8 82:13,14,18,22 83:1,12 84:23 87:17,18,19,21 87:23 88:1,5 88:11,13,14 Life 13:12,14 like 5:24 12:7 13:3 16:14 18:14,16 19:13 23:19 39:7 54:19 60:3 66:24 80:18 83:13 likelihood 49:16 49:18 51:20 likely 12:1,6 51:17 limit 19:8 limitations 1:3 3:6 21:10 limits 21:18 Lin 2:4 3:12 lingering 76:6 list 24:21 25:23 26:9 28:22 47:6 58:16 listed 24:16 27:10,15,18 30:21 72:1,4 74:21 75:7 lists 47:4	liters 78:23,23 Little 86:6 Liu 2:3 3:17 locate 84:19 location 9:1,10 11:9 80:21 locations 7:9,10 7:15,16 24:11 81:2 long 39:12 look 12:14 14:16 30:20 34:9 43:10 48:21 50:15 52:18 63:21,22 69:12 69:14 78:14 83:22 88:18 looked 39:11 57:6,11 59:7 62:8 66:22 70:4 74:19 79:4 83:13 84:13 88:19 89:1 looking 28:11 30:8 36:11 47:11 52:3,15 88:4 looks 39:7 losing 34:21 lot 29:20 73:14 low 7:8 48:4,8 48:14 83:14 88:11 lower 1:4 3:7 41:24 49:18 50:23 51:4 81:14 87:19,21 lunch 90:12 91:9 91:10
J J 90:9 jet 33:7	K K 90:9 kayaking 33:7 37:8 kind 18:7 22:10 29:15 42:24 kinds 17:5 32:4 33:5,5 57:14 59:5 62:9 know 16:3,8,21 24:13 46:3 57:6 60:8 62:13,16 66:4 68:9 69:24 70:16,24 81:16 87:10,13 90:10 90:21,22 91:2 knowing 69:17 knowledge 47:14 57:1 61:17 70:6 known 15:5	L L 6:8 lab 62:7 65:5 labeled 45:11 laboratories 62:8 63:19 64:5 laboratory 48:24,24 49:1 63:10,13,14 66:13 67:12,20 90:5 laid 48:7 63:1 74:16 large 28:3 58:17 58:22 59:8 63:19 68:3 larger 50:1 last 47:1 76:16 82:18 87:4 later 7:12 34:14 74:1,12 76:2 90:10 latest 74:1,3 Laura 1:10 92:5 92:18 lay 21:6 45:22 lead 17:6 22:20 56:14 learn 32:8 least 26:23 60:17 leave 89:10 left 3:16,17 length 19:6 43:2 less 8:9 78:1,13 let 7:2 11:23 14:1 29:12 34:16 39:1 40:17 45:9 53:4 71:5 82:12 83:8 84:11 85:11 let's 6:5 53:3	M M 6:8 made 11:24 14:24 15:22 18:1 20:2,14 39:20 40:7,11 41:6 52:23 57:4 60:5,5 65:16 69:16	

73:22 75:10	89:7	63:22,24 64:7	59:5 67:22,23	negative 90:6
76:3 82:17	mean 19:16,17	64:9 65:18	83:11 85:16	neurovirus 63:9
86:11 88:8	19:22 22:2,6	66:3,6,22,24	88:20,22 89:4	neuroviruses
main 32:3 48:18	29:4,4,6 35:10	67:12	morning 3:2	62:4
make 41:13	35:12 43:6	Metropolitan	6:23,24 38:14	new 16:7
55:13 68:3,16	49:5 55:2 69:1	2:13 4:15	87:13	next 43:16,19
91:5	69:2 74:24	32:24 38:19	most 8:16,22	49:8 52:22
makes 5:18 64:1	78:8 86:7,12	micro 10:11,20	26:19 28:14	nice 83:19
making 55:17	means 8:22	11:1 50:17	59:20 61:12	Ninety-seven
64:22 79:2	90:20	51:3	70:4 82:15	13:20
many 7:13 13:8	meant 50:16,17	microbes 22:22	move 23:11	nonbody 33:5
16:8,8,8,17	measurable 8:17	microbial 21:9	29:12 43:15	noncontact 37:7
46:13 89:13	8:21 9:8 50:3	21:13	49:8 52:22	37:21 38:6
March 72:18,21	measure 7:6	microorganisms	57:3 75:18	nondetect 7:8
72:23	22:23 55:10	7:7,23 61:24	84:22	none 6:16 14:21
Margaret 4:9	68:14,15,16,21	might 11:12,13	moving 43:16,18	34:10 48:22
Marie 1:8 2:2	measured 68:23	11:15,21 22:16	49:13 75:21	noninfectious
3:2	measurement	25:6 51:21	MPM 83:12,21	48:17
Marilyn 4:9 6:1	67:14	52:7 69:23	MPN 78:2,22,23	nonprimary
13:2	measuring	70:1	much 7:15 16:5	32:13 35:1
marine 28:13,13	28:24	migrate 45:21	16:15 19:8	36:8,16 40:3
mark 6:6,14	meeting 92:13	milliliters 40:4	23:4,4 85:16	55:21
13:9 14:19	Melching 76:10	41:7 42:7	Mukahirn 1:10	nonswimming
34:4 37:2	member 2:2,3,3	50:20,22	92:5,18	41:9 42:9,10
44:11 45:13	2:4 3:11,12,15	mills 43:8	multiple 23:17	norovirus 66:18
72:10 73:5,8	5:3 12:16 33:2	mils 42:17	39:8	66:24 89:3
marked 4:10 6:2	33:3	Milwaukee	multiply 50:13	noroviruses
14:18	members 4:6	81:15	51:6	28:4 45:4
marking 4:11,12	5:12 27:20	mind 60:8	myself 83:24	60:21 89:6
match 65:21	28:2 33:10	mine 62:12	M.B 44:13	north 2:6,11
material 12:5	54:5	minimal 22:20		8:24 9:10 37:2
24:23 25:2,3	memory 43:11	minute 71:4	<hr/> N <hr/>	47:5 78:21
67:24 70:17	mention 49:2	minutes 14:16	N 2:1 6:8	81:5,7,13
88:24	mentioned	miscopied 39:15	name 3:2 4:21	86:10,11
materials 74:17	11:20 33:10	Miss 3:21,24 4:4	narrow 64:14	notary 1:10
74:23 75:1	38:7 41:3	34:2 38:9 39:4	narrower 64:20	note 3:20 5:2
matrices 63:20	78:15	49:9	64:23	17:8 78:1
63:23	method 62:18	missed 70:9	national 12:10	notes 92:11
MATTER 1:2	62:20,23 63:4	MMWR 27:4	12:13,14,24	nothing 7:21
matters 72:15	63:15,17,17	Mm-hmm 44:21	41:4 87:11	notion 5:6
may 1:13 4:17	65:4,5,16 66:7	model 42:13	necessarily	nowhere 24:23
8:12 17:5	83:18	modeling 42:4	21:22 73:20	NRDC 53:12
21:12,24 22:11	methodology	moment 18:1	89:10	number 3:9
34:6 38:9 39:7	64:16,18	78:4	need 4:17 13:7	12:21,22 13:24
43:9 56:21,21	methods 10:2	money 23:1	18:18,22 44:10	14:1,2 24:10
77:19 86:7	11:19 60:15	more 11:21 18:8	51:4 59:12	49:22 50:17,21
90:9	61:13,14 62:3	19:13 39:12,14	64:12 73:5	50:23 51:3,23
maybe 72:15	62:5,7,10,16	43:14 48:14	83:6 90:20	57:11 58:10
87:3 88:20	63:2,7,9,10,12	51:21,21 59:3	needed 59:15	59:5,11 63:19
			needs 73:8	

63:20 71:7,10 71:16 73:5,10 90:2 numbers 7:8 9:24 10:5 24:6 63:19 68:10 78:17 83:17 numerous 88:21 NV 45:4	74:7 85:18,22 86:14 87:15 90:15 91:1,8 often 68:13 77:6 77:14 okay 15:13 20:7 23:11 40:16 42:11 43:20,22 47:3 49:8 51:15 52:12,22 54:2 57:3,24 58:8 64:22 65:7 67:15 75:18 79:12 85:18 87:1 90:14,16 91:1 one 2:11 4:23 7:2 8:9 11:5,19 11:21 12:9,18 14:3 15:16 16:4 19:20 20:14 21:17 24:15 25:10,18 27:7 33:21 39:1,12,14,24 41:3,5,14,20 42:13 43:14,17 43:22 44:10 49:13 50:15,19 51:23 54:4,8 54:10,16 55:7 55:18 60:8,11 60:22 63:4 65:14 66:2,12 67:22 68:3 69:17 71:12,17 73:8,18 75:13 78:2,4,6,12,13 81:4 82:3,14 86:4 87:7,20 87:24 90:8 ones 59:19 61:12 61:13,15,15 65:18 66:21 83:14,14 one-tenth 50:11 ongoing 53:4 only 7:17,20 8:20 9:7 65:20	66:4 68:23 69:15,22 73:14 77:7 80:24 88:19 89:1 oozysts 82:7 operating 60:16 66:14 67:13,19 opinion 48:10 81:3 opportunity 14:15 37:19 opposed 41:17 59:8 order 89:5 organism 10:15 10:20 11:1 14:8 25:11,19 organisms 10:12 11:7 12:21 25:1,24 45:19 50:17,21,23,24 50:24 51:3,3 59:22 60:7,10 60:11 64:1 66:11 80:5 85:6,14 Orris 82:17 othe 61:23 other 4:24 16:17 18:13,15 25:13 27:10 35:4 36:17 37:6 39:1 53:13 55:9 57:6,10 58:6,16 60:11 60:22 62:8 63:2 66:19 70:15,23 71:10 74:20 79:19 80:11,13,16 85:7 86:8 89:12 90:22 others 10:3,9,24 51:22 60:15 61:6 out 7:12,17,20 12:12 14:11 18:16 26:20 32:23 35:1	44:3 46:7 48:7 55:9 56:16 60:14 63:1 65:2 70:23 74:16 83:10 84:18 89:12,17 90:18,20 outbreaks 25:12 26:13,17,21,24 28:13 46:23 60:12 62:2 67:17 outcome 48:13 outfall 78:1,13 83:15 outfalls 12:4 81:18 over 4:24 14:16 49:7 overall 81:12 overflows 76:7 77:1 overprediction 18:11 own 66:5 o'clock 5:9,10	70:11 paraphrase 22:7 parasites 17:22 Parasitology 82:6 part 23:24 24:9 51:11 54:4 56:10 71:21 77:18 88:7 particular 15:1 16:10 17:4 18:3 23:18 25:19 37:14,22 41:10 45:19 52:3 55:8,10 55:11 62:6 65:13,15 76:17 81:20 82:8 86:20 particularly 10:23 parties 53:13 parts 1:5 48:19 pathogen 7:4 10:13 14:8 53:1 54:24 65:15 76:6 80:12 pathogenic 7:6 86:22 pathogens 7:14 7:19 9:19,21 9:24 10:3,6,9 11:3 12:1,6,11 12:15,22 13:11 13:12 14:1 15:4,24 16:9 16:12,21,23 17:18 18:2,9 19:9,12 20:4 21:9,13,20 22:9,14 23:2,9 23:10,14,16 24:6,10,13,15 24:22,24 27:10 27:14 28:7 31:10 32:7 33:17 44:12 49:22 57:7,11
<hr/> O <hr/>				
object 21:23 29:3 35:8 47:24 56:19 65:8 69:7 objection 6:14 13:9 14:19 19:15 34:3,9 44:11,16 45:13 45:15,15 objections 13:15 23:21 observed 81:14 obtained 64:3 obviously 66:4 occasions 9:2,4 16:9 78:18,20 89:13 occur 41:10,20 46:18,20 76:8 occurred 26:22 occurrence 17:18 61:18 occurs 46:23 47:5,15 October 86:7,12 off 7:2 offer 33:21 office 72:5 officer 1:8 2:2 3:1,4 4:2 5:22 6:4,13,22 9:11 13:7 14:5,17 20:9,17,22 25:5 26:2 27:3 34:1 38:8 39:4 44:9 45:12 49:9 59:24 67:8 71:21 72:3,7,10 73:3				
			<hr/> P <hr/>	
			P 2:1,1,13 page 7:3,13 8:15 12:19 13:5,19 15:2,10 17:14 17:15 20:18,20 23:12 24:16 28:11 45:1 46:12 52:23 57:4 58:5 61:10 67:6 73:19,19 76:5 77:20 86:9 pages 12:18 21:3 30:20 46:8 74:15 panel 33:4 36:24 41:4 papers 39:8 Paradigm 14:8 paragraph 15:14 parameters 70:5	

58:11,18,20,23	18:16 25:1	61:17,24 66:21	14:10 25:22	56:10 57:21,23
59:1,6,12,15	28:16 31:2,8	66:23 67:4,24	26:3,7 28:21	58:9,13 59:10
60:17,18 61:1	32:23 37:12	68:1,11 70:18	33:11 37:5	64:14 70:13
61:4 63:3	38:1 55:16	80:8 88:23,23	62:14	74:15,22 75:2
65:13 67:14,23	56:3 59:3	89:19 90:3	protozoa 10:22	75:18 76:5
68:10,21,24	80:21 83:10	presented 67:11	15:4 22:21	77:19 81:11
70:13,16,23	87:4,5 89:12	presenting	protozoan 16:1	83:10 85:11
76:24 79:20	90:2,18 91:3	15:20	17:21	87:4 88:8,9
80:2,8 82:19	pointed 7:12	Press 44:14	provide 8:12	questions 4:14
86:20 87:18,22	60:14	pretty 5:19	14:4	4:18,22 5:1
88:1,5,12,19	pointing 85:20	previous 29:13	provided 8:15	6:19,21 14:4
88:22 89:2,2	points 60:5 76:3	34:23	65:21 83:20	14:13 20:13
PCR 64:19	policy 48:15	primarily 81:18	84:1,9	34:14 74:12
89:15,18,20	pollutant 68:15	primary 28:13	public 1:11 4:6	90:9
penetrate 45:20	pollutants 65:3	31:17,21 32:2	14:9 21:6	quick 27:8 31:13
45:21	66:6 68:14	32:9,18,20,22	22:15 34:4	39:19 41:14
people 16:13	Pollution 1:1,9	34:24 35:6,9	48:13 68:4,11	54:20 75:13
33:11 35:21	2:5	36:6,10,12,15	69:3,20 70:5	80:19
46:11 55:14	poor 20:15 21:4	38:10 53:6,9	70:12 73:4,6,9	quickly 15:18
70:1,18 80:3,6	pose 27:11	53:24 56:4	published 39:24	quite 87:3
88:21	posed 81:22	probability 85:5	82:5	quote 12:18
per 43:4,12	position 56:6	85:9	purpose 4:7	61:11 67:6
78:22,23	positive 89:17	probably 72:4	37:14,17,19	82:22
percent 8:9	89:20	83:16	68:18 78:17,24	quoted 59:1
perfect 16:2	possible 8:3	problem 18:2	purposes 18:17	
perhaps 88:10	potential 8:12	22:12 65:3,6	40:21 48:12	R
period 77:9	18:4,6,22 21:8	65:10	77:10 79:2	R 2:1 6:8,8
permits 4:4	22:14 25:21,24	procedures 60:9	put 25:22 53:3	radically 19:21
person 31:24	28:22 68:4	60:17 66:14	55:20	rainfall 76:16
33:14 49:23	88:19 89:1	67:13,20	putting 80:1,5	raise 4:19 44:22
50:18 67:22	potentially	proceed 4:13	puzzle 71:22	raised 74:3
ph 38:5	79:19 88:23	proceeding 3:4	p.m. 90:19	range 7:8 11:3
physically 81:1	practiced 76:22	35:11 40:9	P.O. 2:7	11:14 42:14
85:3	precipitation	69:5 76:10		52:18,20
piece 54:16	77:6	proceedings 1:7	Q	ranges 42:3
placed 28:21	preconceived	92:8,12	quality 1:3 3:5	Rao 2:3 3:16
Plaines 1:4 3:7	5:5	process 11:22	16:7 53:24	rare 25:7
plane 90:19	Predicted 34:4	17:1 18:20	54:13 55:10	rationale 59:19
plant 12:3 81:5	prefiled 4:12	54:8 56:13,18	69:6	59:21 60:3,7
81:7	14:13 57:20	64:19	question 4:17	65:12,21
plants 7:5 11:17	presence 12:5	processes 11:14	5:2 7:2 11:23	rationales 60:13
24:12 79:22	22:13 68:14	17:5	12:8,15 20:6	66:11
80:1 81:24	89:23	project 33:2	21:1,14,17	raw 82:3,13
82:10 87:23	present 6:1 12:1	projection 42:18	22:19 23:11	83:24 84:5,12
please 4:21,23	16:9,14,21	proper 42:7	24:3 27:9	84:14,15,20
5:2 24:2 37:12	23:14 24:6,11	proposed 1:5	29:12 34:16,19	react 44:23
39:5 58:16	24:18,21,24	3:7 19:8 21:11	39:2 43:16,19	read 4:11 13:2
point 7:16 12:12	25:1,3,3 28:1	21:18	44:22 51:2	15:17 17:2
14:11 16:6	59:2,6 61:12	Protection 2:6	52:23 53:2	21:15 22:3
			54:20 55:1	58:13 67:18

reading 17:3 20:19	26:22 27:1 29:14,18 30:9 30:12 31:4 33:6 37:7,21 40:3,14 43:13 47:12 48:12 53:5,23 55:8 60:12 62:1	38:13,17 53:18	report 1:7 12:10 12:23 14:24 17:9 26:16,20 26:23 27:4 33:4,19 34:11 44:19 46:8,17 57:5 75:4 77:8 77:14 79:9,11 79:14 84:12 87:11	70:20 resulting 76:24 results 15:20 17:6 25:18 47:21 50:4 54:2 63:15,22 64:2,3 79:8,8 79:16,18 81:12 89:16,18,19,20 89:21,23
real 54:20	recreator 40:18	regarding 15:23 28:11 40:7 47:17 51:17 54:23 58:5 60:6	reported 28:8 92:8	review 14:15 19:4 37:19 38:3 40:10 48:19 71:9 79:9,10 82:21
realize 72:24	recreators 27:12 37:16	regards 30:22	reporter 4:24 92:6	revised 19:2 33:4 34:15 38:2 41:4,5 45:23 71:5,6 71:14,16,18 73:12,18 74:4 74:17,23 75:6 75:11,14,23 76:9
really 11:6 18:22 21:19 23:5 29:10 32:21 34:18 40:23 51:6 55:15 56:9 69:24 79:17,23 83:5 88:13	reduce 9:24 10:12 16:22 19:20 21:19 23:5 68:10,11 80:8	regularly 46:14	reports 14:2 74:20 75:5,11	reviewed 19:2 33:4 34:15 38:2 41:4,5 45:23 71:5,6 71:14,16,18 73:12,18 74:4 74:17,23 75:6 75:11,14,23 76:9
reason 8:5 43:9 47:22 56:5 63:6,16 64:6 64:10 70:2,8 73:14 77:11,17 82:24 85:4,7	reduced 80:7	regulate 25:24 28:22	represent 4:22 51:19 61:11	revision 56:13 56:18
reasons 16:4 25:10 65:14	reduces 10:10 10:15	related 20:3 67:16	representation 41:17	ribbon 33:4
recall 22:5 43:8	reducing 10:5 20:4,4 29:5	relates 34:19 36:7	reproducible 63:21	right 3:10,12 6:13 8:2 14:17 17:23 24:19 33:20 34:13 42:8 53:5 66:7 77:16 78:4 86:4 91:7
recalling 43:11	reduction 9:19 11:8 14:9 23:3 23:9 69:19	relative 57:12 79:13,22	request 14:15	Right-hand 15:12
received 3:20	reevaluate 53:1 53:3,5 54:23	relatively 17:20 25:7 87:8	require 19:13 56:5	risk 7:7 9:12 16:12 17:9 18:6 21:19 22:16 23:3,5 24:9 27:11 28:9 29:13 30:5,15 31:6 31:17,19 32:3 32:8,23 33:16 34:24 35:23 37:11,16,17,23 38:22 40:7 42:1,12,19,20
recent 26:20	reevaluation 56:4	released 45:20	requires 63:17	
recently 71:12	reexamination 55:5	relevance 75:23 82:8	research 12:10 12:13 29:13 39:21	
reclaim 19:14	refer 9:12 12:8 19:18 26:12 59:9 61:8	relevant 31:2,18 49:17 53:23 54:3,12,17 68:23 69:2,3,8 81:21	reservation 90:19	
Reclaimed 14:9 19:20	reference 17:10	relied 38:21	reserve 34:13	
reclamation 2:14 4:15 12:3 15:19 38:20 71:12	referenced 80:11 82:4	remaining 23:2	reservoir 37:22 37:24 41:11	
record 5:2,4,9 9:12 14:12 17:8 33:19 60:1 66:1 71:19 72:1 84:11	references 12:9	remember 22:4 33:8 43:4	Reservoirs 34:6	
recover 22:23	referencing 81:20 86:2	remind 88:15	respect 54:18 70:22 77:14	
recreate 55:8,14	referred 58:10 73:21,24	removal 82:22 83:1	responding 74:2	
recreating 31:9 80:3,6	referring 13:18 36:16 57:15 70:12 71:18 72:15 80:13,22	removed 82:19 82:23	response 45:3 70:7,7 71:13	
recreation 28:19 31:17,22,23 32:9 33:15 34:5 38:6 53:9 55:22	refers 23:12 47:4	repair 22:22	responses 61:18 74:5	
recreational 25:17 26:13,17	reflect 17:18	repeat 57:9	responsible 62:1	
	regard 19:1	repetitious 72:12	responsive 50:7	
		rephrasing 74:15	rest 51:13	
			result 9:18 31:11 33:16 37:22 48:12 55:12 69:18,19	

45:6 46:11,16 47:11,12 48:7 48:17 49:15,17 50:3,3 51:2,6 51:14 52:5,6 52:14,17 54:7 57:3,12,19 58:3,5 60:19 60:24 61:5,17 63:5 64:11 66:9 67:7 68:12 69:19 70:4,6,10 71:8 71:9 77:8,14 80:6,7 88:4,14 88:16,16,18 90:7 risks 18:22 29:17 32:12 35:18 36:10 46:13 river 1:5 49:7 86:6,7,11 robustness 89:9 Rose 81:16 82:5 round 82:18 Rowes 38:5 Rows 41:12 rule 16:3 Rulemaking 1:3 R08-09 1:3 R08-9 3:9	28:6,8 47:21 68:19 75:16 77:9 79:8,19 80:21 81:2 88:17 saying 32:19 36:11 45:19 63:4,7,10,12 68:22 85:19 says 22:20 37:12 scenarios 50:14 52:16 schistosoma 45:3,5 46:9 schistosomiasis 45:6,8,11,14 46:17,19,24 47:14 Science 12:14,24 13:13 87:11 Sciences 13:12 scientific 33:3 36:24 41:4 54:6 58:16 screwed 30:7 second 11:23 15:2 23:24 secondarily 82:15 secondary 29:17 29:20 30:8 31:3,18,22 32:12,17,22 34:21,22 36:6 37:11 38:11 50:11 54:11 56:7 82:19,23 83:1 Secondly 23:23 Sedmark 81:15 81:22 see 15:1,10 24:22 47:5 78:11,13 84:14 85:13,19,23 87:18 Seeing 6:16 13:15 14:21 34:9 44:16	45:15 seems 17:15 28:12 83:13 seen 33:19 56:11 57:10,18 89:5 selected 61:11 66:19 67:14 selecting 59:19 sense 23:4 29:1 51:20 76:23 sensitive 23:18 sentence 30:6 separate 56:7 September 27:5 61:9 serious 23:17 70:19 71:1 serve 3:3 session 5:8,13 setting 76:18 settings 60:13 settlement 53:11 several 53:17 71:18 73:15 76:16 sewage 16:21 23:14 25:4 46:4 55:19 57:7,12 58:18 59:2,13,16 61:24 68:1 70:18 81:24 82:3 88:24 sewage-related 60:24 61:3 sewer 76:7 77:1 sewers 76:15 Shore 86:10 shorthand 92:6 92:8,11 show 79:19 81:13 84:5 showed 43:12 89:20 showing 26:12 35:23 86:9 shown 18:10 29:15,17 30:13 30:14 31:6	49:23 79:13 80:24 shows 29:13 35:21 55:12 Shundar 2:4 3:12 side 9:1,10 78:21 81:7,14 significant 19:13,16,22 28:20 35:23 37:10,16 45:2 46:16 47:10,19 47:19 50:2 57:11 58:10 78:7,9,11 83:1 84:6 significantly 21:19,24 22:2 36:14 63:5 70:9 83:4,6 85:13 87:6 similar 7:9,12 21:10 35:17 36:19 simply 45:10 51:6 64:9 since 34:11 56:7 73:9 74:21 75:10,10 82:14 single 73:18 79:1 sir 8:4 9:10,20 13:20 15:8 20:6 29:11 42:9,9 46:20 53:15,21 75:1 75:12 76:11,13 76:21 79:11 84:14 88:9 site 55:9 81:4,5 sites 85:3 situation 55:17 67:3,3 88:11 situations 10:1 32:13 55:23 77:4,4 six 15:18,21 size 8:4	skiing 33:7,8 skin 45:21 skip 77:18 90:9 smaller 41:22 50:5 snails 45:20,21 Sobski 37:2 solely 79:3 some 7:24 10:2,3 10:9,23 15:5 17:13 20:13 27:13,14 30:21 31:7 33:16 41:21,21,23 44:24 51:20 52:5 59:14 63:2,2 66:5,22 68:16 70:19,20 74:11 83:14,14 someone 40:20 48:4 64:4 someplace 56:17 something 8:6 64:20 70:8 somewhat 81:19 somewhere 77:24 SOPs 67:4 sorry 8:19 18:15 20:20,24 26:5 39:11 42:10 44:8 49:12 57:9,16,23 62:21 73:2 83:5 85:21 86:13 source 37:24 85:1,15 87:3 sources 79:14,20 80:12,14,17 South 43:24 44:13,20 46:10 46:12 Southern 33:1 speak 4:23 17:4 46:22 speaking 4:24 specialization 45:8
<hr/> S <hr/>				
S 2:1 6:8 safe 21:8 same 10:18 40:19 44:2 62:15 64:3,4 sample 7:22,24 8:1,4,10,11 49:7 78:1,12 78:13 89:3 90:4 samples 7:17,18 49:5 64:5 78:3 78:7 89:5,14 90:3,6 sampling 9:1 24:8 27:16,21				

specific 17:16 18:13 55:5 62:16 70:13 88:5	57:1 58:4 61:22 65:13,17 65:20 82:13 87:11,21	37:10,13,14,17 37:20 38:2,4 39:23 41:2 43:24 45:1 47:16 49:15,24 50:4 51:4 54:9 54:15 58:3,16 58:22 59:7,22 62:2 65:14,20 68:22 69:11,13 77:10 81:15 82:4	swallowed 39:22 swimming 28:15 32:1 35:13 36:16,17 37:6 38:6 42:7 50:12 52:8 sworn 6:5,7,10 System 1:4 3:7 systems 21:9	21:8 24:6 32:18 35:7 53:18 74:14 test 67:1 testified 6:10 12:17 24:1 58:24 66:2 67:22 testify 56:23 testifying 3:23 testimony 4:6,8 4:10,13 6:2,15 7:3,13 8:15 9:6 12:9 19:2,5,11 20:1,8,23 21:3 23:13 24:16 26:19 30:19 34:20,22 35:16 36:7 38:18 52:23 54:23 56:13 59:10,11 60:6 61:9 64:17 65:9,11 66:5 71:6 74:1 74:16 75:7,9 76:3,6,9 77:3,5 77:19,20 82:18 82:21 83:9 86:3,10 90:2 testing 63:18,18 Thank 5:22 20:11 39:17 81:9 86:14 Thanks 5:15 their 16:6,11 17:6 25:23 28:21 35:7 48:24 49:4 52:5,6 55:16 64:5 79:21 82:21 83:9 they'd 63:14 thing 10:18 18:14,16 79:1 84:3 89:12 things 25:19 36:17 think 5:18 8:10 16:1 36:18
specifically 11:18 12:14,19 15:24 53:13 58:3 64:14 67:11 71:17 76:17 82:6	statements 14:24 20:14 21:17 57:4 82:17	Sub 23:11 81:11 83:10	sworn 6:5,7,10 System 1:4 3:7 systems 21:9	test 67:1 testified 6:10 12:17 24:1 58:24 66:2 67:22 testify 56:23 testifying 3:23 testimony 4:6,8 4:10,13 6:2,15 7:3,13 8:15 9:6 12:9 19:2,5,11 20:1,8,23 21:3 23:13 24:16 26:19 30:19 34:20,22 35:16 36:7 38:18 52:23 54:23 56:13 59:10,11 60:6 61:9 64:17 65:9,11 66:5 71:6 74:1 74:16 75:7,9 76:3,6,9 77:3,5 77:19,20 82:18 82:21 83:9 86:3,10 90:2 testing 63:18,18 Thank 5:22 20:11 39:17 81:9 86:14 Thanks 5:15 their 16:6,11 17:6 25:23 28:21 35:7 48:24 49:4 52:5,6 55:16 64:5 79:21 82:21 83:9 they'd 63:14 thing 10:18 18:14,16 79:1 84:3 89:12 things 25:19 36:17 think 5:18 8:10 16:1 36:18
specifics 75:3 specify 8:20 speculate 8:8 29:11 70:1	states 12:20 15:2 18:7 25:15 26:3,6 28:18 37:4 46:18,20 46:24 62:13 66:10	subject 22:22 submitted 71:14 74:21 75:9 subset 7:24 substance 19:10 substantially 9:23 sufficient 25:20 68:2 69:2 suggest 12:2 suite 2:11 68:14 summarize 45:18 sure 21:14 31:15 34:17 35:10 36:8 47:8 55:4 58:15,15 64:22 71:7 72:1 74:24 78:4,8 84:4	sworn 6:5,7,10 System 1:4 3:7 systems 21:9	test 67:1 testified 6:10 12:17 24:1 58:24 66:2 67:22 testify 56:23 testifying 3:23 testimony 4:6,8 4:10,13 6:2,15 7:3,13 8:15 9:6 12:9 19:2,5,11 20:1,8,23 21:3 23:13 24:16 26:19 30:19 34:20,22 35:16 36:7 38:18 52:23 54:23 56:13 59:10,11 60:6 61:9 64:17 65:9,11 66:5 71:6 74:1 74:16 75:7,9 76:3,6,9 77:3,5 77:19,20 82:18 82:21 83:9 86:3,10 90:2 testing 63:18,18 Thank 5:22 20:11 39:17 81:9 86:14 Thanks 5:15 their 16:6,11 17:6 25:23 28:21 35:7 48:24 49:4 52:5,6 55:16 64:5 79:21 82:21 83:9 they'd 63:14 thing 10:18 18:14,16 79:1 84:3 89:12 things 25:19 36:17 think 5:18 8:10 16:1 36:18
spent 23:1 spoke 19:6 spp 45:3 Springfield 2:7 3:14 SS 92:2 stable 87:8 staff 3:18 5:3 stand 83:8 standard 19:21 60:9,16 62:5 63:17,24 66:14 67:12,19 83:18 83:20 standards 1:3 3:5 19:14 54:13 start 5:21 7:2 state 1:11 4:21 12:4 24:20,24 29:13 59:10 73:17 76:6 92:1 stated 21:4 47:13 65:12 statement 7:3 11:24 13:18 15:6,22 17:11 17:14 18:1 22:3,5 23:12 29:24 32:11 34:20 35:16 36:7 52:24 54:21 55:3 56:3,11,12	statistical 83:18 stemming 77:1 STEPHANIE 2:9 Steven 76:10 still 21:12,20,23 23:2 70:12 storm 76:8 straighten 84:18 strings 86:22 strong 12:4 studied 36:1 59:15,22 60:18 61:4 68:1 70:21 71:2 studies 13:14 14:2 16:6,16 18:10 20:3 26:12 29:14,20 30:3,7,13,14 30:18,21 31:17 32:9,16 34:23 35:4,19 36:11 38:13,18,21 40:22 41:2 43:22 53:7,14 53:17,18,22 54:8 57:6,10 57:14 58:7 75:8,22 76:2 81:15 study 15:16 17:16 24:9 30:22 32:24 35:20 36:21	Sub 23:11 81:11 83:10 subject 22:22 submitted 71:14 74:21 75:9 subset 7:24 substance 19:10 substantially 9:23 sufficient 25:20 68:2 69:2 suggest 12:2 suite 2:11 68:14 summarize 45:18 sure 21:14 31:15 34:17 35:10 36:8 47:8 55:4 58:15,15 64:22 71:7 72:1 74:24 78:4,8 84:4 Surely 24:5 surfing 28:14 30:23,24 32:19 32:20 33:7 35:2,5 36:12 36:19 37:8 surprising 82:1 surveillance 27:5 Survey 44:12 susceptibility 17:20 susceptible 10:23 swallow 51:21	swallowed 39:22 swimming 28:15 32:1 35:13 36:16,17 37:6 38:6 42:7 50:12 52:8 sworn 6:5,7,10 System 1:4 3:7 systems 21:9	test 67:1 testified 6:10 12:17 24:1 58:24 66:2 67:22 testify 56:23 testifying 3:23 testimony 4:6,8 4:10,13 6:2,15 7:3,13 8:15 9:6 12:9 19:2,5,11 20:1,8,23 21:3 23:13 24:16 26:19 30:19 34:20,22 35:16 36:7 38:18 52:23 54:23 56:13 59:10,11 60:6 61:9 64:17 65:9,11 66:5 71:6 74:1 74:16 75:7,9 76:3,6,9 77:3,5 77:19,20 82:18 82:21 83:9 86:3,10 90:2 testing 63:18,18 Thank 5:22 20:11 39:17 81:9 86:14 Thanks 5:15 their 16:6,11 17:6 25:23 28:21 35:7 48:24 49:4 52:5,6 55:16 64:5 79:21 82:21 83:9 they'd 63:14 thing 10:18 18:14,16 79:1 84:3 89:12 things 25:19 36:17 think 5:18 8:10 16:1 36:18
			T T 6:8 table 24:21 25:6 27:15 38:18 43:11,23 46:2 47:16 77:24 78:3,5,6 tables 79:1 take 5:11 34:9 42:1 46:14 52:15,19 89:3 90:12 91:8 taken 1:10 47:21 89:6 91:10 92:11 taking 90:11 talk 35:3 38:10 71:4 77:20 talked 17:12,12 70:5 talking 9:13 10:21 18:23 35:14 64:13,15 64:20 74:8 talks 26:20 Tanner 5:16 Taylor 43:24 44:13 team 33:2 38:3 technical 3:17 12:8 Technology 13:13 tell 5:16 20:18 71:17 72:13 ten 50:13,13,22 tenth 8:9 term 18:15,16 18:19 69:8 terms 8:6,14	

38:10 40:23 48:14 50:10 64:12 66:1 69:8 72:9 thinking 70:1 Thirty 42:16,17 Thomas 2:2 3:11,21 Thompson 1:12 THORNBURG 2:10 though 32:11 72:11 thought 4:3 39:11 three 13:8 through 9:22 15:5 16:23 28:14,19 43:10 45:21 51:13 73:21 80:9 throughout 51:1 Thursday 5:7 time 4:4,23 5:12 14:14 15:6 16:6 17:2,3,13 43:2 timing 90:24 Tipsord 1:9 2:2 3:1,2 4:2 5:22 6:4,13,22 9:11 13:7 14:5,17 20:9,17,22 25:5 26:2 27:3 34:1 38:8 39:4 44:9 45:12 49:9 59:24 67:8 71:21 72:3,7,10 73:3 74:7 85:18,22 86:14 87:15 90:15 91:1,8 title 13:5 today 3:10,14,19 3:22 4:7 5:9,17 5:20 90:22 tomorrow 3:14 3:23 5:21 tonight 90:19	top 73:5 total 81:12 trains 11:16 transcript 61:10 85:23 86:1 92:11 treated 82:3,14 82:16 treatment 7:5 10:16,24 11:14 11:16,21 15:5 16:23 17:1 18:20 24:12 79:22 80:1,9 81:24 82:10,20 82:23 83:2 87:23 true 7:5 10:18 40:24 42:11,11 67:19 92:10 try 69:24 trying 11:7,8 23:4 35:1,19 36:9 39:6 56:16 58:6 63:3 65:2 78:14 turn 4:18 turned 89:16 two 4:8 8:20,24 9:7 11:15 13:7 23:21,22 32:4 36:23 55:22 56:6 60:4,13 60:17 66:10 75:5 81:20 type 23:8 types 11:5 23:13 23:16,17 24:6 24:10 26:24 35:15 57:8 58:19 typically 18:2 58:18	47:12 63:5 64:11 undergo 35:22 undergoing 35:21 underpredicti... 22:13,15 underpredicti... 16:12 18:11 underpredictive 18:6 understand 12:17 18:18 35:20 36:9 45:10 53:10,16 58:6 63:3 69:9 81:21 82:8 87:4 understanding 40:6 41:15 43:1 51:24 52:17 53:7,15 53:20 60:23 67:2 80:15 United 25:15 26:3,6 28:18 37:4 46:18,20 46:24 62:13 University 37:2 44:14 unnecessary 56:15 until 4:18 5:9 upstream 7:10 7:16 9:3 77:23 78:2,2,7,12,20 78:22 79:6 80:22 81:5 83:12,14 84:24 85:6,12,14,17 87:9 88:6,12 use 11:10,19 18:16,19,21 22:11 34:24 36:10 37:11 48:24 51:10,13 62:10 63:4,9 64:7 65:5 66:5 68:13,16,20	used 17:1,6 18:8 18:15 37:24 42:8,13,18 43:5 48:11 55:6,21 62:3,7 62:17,18 63:8 64:9 65:4 user 47:12 users 23:18 29:14,18 30:9 using 11:21 18:19 46:11 63:13,14 89:14 89:15 90:4 usually 68:15 U.S 25:8 26:15 66:13 71:10 74:7	49:3,4 vibrio 25:13,17 27:1,1 28:11 28:17,18 29:2 29:9,10 virus 48:19 77:21 81:12 82:9 viruses 8:16,22 9:8 10:22 15:4 15:24 17:23 22:21 27:17,18 27:19,20 28:1 28:2 81:17 82:2 89:19,24 visited 81:1 85:3 volume 31:23 32:5 36:22 40:1,12 41:7 43:4,12 49:21 50:1 volumes 39:21 41:22,24 42:23 voluminous 34:12
			V	
			vague 69:8 vagueness 19:15 29:3 48:1 Validity 14:7 varied 42:23 43:2 varies 10:11 11:1 variety 18:17 63:23 various 24:11 26:24 43:12 74:14 vary 10:15,19 venues 28:13 verify 41:2 versus 32:22 38:10 63:4 79:14 80:22 82:13 85:12,14 very 7:8,19,21 12:1,4 15:18 16:19,20,20 18:18 22:3 31:24 49:1 55:17,22,23 59:4 62:15 63:15 84:5 85:16 viable 21:12	W
				Wacker 2:11 wait 4:18,19 want 3:19 5:6,16 11:18 24:13 38:12 44:22 46:1 47:20 69:24 78:4 90:17,23 wanted 12:8 15:1 49:14 wasn't 34:12 42:10 71:20 wastewater 7:5 15:5,19 17:19 21:7 23:15 24:12 57:8,13 58:19 59:6 61:18 70:7 80:1 87:22 water 1:3,4 2:14 3:5 4:15 11:11 12:22 13:13 14:9 16:7,10
	U			
	ultraviolet 10:16 11:4,17 under 53:10 underestimated			

18:3 19:14,21	19:1,24 20:7	wet 71:8 77:1,4	58:2,8 60:4	78:10 86:9
22:14,17 25:17	29:19 30:19	77:15 79:5,9	61:2 64:23	1.04 78:22
26:1,9,22	32:1 33:10	79:10,13,14,16	65:23 66:8	1.28 78:2,14
27:12 28:23	35:4 45:9	79:18 80:14,16	67:15 70:15	1:00 90:13
29:2,15 30:6	46:13 47:3	we'll 3:23 4:3,5	72:13,22 74:10	10 71:24 72:16
30:11,24 31:3	53:4 54:12	6:17 14:19	75:17 76:1	10:00 1:14
31:5,7,9,10,11	58:13,21 59:4	35:3 49:8	80:15,24 81:8	100 50:20 59:3,5
31:23 32:5	62:11 65:24	74:11 83:8	83:5 84:20	67:23 68:23
33:1,7,14,16	67:6 70:22	84:17,22 89:10	85:21 86:5	69:12,14 78:23
34:6 35:3,5	71:4 74:23	90:8 91:2,3,5	87:16	88:22
36:13,22 37:23	78:10 82:12	we're 18:19,23	witnesses 4:8	1021 2:6
38:19 39:22	83:19 84:5	23:4 64:20	90:22	11 24:16
40:1,7,12,19	85:2,11 87:3	74:8 86:9	wondered 74:4	12 27:5
41:7 43:3	88:1,15 89:10	90:10	75:6	12.12 84:7
48:11 49:6,13	went 21:5 51:13	we've 23:7 33:18	wondering 20:1	13 72:18,21,23
49:21 50:1,5	64:8,8 71:11	34:14 35:10	48:8	16 30:20 43:23
50:20,22 51:1	were 7:9 8:17,21	83:12 88:20	word 21:24	16.07 78:23 84:7
51:21,22 52:4	8:23 9:4,4,7,8	while 31:9 52:8	words 55:9	160 59:1
53:23 54:13	11:7,7,8,9 14:5	white 35:3,5	66:19 85:7	17 30:20
55:10,20 63:20	14:23 24:13,24	36:13	work 46:3 63:22	18 77:21
63:23 68:15	27:15,17,24	whole 8:1 11:3	working 18:21	186 73:7
69:6 80:5	28:4,7 30:1	78:14	world 47:5	19276 2:7
82:15 87:7	32:12 33:6,9	widely 17:16	worms 45:20	1987 82:6
waterborne	33:13 39:23	Williams 2:8	wouldn't 7:11	1995 44:14
12:11,15 13:10	40:11 41:10	34:2 38:9,12	8:1 21:21 85:8	
13:12 21:8	42:2,3,4,23,24	38:14,17,24	88:10	2
23:19 26:18	43:1 47:18,19	39:5,6,17	wrong 53:17	2 23:11,12 38:18
44:12 62:1	48:2,20 51:12	54:19 72:18		43:23 47:16
70:24	51:16 52:21	80:18 81:3,9	Y	52:23 57:4
waters 26:13	59:19,22 60:4	wind 30:22,24	Y 6:8,8	58:5 86:5
27:2 46:11	60:5,18 61:4,5	32:18,19 33:7	Yates 3:24,24	87:12
Waterway 1:4	61:6 62:3,6,17	35:2,5 36:12	4:2,4,9 6:1,14	2.12 78:10
3:6	63:1,8,9 64:7	36:19 37:8	6:23 13:3,6	200 59:1
way 64:11 67:21	65:17 66:3,10	windsurfing	14:23 24:1	2002 34:6 74:20
76:24 81:4	66:12 67:4,4	40:19	27:9 32:11	75:4,15 86:7
weather 7:4	70:21 71:1,10	witness 4:1 6:7,9	35:16 39:20	86:12
10:1 71:8 77:1	74:20 75:2,8	6:24 14:14	43:23 44:19	2003 81:23
77:3,4,15 79:4	76:22 77:23	15:10,13,15	52:24 64:17	2005 14:19
79:5,7,9,10,13	79:19 80:13	20:24 22:1	65:9,16 80:18	26:21 77:21,22
79:14,15,16,18	81:14,17 82:23	25:9 26:5 27:6	85:19 86:2,16	2006 26:21,21
79:18,24 80:4	83:21,24 84:12	27:13 29:24	90:18	2008 26:20 27:5
80:14,16 81:17	84:18,24 85:15	30:2 31:15,20	Yeah 56:24	61:9
82:9	87:2,5 89:6,8	33:22 34:14	years 47:1	2009 1:13 72:16
website 75:9,11	89:17,19,21,24	36:8 38:16,23		72:23
weeks 76:16	90:2,6	39:10,23 40:10	0	217)782-5544
welcome 5:16	weren't 14:6	40:21 41:1,19	084-003592	2:8
well 7:11,24 9:6	59:13,16 61:14	48:2 49:11,20	92:19	239 27:4
9:20 10:17	66:17 75:7	51:24 52:10		249 6:3,15,16
16:20 18:20	78:15 84:8	55:4 56:24	1	25 77:22
			1 7:3 27:15	25th 78:21

250 13:4,14,16 14:6 87:12	<hr/> 7 <hr/>			
251 14:20,21	77:13 8:15			
252 34:7,10 39:2 41:3	75:19 76:5 77:19,20			
253 44:15,17	71 9:14 40:8 67:9			
254 45:14,16	75 7:20 8:1,4			
27 5:18	89:4,6,8			
28 5:18	<hr/> 8 <hr/>			
<hr/> 3 <hr/>	8:00 90:19			
3 20:20 21:3 29:12	<hr/> 9 <hr/>			
3-5A 78:6	9 61:9 67:6			
3.25 78:3,7,12	93 20:10,22			
3:00 5:9,10	97 12:19 13:19			
30 40:4 41:6 42:7 43:8				
301 1:6 3:8				
302 1:6 3:8				
303 1:6 3:9				
304 1:6 3:9 46:8				
305 46:9,12				
306 45:1				
309 43:5				
312)357-1313 2:12				
3163 17:15				
3168 15:2,10				
35 1:5 3:8				
39 61:10				
<hr/> 4 <hr/>				
4 21:3 74:16				
400 19:7				
4400 2:11				
<hr/> 5 <hr/>				
5 74:16 76:5				
5A 57:23				
5th 1:13				
5:00 90:21				
<hr/> 6 <hr/>				
6 27:10 74:15 75:2 86:9				
62794-9276 2:7				
6606-2833 2:12				
69 60:1				