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IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WISCONSIN

Case No. 11-CV-724-bbc

KATHLEEN MCHUGH and DEANNA)
SCHEIDER, Individually and)
on behalf of all persons)
similarly situated,)
Plaintiffs)

vs.)

MADISON-KIPP CORPORATION,)
CONTINENTAL CASUALTY COMPANY,)
COLUMBIA CASUALTY COMPANY,)
UNITED STATES FIRE INSURANCE)
COMPANY and ABC INSURANCE)
COMPANIES 1-50,)
Defendants)

DEPOSITION OF DAVID OZONOFF, M.D., a witness called on behalf of the Defendant, Madison-Kipp Corporation, pursuant to the Federal Rules of Civil Procedure, before Kelly G. Patterson, a Notary Public in and for the Commonwealth of Massachusetts, at The Charles Hotel, 1 Bennett Street, Cambridge, Massachusetts, on Thursday, February 7, 2013, commencing at 10:04 a.m.

1 APPEARANCES:

2 THE COLLINS LAW FIRM

(by Edward J. Manzke, Esquire)

3 1770 Park Street, Suite 200

Naperville, Illinois 60563

4 Tel. (630) 527-1595

ejmanzke@collinslaw.com

5 for the Plaintiffs;

6
7 MICHAEL BEST & FRIEDRICH, LLP

(by John A. Busch, Esquire)

100 East Wisconsin Avenue, Suite 3300

8 Milwaukee, Wisconsin 53202

Tel. (414) 271-6560

9 jabusch@michaelbest.com

for Madison-Kipp Corporation;

10
11 TROUTMAN SANDERS LLP

(by Rebecca L. Ross, Esquire)

12 55 West Monroe Street, Suite 3000

Chicago, Illinois 60603

13 Tel. (312) 759-1921

becky.ross@troutmansanders.com

14 for Continental Casualty Company and

Columbia Casualty Company;

15
16 MEISSNER TIERNEY FISHER & NICHOLS, S.C.

(by Jennifer A.B. Kreil, Esquire)

17 111 East Kilbourn Avenue, 19th Floor

Milwaukee, Wisconsin 53202

18 Tel. (414) 273-1300

jbk@mtfn.com

19 for United States Fire Insurance Company;

20
21 NISTLER LAW OFFICE, S.C.

(by Jacques C. Condon, Esquire)

3235 North 124th Street

22 Brookfield, Wisconsin 53005

Tel. (262) 373-1420

23 JCondon@NistlerLaw.com

for Lumbermen's and American Motorists

24 Insurance Company.

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1 P R O C E E D I N G S

2 (Curriculum vitae marked Exhibit
3 No. 1 for Identification.)

4 (Report of David Ozonoff, MD
5 marked Exhibit No. 2 for Identification.)

6 DAVID OZONOFF, M.D., a witness
7 called for examination by counsel for the
8 Defendant, Madison-Kipp Corporation, having
9 been satisfactorily identified by the
10 production of her/his driver's license,
11 being first sworn by the Notary Public, was
12 examined and testified as follows:

13 DIRECT EXAMINATION

14 (By Mr. Busch)

15 Q. Please state your name.

16 A. David Ozonoff.

17 Q. Have you been retained as an expert in this
18 matter, the McHugh matter?

19 A. I haven't been retained, but I have been
20 asked to offer an opinion which I have
21 done.

22 Q. When were you asked to render an opinion?

23 A. I think it was probably sometime in mid or
24 late last spring. I don't remember

1 exactly.

2 Q. Who approached you?

3 A. Mr. Manzke.

4 Q. Had you ever worked with Mr. Manzke in the
5 past?

6 A. Yes.

7 Q. In what regard?

8 A. Essentially, I was a witness in some cases
9 that he had prior.

10 Q. Do you recall the cases for which you were
11 a witness?

12 A. Well, one of them was called the Lockformer
13 case. I'm not exactly --

14 Q. Can you spell it?

15 A. -- Lisle, Illinois, and then there was one
16 in Indiana. I don't remember the name of
17 the case.

18 Q. Do you recall any other cases?

19 A. I don't, but if there was another case it's
20 probably only one, but I'm not sure if
21 there was or not.

22 Q. Was there a pollutant or a contaminant in
23 the Lisle case upon which you rendered an
24 opinion?

1 A. Yes.

2 Q. What was that?

3 A. That involved chlorinated ethylene like PCE
4 and TCE.

5 Q. Was there a fate or transport mechanism in
6 that case? By that I mean, was it a water
7 case, a vapor case, a ground case, or do
8 you recall?

9 A. I actually don't remember.

10 Q. Do you recall when that case was, when you
11 were hired?

12 A. Five years. Four years. I'm not really
13 sure.

14 Q. In the Indiana case, was there a defendant
15 in the Indiana case?

16 A. Yes.

17 Q. Who was that, do you recall?

18 A. No, I don't.

19 Q. Do you recall the contamination or the
20 toxic issue?

21 A. Yeah, I think everything I've done for
22 Mr. Manzke has been chlorinated ethylene.

23 Q. Do you recall whether there was any
24 particular method of transport of the

1 chlorinated ethylenes in the Indiana case?

2 By that I mean vapor, water, or --

3 A. I actually don't remember. You know, I
4 think it was -- so improperly managed so it
5 wound up on the ground, wound up in the
6 ground water. You know, whether the
7 pathway to human exposure was through
8 ground water or vapor intrusion, I don't
9 remember that.

10 Q. Let me show you what's been marked as
11 Ozonoff Exhibit 1, which was proffered to
12 us as your CV, or curriculum vitae. Take a
13 moment and look at that, and my question
14 is, is that your most recent CV?

15 A. I think there is, you know, some minor
16 changes from this.

17 Q. As you sit here today, do you recall what
18 those are?

19 A. Well, my term on the EPA Science Advisory
20 Board has ended, so I think that's probably
21 on here. Yes. I don't know if this says I
22 was on the Faculty Senate or not but I am
23 on the Faculty Senate again, and I'm on the
24 Faculty Council for the University. I

1 think that's probably -- those are the
2 changes. I think there's another
3 publication.

4 Q. The university of which you speak is Boston
5 University?

6 A. Yes.

7 Q. Let me show you what's been marked as
8 Ozonoff Exhibit No. 2. That's been
9 proffered to us as your report in this
10 matter. If you take a look at it and
11 confirm that that's what it is?

12 A. Yes, I can confirm that.

13 Q. Now, as of the date of this report, did the
14 report contain all the, which is
15 November 29, 2012. As of the date of this
16 report, does the report contain all of the
17 opinions that you have in regard to this
18 matter?

19 A. Yes.

20 Q. Since the date of this report, the 29th of
21 November 2012, have you formulated any
22 other opinions?

23 A. No.

24 Q. Have you been asked to formulate any other

1 opinions?

2 A. No.

3 Q. As you sit here today, do you know how much
4 time you spent in the work leading up to
5 this report?

6 A. You mean work done for this case?

7 Q. Yes, I mean this case. I don't mean your
8 whole career.

9 A. Yes, a lot of work went into this report
10 that was not related to this case.

11 Q. How much work related to this case?

12 A. I probably spent eight to ten hours,
13 something like that.

14 Q. Can you tell me, specifically during that
15 eight to ten hours, what you did relating
16 to this case that's contained in this
17 report?

18 A. Well, a lot of my opinions have been
19 previously written down and what I did was
20 I looked at the data involving the class
21 residences and the site that were provided
22 to me by counsel, and I looked at, you
23 know, some relative associated material,
24 like the website of the Wisconsin DNR, and

1 then I used the information to make the
2 appropriate changes in what I had already
3 prepared, essentially established knowledge
4 about this.

5 Q. Directing your attention to Page 1 of the
6 report.

7 A. Okay.

8 Q. At the bottom, there's a statement, and
9 I'll just read it and then I'm going to ask
10 you about it.

11 The statement is, "Reports indicate
12 that a substantial contamination by
13 chlorinated ethylene solvents of soil,
14 groundwater and soil vapor occurred at the
15 Madison-Kipp Corporation (MKC) facility
16 located at 201 Waubesa Street, beginning
17 decades ago and continuing until at least
18 1989, resulting from improper management
19 and disposal of chlorinated ethylene
20 solvents."

21 The sentence indicates that reports
22 indicate, in particular, the fact that
23 there was improper management and disposal
24 of chlorinated ethylene solvents. Have you

1 done any independent work to ascertain the
2 type of management and disposal of
3 chlorinated ethylene solvents that
4 Madison-Kipp engaged in?

5 A. No, I haven't, but the fact that, you know,
6 the groundwater and soils are contaminated
7 with these materials indicates that they
8 weren't disposed of properly. Exactly the
9 details of the improper disposal, I don't
10 know.

11 Q. On the next page, Page 2, there's the
12 statement that, and I'll just pick up at
13 the semicolon on Page 1, "This
14 contamination found its way into the
15 groundwater, soil, soil vapor and indoor
16 air at homes in the vicinity of the MKC
17 facility and that this contamination has
18 resulted in exposures through inhalation of
19 chlorinated ethylene solvents (primarily
20 PCE) to residents of these homes."

21 Is your opinion limited to the
22 inhalation of chlorinated ethylene solvents
23 in the MKC area?

24 A. Well, yes.

1 Q. Do you know how many homes --

2 A. Let me just say.

3 Q. Go ahead.

4 A. I hesitated for a moment because, in fact,
5 when these solvents are in the air the
6 principal root of exposure is through
7 inhalation, but you can actually ingest it,
8 so things like PCE are very lipid soluble
9 so they can get into things like butter and
10 olive oil that are in the house and you can
11 ingest it that way. I'd expect that to be
12 relatively minor in this case, but I tend
13 to think of everything. I think this is
14 primarily inhalation.

15 Q. Understood. Do you know how many homes of
16 the 34 or so homes that are part of the
17 Class have actually had reported exposures
18 through inhalation of chlorinated ethylene
19 solvents?

20 A. Well, I've seen the data. I can't give you
21 a number right now. I've seen maps, for
22 example, which have the homes in which
23 there were detects located. I think it was
24 probably most of them.

1 Q. Are you aware that some of the homes have
2 non-detect?

3 A. Yes.

4 Q. Is it your opinion that the homes that have
5 non-detect are not exposed or --

6 MR. BUSCH: Strike that.

7 Q. The homes that have registered non-detect
8 do not have an unacceptable risk of cancer?

9 A. So I'm not sure I understand your question.

10 Q. Maybe I'll get to it another way. I
11 believe it's your opinion, on Page 2, that
12 the exposure to PCE in the residential
13 environment presents an unacceptable risk
14 of cancer; is that correct?

15 A. Yes.

16 Q. In the homes that have no detection of PCE,
17 is it your opinion that they do have an
18 acceptable risk of cancer?

19 A. If you were in an area where there's
20 demonstrable contamination and yet there's
21 no detectable level, I'm not ready to
22 conclude that there's no exposure.

23 Q. Are you -- do you conclude that there is
24 exposure?

1 A. I think it's likely that there is exposure.

2 Q. What's the basis of that?

3 A. Or at least potential for exposure.

4 Q. On Page 2, the next sentence reads, "Data
5 provided to me indicate that the
6 concentrations of the chlorinated ethylene
7 organic solvents in the indoor air to which
8 residents have been, are currently, and in
9 the future could be exposed present an
10 imminent and substantial long term health
11 danger." Is that your opinion?

12 A. Yes.

13 Q. Is there any -- it references the fact that
14 the concentrations of the chlorinated
15 ethylene organic found in the homes of the
16 residents. What concentrations of
17 chlorinated ethylene organic do you believe
18 must be reached before an imminent and
19 substantial long term health danger is
20 presented?

21 A. It's my opinion that once you're able to
22 measure it then it's already an
23 unacceptable risk. The reason for that is
24 that, in terms of the biological potential

1 that you have, it's plausibly reasonable,
2 and it's certainly unacceptable, because
3 there's no benefit to it; it only carries
4 risk with it.

5 MS. ROSS: I'm sorry, I didn't
6 hear the last of that sentence.

7 THE WITNESS: It only carries risk
8 with it.

9 Q. Going to the box in the opinion on Page 2.
10 Is there any significance in your reportage
11 as to the bolding and the placement of this
12 language in a box?

13 A. Not beyond the obvious one, which is it was
14 meant to set it off so that it would be
15 easy to see.

16 Q. Okay. This really is at the core -- the
17 boxed in areas tend to be the core of your
18 opinions; is that fair to say?

19 A. Well, I don't know what you mean by core of
20 my opinions. I'm a scientist so I have
21 lots of opinions on things. I think what's
22 in the box was what I thought was pertinent
23 about my opinions for this case, to some
24 extent. If all I needed was what was in

1 the box, I wouldn't have had to have
2 written anything else, so I'm not sure how
3 to answer that.

4 Q. Once again, the first sentence reads, "It
5 is my opinion, within a reasonable degree
6 of medical certainty, that exposures to PCE
7 in the residential environment present a
8 public health risk to the Class Area
9 residents."

10 If I were to interpret what you said
11 previously, that's because it's your
12 opinion that once it's detectable, it's
13 already unacceptable?

14 A. Well, because, for this particular
15 chemical, detectable amounts actually
16 represent a substantial biological
17 potential.

18 Q. And that's PCE?

19 A. Yes. It's not my opinion that once
20 anything is detectable.

21 Q. It's PCE?

22 A. Right. I'm talking about PCE.

23 Q. The next sentence says, "This risk is
24 related to exposures to PCE and its

1 degradation products via inhalation through
2 indoor air and ambient air."

3 Can you list for me the degradation
4 products that you reference there?

5 A. Well, what happens with PCE, if you think
6 of the chemical structure of PCE, it's two
7 carbons connected with these double bonds,
8 and then, like, four ears hanging off are
9 these four chlorines. That's the
10 tetrachloroethylene that's in its name.

11 What happens in the environment is
12 that in anaerobic conditions, that is
13 conditions without oxygen, microbes in the
14 environment start stripping off those
15 chlorines one by one. When you remove the
16 first one, you're left with
17 trichloroethylene. When you remove the
18 second one, you're left with one of the
19 isomers of dichloroethylene. And when you
20 remove three of them, you only have one of
21 the chlorines left, all the others have
22 been replaced by hydrogen, and you have
23 vinyl chloride. And then if you remove
24 that one, you've gone all the way down to

1 ethylene, which is a hydrocarbon. So the
2 degradation products are the anaerobic
3 dechlorinated compounds that are produced
4 from stripping off those chlorines.

5 Q. Are there initials to describe
6 trichloroethylene?

7 A. Yeah, TCE.

8 Q. Are there initials to describe vinyl
9 chloride?

10 A. A lot of people call it VC. And
11 dichloroethylene is often abbreviated VDC
12 or DCE. VDC because it's vinylidene
13 chloride is sort of a generic name for it,
14 but it's chemical name is dichloroethylene
15 and you have to say which of the isomers.

16 Q. What do the initials VOC, if anything,
17 describe?

18 A. Volatile organic chemical.

19 Q. Are these that we just spoke VOCs?

20 A. They are.

21 Q. In the box it also indicates that it's your
22 opinion "within a reasonable degree of
23 medical certainty that the
24 weight-of-the-evidence favors the

1 proposition that exposure to PCE in the
2 residential environment of Class Area
3 members presents an increased and
4 unacceptable risk of cancer to those
5 exposed under the usual circumstances of
6 living and working in a contaminated
7 environment such as in Madison, Wisconsin."
8 And the unacceptable risk once again here
9 is the anytime PCE is detected, correct?

10 A. Well, if there's enough PCE to detect it
11 with the usual analytic methods then the
12 biological potential to produce harm and no
13 benefit at all makes it unacceptable.

14 Q. So PCE at any level once detected presents
15 an unacceptable risk of cancer in your
16 opinion?

17 A. Well, that's not what I said. I said once
18 detected then it's present at a level which
19 presents unacceptable harm. You had those
20 two things reversed. I'm not saying at any
21 level whatsoever.

22 Q. Once detected it presents an unacceptable
23 risk?

24 A. Yeah. But if your instruments can detect

1 it, then the arithmetic really has worked
2 against you because there's quite a lot of
3 it around once it's detected. Even though
4 the units of detection are sometimes
5 expressed in a way that make it sound
6 small, like a part per billion, in
7 biological terms, actually, that's a very
8 large exposure because in terms of the
9 number of molecules, which are the number
10 of potential interactions with a cell that
11 could produce a cancer is very, very large
12 at that point.

13 Q. Is your report limited to risk of cancer or
14 is it broader than risks of cancer?

15 A. Well, my -- I think this report is largely
16 related to cancer. There are risks that
17 are non-cancer risks, some of which are
18 produced by literature that I've
19 contributed to.

20 Q. This opinion is primarily about cancer?

21 A. Yeah, this is primarily about cancer, but
22 if you want to know what my opinion is,
23 actually, since this was written I'm much
24 more concerned, not much more concerned,

1 but I am concerned about non-cancer risks,
2 and I think that when I gave my opinions it
3 was sort of implicit there that there are
4 public health risks in general not
5 completely restricted to cancer.

6 Q. Have you done any analysis of non-cancer
7 risk since your report?

8 A. Well, we published about several papers and
9 I can't remember when the last one came out
10 because it takes awhile for these things to
11 go through the publication.

12 Q. Have you done any work in this case in
13 regard to assessing non-cancer risks since
14 the promulgation of your report?

15 A. No.

16 Q. At Page 3, you reference two
17 government-sponsored studies which you are
18 currently the principal investigator or
19 co-principal investigator. Can you name
20 what those are for me, please?

21 A. Let me see which ones those are when I
22 wrote this. I don't remember which ones
23 they were but I'll tell you the two that
24 exist now.

1 Q. Okay.

2 A. One of them is an EPA grant for which I'm a
3 co-investigator, not a principal
4 investigator. It's in the EPA STAR
5 program. STAR is an acronym that stands
6 for science to achieve results, and it's a
7 program that EPA -- it's a grant program
8 that EPA established, at least the part
9 that we're involved in, to deal with issues
10 of cumulative risk, and so the principal
11 investigator of that, Professor Madeleine
12 Scammell, was my last graduate student, and
13 I'm actually very pleased to say that she's
14 my boss now on this grant, since I'm a
15 co-investigator on her grant, and it makes
16 me very proud to say that.

17 But I also have another grant which
18 she is on, so I'm her boss on that one, and
19 the other grant is an NIH grant, and it's
20 something that I've had for 17 years. It's
21 at the Superfund Research Center, and it's
22 a multi-project grant funded currently at
23 the level of about 2.1 million dollars a
24 year. I'm the program director of it.

1 There are maybe six or seven project
2 leaders of which at least five of them are
3 senior faculty members leading their own
4 projects with me as the overall program
5 director. There are five projects, one of
6 which is a PCE project, and three -- five
7 core facilities.

8 Q. Those two studies, two programs that you're
9 involved in, the NIH and the STAR program,
10 what, if any --

11 MR. BUSCH: Strike that.

12 Q. Of the two programs in which you are
13 involved, the NIH grant and the STAR
14 program, do any of them relate to PCE or
15 its degradation products?

16 A. Yes.

17 Q. Which ones and how?

18 A. Well, the Superfund Research Center has an
19 entire project devoted to PCE, and that's
20 been going on since probably the late
21 1980s, and it's an environmental exposure
22 to PCE and almost only through drinking
23 water, and we publish many papers for them.

24 Q. Are some of those the ones that are listed

1 on Page 6 in the Footnote 3?

2 A. I'm not sure if this has all of them.

3 Q. At least some of them are?

4 A. Yeah, probably most of them. There may be
5 one that's not on there because it came out
6 after this. I'm not sure.

7 Q. In regard to the NIH grant, is there any
8 specific study that's being done with
9 regard to PCE in which you were involved?

10 A. This is the NIH grant.

11 Q. How about the STAR?

12 A. The STAR grant is a methodology grant.
13 It's more theoretical and it has
14 applications to PCE but it's about
15 cumulative risk to all sorts of things in
16 the environment.

17 Q. In this matter, have you been asked to
18 render any opinions in regard to PAHs?

19 A. No.

20 Q. Have you been asked to render any opinions
21 in regard to PCBs?

22 A. No. I know that there are PAHs and PCBs
23 there and I have opinions about them.

24 Q. You didn't report them in your report, did

1 you?

2 A. No -- well, I wasn't aware of any exposure
3 pathway to the residents here so I didn't
4 actually address that.

5 Q. You have not been asked to render any
6 opinions with regard to PAH or PCB,
7 correct?

8 A. No, I haven't, but of course whether I will
9 give opinions about it, I'm not completely
10 in control of because you may ask me for my
11 opinion.

12 Q. You haven't been asked by plaintiffs in
13 this case to render opinions on PAH or
14 PCBs?

15 A. No. I could possibly be asked by you, I
16 suppose.

17 Q. Directing your attention --

18 A. While we're stopped for a second. I like
19 to stop once an hour because I have bone
20 spurs in my neck.

21 Q. You control whatever you want.

22 A. I know. We're a long way from that.

23 Q. You control the whole thing, sir.

24 A. Okay, then let's go home.

1 Q. Which I'm sure is a rarity in your life.

2 On Page 7, you have a discussion that
3 continues about the weight-of-the-evidence
4 methodology; do you see that?

5 A. Yes.

6 Q. Did you employ weight-of-the-evidence
7 methodology in arriving at your opinions in
8 this case?

9 A. Yes.

10 Q. Did you use any other methodology?

11 A. Well, you know, weight-of-the-evidence
12 methodology is sort of a term of art for a
13 lot of different things, which includes
14 making judgments about the evidence and
15 which pieces to weigh, how much importance
16 you give them in your decisions, and I'm
17 not speaking quantitatively there, but
18 qualitatively, so I used lots of other
19 methodologies in pursuing the
20 weight-of-the-evidence.

21 Q. Those are the ones that you discuss at some
22 length in this report?

23 A. Well, I discuss quite a bit the nature of
24 scientific method and scientific judgments

1 and then I employ them.

2 Q. Directing your attention to Page 17. One
3 of the issues that this report addresses is
4 the question "Can chlorinated ethylene
5 solvents cause cancer in human beings?" Do
6 you see that?

7 A. Yes.

8 Q. In opining on that, did you use the
9 weight-of-the-evidence methodology?

10 A. Well, that's not -- yes, I think the short
11 answer to that is yes. Its got a more
12 complicated long answer.

13 Q. Did you use the weight-of-the-evidence
14 methodology in arriving at any opinion
15 other than the one that "Can chlorinated
16 ethylene solvents cause cancer in human
17 beings?"

18 A. In this report you mean?

19 Q. Yes, I'm sorry, in this report.

20 A. Well, I think the answer here is -- I was
21 going to say the answer is yes but now I
22 don't remember what the question was.

23 MR. BUSCH: Can you read back that
24 question?

1 (Previous question is read back by
2 the Court Reporter.)

3 Q. I'll restate it. Did you use the
4 weight-of-the-evidence methodology in
5 arriving at an opinion other than "Can
6 chlorinated ethylene solvents cause cancer
7 in human beings?"

8 A. Well, I do use weight-of-the-evidence
9 methodology for arriving at my scientific
10 opinion. To the extent that I have given
11 scientific opinions in this report, that's
12 what I did.

13 Q. Okay.

14 (Discussion off the record.)

15 Q. At Page 21, you make the statement that
16 "Toxicology is an experimental science,
17 while epidemiology is an observational
18 science." Does that observation play any
19 role in your opinion?

20 A. Just for the record, there's also a
21 footnote there that suggests that there are
22 possible exceptions with respect to
23 epidemiology.

24 Q. Okay.

1 A. Does this play a role? I'm not sure what
2 you mean by "play a role."

3 Q. Well, do you view your opinion -- you view
4 your opinion in this matter as an
5 epidemiological opinion as opposed to a
6 toxilological or both or neither?

7 A. It's a scientific opinion. I am an
8 epidemiologist but I do use toxicology --
9 there is a branch of epidemiology that
10 could be called experimental, so that's
11 part of my professional expertise, but most
12 of the evidence that we're talking about is
13 not in epidemiology, it's from the
14 observational portion of epidemiology, and
15 I am primarily an observational
16 epidemiologist.

17 Q. The methodology that you use in
18 observational epidemiology is described, at
19 least in part, in your report, correct?

20 A. Yes, in part.

21 Q. Is there any part of observation or of
22 epidemiology that's important for your
23 report that's not contained in your report?

24 A. No, I don't think that's important for my

1 report. There's quite a lot that's not
2 here. I'm writing a book now on the
3 subject. But I don't think it affects any
4 of the opinions here.

5 Q. At Page 41 -- excuse me, Page 40 of your
6 report, you reference at Paragraph D,
7 "Relationship with time," and in
8 Paragraph E, "Dose-response relationship".
9 Do either of those, "Relationship with
10 time" and "Dose-response relationship" bear
11 on your opinion in this case and if so how?

12 A. Well, my opinion here is not a specific
13 causation opinion, it's a general
14 causation, and it's not -- it's about the
15 ability of these chemicals to do certain
16 kinds of health effects, so these bear upon
17 the interpretation of epidemiological
18 studies, as described here, and I don't
19 know what to say beyond that.

20 Q. It certainly comes into play but your
21 opinion is not reliant upon any particular
22 dose-response or relationship with time; is
23 that fair to say?

24 A. Yes, except in so far as those things are

1 related to the interpretation of the
2 studies that are considered in this report.

3 Q. Okay. Directing your attention to Page 48.
4 There's a statement, "It is my opinion,
5 within a reasonable degree of medical
6 certainty, that exposure to PCE in the
7 residential environment presents a public
8 health risk to the Class Area. This risk
9 is related to exposures to PCE and its
10 degradation products."

11 How, if at all, does that opinion
12 differ from the opinion set forth on
13 Page 2?

14 A. I think it's saying it's the same general
15 idea in different language.

16 Q. At Page 68, in the box, there's a statement
17 that "At the very least, it is clear there
18 is independent, informed, scientific
19 opinion that accepts the proposition that
20 TCE and PCE are probable human
21 carcinogens."

22 You italicized the word "probable";
23 do you see that?

24 A. Yes.

1 Q. In your opinion, is there a difference
2 between the use of the word "probable" and
3 "likely"?

4 A. No. At least that's not my understanding
5 there's a difference in EPA's language, and
6 I think in ordinary parlance there isn't
7 either.

8 Q. Much of your work at Boston University and
9 through grants has been relating to
10 exposure to PCE in drinking water, correct?

11 A. Didn't you just say how much.

12 Q. No, I just made a statement. Is it correct
13 that much of your work over the past
14 several years at Boston University and
15 otherwise has been in regard to exposure to
16 PCE in drinking water?

17 A. Yes, probably the last 25 years.

18 Q. Is the primary means of ingestion in those
19 studies the actual consumption of water
20 that has PCE in it, as opposed to vapor
21 that may come from the water?

22 A. It's hard to say. Of course a lot of
23 estimates are that when you have all of the
24 organics in drinking water that about half

1 of the exposure may be through inhalation,
2 but that varies from setting to setting.

3 Q. Have you done any --

4 A. And there's dermal exposure, too.

5 Q. Have you done any studies isolated on PCE
6 and its degradation bi-products -- that's a
7 bad term.

8 MR. BUSCH: I'll strike it.

9 Q. Have you done any studies on PCE, DCE or
10 TCE limited solely to vapor being the means
11 of ingestion, inhalation?

12 A. No.

13 Q. At Page 137, in the last paragraph, you
14 reference some testimony from Michael
15 Schmoller and some information from John
16 Hausbeck referencing mitigation systems.
17 Do you see that?

18 A. Yes.

19 Q. Are you aware of the types of mitigation
20 systems that are being offered to certain
21 residents in the Class Area?

22 A. From what I recall from descriptions that
23 this is -- I can't remember exactly what
24 the exact term is, sub-slab ventilation or

1 exhaustion or something like that.

2 Q. Have you had any or have you studied at any
3 point in time the efficacy of such sub-slab
4 mitigation systems?

5 A. No. I say that our Superfund Center, not
6 me personally, but the center and the
7 program I direct, does do vapor intrusion
8 work.

9 Q. Your opinion in -- you have not been asked
10 to render nor are you rendering an opinion
11 on the efficacy of sub-slab mitigation
12 systems as a means of addressing vapor
13 intrusion, are you?

14 A. No.

15 Q. Directing your attention to Page 138.
16 There's a -- the first phrase in the first
17 sentence says that "current uncertainties
18 do not allow precise estimation of cancer
19 risk from exposure to PCE and potentially
20 TCE and VC in the residential environment
21 at levels seen in the Class Area." Do you
22 see that?

23 A. Yes.

24 Q. Can you list for me the current

1 uncertainties of which you refer?

2 A. Just about everything that goes into making
3 these kinds of estimates. The biological
4 mechanistic bases of the models, the
5 parameters used in the models. The
6 uncertainty in the inputs into the models
7 and the fact that the models produce
8 expected values and many of them don't
9 produce distributions of possible risks.

10 Q. Excuse my ignorance, but can you be more --
11 can you elaborate a little bit more on what
12 you mean by "failure to produce
13 distributions"?

14 A. So they tend to produce expected values or
15 average values, in layman's terms. So if
16 you have two people, one who is five feet
17 tall and one person who is six feet tall,
18 their average is five-foot six, but nobody
19 in that sample is five-foot six feet tall,
20 so the distribution is five feet and six
21 feet. The average is five-foot six.

22 Q. What, if anything, do you believe could be
23 done to eliminate the uncertainties that
24 you believe to be current in that Class

1 Area?

2 A. Eliminate exposure.

3 Q. The exposure which we talk about are the
4 detected exposures, correct?

5 A. Well, I'm saying eliminating exposure.

6 Q. At any level?

7 A. Yes. That would eliminate the
8 uncertainties, if that's the question.

9 Q. Yes. The last sentence indicates that the,
10 or states that it's reasonable and
11 supportable "for residents of the Class
12 Area to believe that the measured levels of
13 PCE, TCE and VC contamination of their
14 groundwater, soil, soil vapor and indoor
15 air presents them with an excess risk of
16 cancer not balanced by any benefit and
17 could be considered unacceptable by a
18 reasonable person."

19 In the context of this report, what
20 do you mean by "excess risk of cancer"?

21 A. Cancer that's attributed to the exposure to
22 PCE.

23 Q. At any level above that which would be
24 there in its absence?

1 A. No, not necessarily.

2 Q. What makes it excess?

3 A. Well, first of all, if you can measure it,
4 then there's plenty of it around, because
5 our instruments are not that sensitive that
6 we can get down to levels that don't have,
7 I would say, biological potential of public
8 health significance.

9 Q. So once again, the fact that it's measured
10 makes it in excess?

11 A. No, the fact that the level at which it's
12 measured makes it an excess. If we had
13 instruments that were maybe a thousand
14 times more sensitive, you might be able to
15 get down to a level at which people would
16 say -- I don't know.

17 Q. But based upon the fact that with the
18 current level of instrumentation that it
19 can be detected, that in and of itself
20 represents an excess risk?

21 A. Yes, I think that's primarily a question of
22 arithmetic, and I think in this report, I
23 went through that arithmetic, and
24 essentially it's because molecules are very

1 small and a microgram of PCE has got an
2 awful lot of molecules. Each of those
3 molecules has got some biological potential
4 to cause some harm, but if there were a
5 handful of them, maybe a million of them or
6 ten million or a hundred million, but we're
7 talking about one with fifteen zeros after
8 it. We're talking about very, very, very
9 large numbers of potential and biological
10 interactions, and that's purely a function
11 of the fact that what chemists refer to as
12 Avogadro's number. It's the number of
13 molecules in one gram molecular weight of a
14 chemical, and it's a huge number. It's
15 6.023 times ten to the 23rd. That's one
16 with 23 zeros after it.

17 So if you have even a fraction of
18 this, say one billionth of a mole gram
19 molecular weight, then you still have one
20 with 15 zeros after it or 14 zeros after
21 it. It's an incredibly large number. The
22 fact that a part per billion doesn't sound
23 very big, that's just a function of the
24 unit that's being used, and if you use

1 units of molecules, then that number
2 suddenly is a very, very large exposure.

3 MR. BUSCH: This would be a good
4 time to break. We're an hour into it.

5 THE WITNESS: Sure. That's
6 perfect actually.

7 MR. BUSCH: Okay.

8 (Recess.)

9 Q. Doctor, do you know what regional screening
10 levels are from the EPA?

11 A. You mean what the levels are?

12 Q. No, just generally the concept of regional
13 screening levels?

14 A. Yeah.

15 Q. What do you understand a regional screening
16 level to be?

17 A. They are -- my understanding is that
18 they're sort of -- well, it depends a
19 little bit on what the relationship of EPA
20 to the state is as to whether the state has
21 prelaycy or not, but they're some kind of
22 guidance or direction to people who are
23 trying to deal with environmental problems
24 as to when they should take certain

1 actions.

2 Q. Do you agree that exposures below regional
3 screening levels can be considered not to
4 present toxicological concerns?

5 A. Well, since regional screening levels
6 differ from region to region, that can
7 hardly be true.

8 Q. Assuming that all regions agree as to an
9 appropriate screening level, do you agree
10 with the proposition that exposures below
11 screening levels can be considered to not
12 present a toxicological concern?

13 A. No. EPA doesn't believe that and neither
14 do I.

15 Q. Did you consider at all in your opinion the
16 site specific dose and duration of
17 exposure?

18 A. I'm not sure what you mean by that.

19 Q. Did you consider site specific information
20 in that part of your opinion that addresses
21 dose-response?

22 A. I actually don't understand the question.

23 Q. In your opinion, you do take into
24 consideration dose, correct?

1 A. You mean specific doses?

2 Q. Yes. Or do you not?

3 A. I take -- well, first of all, there is no
4 risk if you're not exposed.

5 Q. Okay.

6 A. And what I -- I took dose into account to
7 the extent that we've already discussed,
8 which is that if you can see it, then we're
9 talking about a biological potential here
10 that concerns me as a public health
11 scientist, so to that extent the answer is
12 yes, I took it into account in that sense.

13 Q. Did you take into consideration or into
14 account the frequency and duration of
15 exposure?

16 A. Yes, I think so.

17 Q. How?

18 A. That when you're living in a house, the
19 frequency is daily and the duration is the
20 amount of time that you spend in that
21 environment, so when I talk about risk to
22 people living under ordinary circumstances,
23 or whatever the exact language was, I was
24 referring to frequency and duration.

1 Q. By the way, of the eight to ten hours that
2 you spent in compiling the report, how much
3 of it did you spend in reviewing the site
4 specific data, do you know?

5 A. Well, you know, for example, not for
6 example, but I review that because I wanted
7 to take what I had written about PCE and
8 make it appropriate to the setting, so I
9 needed to see what the setting was.

10 Q. But if the total amount of time spent was
11 eight to ten hours, how much of it was in
12 reviewing the data?

13 A. Probably at least half of it. I can't give
14 you an exact. I wasn't doing one thing all
15 at once. I would go back and forth.

16 Q. Would you agree with the definition, the
17 following definition, that risk assessment
18 is the characterization of the potential
19 adverse health effects of human exposures
20 to environmental hazards?

21 A. Well, I don't think I object to it. I
22 think one could probably come up with
23 different definitions of risk assessment.
24 I think that probably describes a lot of

1 what's done.

2 Q. Did you engage in risk assessment in
3 formulating your opinions as set forth in
4 the report?

5 A. So when you -- you're saying risk
6 assessment now, you're specifically
7 referring to this definition?

8 Q. Let's go back. Do you use the term "risk
9 assessment" in your practice?

10 A. Yes.

11 Q. Would you define "risk assessment" for me
12 as you use it.

13 A. Well, when I've done risk assessments and
14 when I hear other people talking about it,
15 they usually are talking about some kind of
16 point or interval estimate using one or
17 another kind of a model, so quantitative
18 estimate, and a risk is a probability.

19 Q. Did you engage or did you undergo --

20 MR. BUSCH: Strike that.

21 Q. Did you perform a risk assessment in
22 rendering your opinion as set forth in
23 Exhibit 2?

24 A. No, I didn't perform a quantitative risk

1 assessment, that is to say a point or
2 interval estimate of average risk.

3 Just to add to that. I did perform
4 an assessment of risk. I assessed the
5 risk, but if you want to put -- if you want
6 to put the word assessment after risk then
7 you're referring to a particular kind of
8 operation, but I think my report is really
9 an assessment of risk.

10 Q. On a qualitative as opposed to quantitative
11 basis?

12 A. It's not purely qualitative. When you talk
13 about quantitative basis, in the context of
14 risk assessment, you're talking about a
15 point or interval assessment of a
16 probability.

17 Q. You did not do that in this case?

18 A. I did not do that, no, but I did other
19 quantitative things. For example, there's
20 a fairly complete review of quantitative
21 aspects of the literature up through 2003
22 or so.

23 Q. Did you use at all in your opinion or
24 reference at all or take into consideration

1 at all the EPA's screening level of 9.4
2 micrograms per cubic meter for PCE?

3 A. That refers to what?

4 Q. The EPA screening level.

5 A. For what?

6 Q. PCE.

7 A. Well, are you talking about soil, soil gas,
8 sub-slab, indoor air?

9 Q. Excuse me, vapor. Indoor air.

10 A. Indoor air?

11 Q. Yes.

12 A. Screening level of what? Say it again.

13 Q. 9.4 micrograms per cubic meter.

14 A. Well, the Massachusetts screening level is
15 .21 parts per billion, so a part per
16 billion is about seven micrograms per cubic
17 meter so talking about 1.4.

18 Q. 9.4?

19 A. 1.4 parts per billion screening level, I
20 believe, is what it is in Massachusetts,
21 micrograms.

22 Q. Whatever the screening level is that the
23 EPA adopts, it was not specifically used in
24 your report or referenced in your report

1 that I saw; is that correct?

2 A. No, it wasn't.

3 Q. Do you agree that indoor air typically
4 contains volatile organic chemicals,
5 including PCE, from consumer products,
6 building materials, and outdoor air?

7 A. Yes, it often does.

8 Q. Is indoor air concentration resulting from
9 these sources commonly called background?

10 A. Yes, I think commonly but probably
11 inappropriately called background.

12 Q. Do you know, for example, some of the
13 sources from which background PCE may
14 emanate?

15 A. Yes.

16 Q. Give me some examples, if you would.

17 A. Well, PCE is used in dry cleaning. It's
18 found in some kind of products like drain
19 cleaners, you know, other household things.
20 I don't know what they all might be. Most
21 of the dry cleaning exposure is gone by the
22 time you get the clothes home but it
23 contributes to urban background.

24 Q. That is the more concentrated the

1 population the more background PCE, as a
2 general proposition?

3 A. May or may not be. It depends upon local
4 conditions. So many dry cleaners are now
5 moving away from PCE because of its
6 toxicity so my dry cleaner no longer uses
7 PCE.

8 Q. Is PCE a banned substance from any use in
9 the United States?

10 A. Well, it will be -- in California I think
11 it's going to be banned for dry cleaning
12 use. If not already, in a year or two, but
13 it's not yet banned but likely will be in
14 the not too distant future.

15 Q. Do you know if it's banned in Wisconsin for
16 use in dry cleaning?

17 A. I don't know.

18 Q. Is it banned in Massachusetts for use in
19 dry cleaning?

20 A. Not yet. Actually, I think Los Angeles
21 county is the only place where such a ban
22 has actually been put into effect or about
23 to be put into effect, but Los Angeles
24 county is bigger than most countries in the

1 world so.

2 Q. Do you know if the use of PCE is banned in
3 various cleaners and cleaning substances?

4 A. Not that I'm aware of.

5 Q. Is it banned at all in any application to
6 your knowledge?

7 A. Well, I think we just talked about dry
8 cleaning.

9 Q. In Los Angeles but how about nationwide?

10 A. Not yet.

11 Q. Are you aware that a study was done by the
12 United States Environmental Protection
13 Agency in regard to background indoor air
14 concentrations of volatile organic
15 compounds?

16 A. Yes.

17 Q. It was promulgated sometime in 2011?

18 A. Well, there have been numerous studies.

19 Q. Are you aware of one that was promulgated
20 in 2011?

21 A. I don't know what you mean by
22 "promulgated".

23 Q. Published.

24 A. No.

1 Q. To your knowledge, is there an estimated
2 level of PCE nationwide that's deemed to be
3 background?

4 A. You mean an ambient outdoor air or indoor
5 air?

6 Q. Indoor air.

7 A. Well, I think my general impression that
8 the 50th percentile in a distribution for
9 indoor air concentration is somewhere
10 around half a part per million billion
11 volume.

12 Q. What is the significance, from your
13 perspective of being in the 50th
14 percentile?

15 A. It has no particular significance other
16 than it's one of the places in the
17 distribution that's frequently used as a
18 marker. It's the median.

19 Q. Does -- when it is -- when it's expressed
20 in terms of the 50th percentile, what is
21 meant by that from a lay perspective?

22 A. It's the median.

23 Q. So the median of indoor air background of
24 PCE is what again?

1 A. I haven't looked at this for a bit, but my
2 recollection is somewhere around a half
3 part per billion as a volume measurement,
4 so that means that 50 percent of households
5 will have that or less.

6 Q. Is a half part per billion a measurable
7 level of PCE?

8 A. Yes.

9 Q. Another way to put it is, that's a
10 detectable level of PCE?

11 A. Yes.

12 Q. Does that mean that, on average, I know you
13 don't like to -- I won't say that. That
14 the level -- does that mean that 50 percent
15 of the houses have one half part per
16 billion or that all houses have, on
17 average, a half a part per billion?

18 A. It's not an average, it's a median, and
19 that's an extremely important difference.

20 Q. In the context of this, the median is the
21 mid-point number, correct? It means that
22 half of the detections -- excuse me, that
23 the highest, the mid-point between the
24 highest and the lowest detection, is that

1 the median in this context?

2 A. Well, no, it includes all the non-detects,
3 so supposing that you had 100 measurements
4 and 49 of them were non-detects and the
5 50th was a half part per billion, then that
6 would be the median. In other words, you
7 take all the measurements and you line them
8 up in order and you go halfway down the
9 line, so it doesn't take into account the
10 distribution at all.

11 Q. Are you aware of any studies that take into
12 account the distribution of PCE?

13 A. Yeah, the problem -- there's a different
14 kind of problem there because the
15 non-detects are not zero. Some of them may
16 be zero but a lot of them aren't, so in
17 order to figure out what the non-detects
18 are, you have to make an assumption about
19 what the underlying distribution of the
20 data that it might be.

21 So there's different ways to do it.
22 One of them is you can take all the
23 non-detects and call them zero. I think
24 what EPA frequently does is they fit a

1 lognormal distribution to it. That's a
2 bell-shaped curve which has been
3 transformed logarithmically, so it's now
4 skewed, and they fit that and assume that a
5 lot of the non-detects are -- there's stuff
6 there, but it goes according to the
7 lognormal distribution. That's not a bad
8 way to do it but it can produce certain
9 kinds of bias when you do it, and you don't
10 really know what the measurements are below
11 your level of detection, so that's kind of
12 a long-winded way of saying we don't know.

13 Q. I appreciate that. I believe you said that
14 one of the more prevalent uses of PCE, at
15 least here to for, has been in the dry
16 cleaning industry?

17 A. Yes, that and degreasing are probably the
18 two principal uses.

19 Q. Assume for the moment that my laundry, the
20 laundry that I use to do my shirts, for
21 example, uses PCE, and assume that I wear
22 five laundered shirts a week and every
23 two weeks I take them to the laundry and I
24 pick them up and put them in my car and I

1 drive ten shirts that are laundered in PCE
2 or have some PCE component in them from the
3 dry cleaning. Am I, as you understand it,
4 am I exposed during my car ride to a
5 detectable level of PCE?

6 A. The data that I've seen, and I haven't
7 looked at it for awhile -- well, first of
8 all, my advice to you would be to find
9 another dry cleaner because a lot of them
10 are moving away from PCE not because so
11 much the risk to consumers, although
12 consumers don't like it when they find out,
13 but the risk to the workers.

14 So the answer to your question is
15 that the data that I've seen in the past,
16 when people weren't quite as careful with
17 PCE, was that if you had dry cleaning,
18 let's, say not your shirt but your jacket,
19 your suit jacket, and you took it home on a
20 very hot day wrapped up in plastic from the
21 dry cleaners, that in a certain percentage
22 of them there might be some measurable PCE
23 in your car from that, but mainly not.
24 That's not -- my impression, that's not a

1 significant exposure. I don't think
2 there's probably anything to speak of from
3 shirts.

4 Q. But it's mostly those items that are truly
5 dry cleaned, like suits and woven fabrics?

6 A. Yeah, and of those, only under special
7 circumstances would there be a brief
8 exposure under not well-defined
9 circumstances, like really hot days and
10 only from some dry cleaners. Dry cleaners
11 differ. So you might bring it home from
12 one place and there might be no exposure
13 from another place, and now that they're
14 using the transfer method, there's not as
15 much exposure that way.

16 Q. Have you taken any position at all publicly
17 in regard to the desirability of banning
18 PCE from all use in the United States?

19 A. It's my opinion it should be banned from
20 all use. Have I ever taken a public
21 position on it? I can't remember. If
22 anybody asked me about it, that's what I
23 would say. I think I and a lot of people
24 consider it an unreasonably dangerous

1 product in the sense that you don't need
2 it.

3 Q. Are you familiar with the U.S. EPA's vapor
4 intrusion screening level calculator that
5 was published in March of 2012?

6 A. Well, I mean, I have looked into what EPA
7 is doing on vapor intrusion a little bit,
8 so I don't know that they have actually
9 publicly put anything out there. There was
10 a leaked graph vapor intrusion that inside
11 EPA had, but I don't think that's up on
12 their website. I think it has either been
13 withdrawn or -- so the answer is, I know
14 that there is something, but I don't think
15 it's really out there.

16 Q. Whether it's out there or not, you did not
17 use an EPA vapor intrusion screening level
18 calculator in coming up with your opinions,
19 correct?

20 A. I did not.

21 Q. Did you read the expert report of Barbara
22 Beck?

23 A. I only took a briefest glance through it.

24 Q. You've not been asked to rebut any of her

1 opinions, have you?

2 A. No. Well, to be honest with you, from what
3 I quickly saw from what she said, she seems
4 to agree with me, but I can't say that from
5 a detailed reading of it. I expect that,
6 you know, what she was asked to do is
7 criticize me, and I was not surprised to
8 see, but her bottom line seems to be the
9 same as my bottom line; this is a likely
10 cause of cancer in human beings, or it's
11 likely to cause cancer in human beings.

12 Q. You have not been asking to rebut any of
13 her specific opinions?

14 A. No.

15 MR. BUSCH: I want to take
16 five minutes. I may be able to eliminate
17 some of this stuff.

18 (Recess.)

19 Q. Doctor, in your opinion, are there any
20 members of the Class who are not exposed to
21 an unacceptable risk of cancer?

22 A. Well, just looking at the environmental
23 setting here, the environment that's
24 substantially contaminated and the

1 groundwater and the soil and in the air,
2 and I think you have to be worried about --
3 it's reasonable to consider that there's a
4 risk of harm to anybody who lives bordering
5 on this facility. This is pretty close
6 quarters.

7 Q. Have you been to the site?

8 A. No, I haven't.

9 Q. Have you interviewed any of the homeowners?

10 A. No.

11 Q. Other than discussions with your

12 attorney -- excuse me, with the attorney

13 for the Class and with your review of the

14 information provided to you, have you

15 talked with anyone else?

16 A. No. You mean specifically about this case?

17 Q. About this case.

18 A. I have colleagues. I ask them about stuff.

19 Q. Not about this case?

20 A. No.

21 MR. BUSCH: I'll pass the baton to
22 the others.

23 CROSS-EXAMINATION

24 (By Mr. Jacques Condon)

1 Q. Doctor Ozonoff, my name is Jacques Condon.
2 I just have a few follow-up questions. Can
3 you pull out Exhibit No. 1, which is your
4 CV. I noticed in here -- you described
5 yourself as an epidemiologist, correct?

6 A. Yes.

7 Q. For awhile you were in the staff at the
8 Department of Neurology at the Boston VA
9 Medical Center?

10 A. Yes.

11 Q. What's the difference between neurology and
12 epidemiology?

13 A. They're completely different disciplines.

14 Q. What are they? Can you explain the
15 difference?

16 A. Neurology is the clinical discipline about
17 diseases of the nervous system, and
18 epidemiology is a methodology for
19 understanding determinants of distribution
20 of a disease in a population.

21 Q. When you were at Cornell, was your emphasis
22 in neurology, epidemiology?

23 A. Are you asking me why I was in the
24 Department of Neurology?

1 Q. Yes.

2 A. There's a very simple answer to that
3 question, which is that I was the
4 co-director, along with a colleague who was
5 a neuropsychologist, of the Boston
6 Environmental Hazard Center, which was the
7 principle Gulf War research center for the
8 Department of Veterans' Affairs. So we
9 were located at the Veterans' Hospital and
10 I was given an appointment on the staff of
11 the hospital, which meant that I could see
12 patients if I was so inclined, which I
13 wasn't, because I'm not a diagnosing or
14 treating physician at this point, although
15 I'm licensed to do that. It was
16 essentially just an administrative slot for
17 me as the director of this center in a
18 clinical facility, and the reason it was in
19 the Department of Neurology was because my
20 colleague is a neuropsychologist. She
21 actually succeeded me in the department at
22 Boston University.

23 Q. So it was more a circumstance of being part
24 of the VA that you're listed under the

1 Department of Neurology?

2 A. Yes.

3 Q. The report that has been marked as
4 Exhibit 2, you said in your earlier
5 testimony that came from either prior
6 versions or it came from other sources; is
7 that right?

8 A. It is in part, which is this is a report
9 that I sort of developed over a period of
10 time because this is what I do is
11 chlorinated ethylenes, and I wanted a way
12 to explain this, not only to explain
13 chlorinated ethylenes, but to explain the
14 whole process of how we understand these
15 things. A lot of people have read this, so
16 it's not like you're the only one to have
17 read it, but it's also useful in
18 circumstances like this and so each of the
19 circumstances like this that I've used it
20 with have had specific parameters to them,
21 and so I make the changes that are
22 appropriate to that.

23 Q. There's a lot of background material in
24 terms of methodology,

1 weight-of-the-evidence, other things in
2 this report, right?

3 A. Yes. Actually, one reason is because it
4 has become important when offering opinions
5 these days to explain exactly how you
6 arrived at your opinion, and I think that I
7 took a lot of care to explain that and
8 that's applicable to lots of different
9 cases, not just this one.

10 Q. The opinions in some of the background
11 material that's in your report, have you
12 published that separately?

13 A. No. Well, I'm an academic, so I write
14 papers and I'm sure that these ideas appear
15 in other forms in different ways or they
16 were first part of papers and appear here.
17 I'm writing a book now on mathematical
18 foundations of epidemiology and obviously,
19 this is part of that.

20 Q. When you sat down to prepare this report,
21 were you taking it from one or two sources,
22 did it come from different papers; how did
23 you come up with what we have as a 140
24 page --

1 A. You mean the origin of this?

2 Q. Right.

3 A. My head.

4 Q. Over time.

5 A. Yeah. It's original with me. I wrote it
6 myself. I didn't -- it's not copied or
7 taken from another source, except where
8 cited. I cited everything.

9 Q. In the eight to ten hours you spent looking
10 at things in this case, did you write
11 140-page report in that time?

12 A. No, I think, as I described, I essentially
13 spent the time in this case finding those
14 things which were necessary in order to
15 make this relevant.

16 Q. You took what you thought was necessary to
17 make it relevant, you inserted those into
18 this report; is that right?

19 A. I adapted this report so that it addressed
20 things that are relevant to this case.

21 Q. What source did you adapt it from?

22 A. You know, as I described, the data on
23 residents and site specific --

24 Q. No, I mean -- sorry. We're not

1 communicating very well. You say you
2 adapted it. Does that mean you took
3 down -- you had a report already, you took
4 things out --

5 A. Yes, I had a report already that had lots
6 of stuff in it, and, in fact, there are
7 things that I've written in the past that
8 talk about autoimmune disorders and birth
9 defects, which could very well have been in
10 this one.

11 Q. The report that you had already, what case
12 was that?

13 A. Its been used in a number of cases.
14 There's a case out in Burbank. I can't
15 remember what the caption was.

16 Q. You talked about the Indiana case and
17 another case. Were those reports, would
18 they look similar to what I see in
19 Exhibit 2?

20 A. Yes, they would.

21 Q. Same information with the exception of
22 information that would be case specific,
23 right?

24 A. Probably pretty much so. I can't remember

1 exactly.

2 Q. I believe those cases were five or
3 six years ago, or what was the timeframe of
4 those?

5 A. Something like that. There's more
6 up-to-date citations in this one, but it's
7 not systematic. I do, obviously, keep
8 track of the literature because this is
9 what I do for a living, PCE epidemiology,
10 and there are lots of citations in papers
11 that I've co-authored on that have come out
12 in this period. I don't know if they're
13 all cited in here or not.

14 Q. If you go back to Exhibit No. 1 and look at
15 Page 8. Look at the very top. There's
16 something you published in the New England
17 Journal of Medicine. This goes back
18 awhile, 32 years ago. "Artificial
19 Sweeteners and Bladder Cancer." Did you
20 come to a conclusion in that article?

21 A. Yeah. This was actually a response to an
22 article written by Morrison in New England
23 Journal of Medicine, a case control study.
24 The artificial sweetener involved was

1 saccharin, which was actually banned under
2 the Delaney Clause. It was a comment on
3 Morrison's study, and he and I ran into
4 each other, unfortunately he passed away a
5 number of years ago, but he and I ran into
6 each other and I said, "I wrote that
7 because what you said was going to be
8 misunderstood." He said, "It's not my job
9 to teach people."

10 Q. What was your conclusion?

11 A. Well --

12 Q. Thirty-two years ago, what was your
13 conclusion?

14 A. I'm guessing that you've read it more
15 recently than I have since I read it 32
16 years ago when I wrote it. I can't
17 remember exactly what the issue was
18 anymore, to be perfectly honest.

19 Q. Do you recall whether you were -- either
20 the article you were commenting on or your
21 comment was negative towards saccharin?

22 A. Yeah, I thought that the saccharin ban
23 under the Delaney Clause was reasonable.

24 Q. If you go to Page 11. Let me know when

1 you're there.

2 A. Yeah.

3 Q. You're there?

4 A. Uh-huh.

5 Q. Look at No. 64. It talks about "Cancer in
6 the Vicinity of a Department of Defense
7 Superfund site in Massachusetts," and this
8 was something that was apparently published
9 in a Toxicology and Industrial Health
10 publication. Do you see that?

11 A. Yeah.

12 Q. Do you recall if you reached a conclusion
13 in what this particular article or whatever
14 this was?

15 A. Well, reach a conclusion. We reported an
16 association.

17 Q. Association of what?

18 A. A statistically significant association
19 between breast cancer and, I think it might
20 have been lung, and these mortar training
21 positions on Otis Air Force Base on Cape
22 Cod.

23 Q. You said there was a statistically
24 significant correlation?

1 A. Association, yes.

2 Q. Is that based on studies that you reviewed
3 or what was that?

4 A. It was based on studies we did.

5 Q. When you say "we," was it you, part of a
6 grant, what was it, if you can recall?

7 A. It was part of a grant and, you know, those
8 are my co-authors listed with me.

9 Q. Was it a grant from governmental --

10 A. Yeah, it was either the Commonwealth of
11 Massachusetts or NIH and I, on that date, I
12 don't remember exactly who the funder was.

13 Q. Okay.

14 A. Just to explain -- do you want me to
15 explain what it was about or you don't
16 care?

17 Q. Let's move on. If you can go to your
18 report, which is Exhibit 2, and in
19 particular I want you to look at Page 6.

20 A. Okay.

21 Q. In the large footnote number three, if you
22 go eight lines down, there's a reference to
23 "Cancer risk and residential proximity to
24 cranberry bog cultivation in

1 Massachusetts." Do you see that?

2 A. Yes.

3 Q. Are you familiar with this cancer risk in
4 residential proximity to cranberry bog in
5 Massachusetts?

6 A. Yes, I'm co-author of it.

7 Q. What was going on?

8 A. Cape Cod, which is where we've done a lot
9 of work, and this was either funded by
10 Massachusetts or NIH. I think it was --

11 Q. You said NAH?

12 A. NIH. I think it was the Commonwealth of
13 Massachusetts at this point. There are two
14 states, maybe three, actually, Wisconsin
15 may be one of them, that produce
16 cranberries so a cranberry bog is like a
17 giant pool full of cranberries, and in
18 order to grow them, they put pesticides on
19 them, and often that's done through the
20 water. It's call chemigation. At one
21 point it was done by airplanes, aerial
22 spraying of cranberry bogs.

23 Now people live right along there,
24 their houses border on the cranberry bogs,

1 and so we used a drift model for that have
2 been used by the pesticide people about how
3 pesticides drift away when you're spraying
4 them.

5 Q. Just so I'm clear, when you say "drift
6 model," is this an actual physical model or
7 more a model from a scientific --

8 A. I'm not sure what you mean by a physical
9 model.

10 Q. When you say "drift model," what is a drift
11 model?

12 A. It's a, in this case it was an equation
13 predicting how pesticides drifted when you
14 spray things, although we did something,
15 now that I'm telling you, we used
16 information on drift models, but we
17 actually used a buffer around the cranberry
18 bogs. I think it was 2500 meters,
19 something like that, so we compared the
20 cases of brain cancer within that buffer
21 and outside that buffer zone, and that's
22 where this association came from.

23 Q. Was that also a grant?

24 A. Yeah.

1 Q. When you're part of this grant proposal and
2 you're doing your research and you create a
3 buffer around the zone, are you there
4 literally taking samples or how does that
5 work?

6 A. Okay. It was not a grant proposal, it was
7 a grant. A proposal is how you get the
8 grant.

9 Q. Thank you.

10 A. We were funded to do research by the
11 Commonwealth of Massachusetts on cancer on
12 Cape Cod, different kinds of cancer. I
13 think there were seven different kinds of
14 cancer. One of them was brain cancer. And
15 one of the things we decided to look at was
16 whether living near cranberry bogs, because
17 they're sprayed aerially, was related to
18 brain cancer, and there was actually a
19 pretty strong association with brain cancer
20 living close to the bog and the vicinity of
21 the bog, so this was a study that we did
22 using the state's cancer registry and
23 interviewing people.

24 Q. What was your ultimate conclusion on the

1 spraying?

2 A. There was a relative risk, something like
3 four, four and a half, living close to the
4 cranberry bog.

5 Q. What do you mean by "relative risk"?

6 A. In other words, the risk living close to
7 the bog compared to living farther away
8 from the bog.

9 Q. When you say "relative risk," that's a
10 percentage?

11 A. I presume too much, I'm sorry. So if I
12 were to ask what the relative risk of, say,
13 being in this room versus not being in this
14 room. I would take the risk, a measured
15 risk of being in this room and compare it
16 to the measured risk outside the room and
17 take their ratio. That's the relative
18 risk. So a relative risk of ten would mean
19 that it was ten times riskier to be in this
20 room than outside this room.

21 A relative risk of four for cranberry
22 bogs means that it was four, four and a
23 half times riskier to live within 2500
24 meters of the cranberry bogs than to live

1 outside of that 2500 meters by part of the
2 study group, which were the members who
3 lived on Cape Cod?

4 Q. In that particular study, you came up with
5 the relative risk numbers?

6 A. Yeah, it was estimated with something else
7 called an odds ratio.

8 Q. Odds ration, I saw that in your report.
9 You refer to it as OR.

10 A. Yes.

11 Q. There is some odds ratios related to births
12 and other things in some reports?

13 A. Yeah, so often you can't measure a relative
14 risk directly because of the way your
15 observations are collected, and if you use
16 a study design called a case control
17 design, you don't actually get the relative
18 risk, you get something called an odds
19 ratio, which is the odds of having the
20 disease if you're exposed compared to the
21 odds of having the disease if you're not
22 exposed, but it turns out when the risk of
23 getting the disease is relatively low, less
24 than ten percent or less than one percent,

1 then the odds ratio and the risk ratio are
2 basically the same thing.

3 Q. There are other references, and you just
4 mentioned in the Cape Cod that it sounds
5 like it was an extensive study in Cape Cod?

6 A. We have been studying them probably for
7 20 years, maybe longer, and it's not the
8 same datus. We keep collecting new data.

9 Q. It's an ongoing study?

10 A. Yes, its been ongoing and now it has been
11 extended into Rhode Island.

12 Q. Is it because of how the geography of Cape
13 Cod or what's --

14 A. That's a good question. The original
15 impetus for the study was that when people
16 looked at the state's cancer registry they
17 saw that the risk of cancer was about
18 25 percent higher if you lived on Cape Cod
19 compared to the rest of the state by a
20 particular kind of measure, and then the
21 question was why. So we were asked by the
22 state and funded by the state to try to
23 come up with an answer to that question.

24 So we looked at a number of things.

1 One of them was cranberry bogs and one of
2 them was one of the original suspicions,
3 which was Otis Air Force Base might be the
4 source of contamination. Relevant to this
5 case, it turned out that there was another
6 source of contamination on the Cape that
7 people sort of knew about but didn't know
8 what the extent of it was.

9 Q. What was that?

10 A. PCE contamination of the water. Now, the
11 really interesting part about this is where
12 that PCE contamination came from. It
13 turned out that it came from the lining of
14 the water mains, which made this an
15 extremely unique situation because it
16 became like a gigantic natural experiment.

17 Q. How long did it take to realize it's the
18 lining of the water mains --

19 A. It was going on for a full ten years before
20 anybody realized it, and they discovered it
21 by accident in Rhode Island when they did
22 some routine water testing and they found
23 PCE in the water and they couldn't figure
24 out where it was coming from because this

1 case is typical of where PCE comes from,
2 water and the air, which is someone throws
3 it on the ground and it gets into the
4 groundwater, but they couldn't find any
5 source of PCE here, and it took many months
6 for the EPA to figure this out, and here's
7 what the story turned out to be.

8 Q. Were you part of the team that figured it
9 out or was it EPA acting alone?

10 A. EPA and Commonwealth of Massachusetts and
11 Rhode Island.

12 Q. Okay. Keep going.

13 A. Sure. So here's what happened. That there
14 is very soft sort of corrosive water in the
15 northeast and the water mains had been
16 coated with sort of tar, asphalt type
17 substance to protect the water mains from
18 corroding and so on, but with this soft
19 corrosive water it was creating color and
20 taste and odor problems. So in the late
21 1960's, two companies, Johns Manville
22 Corporation and, I think, CertainTeed, who
23 are makers of asbestos cement pipe said
24 "Well, you know, if you're in one of these

1 areas, we'll give you a new kind of water
2 pipe. We'll coat the inside of it with a
3 plastic," and a plastic is something called
4 Piccotex. It's a resin.

5 Q. Piccotex?

6 A. Yes, P-i-c-c-o-t-e-x. It's on the outside
7 of milk cartons. So its been tested to be
8 safe for contact with water and stuff like
9 that. So the question is how do you get
10 this on the inside of the pipe. Well, what
11 they decided to do is dissolve it in PCE
12 and then paint the inside of the pipe with
13 it and under the assumption that the PCE
14 would evaporate and they would have a lined
15 plastic pipe, but there wasn't a big enough
16 market for this pipe so they made the pipe
17 to order, and what that meant was that if
18 you lived in Falmouth on Cape Cod and you
19 were in the water department and you needed
20 to replace the water mains on Oak Street,
21 you ordered 100 feet of water main for Oak
22 Street and within 48 hours of the order
23 they would paint the inside of some
24 asbestos cement pipe and ship it off to

1 you, so you got freshly painted. They put
2 it in the ground and the assumption was
3 that it would go away. It would dry up and
4 by the time they put it in the ground, it
5 would all be gone. Well, that turned out
6 to be really wrong.

7 Q. Has it since been remediated?

8 A. So they started putting the pipe in in 1969
9 and by 1979 they figured this out. The
10 amounts in the water were pretty
11 substantial.

12 Q. Sorry, the mouths in the water?

13 A. The amounts in the water were pretty
14 substantial and they had about 700 miles of
15 this pipe and it was scattered all over the
16 place. Oak Street might have some and then
17 Main Street a mile away might have some for
18 a block or two.

19 Q. When you talked about substantial amounts,
20 they were doing tests and coming up with
21 whatever the ratios were?

22 A. Yes. It was way over what EPA at that
23 point allowed it, and the suggested no
24 adverse response level for PCE in water was

1 40 parts per billion. It's now five parts
2 per billion, and it was way over 40 parts
3 per billion and some of the time it was
4 thousands of parts per billion.

5 So the way they remediated it was to
6 a systematic program of flushing and
7 bleeding, so they put a tap on Oak Street
8 where this pipe was and they just kept
9 running fresh water through it all the time
10 so it diluted it, basically, until they got
11 it under the five-part per billion level,
12 and they've been doing that ever since.
13 It's still there.

14 Q. Still being flushed?

15 A. It's still being flushed, and the pipe is
16 still there but a lot of the PCE now is
17 leached out of the lining of the pipe.

18 So what does this have to do with us?
19 So I was on an advisory committee for the
20 Department of Environmental Quality
21 Engineering and this issue came before us,
22 what are they going to do about the pipe
23 and about the health threat from it. So I
24 actually, and that's where this flushing

1 and bleeding was devised, and so I knew
2 about this and I decided this would be a
3 really good subject for epidemiologic
4 investigation, and we were funded to -- you
5 know, along with all these other possible
6 sources of cancer, this is one that was a
7 lot of interest to me, because one of the
8 things you'd like to do with an
9 epidemiological study is when you make a
10 comparison, you like to compare like with
11 like, and we have this natural experiment
12 here, so we located where all the pipe was
13 from records of the water companies and
14 then we did a big study by comparing cancer
15 of people who had cancer with the pipe in
16 front of their house and people who didn't
17 have the pipe.

18 Now, I've simplified a little bit
19 because we used a mathematical model
20 actually to estimate the amount of PCE that
21 was leaching out of the pipe, given the
22 diameter of the pipe, the age of the pipe,
23 and when the person moved into their house,
24 so it's quite an elaborate methodology, and

1 I think we published our first cancer paper
2 on PCE and bladder cancer in 1993 and one
3 of the things that you'll find, if you look
4 at the iris assessment, is that paper is
5 cited as one of the half a dozen with the
6 highest quality exposure assessments.

7 Q. I think you said, correct me if I'm wrong,
8 that you're part of the study that helped
9 devise the flushing technique?

10 A. I was part of the advisory committee. It
11 all emerged from the advisory committee and
12 the department.

13 Q. Can't they just use different type of pipe?

14 A. Well, they would have to dig up 700 miles
15 of pipe. That would have been the ideal
16 solution, replace the pipe, but that was
17 not possible.

18 Q. The other solution you came up with was a
19 flushing technique?

20 A. Yeah. Not ideal, obviously, but it did get
21 the levels way down.

22 Q. Below the EPA level?

23 A. Yeah, substantially below, actually.

24 I should explain something.

1 Massachusetts is not like Wisconsin or
2 Illinois. In fact, it's not like almost
3 any other state in the union.

4 Q. Well, nothing compares to Wisconsin.

5 A. Well, I'm from Wisconsin so I appreciate
6 that, but in this important respect, which
7 is that every square inch of Massachusetts
8 is in a city or town. There's no such
9 thing as an unincorporated area. Counties,
10 basically, exist only on paper. So there's
11 351 cities and towns and almost as many
12 water companies, so when you have all these
13 cities and towns on Cape Cod, it's not like
14 you can do one thing to everybody at once.
15 You've got all these small jurisdictions.

16 Q. Small jurisdictions, municipalities?

17 A. Cities and towns, and that's all there is.
18 On Cape Cod it turns out there is a county
19 health department but that's unusual.

20 Probably more than you wanted to know
21 about this.

22 Q. Thank you. As part of the Cape Cod
23 research, you're also looking at the
24 drinking water aspect and the potential

1 cancer causing effect of the drinking
2 water?

3 A. That's the study I just described to you.

4 Q. It's the same one?

5 A. Yeah, because the PCE is in the drinking
6 water, and it's in the drinking water if
7 you've got that pipe and it's not in the
8 drinking water if you don't, so that's why
9 this is a giant natural experiment because
10 you might have PCE in your water and your
11 neighborhood in back of you doesn't
12 because, and they didn't have that pipe
13 replaced in front of their house.

14 So all of these studies about PCE
15 that you see here cited on Page 6, those
16 are all almost, I think every one of them
17 is a study this situation of the PCE coming
18 out of the lining of the pipe.

19 Q. As an epidemiologist, you're looking at a
20 natural setting and trying to determine if
21 that natural setting relates to the actual
22 event for which you're researching?

23 A. Well, ideally, we like to do an experiment,
24 which is randomly assign people to PCE

1 contaminated water and not. You can't do
2 that. So you look around in the world for
3 something that's almost like a natural
4 experiment, and this is almost unique in
5 PCE studies. In fact, it is unique in PCE
6 studies because you have almost a natural
7 experiment going on here that you can
8 observe.

9 You should never ask an academic
10 about his research. You'll never get out
11 of here. I'll just keep talking.

12 Q. On that note, I have no further questions
13 at this time. Thank you.

14 MS. KREIL: I have no questions.

15 MS. ROSS: I just have a couple of
16 questions.

17 CROSS-EXAMINATION

18 (By Ms. Ross)

19 Q. I'm Becky Ross. I represent Continental
20 Casualty Company and Columbia Casualty
21 Company.

22 Were there any opinions that you were
23 asked to provide that you chose not to
24 provide?

1 A. No.

2 Q. Were there any opinions that you formed
3 that you were asked not to provide?

4 A. No.

5 Q. Are there any plaintiffs in the Class that
6 you believe have not been exposed to PCE
7 through inhalation?

8 A. Well, I described the information that I
9 was given. On the basis of that
10 information, I can't make a determination
11 about individuals, but it's my opinion as a
12 scientist that they all have substantial
13 potential for exposure, if not actual
14 exposure.

15 Q. That's true of the non-detects, as well?

16 A. Yes.

17 Q. Thank you. That's all I have.

18 CROSS-EXAMINATION

19 (By Mr. Condon)

20 Q. Did you ever provide the plaintiffs'
21 counsel with an itemization of your time
22 that you spent?

23 A. No, I don't.

24 Q. Did you bill them?

1 A. I haven't billed them yet. I just have to
2 remember to do that. I'm a horrible
3 business person and I don't do very much
4 litigation anymore. I'll bill him, I'm
5 sure.

6 Q. So you haven't billed him yet. When you
7 provide him with a bill, do you have an
8 itemized bill, this amount doing this?

9 A. It says one and a half days of whatever.

10 Q. That's how you normally do it?

11 A. Yeah.

12 Q. Okay. Thank you.

13 MR. MANZKE: Why don't we reserve
14 and we can take a look at the transcript.

15 (Discussion off the record.)

16 MR. CONDON: Condensed and e-tran.

17 MS. KREIL: Same, condensed and
18 e-tran.

19 MS. ROSS: We'll take a condensed
20 and e-mailed.

21 MR. MANZKE: Condensed and e-tran.

22 (Whereupon the Deposition was
23 concluded at 12:16 p.m.)
24

1 DEPONENT'S ERRATA SHEET
2 AND SIGNATURE INSTRUCTIONS
3

4 The original of the Errata Sheet has
5 been delivered to Atty. Edward J. Manzke.

6 When the Errata Sheet has been
7 completed by the deponent and signed, a
8 copy thereof should be delivered to each
9 party of record and the ORIGINAL delivered
10 to Atty. John Busch to whom the original
11 deposition transcript was delivered.
12

13 INSTRUCTIONS TO DEPONENT
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22 REPLACE THIS PAGE OF THE TRANSCRIPT WITH
23 THE COMPLETED AND SIGNED ERRATA SHEET WHEN
24 RECEIVED.

1 ATTACH TO THE DEPOSITION OF DAVID OZONOFF,
 M.D.
 2 CASE: KATHLEEN McHUGH vs. MADISON-KIPP,
 et al.

3 ERRATA SHEET

4 INSTRUCTIONS: After reading the transcript
 5 of your deposition, note any change or
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21 I have read the foregoing transcript
 of my deposition and except for any
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 22 hereby subscribe to the transcript as an
 accurate record of the statements made by
 23 me.

24 (WITNESS) (DATE)

COMMONWEALTH OF MASSACHUSETTS
MIDDLESEX, ss.

I, Kelly G. Patterson, a Notary Public
duly commissioned and qualified within and
for the Commonwealth of Massachusetts, do
hereby certify:

That DAVID OZONOFF, M.D., the witness
whose deposition is hereinbefore set forth,
was duly sworn by me, and that such
deposition is a true record of the
testimony given by the witness to the best
of my skill, knowledge, and ability.

IN WITNESS WHEREOF, I have hereunto set my
hand and my affixed notarial seal this 15th
day of February, 2013.

Kelly G. Patterson
Notary Public

My Commission expires:
September 12, 2014