



2

1 THE CLERK: Please raise your right hand.

2

3 ROBERT GEORGE KALEY, II

4 having been called as a witness and sworn testified as

5 follows.

6

7 THE WITNESS: Yes, I do.

8 THE CLERK: Thank you.

9 Please be seated in the witness stand.

10 Please state and spell your first and last name.

11 THE WITNESS: It's Robert George Kaley, K-A-L-E-Y, II.

12 THE CLERK: Thank you.

13 THE COURT: You may inquire.

14

15 DIRECT EXAMINATION

16 BY MR. UPshaw:

17 Q. Good morning, Dr. Kaley.

18 A. Good morning.

19 Q. Are you a chemist?

20 A. I am.

21 Q. Are you the only chemist that this jury will

22 hear from?

23 A. I believe I am.

24 Q. As far as you know.

25 A. As far as I know, yes, that's correct.

26 Q. Now, we have asked you here to help us

27 understand from Monsanto's perspective the history of PCBs and

28 what's known about their use, their properties and the health

3

1 effects of PCBs.

2 Can you also explain what Monsanto understood

3 concerning whether PCBs would become a widespread

4 environmental contaminant?

5 A. Oh, yes. I will be able to do that.

6 Q. Did you work for Monsanto?

7 A. I did. Yes, I did.

8 Q. How long?

9 A. About 30 years.

10 Q. From what years?

11 A. I joined in late 1973.

12 Q. Until when you retired from Monsanto?

13 A. It was about 2003.

14 Q. Now, you didn't retire from Monsanto, but we'll

15 get into that in a second.

16 A. Okay.

17 Q. When you joined Monsanto, had they already

18 stopped making PCBs for anything other than electrical uses?

19 A. Yes, they had. They stopped in 1972 for

20 everything but electrical.

21 Q. During the course of your time at Monsanto and

22 thereafter, in your employment after your retirement from

23 there, have you reviewed Monsanto documents?

24 A. Yes, I have.

25 Q. In addition to that, you actually knew some of

26 the key people that this jury has heard about and have seen

27 some of the documents before, right?

28 A. Yes, I was lucky enough to do so, yes.

4

1 Q. Did you speak with those people and actually

2 have a chance to learn things about Monsanto from them?

3 A. I did, yes.

4 Q. How about George Papageorge? What's his first

5 name?

6 A. Bill Papageorge, William.

7 Q. Did you know him?

8 A. I did.

9 Q. Did you get a chance to work with him?

10 A. I did, closely.

11 Q. He died?

12 A. Yes, unfortunately. Yes.

13 Q. How old was he around?

14 A. Pardon?

15 He was 93 or something when he passed away.

16 Q. How about Dr. Kelly?

17 A. Yes.

18 Q. Dr. Emmet Kelly?

19 A. I knew Emmet quite well and worked with him also

20 for a short time. He retired not too long after I joined the

21 company, but he still continued to have involvement.

22 Q. Has he passed away as well?

23 A. Yes.

24 Q. How old was he?

25 A. He was also in his 90s.

26 Q. How about Elmer Wheeler?

27 A. Yes, I knew Elmer.

28 Q. You knew him?

5

1 A. I did.

2 Q. Has he passed away as well?

3 A. Unfortunately, yes.

4 Q. The jury has also heard of Mr. Benignus.

5 A. Paul Benignus, yes. Paul Benignus.

6 Q. You worked with him too?

7 A. A little bit. Not as much as the others, but,

8 yes, I knew Paul and did interact with him somewhat.

9 Q. Unfortunately I believe he has passed away as

10 well?

11 A. He has.

12 Q. Are you the only person still around who can

13 tell us about Monsanto PCBs?

14 A. Well, there are a few of us left, but I'm

15 probably the one that's most knowledgeable, I believe, yes.

16 Q. Let's talk about your education a little bit and

17 let this jury know you a little bit better.

18 So I'm going to let you go through this slide and point

19 out to them where you went to school and some of your

20 professional memberships.

21 A. Sure.

22 I grew up in northern Indiana. I went to Purdue

23 University for my undergraduate work, graduated with a

24 bachelor of science in chemistry from Purdue.

25 Then went to the University of Illinois for graduate

26 work, receiving a master's of science and then a Ph.D. in

27 analytical chemistry from Illinois.

28 Q. Okay. And some of your professional memberships

6

1 that you -- do you currently belong to some of these?

2 A. Yes. I belong to all of those currently.

3 They kind of -- the American Association for the

4 Advancement of Science is a broad-based organization in the

5 United States of all kinds of scientists, biologists,

6 physicists, some medical doctors, a wide range, actually

7 publishes a very renowned journal called Science, a weekly

8 journal magazine format that is quite respected.

9 The American Chemical Society, as you can guess, is

10 primarily made up of chemists. It does have certain

11 requirements to join, and I belonged to that for many years.

12 The International Society for Environmental Forensics,

13 big words, but basically they look at -- study chemistry and

14 biology and risk assessment to understand possible sources of

15 contaminants that might be in the environment. Or forensics

16 often means courtrooms. Sometimes they actually do the kind

17 of work that ends up being put into a case in a courtroom.

18 Q. Now, you worked with me and others on our team

19 to put these slides together, right?

20 A. Yes, I did.

21 Q. But it was my idea to put your picture up there?

22 A. Unfortunately.

23 Q. Tell us a little, if you would, about your time

24 at Monsanto.

25 A. Okay. Excuse me.

26 As I said, I started at Monsanto in 1973. Actually

27 before I actually received my degree, I finished my course or

28 my thesis at Illinois, joined in December of '73, and for

7

1 about five years I was a laboratory chemist.

2 I walked into the company and started doing analyses

3 for PCBs. I worked in a group that was focused on doing

4 analytical chemistry, measuring PCBs and various materials,

5 also studying various properties of PCBs, would they degrade

6 in the environment, et cetera.

7 After that I became a research group leader, basically

8 doing the same kind of thing, but having a few people report

9 to me.

10 In 1981, I moved to our corporate research. In the

11 years from '73 to '81, I was in the part of Monsanto that

12 had -- was making for a while and then had made PCBs.

13 In 1981 I moved into our corporate research group doing

14 a kind of chemistry called mass spectrometry. You may have

15 heard that term. If you haven't, you'll probably hear it more

16 times than you want today.

17 Q. We'll learn all about mass spectrometry later

18 today.

19 A. Yes.

20 I did less work with PCBs but I still had expertise.

21 Then in 1985 I moved to what was then called our

22 corporate environmental policy staff, and then my primary

23 responsibilities from really then on were to interact with

24 various people inside and outside the company on PCBs and

25 other related issues.

26 And the others are a few promotions I was lucky enough

27 to receive up to that point.

28 I don't know, Mr. Upshaw, do you want to go into the

8

1 Solutia/Monsanto thing in '97?

2 Q. Just the fact that you were with the company

3 when it changed names and kind of changed ownership.

4 A. Right. In 1997, the former Monsanto Company,

5 old Monsanto, spun off the chemical businesses, which included

6 the old PCB business, and formed a company called Solutia.

7 Because my expertise and my job was around those kind

8 of chemicals rather than other parts of Monsanto, I went with

9 Solutia.

10 So when Mr. Upshaw mentioned that I didn't really

11 retire from Monsanto. I actually retired from Solutia, but it

12 was the old chemical company.

13 THE COURT: I'm sorry. It was the old chemical

14 company? What do you mean?

15 THE WITNESS: Well, Solutia had been the Monsanto

16 Chemical Company division of the bigger corporate Monsanto.

17 THE COURT: Okay.

18 Q. BY MR. UPSHAW: At Solutia, what was the

19 position director of environmental affairs. Tell us a little

20 about that.

21 A. Well, basically the focus was largely, or in my

22 case -- I already have gray hair -- chemicals that had

23 formerly been manufactured by Monsanto but were no longer

24 manufactured.

25 PCBs were among those, but there were still lots of

26 reasons to be thinking about those kinds of chemicals.

27 There were regulations. The company got inquiries from

28 outside, and other issues.

9

1 So I was basically responsible for what we call legacy

2 products or products that were no longer being manufactured.

3 Q. And one of those was PCBs?

4 A. And one of those was PCBs. That's right.

5 Q. So is it appropriate to say you worked with PCBs

6 throughout the time you were with Monsanto?

7 A. Yes. Absolutely, yes.

8 Q. Now, Monsanto stopped making or selling PCBs

9 while you were there, correct?

10 A. Yes.

11 Q. Okay. And what did you do -- I think you told

12 us what you did regarding PCBs after that. You just spoke to

13 us about that.

14 So I'll tell you what. Let's talk a little bit about

15 you.

16 A. Okay.

17 Q. Where do you live?

18 A. I live in St. Louis.

19 Q. Are you married?

20 A. I am.

21 Q. Where were you born and where did you grow up?

22 A. I was born in Illinois, a little town in

23 southern Illinois, and I grew up in South Bend, Indiana.

24 Q. Now, since retirement -- how many kids?

25 A. I do have a daughter who actually went to UCLA

26 and then Southern Cal, so I have a little bit of a California

27 link.

28 Q. Okay. So tell us what you have done since 2003

10

1 as a consultant.

2 A. Yes. In 2003 after I retired I was requested by

3 Monsanto and persons, counsel working for Monsanto, to

4 continue to consult with them, to provide things I knew and

5 historical insights, chemical insights into PCB issues which

6 continue to occur occasionally.

7 Q. So I want to show the jury something Mr. Aquino

8 found. And who is that dashing young guy?

9 A. That was a long, long time ago. I still have

10 the beard. It hasn't come off since then.

11 That was actually taken in 1974, '75 while I was

12 working at Monsanto in the laboratory.

13 What we are actually doing there is measuring

14 biodegradation of PCBs. That was some of the work we were

15 doing.

16 Q. Let's go back to our slides if we can.

17 So you were telling us about what you do as a

18 consultant.

19 A. Yes.

20 Q. Since 2003.

21 A. Yes.

22 Q. Now, do you work with attorneys as well?

23 A. I do, yes. A large part of my consulting

24 business is working with attorneys.

25 Q. And not just attorneys, but would you consult

26 with -- if someone at Monsanto has a technical problem or

27 something like that?

28 A. Yes, I do remain on -- basically I'm the

11

1 person -- if the new Monsanto Company, the one that exists

2 today, gets questions about PCBs, those questions are referred

3 to me to deal with. So, yes, I certainly do consult on that

4 basis with Monsanto Company also.

5 Q. As a consultant I'm sure you're paid?

6 A. I am.

7 Q. And how much are you paid?

8 A. I'm paid \$16,000 a month.

9 Q. And does that fluctuate? Does that change or is

10 it 16,000 a month and that's your contract?

11 A. That's my agreement, 16,000 a month, whether I

12 work a lot or sometimes I'm on vacation and I work a little, I

13 still get paid that amount.

14 Q. Why \$16,000?

15 A. That was about what I was making when I worked

16 with Monsanto. That is the agreement, that I wasn't going to

17 get a raise, but I wasn't going to get a pay cut either. So

18 that was the agreement that was worked out.

19 Q. Who do you submit your invoices to?

20 A. I submit to the Husch Blackwell law firm.

21 Q. And Mr. Miller's firm?

22 A. Yes.

23 Q. And Ms. Buck's firm as well?

24 A. Exactly, yes.

25 Q. And where is your office?

26 A. Well, I work both at home, but I do have an

27 office at the Husch Blackwell firm. They've been very

28 gracious to give me access to an office and support there, so

12

1 I do spend about half my time in that office, yes.

2 Q. All right. Now, tell us a little, if you would,

3 Dr. Kaley, about Monsanto and the company it was when you

4 worked there.

5 What was the basic business of Monsanto?

6 A. Well, the basic business? There was no basic

7 business. Monsanto -- I don't remember exactly, but as his

8 Honor has mentioned, Monsanto was a very big company. They

9 had lots of divisions. So the one I was most closely

10 associated with was the chemicals division, but they also had

11 an agricultural division. And that's what has devolved into

12 the new Monsanto Company, what is Monsanto today.

13 They had an electronics division. They had a plastics

14 division, a fibers division. So it was a very broad-based

15 company.

16 Q. And where was it headquartered?

17 A. It was headquartered in St. Louis.

18 Q. And who were the competitors of Monsanto?

19 A. Well, all of the big-name chemical companies

20 that you've probably heard of, Dow, DuPont, Stauffer, which is

21 no longer there, others. But Dow and DuPont are probably the

22 ones that come to mind and the ones that still exist, although

23 they're merging so --

24 Q. Yes. As we've recently heard.

25 A. The world shrinks.

26 Q. Major products that we might recognize?

27 A. Well, I think the major product is probably

28 RoundUp, the herbicide RoundUp, widely used.

13

1 Q. How about when you were working there. What

2 were the major products?

3 A. Well, RoundUp was one of them, actually.

4 Monsanto made the interlayer in your car windshield.

5 There is actually a thin layer of plastic between two layers

6 of glass, so that if, unfortunately, someone is in an

7 accident, the windshield doesn't shatter into little shards.

8 It may crack but it stays together.

9 Monsanto manufactures that, and Solutia today still

10 manufactures that layer of glass. They made lots of -- they

11 didn't really make a lot of off-the-shelf things you would

12 recognize because they were basically making materials -- for

13 instance, PCBs -- that were sold to other companies that

14 actually made the products themselves.

15 Q. My favorite, AstroTurf?

16 A. AstroTurf. For a while Monsanto bought the

17 company and manufactured AstroTurf.

18 Thank you for reminding me.

19 Q. I like that.

20 Different divisions of Monsanto, were they all managed

21 by one central management or were they under different

22 management?

23 A. Well, both. There was an overall management.

24 Obviously, the CEO was responsible for the whole

25 organization, but each of those divisions had their own

26 management organizations as well as their own sales and

27 research organizations.

28 Q. Where did PCBs fit into that?

14

1 A. Well, PCBs were in the chemical company. They  
2 were manufactured in two plants, you may have heard, one in  
3 Alabama and one in Illinois.

4 Q. And I think that division was fluid division,  
5 fluid function, functional fluid?

6 A. Well, actually -- okay, so there was the  
7 chemical company and then within that there were business  
8 groups. Two of those were functional fluids and another group  
9 was plasticizers. There was another one that was basic  
10 chemicals.

11 So PCBs were generally in the functional fluids group,  
12 but they also had -- the plasticizer group also had a piece of  
13 that business.

14 Q. Okay. So in the functional fluid group, did  
15 they have their own sales force?

16 A. Yes, they did, certainly.

17 Q. And their own management, I guess you said?

18 A. Right. Yes.

19 Q. Now, was it important that each group develop  
20 their own expertise about their particular products?

21 A. Yes, and the uses of their products.

22 Their products and then the uses of their own products,  
23 yes.

24 Q. Now, PCBs was not the only product of the  
25 functional fluids division, correct?

26 A. Oh, no, not by a long shot. It was actually a  
27 fairly small piece of that company.

28 Q. And the overall business of Monsanto, how much

15

1 of the overall business of Monsanto were the manufacture of  
2 PCBs back when they were being made?

3 A. As best we can tell, it was about 1 percent of  
4 the overall business of the large company.

5 Q. Okay. And the jury has seen this slide before.  
6 We've broken out that 1 percent into the various uses.

7 Tell us just quickly what the uses were of the  
8 1 percent of the total sales. And you can just walk down the  
9 list.

10 A. All right. I'll start at the bottom and move  
11 up, because by far the biggest use was for electrical  
12 equipment.

13 Monsanto sold most of their PCBs to the General  
14 Electrics and the Westinghouses and other manufacturers of  
15 electrical equipment.

16 There was another line. As you can see, about  
17 6 percent were into hydraulic fluids. Again, that was a very  
18 small piece of the hydraulic fluid market.

19 I'm sure you've heard PCBs are non-flammable, so the  
20 products that were in the hydraulic fluids were for use in  
21 foundries or places where there was molten metal or where a  
22 fire would be disastrous if a hydraulic line broke.

23 Heat transfer fluids, we're going to talk about a  
24 little bit later, I think, but that was about 1 percent or  
25 1 and a half percent.

26 Rather than explain now, I think we have a slide later  
27 that we worked on.

28 Q. Sure.

16

1 A. And then plasticizers were about 9 percent.

2 Q. They've heard from Dr. Reitman about that?

3 A. They've heard a great deal about those. Yes.

4 Q. So back to the functional fluids division, did  
5 that division have its own chemist?

6 A. Yes, it did.

7 Q. Did it have a laboratory?

8 A. Yes. They were in the same research  
9 laboratories, but they had different rooms in the building.

10 Excuse me.

11 Q. No problem. Do you want some more water?

12 A. No. I'm sipping away.

13 Q. You were losing your voice yesterday.

14 A. I was, yes.

15 Q. Now, so back in the day, back when you were  
16 first starting in the '70s, Monsanto had business units?

17 A. Yes.

18 Q. And functional fluids was one of those business  
19 units?

20 A. Right. That's a good way of putting it. Yes.

21 Q. They had executives and they had salespeople, we  
22 talked about?

23 A. Yes.

24 Q. Did they have a public relations department?

25 A. Well, the public relations is what they would  
26 have called a corporate department. So there wasn't a  
27 separate public relations department in functional fluids, but  
28 there was a person in that group that had primary

17

1 responsibility.

2 The same thing would be true of the medical department.  
3 For example, there was a corporate medical department, not one  
4 within a division.

5 Q. How about product development and improvement.  
6 Were those folks separated out?

7 A. Oh, absolutely. They went along with their  
8 business group.

9 Q. All right. And let's change gears a little bit  
10 for our discussion today.

11 You are a chemist as we started?

12 A. I am.

13 Q. Not just a chemist but an analytical chemist?

14 A. Correct.

15 Q. What is an analytical chemist?

16 A. Well, analytical chemistry is a branch of  
17 chemistry that basically does two things. It tries to figure  
18 out what something is and it tries to figure how much of that  
19 something is somewhere.

20 So it's a question of how much and what is it.

21 Q. And you don't do this on a pounds level or a  
22 tons level. What level do you look at things on?

23 A. Well, sometimes you do it on that kind of a  
24 level. But generally when I was working we were working at  
25 parts per million and parts per billion, very small levels of  
26 materials and various samples.

27 Q. Now, have chemists always been able to work at  
28 the parts per million or parts per billion? They're smaller

1 parts now, right?

2 A. Yes. We're down to parts per trillion and down  
3 to parts per quadrillion, believe it or not, and they're  
4 pushing it even further.

5 Q. So have chemists been able to do that always?

6 A. No, that has developed really through the 2000s  
7 and really into the -- I mean, through the 1900s into the  
8 2000s. It continues to develop. As I said, they keep pushing  
9 it further and further.

10 So in the early days, in the 1930s and 1940s, they were  
11 looking at percent levels.

12 By the 1960s they were thousands of parts per million,  
13 down to the parts per billion. So it just keeps getting  
14 smaller and smaller.

15 Q. Now, you talked about parts per billion. I'm  
16 trying to give the jury some idea of what that means.

17 I think you told me one second in 32 years?

18 A. That's one of the -- there are a number a  
19 analogies like that. That's one of them.

20 I think, you know, a shot of gin in a swimming pool of  
21 tonic or something like that.

22 There are a number of those, but it's a very small  
23 amount.

24 Q. You went to the alcohol and I went to time.

25 A. Yeah. That's why my beard is gray.

26 The one I like to use, if you think about an M&M, an  
27 M&M weighs about what we call 1 gram, which is a very small  
28 amount.

1 If you cut that M&M -- if you can conceive of cutting  
2 it into a million pieces, each one of those little pieces  
3 which you wouldn't even be able to see would be a part per  
4 million. So it's a very small amount.

5 Q. Okay. All right. So let's on Tuesday morning  
6 have a little chemistry lesson, if you don't mind.

7 A. I can do that.

8 Q. What is an atom?

9 A. All right. An atom is one of the basic what  
10 they call building blocks of chemistry. It's a single little  
11 unit that is one element, whether it be oxygen or carbon or  
12 lead. It's the smallest unit of chemistry.

13 Not really, but we're not going to go below that.

14 Q. Let's not go below an atom at the moment.

15 A. Yeah.

16 Q. What's a molecule?

17 A. If you put two atoms together, whether they are  
18 the same atom or different elements, that's a molecule.

19 So a molecule is two or more atoms hooked together.

20 Q. And what's a compound?

21 A. Well, a compound is basically the same thing.

22 You usually think of a compound as a bigger amount, but  
23 a compound is -- can be made up of molecules.

24 So a compound is a conglomeration of similar molecules.

25 Q. What is a benzene ring?

26 A. Well, a benzene ring is a structure that -- it's  
27 conceived of as a hexagon. It's made up of six carbons.

28 Q. Is there benzene in PCBs?

1 A. No, there's not. It was the starting material,  
2 but by the time it became PCBs, they were gone.

3 Q. All right. So the jury has heard a term  
4 biphenyl. Is that the same thing as a diphenyl?

5 A. Yes. In the early days of the 1930s and '40s,  
6 it was called diphenyl. Di means two. But for some reason  
7 unknown, the name evolved into biphenyl, again meaning two, as  
8 in bicycle.

9 Q. Are diphenyls used today? Is that term used at  
10 all today?

11 A. I haven't seen it for many, many years. So I  
12 don't think so.

13 Q. And are biphenyls used for anything today?

14 A. Yes, yes.

15 Solutia, the company, the former chemical company,  
16 stills makes biphenyl itself, not PCBs, but biphenyl itself.  
17 It's used as a heat transfer fluid.

18 Q. We're going to talk about heat transfer fluids  
19 in a little bit.

20 Now, what's a polychlorinated biphenyl?

21 A. Well, if you have a biphenyl ring, a biphenyl is  
22 two benzene rings hooked together. It's not dibenzene, for  
23 some reason. It's diphenyl or biphenyl.

24 If you hook two of those together, you have biphenyl.

25 And then if you start chemically adding chlorine at the  
26 corners of those hexagons, then you get a polychlorinated  
27 biphenyl.

28 Q. All right. Now, I think the jury has heard

1 there are 209 different -- I think the word is congeners,  
2 right?

3 A. That's correct.

4 Q. What is a congener?

5 A. Well, it's just a term that means a member of a  
6 family.

7 Q. Now, the jury has also heard Aroclor 1254 and  
8 Aroclor 1242.

9 What does that mean? What do those numbers mean?

10 A. Well, Aroclor was the trade name, Monsanto's  
11 trade name for its PCBs. And I think we'll talk about it.  
12 You may have heard PCTs, polychlorinated terphenyl, product  
13 line. So it was just a Monsanto trade name.

14 It actually came from two terms, aromatic, which means  
15 smell, obviously, because things with benzene rings in them  
16 often have an odor. PCBs really didn't very much, but some of  
17 them do.

18 So it was aromatic and then it had chlorine. So it's  
19 Aroclor. That's where that term came from.

20 The numbers were the different products in that  
21 particular line.

22 Q. And did the 12 mean something and the 54 or the  
23 42 mean something?

24 A. Well, the 12 was basically a code name for the  
25 PCB products. And then there was also a 5400 series, which  
26 was the PCT products.

27 And then the second two numbers were the percent by  
28 weight of chlorine in that material.

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| <p style="text-align: right;">22</p> <p>1 So a 1242 had a little bit of chlorine on the rings.</p> <p>2 A 1254 had kind of a moderate amount.</p> <p>3 And a 1260 or higher had lots of chlorines on the</p> <p>4 rings.</p> <p>5 Q. So the higher number would be the higher</p> <p>6 chlorinated ones?</p> <p>7 A. That's correct.</p> <p>8 Q. All right. What is an organochlorine?</p> <p>9 A. Well, organic chemistry, another one of the</p> <p>10 branches of chemistry, is the branch of chemistry that</p> <p>11 involves carbon.</p> <p>12 So we are all carbon-based people. Animals are</p> <p>13 carbon-based. Plants are carbon-based. Anything that has</p> <p>14 carbon in the structure except for something like coal or</p> <p>15 diamond, where it's only carbon -- if it's carbon and</p> <p>16 something else, it's an organic compound.</p> <p>17 If it has chlorine on that compound, it becomes an</p> <p>18 organochlorine.</p> <p>19 Q. All right. Would you do a little drawing</p> <p>20 for me.</p> <p>21 A. I would be happy to.</p> <p>22 MR. UPSHAW: Your Honor, I can move the easel there</p> <p>23 or --</p> <p>24 THE COURT: However you want to.</p> <p>25 Q. BY MR. UPSHAW: Dr. Kaley, why don't you come</p> <p>26 over here and make it easy.</p> <p>27 I'll put this over here.</p> <p>28 We do have a marker. It's up here.</p>                                                                                                        | <p style="text-align: right;">24</p> <p>1 to a chemical makes it a different structure?</p> <p>2 A. Right. In this particular case, yes.</p> <p>3 It clearly makes a different structure, but it also can</p> <p>4 have widely different properties.</p> <p>5 Q. Now, you're not saying it's easy to change water</p> <p>6 into rocket fuel, are you?</p> <p>7 A. No. The point I'm trying to make is you can't</p> <p>8 just look at two structures and say -- while they pretty much</p> <p>9 look alike, you can't say they're the same because they're</p> <p>10 not.</p> <p>11 Q. Under that would you draw a biphenyl that we've</p> <p>12 been talking about.</p> <p>13 A. All right. I'm going to start first with -- if</p> <p>14 you don't mind, we talked about what benzene is. I was just</p> <p>15 going to start with benzene.</p> <p>16 Q. All right.</p> <p>17 A. So benzene -- each of these corners is a carbon</p> <p>18 atom.</p> <p>19 So benzene is usually drawn, or always drawn as a</p> <p>20 hexagon, with one hydrogen at each corner, one hydrogen</p> <p>21 attached to each carbon.</p> <p>22 So to get the biphenyl, we put both of those together.</p> <p>23 Monsanto did that and still does that.</p> <p>24 From here on, I'm going to do a little chemist cheating</p> <p>25 trick. I'm going to use a hexagon with a circle in the middle</p> <p>26 to mean benzene.</p> <p>27 So you won't see this anymore. You'll see the</p> <p>28 shorthand.</p>                 |
| <p style="text-align: right;">23</p> <p>1 Okay. Let me hand this to you.</p> <p>2 THE COURT: Mr. Upshaw, on the bottom right corner,</p> <p>3 will you place an 883 with a circle around it. It will be</p> <p>4 marked as Exhibit 883.</p> <p>5 MR. UPSHAW: Okay.</p> <p>6 (Exhibit 883, Chart, marked for I.D.)</p> <p>7 MR. UPSHAW: There we go.</p> <p>8 Q. All right. Can you show the jury, just to start</p> <p>9 out with, dihydrogen oxide.</p> <p>10 A. All right. So oxide means oxygen, and di means</p> <p>11 two hydrogens.</p> <p>12 So that is the dihydrogen oxide.</p> <p>13 Q. Do we know that by something else?</p> <p>14 A. We do. We call that water.</p> <p>15 Q. All right. Now, what happens when you put one</p> <p>16 more oxygen atom on that?</p> <p>17 A. Right.</p> <p>18 If you make a structure that looks like that, very</p> <p>19 similar looking, just the addition of one oxygen, that becomes</p> <p>20 a chemical we know as hydrogen peroxide.</p> <p>21 You probably have some hydrogen peroxide in your</p> <p>22 medicine cabinet. If you get a cut, you put a little on and</p> <p>23 it bubbles because it's very active. It's very reactive.</p> <p>24 That's a very small solution or a very weak solution of</p> <p>25 hydrogen peroxide.</p> <p>26 Actually hydrogen peroxide itself can be used as rocket</p> <p>27 fuel, so it's a lot different than water.</p> <p>28 Q. So adding just one molecule or adding one item</p> | <p style="text-align: right;">25</p> <p>1 So if we put our two benzene rings together, we get</p> <p>2 biphenyl.</p> <p>3 Q. And please show chlorinated.</p> <p>4 A. That's a combination Z and Y.</p> <p>5 As I mentioned earlier, to make PCBs or chlorinated</p> <p>6 biphenyls you basically -- not basically -- you actually react</p> <p>7 this biphenyl molecule with chlorine. And the reaction starts</p> <p>8 to add chlorines at various positions on these rings.</p> <p>9 So you can start out to get -- just put one chlorine on</p> <p>10 the biphenyl, two, three, all the way up to 10.</p> <p>11 And they can be in different positions. So you could</p> <p>12 have one here or you could have it here or here.</p> <p>13 That's how you get up to the 209 different PCBs.</p> <p>14 It depends on how many chlorines are on the ring and</p> <p>15 where they are.</p> <p>16 Each one of those chemicals is a different chemical.</p> <p>17 It has different properties. And that's what determines how</p> <p>18 PCBs behave in use or if they happen to get into the</p> <p>19 environment.</p> <p>20 Q. Now, the jury has heard briefly about congener</p> <p>21 209, which is 10.</p> <p>22 A. Right.</p> <p>23 Q. And how do you say that?</p> <p>24 A. That's deca, meaning 10, decachlorobiphenyl.</p> <p>25 Q. The jury has also heard a little bit about DDT.</p> <p>26 Can you draw that structure and tell us why those two</p> <p>27 are different?</p> <p>28 A. Sure.</p> |

1 Q. If you can get both on the same page, if you  
2 can.

3 A. I'll squeeze it down here.

4 Q. I'll try to stay close to the podium.

5 A. All right. So this is the structure for the  
6 pesticide DDT. They stand for a very long chemical name. I'm  
7 not going to trouble you with that, but that's the structure.

8 Q. And what's the major difference?

9 A. Well, the major difference -- well, there are a  
10 lot of major differences. But the major difference is that  
11 the two rings are not connected together. They have this  
12 other group between them.

13 And there's a little what we call a tail. That's what  
14 I call it. We don't. I call it a little tail coming off  
15 here, this carbon with three chlorines attached.

16 I'm sorry. I made a little error. It should be a  
17 carbon with three chlorines.

18 And that little structure there is what makes DDT  
19 poisonous to insects.

20 Q. So that's what kills the mosquitoes?

21 A. It is. That's what kills the mosquitoes.

22 Correct.

23 Q. Dr. Kaley, you can take a seat if you would.

24 A. Thank you.

25 Q. So are PCBs like a cousin or any relation to  
26 DDT?

27 A. Well, I would start out by saying, based on my  
28 definition, they are both organochlorines, but that's where

1 names?

2 A. I said I wasn't going to trouble you with the  
3 long name, but there it is. And they have different names.

4 Q. So given all the chemicals we talked about, you  
5 mentioned PCTs?

6 A. Correct.

7 Q. What is a PCT?

8 A. Well, if you look at the drawing, a PCT has --  
9 it's a three-benzene ring structure. So if you can imagine an  
10 extra benzene ring hanging off biphenyl, that becomes a  
11 terphenyl.

12 Then if you chlorinate that, you get polychlorinated  
13 terphenyls.

14 Q. Now, to be fair, when you make PCTs, is there a  
15 byproduct from that manufacturing process?

16 A. Yes. When you make biphenyl -- I'm sorry. When  
17 you make triphenyl, it's basically the same process as when  
18 you make biphenyl. So that -- you have to have more heat and  
19 you have to react it longer, but when you make that reaction,  
20 there is a little bit you of biphenyl left in that  
21 polychlorinated terphenyl.

22 If you go on to chlorinate that terphenyl, then the  
23 biphenyl also gets chlorinated, obviously. So there's about  
24 1 percent PCBs in the PCT products.

25 Q. Is that considered a trace amount?

26 A. Yeah. It would be a trace amount or, you know,  
27 a small byproduct, yes.

28 Q. Now, when did Monsanto find out that this

1 the similarities end.

2 Q. All right. And talk to us about what we're  
3 seeing here.

4 A. Yes. We put together a slide to point out the  
5 major differences.

6 DDT was designed to be poisonous to insects, whereas  
7 PCBs were designed or turned out to be very useful for fire  
8 safety and durability.

9 DDT was designed to be put out into the environment. I  
10 don't know whether we've seen pictures, but those of you with  
11 gray beards like mine remember in the old days there used to  
12 be trucks going through neighborhoods spraying DDT in the  
13 neighborhoods. It was widespread. It was spread by farmers,  
14 by airplanes.

15 PCBs were designed not to be used that way. They were  
16 designed to stay put in whatever product they were put in,  
17 whether it was sealed in a transformer or locked into a  
18 plastic structure.

19 The DDT was applied directly to crops. And as I  
20 mentioned, PCBs were largely contained in products, whether it  
21 was transformers or plastics.

22 DDT was very toxic to insects. Obviously that's why it  
23 was used. And PCBs have a low acute toxicity, meaning really  
24 to get an immediate effect you have to have lots and lots of  
25 PCBs.

26 Q. And they had different names?

27 A. Pardon?

28 Q. It looks like they used to have very different

1 process created the -- when they were making PCTs, that a  
2 trace amount of PCBs was also being created?

3 A. They learned that in the late 1960s.

4 Q. Now, do all chemicals that are produced get into  
5 the environment to some extent?

6 A. Yes, they do.

7 Q. And can you talk to us a little bit about the  
8 difference between an effluent and widespread contamination?  
9 What is the difference in those terms?

10 A. Well, an effluent is basically a discharge from  
11 a manufacturing facility.

12 So in the older days, in the '30s and '40s and '50s,  
13 even somewhat into the '60s, often chemical plants just  
14 discharged their waste directly into a river, or,  
15 unfortunately, into the ocean.

16 So that is a plant effluent.

17 You still have a plant effluent today, but it goes  
18 through usually treatment systems at the chemical plants  
19 themselves or treatment systems in a municipal -- a city  
20 sewage treatment plant.

21 Q. Okay.

22 A. So an effluent is basically something coming out  
23 of the plant, whereas a disbursement, a widespread use, it's  
24 intentionally spread throughout the environment, like DDT was.

25 Q. Biodegradation, what is biodegradation?

26 A. Well, most chemicals, or a lot of chemicals,  
27 when you put them into the environment if they get into a  
28 water system or a sewage treatment plant, they biodegrade.

1 The little bugs in the system will basically eat up those  
2 materials. That's the whole principle of a sewage treatment  
3 plant.

4 All our sewage goes to a treatment plant where they  
5 cultivate bacteria basically to eat up those wastes and turn  
6 them into harmless products.

7 That occurs naturally in the environment. So a  
8 chemical that biodegrades, if it gets into the environment,  
9 will -- microbes will find it and turn it into harmless  
10 products.

11 So that's the concept of biodegradation.

12 Q. Now, was this an issue in, say, the '30s, '40s  
13 or '50s?

14 A. Not really. People weren't thinking along those  
15 lines in those years.

16 As I said, the plants, a lot of plants, and Monsanto's  
17 included, were discharging directly into rivers and streams.

18 Q. Was there anything about the chemical properties  
19 and uses of PCBs that would have led Monsanto to conclude that  
20 PCBs would not be widespread in the environment?

21 A. No. We were thinking that -- as I said, they  
22 were either contained in containers in transformers or  
23 something or they were locked into our products, so we didn't  
24 really, you know, think about the concept of getting  
25 widespread into the environment.

26 Q. So are PCBs chemically resistant?

27 A. Most PCBs are, yes. That was one of the  
28 properties that made them useful.

1 Q. How about heat-resistant?

2 A. Yes. That's essentially one of the most  
3 important properties that they were heat-resistant.

4 Q. Are they soluble in water?

5 A. Not very much, no. They are -- generally you  
6 would see them called insoluble.

7 Now, like many terms in science or in life, actually,  
8 that's relative. There are a little bit -- there is a little  
9 bit of solubility and it depends on how many chlorines are on  
10 the ring, for example.

11 Q. So it depends on which congener or which  
12 chemical you're talking about?

13 A. Which congener, yes.

14 Q. They're very stable?

15 A. They are stable, most of them, some of them more  
16 than others. Again, with a lot of these properties, the more  
17 chlorines you have on the ring, the more they are stable,  
18 heat-resistant, et cetera.

19 Q. Is that true for low volatility?

20 A. Yes, the same.

21 Q. What does that mean, volatility?

22 A. Volatility means evaporate.

23 So if you put a little dish of water, a little glass of  
24 water on your kitchen counter and come back a day or so later,  
25 the water will be gone. It will have evaporated because it  
26 has relatively high volatility.

27 If you put rubbing alcohol in your hand, it evaporates  
28 almost immediately. It has very high volatility. In fact,

1 your hand gets cool because it's evaporating so fast.

2 PCBs or other things, if you put that dish of PCBs on  
3 your counter and come back a month, a year later, you wouldn't  
4 be able to tell that any of it evaporated. They would all  
5 still be there.

6 Q. Would you call them virtually indestructible?  
7 What does that mean?

8 A. Well, some of them are. That's a term, I think,  
9 that has been used.

10 The higher chlorinated ones are -- they can be  
11 destroyed. They're not totally indestructible, but under  
12 normal use conditions and apparently in the environment, the  
13 higher chlorinated ones are pretty much indestructible.

14 Q. Okay. Are these the very properties that made  
15 PCBs good products for industry?

16 A. Yeah. That's exactly the point. That's right.  
17 That's why they were used in the applications they were used  
18 in.

19 Q. Okay. So let's move forward.

20 Now, this is just another version of a bar, right?

21 A. Yes.

22 Q. Okay. What were the main uses of PCBs?

23 A. Well, the big selling point, the primary  
24 advantage of PCBs over other chemicals that were available was  
25 that they were non-flammable. And that's what really --  
26 that's really why the electrical industry used them and the  
27 hydraulic fluids, there were obviously other hydraulics  
28 fluids. Heat transfer fluids, there were always other heat

1 transfer fluids. But the PCBs had this non-flammability, and  
2 that's what made them so useful.

3 Q. Let's step back a little bit.

4 We've heard from -- the jury has heard from  
5 Dr. Reitman. She showed this slide. It was questioned as to  
6 the source of the slide, which says Dr. Vorhees' report.

7 You've seen that report?

8 A. Yes, I have.

9 Q. Okay. Is this information from her report?

10 A. Yes, it is.

11 Q. I think the jury saw a draft report, but you've  
12 seen both the draft and the actual final?

13 A. Right. And the data itself were actually taken  
14 in a report that was actually issued by the EPA.

15 Q. Now, primarily how were PCBs used by Monsanto  
16 customers in the '30s and '40s.

17 A. Mostly by far, I would say the 77 percent of  
18 electrical equipment was much higher in that time frame. That  
19 was really the first product line that really developed and  
20 was used.

21 So I don't know the percentage, but it was almost all  
22 electrical equipment.

23 Q. And when we say used by, used in electrical  
24 equipment, you're talking about transformers and capacitors?

25 A. That's correct.

26 Q. All right. And when PCBs are being used in a  
27 formula in that way, what are they called?

28 A. They're called dielectric fluids.

1 Q. Can you explain what that is.

2 A. Basically a dielectric fluid, dielectric is a

3 measure of how electrically resistant they are.

4 One of the other useful properties of PCBs is they

5 don't conduct electricity, so they can be used around high

6 voltage and not cause shorts in a transformer or something

7 like that. That's another one of their advantages.

8 Q. Who developed the use of dielectric fluids in a

9 transformer?

10 A. That was actually developed by General Electric.

11 There had been a number of disastrous transformer fires and

12 explosions in the '20s and '30s. And General Electric was

13 looking for a non-flammable fluid to use in their

14 transformers.

15 Q. We're going to hear from a Dr. Kytmaa, who is

16 going to talk more about transformer fires.

17 Who holds the patent for dielectric fluids?

18 A. General Electric -- for the use of those fluids,

19 General Electric, yes.

20 Q. Now, did Monsanto make dielectric fluids to the

21 specifications of the patent holder, General Electric?

22 A. Yes, they certainly did.

23 General Electric -- a guy named Frank Clark really

24 developed that application. And they had very strict rules,

25 specifications or really rules about how to make those

26 materials pure enough so that General Electric could use them.

27 Q. All right. Are we showing from 1941 some

28 General Electric specifications for 1254?

1 A. Correct. That's an example of the kind of

2 information that General Electric told Monsanto. You can make

3 this product, but it has to have these properties. So there

4 is chemical properties and physical properties.

5 Q. Do you want to zoom in on this?

6 A. Pardon?

7 Q. So what you were talking about is some of the

8 properties where it says property, specification and method

9 number?

10 A. Right. You see dielectric. We talked about

11 dielectric. Specific gravity is basically a measure of how

12 much chlorine is on there. So they have to have a given

13 number of chlorine.

14 Somewhere at the bottom -- it's not here -- there is

15 probably a water specification, because water does conduct

16 electricity. As you know, you don't tune your radio when

17 you're in the bathtub, so you don't want any water in your

18 dielectric fluids. So those are specs or rules --

19 Q. Nobody has the radio in a bathroom.

20 A. TV. Okay. Gray beards.

21 Q. Let's look at another one, 1945.

22 Similar specifications for 1254?

23 A. Yes. Correct.

24 Q. All right. Did GE control the manufacture of

25 PCBs? In other words, could Monsanto manufacture PCBs for

26 dielectric fluid without GE's control?

27 A. No. GE had the exclusive patent for the use in

28 transformers.

1 Q. Do you remember what the trade name was for GE's

2 dielectric fluids that contained PCBs?

3 A. Sure. It's Pyranol. Pyre means fire, so it's

4 pyro, and no means no, so it was no fire. That's why they

5 named their fluid "no fire."

6 Q. Could Monsanto manufacture Pyranol for GE to

7 sell to other customers?

8 A. Well, actually GE didn't sell it -- well, they

9 did to some extent. But what GE did was license their

10 technology or their patents to other companies like

11 Westinghouse so that Monsanto then could manufacture and sell

12 PCBs to Westinghouse, but it was under a General Electric

13 license.

14 Q. Now, Westinghouse had its own fluids made by

15 Monsanto, didn't it?

16 A. Right. They had a different trade name.

17 Correct.

18 Q. And what was their trade name?

19 A. It was called Inerteen, I-N-E-R-T-E-E-N,

20 basically from the term inert because these fluids were inert.

21 So their trade name was Inerteen.

22 Q. And they sent their own specifications to

23 Monsanto, correct?

24 A. Yes, they did.

25 Q. Here's another one from 1943, as well.

26 A. Right.

27 Q. Now, did Monsanto make Inerteen for Westinghouse

28 so it could license it to other customers as well?

1 A. No. I don't believe so because GE had those

2 licenses.

3 There were certainly other electrical equipment

4 manufacturers that were licensed by GE and had their own trade

5 names, but the patents were held by GE up until the time they

6 expired.

7 Q. All right. Can you go back to slide six for a

8 second.

9 So we talked about electrical equipment.

10 Some of the other uses for safety reasons, for fire

11 reasons, I think are in the yellow?

12 A. Yes.

13 Q. Okay. And we talked about all of those.

14 Some of those applications, but not all, were for the

15 same thing, fire protection?

16 A. Yes, clearly.

17 Where it says hydraulic fluids, the most widely used

18 hydraulic fluid is oil.

19 If you go to a filling station, I guess they still have

20 hydraulic lifts in a car service station. Those are oils.

21 But PCBs, I think I did mention briefly, were developed

22 in conjunction with foundries where they had hot molten metal

23 where, again, you wanted the flame resistance or the

24 non-flammability of PCBs.

25 Q. And specifically that was for the auto industry,

26 right?

27 A. The auto industry and the metallurgical

28 industry.

38

1 Reynolds Aluminum actually developed -- you referred to  
2 Pydraul, which was the trade name for Monsanto's hydraulic  
3 fluids, were actually developed in conjunction with Alcoa, I  
4 believe, the aluminum company.

5 Q. Not to ignore it, but I think Dr. Reitman talked  
6 about this a lot. So when PCBs were being used in  
7 plasticizers, was it again for some of the properties we just  
8 talked about?

9 A. Yes. Clearly it was for those properties,  
10 including flame resistance or flame retardants in some cases.

11 Q. Let's talk a little bit about NCR and carbonless  
12 copy paper.

13 Who was NCR?

14 A. NCR was a company -- is a company. In the '50s  
15 and '60s they were widely known for carbonless copy paper. It  
16 was National Cash Register. Today they make ATM's.

17 They've moved on.

18 Q. Who developed the use of Aroclor 1254 in  
19 carbonless copy paper?

20 A. Actually it was Aroclor 1242.

21 Q. I'm sorry.

22 A. And that use was developed by NCR.

23 Again, they had the patent for that use.

24 Q. So 1242 is a lower chlorinated than what I said,  
25 1254?

26 A. Correct.

27 Q. And they used 1242.

28 Did they use any others that you're aware of?

39

1 A. Not that I'm aware of.

2 Q. So they used 1242 exclusively?

3 A. Yes.

4 Q. Right?

5 Is 1242 found in the environment?

6 A. It wasn't at that particular time.

7 When the PCBs in the environment story broke, so to  
8 speak, they were finding higher chlorinated materials, not the  
9 low-chlorinated materials like 1242.

10 Q. Okay. Now, did Monsanto know PCBs were  
11 widespread in the environment like chlorinated pesticides were  
12 prior to the late the 1960 -- '66?

13 A. No, they did not.

14 Q. Why was that?

15 A. Well, I think we touched on it before, that  
16 their use, pattern and their physical properties would suggest  
17 that there was no reason to expect them to be widespread in  
18 the environment.

19 Q. Okay. So you put together a little timeline  
20 here for us to follow.

21 A. Yes.

22 Q. And let's go through that if we can.

23 So 1934, GE obtained a patent for the PCB electrical  
24 uses to prevent explosions and fires.

25 You talked to us about that, right?

26 A. Yes, we did.

27 Q. What's happening in 1935 with Monsanto buying --  
28 I think it's Swann?

40

1 A. Right. There was -- the company that actually  
2 developed the process for biphenyl itself and then for PCBs  
3 was a company in Alabama called Swann Chemical Company. That  
4 was the owner's name.

5 And obviously in the 1930s times were tough for people  
6 and for companies. Swann was about to go under, so Monsanto  
7 bought that company.

8 Q. Okay. So from 1931 to '39, PCBs are tested for  
9 toxicity by university scientists?

10 A. Yes, that's correct.

11 Q. Does this include some of the names the jury has  
12 already heard, Dr. Drinker and others?

13 A. Yes.

14 In the 1930 time frame there were some acute -- we  
15 talked about acute, short-term health effects, serious health  
16 effects noted among some workers.

17 So Monsanto and other companies contracted with these  
18 universities to study the PCB toxicity.

19 Q. All right. And so Dr. Flinn was from Columbia?

20 A. That is my recollection, yes.

21 Q. And Dr. Drinker was from Harvard?

22 A. Correct.

23 Q. And they tested -- they were asked to make some  
24 tests after some workers got sick; is that the story?

25 A. Right. There were basically two incidents that  
26 really triggered these studies.

27 One was an outbreak of a disease called chloracne at  
28 the Monsanto manufacturing or at the time the Swann

41

1 manufacturing plant.

2 Chloracne is a very serious form of acne. That was  
3 investigated at Columbia.

4 Q. And what did they find?

5 A. They found that Monsanto or Swann had changed  
6 the benzene supplier, really, and that this new supply of  
7 benzene had an impurity in it that when it went through the  
8 process was causing this chloracne. It wasn't the PCBs. It  
9 was the chlorinated impurity.

10 Q. And then if the jury happens to see documents,  
11 that impurity was called?

12 A. It was a styrene impurity.

13 Q. Now, there were three worker deaths at another  
14 plant and that was investigated as well?

15 A. Right. Yes. This other plant was making wire  
16 coatings for largely military uses.

17 My understanding is that that process was a very  
18 high-exposure process.

19 These guys would be standing, basically straddling  
20 tanks, trays of these mixtures that were called Halowaxes and  
21 running the cables through these heated materials. So it was  
22 very dirty process.

23 Unfortunately three workers in that process contracted  
24 liver disease and passed away.

25 Q. Now, did all three workers work with PCBs?

26 A. No. There were -- some of the Halowaxes had  
27 some PCBs in them, some did not.

28 So I think only two of them actually had PCBs in the

1 mixtures, but they weren't PCBs pure anyway. They always had  
2 the naphthalenes in them.

3 Q. And naphthalene is another chemical?

4 A. Right. Yes. It's another two-ring benzene  
5 structure, but it's totally different than biphenyl.

6 Q. Back in the '30s did Monsanto have other  
7 testing, I guess, above and beyond those two on PCBs in their  
8 toxicity, correct?

9 A. Yes.

10 Q. And what conclusion was drawn from all that  
11 testing, Doctor?

12 A. Well, primarily from the Drinker studies, but  
13 the conclusion was drawn that the PCBs were only toxic in the  
14 animal studies at very elevated temperatures.

15 So if you control the temperature and control exposure,  
16 they can be used and manufactured safely.

17 Q. All right. So we talked about this a little  
18 bit.

19 Just to go through this briefly, tell us what you want  
20 to show -- tell the jury what you're showing here.

21 A. This basically summarizes what I said before.

22 There were health effects, yellow atrophy of the liver  
23 and chloracne, which is a very serious skin disease.

24 Those early on were both attributed to PCBs, thought to  
25 have been caused by PCBs.

26 But the research in the '30s showed that the yellow  
27 atrophy of the liver was basically caused by the naphthalenes,  
28 and the chloracne was caused by the styrene impurity.

1 So the studies show it was not PCBs that were causing  
2 the illness, but PCBs were also studied.

3 So the studies actually established safe working  
4 conditions for PCBs.

5 Q. And Dr. Drinker publicized this information,  
6 correct?

7 A. Yes. He published a paper where he said  
8 basically what I've said here.

9 Q. All right. Now, Dr. Markowitz testified that  
10 Monsanto knew as early as the 1930s that the chemical PCT  
11 contained at least 1 percent of PCBs because of Dr. Drinker's  
12 studies in '37, '38, '39, those papers; is that true?

13 A. No, that's not true. There is a mistake in one  
14 document which could lead somebody to maybe think that, but  
15 it's clear that that is not the case.

16 Q. What was the mixture actually -- the formulation  
17 that Dr. Drinker was actually testing?

18 A. Well, he was actually testing a mixture. It was  
19 about half PCBs and half PCTs. It was called 4465, Aroclor  
20 4465.

21 So rather than being one or the other, it was a mixture  
22 of those two groups of Aroclors.

23 Q. Right. And is that the conclusion from that '38  
24 paper?

25 A. Well, this is a different -- yeah, that's the  
26 conclusion from the paper, but this actual -- this slide  
27 actually refers to a different material.

28 Q. Different material.

1 A. Right. 1268 was a pure PCB.

2 It was tested -- I don't know how --

3 Q. If you can explain what you mean.

4 THE COURT: One at a time.

5 MR. UPSHAW: All right.

6 THE WITNESS: Sorry, your Honor.

7 THE COURT: Wait for a question.

8 Q. BY MR. UPSHAW: Why don't you explain the  
9 different mixtures and then we'll clarify.

10 A. Okay. In the first Drinker study, Dr. Drinker  
11 thought he was testing a PCB, pure PCB, something he thought  
12 was 1268.

13 It turned out in the first paper to be quite toxic.  
14 That didn't make sense to Monsanto based on their experience  
15 with their workers. So they asked Dr. Drinker to work -- to  
16 do specifically some work on Monsanto products to test the  
17 real 1268, which turned out to be non-toxic.

18 The earlier material was then found to have been  
19 mislabeled and was found to have been that mixture of PCBs and  
20 PCTs.

21 Q. Now, 1268, does it contain each of the congeners  
22 that are listed here that have been at issue in this case?

23 Can you see that?

24 A. Yes, it has some content of every one of those,  
25 yes.

26 THE COURT: Indicating 845, Exhibit 845.

27 MR. UPSHAW: 845. Yes.

28 Q. Now, the jury has heard Dr. DeGrandchamp say

1 that 1268 is not carcinogenic.

2 Are you aware of that testimony?

3 A. I am aware of that testimony.

4 Q. Did Monsanto take what it learned from  
5 Dr. Drinker and Dr. Flinn and let people know what they were  
6 saying and advise its customers?

7 A. Yes, they did.

8 Q. So they provided warnings?

9 A. They did. They provided warnings and labels on  
10 their products.

11 Q. Okay. So what are we looking at here,  
12 Dr. Kaley?

13 A. Well, this is actually an internal letter or an  
14 internal memo within Monsanto.

15 Basically if you'll drop to the bottom paragraph,  
16 Dr. Kelly was the medical director. And Dr. Kelly was saying  
17 that we ought to use what we learned from the Drinker study to  
18 put on our labels and put in our product bulletins.

19 What they learned were the first three paragraphs, that  
20 if you're exposed to Aroclor at high temperatures or have  
21 repeated oral ingestion at high levels, it will lead to  
22 toxicity. You may get chloracne.

23 If you use ventilation to protect from these exposures,  
24 they can be used safely.

25 Q. And it actually went into -- this information  
26 actually went into what they called an Aroclor booklet?

27 A. Product bulletins, yes.

28 Q. Product bulletins.

1 Did Monsanto know anything about PCBs that they  
 2 excluded or suppressed from customers or the public?  
 3 A. No. They were transmitting the information they  
 4 had to their customers and to the public.  
 5 Q. Now, during this time were there any signals  
 6 that workers had unusual rates of cancer?  
 7 A. No, there were not.  
 8 Q. How about customers? GE, Westinghouse?  
 9 A. No, there was no such information.  
 10 Q. Dr. Kaley, based upon your review of the  
 11 information, the documents you've seen -- we didn't talk about  
 12 that so let me step back for a second. We should have talked  
 13 about that earlier.  
 14 You've looked at a number of documents, correct?  
 15 A. Yes. Throughout my career I've looked at lots  
 16 of documents.  
 17 Q. Thousands, tens of thousands?  
 18 A. Certainly thousands, but -- I don't know about  
 19 tens but certainly thousands over the 40 years I've been  
 20 dealing with them.  
 21 Q. Now, Monsanto has a document archive, correct?  
 22 A. Yes, they do.  
 23 Q. And you have access to that?  
 24 A. I do.  
 25 Q. Was there a time where you were under the  
 26 impression that you didn't have access to that?  
 27 A. That was my understanding, yes, that I did not  
 28 have direct access to go in and shuffle the papers.

1 Q. And what you would do -- well, tell us what you  
 2 would do.  
 3 A. Well --  
 4 Q. Back then when you thought you didn't have  
 5 access.  
 6 A. Right. Well, the Monsanto days there were lots  
 7 of documents available. I had those.  
 8 After I retired and became a consultant, if I had a  
 9 specific question about a specific issue, I would ask someone  
 10 in the law firm to look in the document repository and try to  
 11 find all the documents related to that topic.  
 12 Q. All right. Anytime anybody said you can't have  
 13 that document or we're only going to give you two of the ten  
 14 we found?  
 15 A. No, I didn't never had any reason to believe I  
 16 didn't get everything that was available.  
 17 Q. Anybody ever tell you -- any of those lawyers  
 18 tell you you can't go into the archives?  
 19 A. Not that I can recall. It was just my  
 20 understanding.  
 21 Q. So when that understanding was clarified, you  
 22 had total access?  
 23 A. Yes, I do now.  
 24 Q. Can you look at anything you want to look at?  
 25 A. I can and I felt like I could then. I just had  
 26 to ask for it.  
 27 Q. All right. So from your review of all the  
 28 documents, your knowledge, your discussions with -- is this

1 the same Dr. Kelly that you met?  
 2 A. Yes.  
 3 Dr. Kelly had a very long career at Monsanto. Yes.  
 4 Q. Okay. Based upon all that, what was the  
 5 relative size compared to GE of Monsanto back in the '30s,  
 6 relatively?  
 7 A. Roughly, I think Monsanto was about one-tenth  
 8 the size of General Electric.  
 9 Q. And that would hold true for sales as well, as  
 10 far as you knew?  
 11 A. As far as I know, yes.  
 12 Q. Did that size difference continue or did the gap  
 13 increase over the '40s and the '50s?  
 14 A. My understanding, without really knowing the  
 15 numbers, my understanding is it probably increased  
 16 significantly.  
 17 GE was obviously one of the largest companies in the  
 18 United States for most of the '60s and '70s, as I recall.  
 19 Q. How about Westinghouse? Where does Westinghouse  
 20 fit in between GE and Monsanto?  
 21 A. I think they were about half the size of General  
 22 Electric. They were certainly two to maybe four times bigger  
 23 than Monsanto.  
 24 Q. All right. So we saw a 1937 memo talking about  
 25 the Aroclor booklet.  
 26 Does Monsanto in the '40s continue to issue warnings on  
 27 labels and bulletins?  
 28 A. Yes.

1 Q. A long question. That's my fault.  
 2 Something else was happening in the '40s as well,  
 3 right?  
 4 A. Yes. There was a big war going on in the '40s.  
 5 Q. And during this time, did Monsanto warn  
 6 customers about what was going in the Aroclors and how they  
 7 should use Aroclors?  
 8 A. Yes. They always had product bulletins  
 9 available and were always labeling their products. Yes.  
 10 Q. In fact, what are we looking at here, Dr. Kaley?  
 11 A. This is actually one of the product bulletins,  
 12 actually the earliest we've ever been able to find, from 1943.  
 13 Q. Okay. And what does it say in that last  
 14 paragraph?  
 15 A. Well, I think, again, it repeats what they  
 16 learned from the Drinker studies.  
 17 If you have ventilation or avoid high temperatures  
 18 which causes the PCBs to evaporate faster, then they can be  
 19 used and manufactured safely.  
 20 So ventilate and protect your workers.  
 21 Q. Now, there were some questions I think to  
 22 Dr. Reitman about whether or not the Navy and other government  
 23 contractors were given warnings about Aroclors and their use.  
 24 Would they have access and be given these same exact  
 25 bulletins?  
 26 A. Sure. They would have access to the bulletins,  
 27 certainly. And as I said the products being shipped out of  
 28 the company had labels on them, so those labels conveyed safe

1 operating conditions for those materials.

2 Q. Can you confirm in the '40s that Monsanto  
3 specifically warned against the use of PCBs in the food  
4 industry?

5 A. Yes. I believe there's a bulletin that has that  
6 specific information in it.

7 Q. Okay. And I think the jury has seen those.  
8 That was 703 and 704, for the record.

9 I'm not going to show them again. There has been some  
10 discussion of those already.

11 But moving forward, unless you want to have some  
12 comment on those.

13 A. No. I just think it's important that early on  
14 it was recognized they were not to be used, you know, as a  
15 food additive or in that industry.

16 Q. Okay. We'll get back to that in a little bit.  
17 Monsanto continues to fund PCB toxicity testing.

18 So is there testing going on even the war effort?

19 A. Well, after the war, shortly after the war, the  
20 tests were resumed, yes.

21 Q. Okay. And the jury has already heard that  
22 Monsanto was decorated for its war effort, so we won't go into  
23 that.

24 You're aware of that?

25 A. Yes, I am.

26 Q. All right. Dr. Kaley, Monsanto around this time  
27 starts a cancer index.

28 A. Yes.

1 Q. Can you explain to the jury what that is and who  
2 started it.

3 A. Well, basically Dr. Kelly, who you've heard a  
4 lot about and will continue, decided that it was important to  
5 understand if cancer were arising in the Monsanto workforce.

6 So he began reviewing on a monthly basis insurance  
7 records from the company that insured Monsanto's workers and  
8 basically started writing down every case of cancer that  
9 occurred in these records and at what plant that worker worked  
10 and what kind of cancer he had.

11 In some cases there's information about the job that he  
12 was working at or at least some general information. In fact,  
13 most cases.

14 Q. Now, did he do a lot of work to make sure the  
15 workers stayed safe as well?

16 A. Oh, yes. Monsanto was always concerned about  
17 the worker safety and making sure we were doing what we were  
18 telling our customers to do.

19 Q. Did he implement, like, yearly work physicals  
20 for workers and other programs?

21 A. Yes. They were always yearly physicals. In  
22 fact, there were yearly physicals when I worked at the  
23 laboratory with much lower exposure than factory workers. I  
24 had a yearly physical. Even the office workers had yearly  
25 physicals.

26 So Monsanto was and continues to be concerned about the  
27 health of its workforce.

28 Q. Now, when he was keeping this cancer index, did

1 he identify a cluster of non-Hodgkin's lymphomas with anybody  
2 at Monsanto?

3 A. No, there were no what I would call or what  
4 you're calling a cluster of non-Hodgkin's lymphomas in any of  
5 them.

6 Q. Including PCBs workers?

7 A. Oh, yes, definitely.

8 Q. Any liver cancers that he saw a cluster of?

9 A. Not clusters. There were liver cancers,  
10 obviously.

11 Q. But nothing unusual that he --

12 A. Right. There wasn't any grouping of liver  
13 cancer associated with a particular product line or at a  
14 particular plant.

15 Q. There weren't a huge number of PCB workers, were  
16 there, either at Anniston or I think you said the Sauget  
17 plant?

18 A. No. It required a small number of actual people  
19 in the process at any one time.

20 Q. Do you recall how many?

21 A. Less than a dozen, as I recall, certainly at  
22 Anniston. I don't know for sure at Krumrich.

23 I think you probably heard the Monsanto Illinois plant  
24 was named the WG Krumrich plant. So you'll hear it called  
25 WGK, the Krumrich plant, the Sauget plant. We kind of flip  
26 back and forth. So it's all one plant.

27 Q. So there were a few workers.

28 So even one non-Hodgkin's lymphoma would have been

1 noticeable?

2 A. Well, yeah. It would have been on the cancer  
3 index, certainly, if it were in the PCB process.

4 Q. Let me change gears a little bit, if we can, and  
5 talk about SC Johnson and Glo-Coat, since that's been a topic  
6 that's brought up.

7 Dr. Markowitz has testified that SC Johnson used  
8 Aroclors in the manufacture of its commercial Glo-Coat. Are  
9 you aware of that?

10 A. That's my understanding, yes.

11 Q. And he showed them a document which was  
12 Exhibit 452, which was an annual research report that noted  
13 SC Johnson had found Aroclor 1254 replaced something called  
14 Congo gum and had purchased carloads of 1254.

15 Now, because SC Johnson in fact purchased some 1254,  
16 are you aware of that in 1946?

17 A. I've seen that document, yes.

18 Q. It was his conclusion that SC Johnson actually  
19 used it in its floor wax which was sold.

20 You've seen that document. Can you describe what an  
21 annual research report is?

22 A. Well, I think from the title it certainly  
23 indicates that it was work being done in the research  
24 department to look for possible applications of Aroclors or  
25 other products, for that matter.

26 It certainly didn't imply that it was being used  
27 commercially for that particular use.

28 So it was probably Monsanto's research department

1 talking about research at the SC Johnson Company.

2 Q. You looked at Monsanto's sales records and

3 attempted to determine whether Monsanto actually sold PCBs to

4 SC Johnson for use in its formulation of wax?

5 A. Yes.

6 Q. And what did you find?

7 A. Well, all indications in the sales records are

8 that there are no indications of sales of Aroclor 1254, you

9 know, as a plasticizer to SC Johnson.

10 Q. Now, sales records only go back to 1958, right?

11 A. They do. That's correct.

12 Q. So what you found -- and you found this memo.

13 Can you tell us what we're looking at from 1970?

14 Can you increase that?

15 Okay. Can you see that?

16 A. That helps.

17 MR. UPSHAW: Just for the record, that's Exhibit 857,

18 your Honor.

19 THE WITNESS: Yes.

20 This is a letter from the 1970 time frame talking about

21 Johnson floor waxes and what kinds of materials Monsanto is

22 selling them.

23 So certainly by this time frame they are selling them

24 another plasticizer that is not a PCB.

25 Q. BY MR. UPSHAW: Okay. So talk us through this a

26 little bit.

27 It says, "As you know, Johnson manufactures floor waxes

28 using ABS and acrylic resins."

1 What's ABS?

2 A. ABS is a kind of plastic. It's the initials of

3 the starting materials for that kind of plastic.

4 THE COURT: Do we have an exhibit number?

5 MR. UPSHAW: 827.

6 Q. And, "At the heart of this, incidentally, as you

7 know, we are selling them something like 400 million"?

8 A. No, that's actually thousand.

9 Q. "400,000 pounds of TBEP for their ABS type floor

10 waxes."

11 What is TBEP?

12 A. Well, it's another plasticizer. It's a

13 different group of plasticizers called phosphate esters.

14 They're derivatives of phosphoric acid. So it's another huge

15 group of plasticizers that Monsanto manufactured.

16 There were a number of phosphate esters. This is one

17 of them.

18 Q. Any PCBs in it?

19 A. No. It didn't even have chlorine in it.

20 Q. Let's look at another memo from 1968.

21 Would you, Mr. Aquino, blow up the left side for me so

22 we know who that's from.

23 This is exhibit 832. This a letter from the

24 plasticizer sales department?

25 THE COURT: 832.

26 MR. UPSHAW: Yes, your Honor. 832.

27 Q. All right. And you showed the other side as

28 well.

1 So what does this letter, this internal document, talk

2 about?

3 A. Well, again, this is basically the same thing,

4 showing that we're selling hundreds of thousands of pounds of

5 this phosphate ester plasticizer to SC Johnson.

6 Wisconsin Solvents is a distributor.

7 And I don't know if it was mentioned earlier, but for

8 plasticizers, Monsanto did sell some directly to customers,

9 but most of them were sold through distributors, where

10 Monsanto would ship the product to the distributor, sell the

11 product to the distributor, and he would distribute it among

12 other companies in his general area.

13 So that's what the Wisconsin Solvents piece is.

14 Q. All right. And this is showing that Wisconsin

15 Solvents is selling TBEP to SC Johnson?

16 A. Yes, to SC Johnson. That would be the ultimate

17 customer.

18 Q. So other than that 1946 research report

19 noting the application that's being researched, have you seen

20 any indication that SC Johnson ever purchased Aroclor 1254 for

21 purposes of including it in a final formulation of floor wax

22 that was sold commercially?

23 A. I have not, no.

24 Q. Let's go back and finish out the '40s.

25 We talked about the cancer index. There was no

26 outbreak of any NHL.

27 How about any NHL noted in the customer workforce?

28 That's GE workforce or Westinghouse's workforce or other

1 customers?

2 A. No, there was none.

3 Q. Any reason to believe, given the properties and

4 uses of PCBs at the time, that PCBs were widespread in the

5 environment at the end of the '40s?

6 A. No. Again, the same considerations would have

7 applied.

8 Q. Let's go on to the '50s.

9 Monsanto continues to fund PCB toxicity studies,

10 including the Treon studies.

11 Who was Dr. Treon?

12 A. He was a toxicologist, a researcher at the

13 Kettering Institute, part of the University of Cincinnati.

14 Q. Preeminent toxicology organization at the time?

15 A. Yes. They were very highly thought of at the

16 time. Yes.

17 Q. Now, he did some studies. And what were his

18 conclusions, if you recall?

19 A. Basically he studied -- again, kind of similar

20 to Drinker, but he studied the properties of Aroclor 1242 and

21 Aroclor 1254, looking at their toxicity to a number of

22 animals, including rats and mice. And, again, was using the

23 PCBs at elevated temperatures in the vapor phase to do those

24 toxicity studies.

25 He found that at some high levels PCBs did cause some

26 toxicity, but at low levels that would normally be encountered

27 they were safe to use again.

28 Q. So if you tried these experiments just sitting

1 in the Petri dish in the cage with the rats, would he have  
2 gotten any results? Would there have been any inhalation of  
3 PCBs?

4 A. No. He had to heat the PCBs to quite high  
5 temperatures to get enough vapor to get to the exposure levels  
6 where there was toxicity.

7 Q. Okay. Now, Dr. Markowitz showed the jury a  
8 slide that had one side, the 1955 report, that was a report to  
9 Monsanto.

10 Then he put a Monsanto logo in the middle and then he  
11 showed a '56 report and said the mouse was missing.

12 You've heard that missing mouse story before, right?

13 A. I have heard about the missing mouse, yes.

14 Q. Did Monsanto ever have -- let me rephrase that.

15 Did Monsanto have any influence or any input as to the  
16 final published report of Dr. Treon that you could find?

17 A. Not that I'm aware of.

18 Researchers typically are very insistent that even no  
19 matter who's paying for the study to be done that they get to  
20 publish their own study.

21 Q. Now, Dr. Markowitz also suggested that Dr. Treon  
22 hid the mouse that died of lymphoma.

23 Did that actually happen? Was it actually in the --  
24 was that mouse identified in the 54?

25 A. Yeah. It talked that and two other mice that  
26 died of natural causes. It didn't specify that it was a  
27 lymphoma, but it did say it was an extraneous cause and that  
28 it was replaced in the study so that the study could go on

1 with enough animals.

2 Q. And his ultimate conclusion was that PCBs could  
3 be used safely?

4 A. Yes, that's correct. Yes.

5 Q. So Monsanto funds studies, about 78 of them,  
6 toxicity studies in the '50s.

7 Anything unusual happening with the workforce at the  
8 time? Any outbreaks of non-Hodgkin's lymphoma at all in  
9 Monsanto's workforce?

10 A. No.

11 Q. How about in the workforces of General Electric  
12 which is using the product or Westinghouse which is using the  
13 product?

14 A. No. There was none reported.

15 Q. And Monsanto continues to issue warnings on  
16 product labels and bulletins during the '50s?

17 A. Absolutely, yes.

18 Q. And what are we looking at here, Dr. Kaley?

19 A. Well, this is a report on a PCB product, Aroclor  
20 heaters. So we're touching on the heat transfer fluid  
21 application, again, basically repeating the information that  
22 we've learned from early on in Drinker, and now after Treon  
23 that if you breathe -- excuse me, if you breathe vapors from  
24 PCBs that are heated to elevated temperatures, you can get  
25 sick.

26 Certainly animals get sick and there is the possibility  
27 that humans could get sick.

28 Q. And this is what you would call a systemic

1 warning, a systemic toxic effect warning?

2 A. Yes. An injury to the liver would be a systemic  
3 effect.

4 Q. Let's go back a second.

5 So let's go to the '60s, and we'll start with the '60s.

6 Before I get to the '60s, though, let me drop back a  
7 second.

8 Pesticides. Let me catch up.

9 We didn't talk about this before we get to pesticides.

10 Was this another example of warnings from the '60s?

11 A. Yes. This is the bulletin for capacitors, one  
12 of the electrical uses of PCBs.

13 Q. And inside the bulletin it said what?

14 A. Right. Again, it says that if you neglect the  
15 precautions, you might have liver damage. You might have acne  
16 or actually chloracne.

17 Q. Okay.

18 A. And both of those are considered to be systemic  
19 diseases or systemic conditions.

20 Q. Right. Now, I asked you the question about the  
21 '40s, the '30s.

22 I'm going to ask you this. In the early '60s, any  
23 indication of an outbreak of non-Hodgkin's lymphoma with  
24 Monsanto workers?

25 A. No.

26 Q. Or with General Electric or Westinghouse  
27 workers?

28 A. None that I've ever seen.

1 Q. Any high or unusual rates of any lymphomas of  
2 any of those workers?

3 A. No.

4 Q. So now let's go to pesticides because there was  
5 some discussion on that.

6 Were pesticides ever used -- first off, are PCBs a  
7 pesticide?

8 A. No. They were actually tested a little bit as  
9 pesticides and they were lousy pesticides, so they are not a  
10 pesticide.

11 Q. Were they considered a pesticide extender?

12 A. They were considered as possibly to be used as  
13 pesticide extenders. Most of that work was with ECTs,  
14 actually, not PCBs, but there was some suggestions that they  
15 could be tried.

16 But, again, not any widespread use that's been --

17 Q. Was that for crop use or non-crop use?

18 A. Definitely for non-crop use.

19 Q. Explain to the jury what that means, crop use  
20 versus non-crop use?

21 A. Well, basically a crop is something that is  
22 expected eventually to end up being in either animal food or  
23 human food. So corn, wheat, soybeans, those would be crops.  
24 So they weren't used for that kind of application.

25 Something like spraying a tree for insects, that would  
26 be a non-crop use.

27 Q. Okay. In fact, did Monsanto tell its customers  
28 about using specifically Aroclor 5460 for non-crop use?

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1 A. Right. This is one of the plasticizer bulletins  
2 out of the plasticizer group.  
3 Again, 5460 is a polychlorinated terphenyl product.  
4 That was the one that had been tested the most and  
5 recommended.  
6 They also suggested you might try some of the PCBs, but  
7 as far as we know, that never went anywhere.  
8 But, again, the emphasis is non-crop use.  
9 Q. Now, there was an organization that experimented  
10 with 5460 back in the '60s, right?  
11 A. Yes.  
12 Q. Who was that?  
13 A. That was the U.S. Department of Agriculture that  
14 actually did some of the early studies.  
15 Q. Did that application ever develop into anything?  
16 A. Not that we have ever been able to determine,  
17 no.  
18 Q. Were they the first ones to experiment or  
19 suggest the use of 5460 as a pesticide or insecticide  
20 extender?  
21 A. Well, they were certainly the first ones to  
22 publish in a scientific journal that that use was being  
23 investigated, yes.  
24 Q. Was there ever any recommendation by anyone for  
25 use of food or other crops in this experiment?  
26 A. Not that I've ever seen, no.  
27 Q. Now, was there one customer that actually used  
28 PCBs as an extender?

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1 A. Yes. Yes. When the PCB environmental issues  
2 arose, Monsanto did an internal investigation among their  
3 customers and did find one customer that had purchased some, I  
4 believe, Aroclor 1254 for pesticide extender use.  
5 Q. All right.  
6 MR. UPSHAW: And, Mr. Aquino, could you give me --  
7 could you zoom in on that.  
8 THE COURT: That's Exhibit 692?  
9 MR. UPSHAW: 692.  
10 Q. Okay. So this identified that customer, I  
11 believe, or am I ahead?  
12 A. I don't believe that this is -- I think this is  
13 a different --  
14 Q. All right. Okay. That's the one I'm looking  
15 for.  
16 THE COURT: Not --  
17 MR. UPSHAW: No. Exhibit 59, your Honor.  
18 THE WITNESS: Yes. This is -- I'm sorry.  
19 Q. BY MR. UPSHAW: So what are we seeing?  
20 A. This is a document that shows the results of  
21 Monsanto's internal search for customers. And as it says, the  
22 records show that there was only one customer buying PCBs for  
23 insecticide extender use or a carrier.  
24 Carrier is basically the same thing as extender.  
25 Q. So if PCBs were ever used as a pesticide  
26 extender, it was for a limited quantity?  
27 A. Yes, it definitely would have been.  
28 Q. For testing?

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1 A. Well, it's hard to say from this whether it's  
2 testing or actual some use, but generally they would have been  
3 very, very small usage.  
4 Q. And, in fact, PCTs are better suited for this?  
5 A. Yes, because they are stickier. They stick  
6 around longer. They have less volatility. So they would have  
7 been much more satisfactory.  
8 Q. Now, I assume you can't just go out and make a  
9 pesticide and sell it, can you?  
10 A. No.  
11 Q. Is it regulated?  
12 A. It's highly regulated.  
13 Q. By who?  
14 A. In the 1960s and earlier it was by US Department  
15 of Agriculture. After the creation of the EPA in 1970, that  
16 function moved to the Environmental Protection Agency.  
17 Q. How about all the way back in 1947? Did you  
18 have to register a pesticide?  
19 A. Yes, you certainly did.  
20 Q. Did you see any documents or anything, in  
21 anything into you reviewed, that showed PCBs were ever  
22 registered as a pesticide with the USDA?  
23 A. No, I've never seen that.  
24 Q. Let's move on to food additives.  
25 Were PCBs ever intended as a food additive?  
26 A. No, they were not.  
27 Q. All right. Were they ever approved by the FDA  
28 as a food additive?

65

1 A. No, certainly not.  
2 Q. Were PCBs ever approved by the FDA to be used  
3 commercially in adhesives that were applied to food packaging?  
4 A. No.  
5 Q. And Dr. Reitman has showed this jury the final  
6 Federal Register where -- the final Federal Register entry  
7 where it was noted that PCBs did not make the list of approved  
8 chemicals for use with food packaging.  
9 You're familiar with that?  
10 A. Yes. I've seen that document.  
11 Q. All right. Did Monsanto identify or actually  
12 talk to its customers about that final ruling?  
13 A. Yes. In response to some inquiries, Monsanto  
14 did communicate that information.  
15 Q. Okay. If you could blow this up.  
16 Is this one of those letters?  
17 A. Yes, it is.  
18 MR. UPSHAW: Your Honor, I think we need a new exhibit  
19 number for this letter.  
20 1962 Pappas letter.  
21 THE COURT: It will be marked as 884.  
22 (Exhibit 884, Pappas letter, marked for I.D.)  
23 Q. BY MR. UPSHAW: Okay. What is Dr. Kelly telling  
24 Mr. Pappas?  
25 A. Well, apparently -- well, not apparently. They  
26 have obviously been having some ongoing communications and  
27 correspondence. Apparently Mr. Pappas had inquired about  
28 Aroclor 1242 and Dr. Kelly was telling him that, in fact,

1 based on the Federal Register that PCBs were not on the  
2 approved list of adhesives and that the bottom line Monsanto  
3 had no intention of ever applying for such permission or for  
4 such licensing.

5 Q. Okay. Did you see any indication prior to this  
6 date -- I mean when this was an issue back in '61 -- that  
7 Monsanto had the intention of applying for approval from the  
8 FDA for PCBs as an adhesive?

9 A. No. As far as I know, that was never  
10 contemplated.

11 Q. Let's look at this letter from 1968, a little  
12 further down.

13 Thank you very much, sir.

14 THE COURT: Would that be Exhibit 820?

15 MR. UPSHAW: It would, your Honor.

16 THE COURT: All right.

17 Q. BY MR. UPSHAW: And what are we seeing here,  
18 Dr. Kaley?

19 A. Well, again, this is a letter responding to a  
20 request for information about toxicology data on Aroclor  
21 products. One is a PCB and one is a PCT.

22 We communicate that information, but then we stress  
23 that it's not approved for a food additive or food packaging  
24 applications and suggest that Monsanto makes other  
25 plasticizers that are approved, and we'll send them the  
26 catalog so they can consider those.

27 Q. So we're trying to lead them in the right  
28 direction?

1 had nothing to do with uses in any kind of a food additive or  
2 chewing gum.

3 If it was ever even contemplated, that would have come  
4 out of the plasticizer division.

5 So these products are industrial fluids. Would never  
6 have been put in chewing gum.

7 Q. So this is not out of the plasticizer division?

8 A. No.

9 Q. This is out of the functional fluids?

10 A. Functional fluids.

11 Q. There was a long list attached to this of pages  
12 and pages and pages of companies?

13 A. That's correct, yes.

14 Q. And those pages and pages of companies included  
15 American Chicle and Wrigley.

16 You've seen that?

17 A. I have, yes.

18 Q. Were they -- on this big list those customers of  
19 customers, were those functional fluid customers?

20 A. Yes, that's why it was sent to that group of  
21 people. Yes.

22 Q. And functional fluid customers go to what  
23 products?

24 A. To the hydraulic fluids and the heat transfer  
25 fluids.

26 Q. Have you looked for sales records for Wrigley,  
27 and what did you find?

28 A. Well, we did find some sales records to the

1 A. Sure.

2 Q. Okay. So this has been mentioned and I feel  
3 compelled to talk to you about it, chewing gum.

4 A. Okay.

5 Q. All right. Now, Dr. Markowitz showed the jury  
6 Exhibit 414 and said -- it was a letter from Monsanto to  
7 customers about certain PCB products. He claimed that showed  
8 Monsanto sold 1254 and 1260.

9 You got it?

10 1254 and 1260 to companies like Wrigley and American  
11 Chicle for use in chewing gum.

12 Can you explain this letter to the jury?

13 A. Yes. This is one of the letters --

14 THE COURT: Exhibit 414?

15 MR. UPSHAW: Yes, your Honor, 414.

16 Q. Go ahead. Sorry for the interruption.

17 A. This is one of a number of letters that Monsanto  
18 sent to customers alerting them to the environmental concerns  
19 that were coming to the fore with regard to PCBs. It  
20 explained which PCBs were being found and then pointed out  
21 various product lines to these customers.

22 And the products that are dealt with in this particular  
23 memo are hydraulic fluids. That's the Pydraul fluids and  
24 Therminol fluids, which are heat transfer fluids.

25 The Turbinal that's mentioned in there is another -- it  
26 was basically a lubricant for air compressors.

27 So, again, it was a general letter. It went to a large  
28 list of customers. But these particular products would have

1 Wrigley company. They were basically for non-PCB products.

2 Q. You sold them Therminol 66?

3 A. That's correct.

4 The Therminol trade name was Monsanto's heat transfer  
5 fluids, but the only ones that contained PCBs had a capital F,  
6 capital R designation, Therminol FR.

7 Monsanto at the time and still Solutia makes lots of  
8 other heat transfer fluids. Therminol 66 does not contain  
9 PCBs.

10 THE COURT: That's Exhibit 840?

11 MR. UPSHAW: Yes, your Honor.

12 And 841 I think is the next page.

13 We have two exhibits on one slide.

14 Q. What are we showing here, Dr. Kaley?

15 A. Well, this is a sales record from the Monsanto  
16 records that again shows that we were selling Therminol 66.

17 Q. Okay. Now, did you also find out if Monsanto  
18 sold products to American Chicle?

19 A. Yes, we tried to find sales records for that  
20 company, also.

21 Q. And you sold Pydraul AC?

22 A. That's correct.

23 Q. Okay. And what's Pydraul AC?

24 A. Well, Pydraul is the hydraulic fluid. AC is for  
25 air compressor. So it was a specific Pydraul designed for use  
26 with air compressors.

27 Again, it's a hydraulic fluid.

28 Q. So, Dr. Kaley, have you seen any evidence that

1 Monsanto sold PCBs to anyone for use in chewing gum?

2 A. No. I've never seen such documentation.

3 Q. Now, by 1940 Monsanto was already warning

4 customers not to use PCB plasticizers in the food industry;

5 correct?

6 A. That's correct, yes.

7 Q. All right. Let's move forward if we can.

8 MR. UPSHAW: Your Honor, if this is a good spot, fine.

9 If not, we'll keep going.

10 THE COURT: Well, Robert is standing by the door. So

11 that must mean he wants a break.

12 Ladies and gentlemen, we will take a morning break.

13 Keep in mind the admonition.

14 See you back in 15 minutes.

15 (Recess.)

16 THE COURT: In the case of Dauber versus Monsanto, all

17 counsel are present. All jurors and alternates are present in

18 court.

19 Mr. Upshaw.

20 MR. UPSHAW: Thank you, your Honor. May it please the

21 Court, ladies and gentlemen.

22 Q. Dr. Kaley. Okay. I kind of took us well ahead

23 here. I'm not going to go that far.

24 Let's go on to Therminol if we can.

25 A. Okay.

26 Q. Could you explain to the jury what Therminol is,

27 means and what it's used for.

28 A. Yes. Therminol is a trade name for Monsanto's

1 heat transfer fluids.

2 They are used in a variety of industries, without

3 trying to sound silly, that transfer heat. And we'll talk

4 about that in a minute.

5 Some of them contain PCBs up to about 1971. Those were

6 designated with the FR, as I mentioned earlier.

7 Then after the FR there was a number 1, or zero,

8 actually, through 3, I think, that told which Aroclor was in

9 there, and what -- basically as the numbers went up, you would

10 use them at higher temperatures.

11 Q. Okay. So is this a heat transfer system?

12 A. It's a symbolic heat transfer system, yes.

13 Q. Now, heat transfer systems were mainly used in

14 what application?

15 A. Well, they were primarily used in other

16 industrial applications in chemical plants and other plants

17 where you needed to heat a process that was on going.

18 Q. Interestingly, did Monsanto use a similar heat

19 transfer system to make PCBs?

20 A. They actually did, yes.

21 Q. So they used their product to make their

22 product?

23 A. Yes. That's fairly common within that industry,

24 actually.

25 The interesting thing kind of is that the division

26 using the product had to pay the division that was selling the

27 product.

28 Q. So they had to buy their own product?

1 A. Exactly.

2 Q. So how did the heat transfer system work?

3 Do you have a pointer there?

4 A. I do.

5 Basically heat transfer systems are basically used

6 where you want the source of the heat to be separate from what

7 you're heating.

8 So there it is.

9 So you have a heat source, whether it's a steam heat

10 system or actually sometimes an open flame, and the fluid --

11 the heat transfer fluid is actually the blue symbol in the

12 tubes.

13 So the heat source would heat the fluid. It would be

14 pumped to the reaction vessel or wherever you needed the heat.

15 The heat in those fluids would then be transferred to

16 the oil or the reaction medium, whatever was in this big vat.

17 As it transferred its heat, it would cool.

18 The cool material would recirculate back and be

19 reheated.

20 It's very similar to the radiator in a car, although

21 it's working the other direction.

22 The radiator in a car is transferring the heat from the

23 engine to the atmosphere to cool the engine. So basically

24 your anti-freeze is a heat transfer system.

25 Q. Now, why would you use that? Why would you need

26 that in this process?

27 A. Well, in the vat itself in many cases there are

28 flammable materials. So, for instance, if you're using an

1 open flame as your heat source, you don't want it right under

2 the flammable material.

3 You know, it would be as dangerous on an

4 industrial-sized basis as oil in a frying pan that you forget

5 and it ignites. It's basically a safety consideration.

6 Q. We saw in that chart the percentage of Therminol

7 sales.

8 A. It was about 1.6 percent of all PCB sales were

9 for Therminol.

10 Q. Now, there was a time in the late '50s, early

11 '60s, when this system was used in some industrial food

12 applications?

13 A. It was used by some food companies, primarily

14 for the reasons that I kind of talked about, where in the vat

15 where they were doing something they could be using -- frying

16 a material in oil, vegetable oil, which is flammable. So you

17 don't want a direct heat source applied to that oil.

18 Q. So did that need FDA approval?

19 A. No. It was not a food additive, either a direct

20 food additive or an indirect food additive. It was just part

21 of the process.

22 Q. So if you compare the industrial application of

23 a heat transfer system to the -- I call it the industrial food

24 application -- what was the percentage, if you recall?

25 A. I don't know exactly, but it was very small. It

26 was not a large contribution. It was by far to other

27 companies using it in their plants.

28 Q. All right. Are you aware when a heat transfer

1 system was used in -- I'll just call it food application --  
 2 was contaminated food -- did they ever leak?  
 3 A. Yes. Unfortunately all systems leak. No system  
 4 is foolproof. So there was the potential for leaks.  
 5 Certainly Monsanto warned against them.  
 6 Q. All right. And did Monsanto in fact design some  
 7 systems itself?  
 8 A. They did. They actually had heat transfer  
 9 systems that they sold the whole system including the hardware  
 10 as well as the fluid. They did, yes.  
 11 Q. And did they tell customers how to maintain  
 12 those and make sure they were in top operating order, as well?  
 13 A. Yes. They did it that for whether it was their  
 14 system that was being purchased or they were using another  
 15 system. They were very explicit and very clear about how to  
 16 treat these systems down to what kind of welding to use so  
 17 that leaks were as minimal as possible.  
 18 Q. Are you aware of any contaminated food that was  
 19 ever sold or consumed?  
 20 A. Everything I've seen says that none ever was.  
 21 Q. Did Monsanto sell other products as heat  
 22 transfer fluids?  
 23 A. Yes, they did.  
 24 As I mentioned, there were Therminols that were not FR  
 25 that were probably the bigger part of the heat transfer market  
 26 for Monsanto.  
 27 Q. Right. And you talked about Therminol 66?  
 28 A. Exactly. That would have been an example.

1 Q. And if you see Therminol, does that mean it's  
 2 got to be PCBs?  
 3 A. No. I think that goes back to what we were just  
 4 saying. It has to have an FR to be PCB fluid.  
 5 Q. So you said it was foreseeable that there could  
 6 be a leak into an oil or a cooking oil, right?  
 7 A. It's conceivable, yes.  
 8 Q. Can you smell Therminol?  
 9 A. Well, generally, if you look at the product  
 10 bulletins or other places, they say that PCBs are odorless,  
 11 but we have to remember that in these heat transfer systems  
 12 they're being used at elevated temperatures.  
 13 As you heat the PCBs, the vapor pressure, they're more  
 14 volatile and you do get some odor at that point.  
 15 So there's kind of a conflict in what you may read, but  
 16 at high temperatures they do have an odor.  
 17 Q. What kind of odor does it have?  
 18 A. It's kind of a medicinal kind of odor. It's  
 19 really hard to describe. Nothing that you would recognize as  
 20 an odor, but kind of medicinal.  
 21 Q. Now, have you seen documents that indicate that  
 22 odor tipped off heat transfer customers for food applications  
 23 when there was some leak due to a failure of maintenance or  
 24 something?  
 25 A. Yes. There was some indication that the  
 26 customers could smell the PCBs.  
 27 Q. All right. And we're looking at document 506,  
 28 Exhibit 506 -- Mr. Aquino, could you zoom in on this.

1 Doctor, what are we looking at here?  
 2 A. Well, this is an internal document talking about  
 3 contamination of foods by heat transfer -- potential  
 4 contamination by heat transfer fluids.  
 5 Q. Okay. So this is 1969?  
 6 A. Yes.  
 7 Q. And Monsanto has checked with all of its  
 8 customers and this is kind of a summary of what they found  
 9 with regard to Therminol use?  
 10 A. Precisely. It is a summary of -- they are  
 11 interested in what is our experience with this kind of  
 12 situation. So they did an internal investigation with their  
 13 customers.  
 14 Q. Now, how many instances did they find that there  
 15 was a leak in all the uses that they looked at?  
 16 A. Well, there were actually four mentioned in this  
 17 memo where there were actually leaks that had been discovered.  
 18 Q. And two of those, what happened? Did the oil  
 19 come in contact with any food?  
 20 A. In two of them there actually was contact with  
 21 the food product, but in both cases the food was discarded.  
 22 Q. Okay. And in the two others it was not?  
 23 A. That's correct. They were away from the food  
 24 contact location.  
 25 Q. All right. So the last paragraph is  
 26 interesting. I'm not sure if the jury can see it.  
 27 It says, "It is also interesting to note that not one  
 28 failure has been reported on the approximately 192,000

1 electrically heated stainless steel fry pans containing  
 2 Therminol FR 3."  
 3 Those were the West Bend frying pan?  
 4 A. Yes, that's correct.  
 5 Q. And not one leak reported?  
 6 A. That's correct also, yes.  
 7 Q. Prior to late 1966 -- prior to this time in '69  
 8 and back, any indication to believe that the properties and  
 9 uses of PCBs, that they are widespread in the environment at  
 10 this point?  
 11 A. Well, by '69 --  
 12 Q. '69. Yes. Let's go back to the '60s.  
 13 A. By the early '60s -- by the mid-'60s there was  
 14 no such indication.  
 15 Q. Okay. So let's go back to talking about, while  
 16 we're here, the heat transfer and food indications.  
 17 Any indication that -- well, the jury saw something  
 18 about Frito-Lay.  
 19 Any indication that one potato chip that was ever sold  
 20 by Frito-Lay was contaminated with Therminol?  
 21 A. Not that ever reached the consumer. Certainly  
 22 not that I'm aware of.  
 23 Q. Okay. So let's talk about this a little bit.  
 24 This is Exhibit 77. This is a letter from 1955, and  
 25 the jury has seen this.  
 26 It talks about lunch rooms. And it was a memo in the  
 27 Krummrich plant, correct?  
 28 A. Yes.

1 Q. Now, Department 246 was what?

2 A. That was the department -- each chemical product

3 was made in a different department at the plant. This was the

4 department that was making PCBs.

5 Q. Before this memo came out, any indication that

6 workers are getting sick from eating where they're working?

7 A. No.

8 Q. Should you eat where you work?

9 A. Generally not if you're around chemicals or in a

10 hospital or someplace where there's any danger of any kind of

11 contamination, whether it be bacterial or chemical or

12 whatever.

13 Q. Is this good industrial hygiene?

14 A. Yes. As the last point says, you know, although

15 this is directed to the PCB department, our medical director

16 is saying, hey, nobody should be eating in their department.

17 Q. Okay. All right. Let's go back to our timeline

18 here and step back a second.

19 We have established the '30s, we've looked at the '40s

20 and the '50s, that Monsanto continued testing for PCBs and

21 toxicity, correct?

22 A. Yes. They did continue those tests.

23 Q. They warned customers in product labels and in

24 bulletins?

25 A. That's correct.

26 Q. About the use of PCBs?

27 A. That's correct, yes.

28 Q. Any indication here up to '66 of a signal or

1 anything that would indicate to Monsanto during this time

2 frame that its workers were getting sick from PCBs?

3 A. No.

4 Q. Excess lymphoma seen or any excess cancer?

5 A. No.

6 Q. How about GE or Westinghouse up to this time,

7 any indications whatsoever that its workers are getting sick?

8 A. Not that I'm aware of, no.

9 Q. All right. So let's take a step back in time

10 for a second, and let's go specifically to 1966.

11 What was Bob Kaley doing in 1966?

12 A. Well, it would have been after my sophomore year

13 at Purdue. That summer I was actually working in an

14 analytical chemistry lab for Miles Laboratories in Indiana.

15 They made Alka-Seltzer. So I was pursuing my career, or my

16 future career.

17 Q. So I was six years old.

18 Was Purdue like Woodstock?

19 A. No. Au contraire, Purdue was pretty

20 conservative at the time.

21 Q. It sounds like the Beatles and the civil rights

22 movement and changes were happening in the United States.

23 A. That's right. It was a time of great change in

24 this country, yes.

25 Q. Are you familiar with the book Silent Spring?

26 A. I am.

27 Q. Did that have a big effect on what was happening

28 at Purdue?

1 A. To some extent, yes.

2 I mean, people were becoming more aware of

3 environmental concerns.

4 But, you know, Purdue was engineers and farmers. And

5 the farmers were concerned. It was a big agricultural school.

6 So certainly it was getting people to start to think about

7 these issues that really had kind of passed under the radar

8 screen before then.

9 Q. So the environmental awareness is starting to

10 happen, right?

11 A. That's correct, yes.

12 Q. How about -- when did you notice it, the

13 environmental awareness happening?

14 A. To some extent at Purdue, but generally by the

15 time of graduate school, the graduate students tend to be a

16 little more activist.

17 Illinois was a little more liberal than Purdue. So the

18 focus at that point was really the Vietnamese war, frankly,

19 but the environmental movement was getting traction.

20 Q. All right. So let's -- keeping this time frame,

21 did the EPA exist back then, 1966?

22 A. No, it did not.

23 Q. How about OSHA?

24 A. No.

25 Q. How about the Superfund litigation and all that

26 going on?

27 A. No. There was no Superfund law at that point.

28 Q. Toxic Substances Control Act, was that around

1 then?

2 A. No. That is the federal legislature and the

3 federal law that controls chemicals, PCBs included, so that

4 was not passed yet.

5 Q. The jury has heard about the NTP, National

6 Toxicity -- go ahead.

7 A. Toxicology Program.

8 Q. Was that around the summer of '66?

9 A. No, it was not.

10 Q. Now, Monsanto was in the PCB business, right?

11 A. Yes, sure. Yes.

12 Q. Now they had engaged in PCB business and PCB

13 testing at that point for about, what, 30 years?

14 A. Yes.

15 Q. In your view was Monsanto up to 1966 hiding

16 anything from customers, the government or anybody else?

17 A. Oh, certainly not. They were communicating what

18 their studies were showing.

19 Q. Were their warnings consistent from that time as

20 to what they were finding in their studies?

21 A. Yes, absolutely.

22 Q. Based on documents you've read, what was

23 Monsanto's understanding in the summer of '66 as to whether

24 workers, either Monsanto's or their customers, could safely

25 work with and around PCBs?

26 A. Yes. Their understanding was they could and

27 their experience was that that was what was happening, that

28 they weren't seeing disease in their workers.

1 Q. All right. Somebody like NCI, had they, by the  
2 summer of 1966, told Monsanto they were noticing that people  
3 who were exposed to PCBs were having problems or getting  
4 illnesses at all?

5 A. No, I'm not aware of any things like that.

6 Q. How about universities? Were any universities  
7 looking to Monsanto and saying, hey, we're noticing there is  
8 an issue with your chemical PCBs?

9 A. Well, some of them were --

10 Q. Before 1966?

11 A. Before 1966, no.

12 Q. How about government agencies as of '66. Let's  
13 stick with that.

14 A. Not that I'm aware of.

15 Q. Had any chemical company done any long-term  
16 cancer studies on PCBs by 1966?

17 A. No, they had not.

18 Q. Were there producers in 1966 of PCBs outside the  
19 United States?

20 A. Yes. There were a number of worldwide producers  
21 at that time frame and before and after.

22 Q. Okay. Had any of them done any long-term cancer  
23 studies by 1966?

24 A. Not that I'm aware of, no.

25 Q. Any reports of workers outside the U.S. getting  
26 excess cancers from PCB exposure?

27 A. Not that I've ever seen, no.

28 Q. Had NCI done any such test?

1 We talked about a difference in awareness about  
2 environmental issues around that time?

3 A. Yes.

4 Q. Was that same issue, that same awareness,  
5 beginning in Monsanto around 1966?

6 A. Sure.

7 Q. And you started in 1973.

8 A. Right.

9 Q. Was that awareness continuing when you got  
10 there?

11 A. Oh, a huge focus of why I got there, that is  
12 part of what we were involved in was testing for PCBs, their  
13 environmental presence, their environmental effects and how to  
14 minimize such effects, if there were any.

15 Q. Now, in the summer of '66 did Monsanto have any  
16 information coming back to it from any source that PCBs  
17 getting into the environment were causing any apparent  
18 problem?

19 A. No. That was one of the other things that would  
20 trigger long-term testing, would be an obvious environmental  
21 problem, and there was no such indication with PCBs.

22 Q. Okay. So for the first time in November of  
23 1966, two scientists, Jensen and Widmark, do some studies and  
24 they present their findings.

25 A. That's correct, yes.

26 Q. What were they studying, who are they, and what  
27 did they find?

28 A. Well, Jensen and Widmark were two researchers in

1 Now, NCI was around at that time, right?

2 A. Yes, they were.

3 Q. They've been around since, what, 1937?

4 A. Late 30's, '37 or something, yes.

5 Q. So in all that time had they done any testing on  
6 PCBs, long-term animal testing?

7 A. No, they had not.

8 Q. So why is it that Monsanto didn't test PCBs for  
9 long-term cancer before 19 -- what is it, 1968?

10 A. Yes.

11 Q. Why is that?

12 A. There were basically three or four reasons why a  
13 material would be subject to a long-term cancer test.

14 One was -- and we've talked about several times -- is  
15 cancer in the workplace. If you're seeing cancer in your  
16 workers, you need to figure out why and what chemical might be  
17 causing it. So that might trigger some testing.

18 Food additives after the mid-1950s had to be tested for  
19 long-term carcinogenicity.

20 Widespread application like pesticides would be an  
21 indication that such testing would be appropriate.

22 Really none of those applied to Monsanto or to PCBs.

23 They applied to Monsanto, but not to PCBs.

24 Monsanto did have products that they did do long-term  
25 testing on because of those reasons.

26 Q. Okay. O let's talk about the environment and  
27 environmental concerns in the summer of '66, and let's stay  
28 there for a second.

1 Sweden. They had been doing for a number of years testing of  
2 environmental samples for the presence of DDT and other  
3 pesticides.

4 And during those analyses, they were seeing some  
5 signals that they couldn't identify as pesticides.

6 I'm going to get a little technical if that's okay.

7 Q. Okay.

8 A. They were using an instrument called a gas  
9 chromatograph. And a gas chromatograph is basically an  
10 instrument that separates chemicals.

11 The output kind of looks like a mountain range. So  
12 when a chemical comes out of the end of it, you'll see a  
13 signal, a peak on the recorder, and something like DDT, a  
14 single compound, you would get a single peak.

15 Always if you ran the conditions the same, you would  
16 always see it at the same time. So every time you saw that  
17 peak, you could say, oh, that's DDT, or probably DDT, and  
18 depending how big it was, you could tell how much.

19 They were doing these analyses, and we'll just focus on  
20 DDT. But they were seeing peaks that they didn't know what  
21 they were. They didn't match up with any other pesticides,  
22 but they had no way of knowing what those peaks were.

23 Q. So what did they do?

24 A. So at some point there was an instrument company  
25 in Sweden that was manufacturing a new -- really a combination  
26 of two instruments, a gas chromatograph and then I mentioned  
27 briefly a mass spectrometer, and they had linked those  
28 together.

1 A mass spectrometer allows you to identify what  
2 chemical is there. Once that linkage was made, then they were  
3 able to at least tentatively identify those peaks as PCBs.

4 So that's what they presented at a meeting in 1966 and  
5 then later went on there was a short article published on  
6 that -- about that finding in a British magazine called New  
7 Scientist in December of 1966.

8 Q. Now, before the researchers Jensen and Widmark  
9 came out with their finding, had anybody made this finding  
10 previously?

11 A. Well, they had seen the peaks, but they didn't  
12 know what they were.

13 Q. They didn't know what they were.

14 Had anybody published on them or came out publicly and  
15 said we think we're finding PCBs in the environment?

16 A. No. This was the first indication.

17 Q. Now, at what level did they detect these PCBs?

18 A. Well, these were back at our ppm level we talked  
19 about earlier.

20 This was really just at the dawn of time when chemists  
21 could start talking about parts per million. So that's  
22 basically the levels they were finding.

23 Q. We actually talked about parts per billion,  
24 right? That was the one second --

25 A. Oh, was that parts per billion? Okay.

26 Q. Right. So parts per million would not be as  
27 small but almost as small, right?

28 A. Right. They are very small. That was my M&M

1 analogy, was my part per million.

2 Q. Part per million.

3 So, now, did Jensen and Widmark report anybody was  
4 being hurt by what they found?

5 A. No. They were very clear they didn't know what  
6 either the environmental or human effects were. There was no  
7 indication that there were any.

8 Q. So they're just saying we see this stuff?

9 A. That's correct, yes.

10 Q. And we think it's PCBs?

11 A. Yes.

12 Q. Did they report anybody -- any humans were being  
13 affected by it?

14 A. Not affected, no.

15 Q. Any animals being affected by it?

16 A. No, they did not record that.

17 Q. Actually Jensen and Widmark found it in several  
18 places, correct?

19 A. They did.

20 Q. Did they report -- did they report that they  
21 found it -- what the cause of it -- why they were finding it?

22 A. No. They speculated later on, but at the time  
23 they had no idea where it was coming from.

24 Q. Okay. So what happened here? Did this spur  
25 interest? Were people excited about it? Was there some  
26 movement at Monsanto at the time?

27 A. Well, Monsanto, obviously, because it was one of  
28 their products, although it was in Europe and other people in

1 Europe made PCBs, they were clearly interested.

2 Other researchers doing other pesticide analyses had  
3 seen these peaks and they were, of course, saying, oh, that's  
4 maybe what our peaks are. So they started doing that kind of  
5 research.

6 So it really, both within and outside of Monsanto,  
7 stimulated questions, interest and a path forward on trying to  
8 really understand what was going on.

9 Q. So initially, after this report, was there some  
10 confusion as to whether these were PCBs, specifically Monsanto  
11 PCBs?

12 A. Well, certainly there was confusion whether they  
13 were Monsanto PCBs.

14 There was some confusion whether they were PCBs at all  
15 or whether they might be degradation products of some  
16 pesticide since they were doing pesticide analyses.

17 So there was some question. Some of the chemists were  
18 seeing different things than Jensen and Widmark. There were a  
19 lot of questions.

20 Q. So we'll get to what some of the other chemists  
21 did and how they got their samples and things of that nature  
22 as we move forward in our timeline.

23 But let me ask you here.

24 Right around this time period was there confusion as to  
25 how it was getting even into the environment?

26 A. Oh, certainly, yes.

27 Q. How so?

28 A. Well, because we're kind of back where we

1 started.

2 PCBs were an industrial product, largely used in the  
3 electrical industry.

4 When they weren't, they were thought to be, you know,  
5 as I keep saying the phrase, locked in, but they were locked  
6 into the product. They were in the plastic or wherever they  
7 were.

8 It just seemed very curious to Monsanto and others as  
9 to how could it be that these things apparently were fairly  
10 widespread in the environment.

11 Q. Well, at this point, in fact even today, are you  
12 able to tell, when you look at PCBs in the environment, where  
13 they come from?

14 A. No. The analytical chemist can tell you what's  
15 there and how much, but they can't generally tell you where it  
16 came from.

17 There are methods to do some of that, but not by just  
18 doing the analysis. It takes a lot of computer time to do  
19 those kind of analyses. That wasn't available at this period.

20 Q. Okay. So there's no Monsanto PCB fingerprint  
21 versus some other person making --

22 A. No. There's no little red "M" on the PCB  
23 molecules.

24 Q. Okay. So what theory did Jensen and Widmark  
25 have that they thought was causing PCBs to even be in the  
26 places they were testing?

27 A. Well, they really thought two things.

28 They were found basically in a harbor and water. So

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1 they thought it possibly could be coming from marine paints  
2 that were on the ships or possibly from some sort of  
3 industrial discharge from somebody that was using PCBs  
4 upstream somewhere.

5 Q. I think we touched briefly on what Monsanto's  
6 reaction was, which was they didn't understand this happening?

7 A. Yes.

8 Q. So how does Monsanto react, then, to this?

9 A. Well, they do several things.

10 First they -- GE was by far their largest customer.  
11 They alerted or they noticed or told GE that this information  
12 had been published and wanted to make them aware of it so they  
13 could start thinking about this issue too.

14 They were very sophisticated and had a lot of  
15 scientists and were using a lot of PCBs.

16 Q. So GE is probably Monsanto's biggest customer  
17 for PCBs?

18 A. No question, absolutely, yes.

19 Q. Almost a month later -- a month later does  
20 Monsanto have all the information here?

21 Let's make sure we're back in 1966, right?

22 They couldn't email, then, Jensen and Widmark, and ask  
23 them for their paperwork and their results, right?

24 A. No. Monsanto actually sent people to visit with  
25 Jensen and Widmark at the university in Sweden.

26 Q. Right. And that was early '67.

27 But back in December of '66, they're working off pretty  
28 limited information.

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1 A. Right. They basically have a written report  
2 through the mail of what Jensen and Widmark had said.

3 There was even some confusion in that, so --

4 Q. And immediately for that time frame they get  
5 this information to their biggest customer?

6 A. Correct.

7 Q. Now, you said GE was larger.

8 They had big labs and they had researchers and all  
9 this?

10 A. Oh, absolutely, yes.

11 Q. So we go on to our next bullet, our next flag,  
12 and here that Monsanto visited the Swedish scientists.

13 They actually flew over to Sweden and wanted to sit and  
14 chat about what he found?

15 A. Well, the first visit was by -- Monsanto had an  
16 operation in Great Britain. The first visit was by people  
17 from -- they were already based in Europe. They later did  
18 send another delegation over, but the first visit were people  
19 who had been based in Europe.

20 Q. Then in February of '67 a gentleman named  
21 Richardson from the Shell Oil Company?

22 A. Yes. It was actually a division of Shell that  
23 manufactured pesticide. Shell had a large pesticide  
24 manufacturing business also.

25 Q. What's his role here? Why are we pointing out  
26 that Richardson questioned Jensen's findings?

27 A. Well, because PCB -- because Shell had pesticide  
28 business and interest, Dr. Richardson had been analyzing

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1 PCB -- geez, had been analyzing pesticides much like Jensen  
2 and Widmark had, had seen the same peaks and was interested in  
3 their findings.

4 So this triggered additional research on his part to  
5 see what he was finding matched what Jensen was finding.

6 His first indications were that he didn't really agree  
7 with what they were reporting.

8 Q. Okay. So he's creating a little controversy  
9 here?

10 A. Well, I wouldn't call it controversy, but  
11 certainly raising questions about, you know, whether the  
12 findings were true or not.

13 Q. All right. And so this was his letter?

14 There you go.

15 THE COURT: Which exhibit is this?

16 MR. UPSHAW: This is Exhibit 614.

17 THE WITNESS: 602.

18 MR. UPSHAW: 602. I've got the wrong one. I've the  
19 wrong thing here. I apologize.

20 THE COURT: 602.

21 Q. BY MR. UPSHAW: So Monsanto here -- go back to  
22 the top if you would.

23 This letter is to Dr. Kelly?

24 A. Yes, it is.

25 Q. Okay. And what are they discussing here just so  
26 we all know and we don't have to read it all.

27 A. Well, basically Dr. Hardy was a Monsanto  
28 researcher in Great Britain in our British operation. And

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1 he's basically summarizing communications that had gone on  
2 before with Jensen and Widmark with other researchers.

3 Now, there were other researchers starting to publish  
4 articles about PCBs in the environment along with pesticides.

5 Then talking about his conversations with -- he says  
6 Mr. Richardson. I believe it's Dr. Richardson.

7 Q. Okay. But he thinks Dr. Richardson has jumped  
8 the gun?

9 A. Well, Richardson -- according to this memo,  
10 Richardson thinks Jensen and Widmark may have jumped the gun.

11 Q. Oh, all right. We're going to find out a little  
12 more about how that story goes.

13 So Monsanto then sends the article to NCR?

14 A. Right.

15 Q. And where is NCR located?

16 A. They are in Wisconsin, I believe.

17 Q. So they're telling one of their other big  
18 customers to look out for this information coming?

19 A. Yes.

20 NCR was probably the biggest -- other than the  
21 capacitor manufacturers, the biggest purchaser of Aroclor  
22 1242.

23 Q. Okay. Did Monsanto send additional samples to  
24 Jensen and Dr. Richardson?

25 A. Yes. Both Dr. Richardson and Jensen and Widmark  
26 had requested pure samples from Monsanto to be sure -- to  
27 confirm that what they were finding was, in fact, PCBs.

28 So Monsanto sent those samples.

1 Q. All right. And this is just Exhibit 606, now,  
2 showing them sending small samples, correct?

3 A. Right.

4 Q. Sending small samples?

5 A. Mr. Tatton was a chemist in the British  
6 regulatory -- I forget which agency, but he worked for the  
7 British government. He was a government chemist.

8 Q. Okay. So now that Dr. Richardson has these  
9 samples, he confirms -- is it Dr. Jensen?

10 A. Yes.

11 Q. He confirms Dr. Jensen's finding by now?

12 A. Yes, right. By November he had become convinced  
13 that there really was PCBs that Jensen had reported. That was  
14 pretty much that for them.

15 Q. So Monsanto starts sending out samples, correct?

16 A. Yes. Monsanto received numerous requests from  
17 all sorts of people for samples, and they complied with those  
18 requests immediately.

19 Q. Okay. Including the U.S. Government?

20 A. Yes, a number of agencies of the government.

21 Q. How about to universities?

22 Well, this is Monsanto sending samples.  
23 This is an interesting letter. This is Exhibit 614.  
24 If you would blow up the page.

25 It starts, "We have been cooperating with Aroclor  
26 samples to the following investigators."  
27 This is just one letter of --

28 A. Right. This is at this point a summary of every

1 place they had sent them at this point in time.

2 Q. Okay. So including the FDA, at Cornell?

3 A. Right. U.S. Government agencies, lots of U.S.  
4 research facilities, yes.

5 Q. Okay. So also universities?

6 A. Yes. Wisconsin was one. They were  
7 investigating PCBs in the Great Lakes.

8 Q. Okay. New York State and Cornell I just  
9 mentioned?

10 A. Right, both in New York. Again, Great Lake  
11 states.

12 Q. Okay. Sending them to specifically the FDA and  
13 the USDA?

14 A. Yes.

15 Q. On request?

16 A. Yes, absolutely.

17 Q. So the U.S. government is also researching this?

18 A. Yes, they are.

19 Q. Back in 1968?

20 A. Correct. Yes.

21 Q. That's going to come into play later on. So  
22 we're going to remember that in June of '68 the government had  
23 samples, okay?

24 A. Okay.

25 Q. All right. In July of '68, U.S. Bureau of  
26 Commercial Fisheries, another U.S. agency?

27 A. Yes.

28 Q. Doing separate testing, as far as you could

1 tell?

2 A. Absolutely, yes.

3 Q. So what's happening on July 29, 1968, with a  
4 company called IBT?

5 A. Yes. IBT stands for Industrial Bio-Test. At  
6 the time they were one of the premier toxicology testing labs  
7 in the country.

8 By this time there were questions about whether there  
9 were PCBs in fish.

10 The FDA was obviously looking at the potential for PCBs  
11 in food samples. So Monsanto, you know, responded with  
12 commissioning long-term testing studies now that it was  
13 confirmed that PCBs were in the environment.

14 Q. So at this point was there any reports that PCBs  
15 were causing cancer in animals?

16 A. No, there were none.

17 Q. Any reports that PCBs are causing cancer in  
18 humans?

19 A. No, there were none.

20 Q. Had Monsanto been ordered by any of those  
21 government agencies or the government in general to start this  
22 testing?

23 A. No, they undertook that on their own,  
24 voluntarily.

25 Q. You mentioned other researchers and we see the  
26 U.S. Government, some U.S. universities.

27 Were there other places around the world, independent  
28 researchers, who were starting chronic testing about the same

1 time?

2 A. No. There were no other chronic tests started.

3 Q. What's the process for long-term chronic animal  
4 study, briefly, because we're going to hear from a  
5 toxicologist here actually.

6 A. Right. So a long-term study in the terms that's  
7 being used around in this case, I think, is basically a  
8 two-year feeding study.

9 Two years is about the lifetime of a rat, a laboratory  
10 rat. So a long-term study would a lifetime study.

11 But before that two years, you have to do what's called  
12 a range-finding study to figure out how much of a chemical you  
13 can feed to those rats so they might have an effect, but  
14 they're not going to die.

15 If you're going to do a two-year study, you don't want  
16 to kill them after two weeks.

17 So that study typically takes six months. There are  
18 other things around that.

19 So and then at the other end of the study it takes  
20 months to understand the data, get them compiled, get them  
21 reported.

22 So a two-year study really takes maybe three to four  
23 years.

24 Q. Okay. In August of '68, and, again, we started  
25 this in late '66, so we're less than two years down the line  
26 from when Jensen first reports that there are PCBs in the  
27 environment, right?

28 A. Right.

1 Q. Monsanto purchases advanced analytical  
2 equipment.

3 What are you telling us there?

4 A. Jensen and Widmark for their pesticide analyses  
5 had been using equipment where these peaks were -- it took a  
6 special kind of detector. And, again, I'm not talking about  
7 the mass spec, but there was another detector on the end of  
8 the GC that was being used.

9 It also turned out that you couldn't have metal in the  
10 analytical system. Everything had to be all glass.

11 So once Monsanto learned this and realized if they were  
12 going to be a world-class laboratory, they needed this kind of  
13 instrument, so they went out and bought the instrument they  
14 needed to do the best work they could.

15 Q. Okay. Samples to Fish and Wildlife, federal and  
16 state departments.

17 So now the states are getting samples now?

18 A. Yes. Some of them are, yes.

19 Q. And they're doing their own research as well?

20 A. Correct. That's correct.

21 Q. University of Wisconsin lab. Why University of  
22 Wisconsin?

23 A. Well, again, they're doing work. It's kind of  
24 that more samples to work with at the research institutes that  
25 were studying PCBs in the Great Lakes.

26 Q. Out here to California, to Riverside?

27 A. Yes.

28 Q. Okay. Now, Monsanto and IBT expand the scope of

1 A. Well, he suspected some effects on animals.

2 There were two things going on.

3 The primary one of interest was that it had been known  
4 for some time that birds of prey -- for example, the peregrine  
5 falcon really became the symbol -- but birds of prey, they  
6 were having trouble with their population because of the  
7 eggshell thing. That had been attributed to pesticides. And  
8 Risebrough speculated that PCBs could also be contributing to  
9 that effect in those birds.

10 Q. So this was the first time, was it not,  
11 Dr. Kaley, that someone had connected PCBs with harm to --

12 A. With any specific potential harm. That's  
13 correct.

14 Q. Did it turn out that Dr. Risebrough was correct  
15 in his theory?

16 A. No.

17 Later research showed that, in fact, DDT did cause  
18 eggshell thinning in these birds, but controlled studies  
19 showed that PCBs didn't have that effect.

20 Q. So at this time, around when Dr. Risebrough's  
21 report was summarized in the article from the San Francisco  
22 Chronicle, was Monsanto still puzzled as to how PCBs could be  
23 in the environment and maybe even affecting wildlife in a  
24 widespread way?

25 A. Yes, they still were.

26 Again, going back to the things we've touched on a  
27 little bit, the use pattern just didn't make any sense, that  
28 there was any way they could be this widespread in the

1 animal studies here. Why is that?

2 A. Well, I think they were doing the two-year  
3 studies, but they wanted to test additional animals.

4 You get different information from different animals.  
5 I guess that's not too surprising. But because chemicals  
6 don't always react the same in people as rats or dogs as rats  
7 or dogs as people, so they wanted just to get a broader view  
8 of what are the potential toxicities.

9 Q. So about this time, not too long after this  
10 time, a Dr. Risebrough comes on the scene.

11 A. Correct.

12 Q. Right.

13 Now, tell us a little bit about the Risebrough article  
14 and how it was reported in the San Francisco Chronicle.

15 A. If you recall from the previous slide, Monsanto  
16 sent samples to the University of California, Riverside. One  
17 of the researchers there was a Dr. Robert Risebrough, and he  
18 was doing investigations on the West Coast, the first in the  
19 United States.

20 In December, I believe, of '68, he had published an  
21 article in the San Francisco Chronicle which was the first  
22 report of PCBs being found in the U.S. environment. Other  
23 than that, before that it had all been in Europe.

24 So this caught the attention of the editorial staff of  
25 the San Francisco Chronicle, and they published an article  
26 summarizing Risebrough's effects in February.

27 Q. Now, part of their summary was that Risebrough  
28 had found some effects on animals, correct?

1 environment.

2 Q. Now, the jury saw this. This is Exhibit 16  
3 earlier when Dr. Markowitz was testifying.

4 And he showed this to say that Monsanto was questioning  
5 what Dr. Risebrough was saying and whether -- questioning  
6 whether PCBs were really found in the environment.

7 This was the paragraph that was shown to the jury.

8 You've read this document before, right?

9 A. Yes, I have.

10 Q. I'll submit to you that Dr. Markowitz didn't  
11 show the entire document.

12 There are other portions of this document that you  
13 would like to show the jury, correct?

14 A. Yes. There are other things that I think are  
15 important, yes.

16 Q. Let's show what was not shown.

17 If you will go to the left side there, Mr. Aquino.

18 What did you want to show here?

19 A. Well, I think this wording or this highlight  
20 really puts words to what I've been trying to say, that there  
21 were several puzzling aspects.

22 They were stable compounds. They weren't soluble in  
23 water. Their use pattern didn't make them easily released.  
24 And the market was largely for what later became to be called  
25 closed systems, but they were sealed in metal containers and  
26 heat transfer systems.

27 So, again, you know, there was some question whether it  
28 was PCBs, not really, but why were they there. It didn't make

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1 any sense.

2 Q. Now, go to the next side of that slide if you

3 will. Just continue and finish that out.

4 Did Monsanto saying they had programs in place?

5 A. Yes. Even before this time we were taking back

6 our fluids. You know, the environmental awareness movement

7 had, as we talked about, had been growing. So part of that

8 was Monsanto to take back used products so they weren't

9 irresponsibly disposed of.

10 Q. And Monsanto reiterates that it's not being

11 sprayed or dusted on crops?

12 A. That's correct, yes.

13 Q. So here's another portion of that same letter

14 that you wanted to show to the jury, correct?

15 A. Right.

16 Again, this summarizes some of what we've been talking

17 about.

18 Obviously we had a research program going. We had got

19 the analytical equipment. We're well on the way to becoming a

20 world-class lab.

21 We had started the long-term toxicity testing. We

22 continued to do short-term testing. And we were sending these

23 samples to anybody that asked.

24 You know, we were trying to help other people help us

25 understand what was going on.

26 Q. Okay. So was Monsanto in any way questioning

27 that Dr. Risebrough had found PCBs?

28 A. Well, there was a little question.

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1 Dr. Risebrough had not used the combination of GC mass

2 spec.

3 So I think there was a little bit of questions among

4 some of the chemists of whether, you know, maybe it really was

5 a pesticide degradation product or something, but the reality

6 is that there really wasn't that much question about it.

7 Q. Okay. Let's go on.

8 You've indicated in your February of '69 -- the Tucker

9 memo on incineration of NCR paper.

10 Can you explain to us why we're seeing that?

11 A. Yes. One of the questions, again, kind of

12 addressing how could PCBs even be out there was possibly, you

13 know, people used a lot of carbon paper in the '60s and '50s,

14 and a lot of it was probably burned. Could that be a

15 mechanism to get PCBs in the environment.

16 So Dr. Tucker at Monsanto, who was my first boss

17 actually, had done a study burning paper under a controlled

18 situation and analyzing the gases that came off and found out

19 that, yes, PCBs were released during that process.

20 Q. And which number of PCB was that?

21 A. This was Aroclor 1242, because that was the one

22 used in the paper. It wasn't being found in the environment,

23 but it was still a potential source anyway. So that's why

24 that one was being tested.

25 Q. Does Monsanto continue to send samples at this

26 time?

27 A. Yes. Again, whatever -- whoever asked, we

28 were -- you know, we were happy to send samples, whatever they

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1 needed.

2 Q. All right. Now, the jury has seen a document

3 from Mr. Metcalf. Explain again who is Mr. Metcalf.

4 Dr. Metcalf. I'm sorry.

5 A. Dr. Metcalf was a researcher, a biologist

6 primarily at the University of Illinois. Monsanto had worked

7 with him a number of times over the years on other issues.

8 So Monsanto asked him to take a look at this PCB issue,

9 what's going on from his point of view. You know, give us

10 some advice on how to approach the problem.

11 Q. And the jury has seen this as Exhibit 21.

12 Is this Dr. Metcalf's findings?

13 A. Yes. After he talked about the situation and

14 summarized some of the situations, he suggested seven things

15 for Monsanto do to address this issue.

16 Q. Did Monsanto actually do any of those seven?

17 A. Well, they actually did all of those seven to

18 some extent.

19 Number 6 was not undertaken in great detail, but they

20 did do -- I mean, it says they're partially included in

21 industrial bio tests. So Monsanto was touching on that, but

22 other than that, they did all of those.

23 Q. Okay. All right. So this is what we were

24 talking about.

25 Even though Dr. Tucker did the tests on incineration

26 and found 1242, Dr. Widmark does what in May of 1969?

27 A. Well, this was a conversation that Monsanto

28 scientists were having with Dr. Widmark. Again, two years

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1 after the initial discovery, there are still questions about

2 this doesn't make sense.

3 One of the questions was, okay, 1242 is a big product.

4 We know it's in carbonless copy paper, but still it's not

5 being found in the environment, at least in the places where

6 they were looking.

7 So, you know, that was one of the questions that

8 Widmark reported. We don't see 1242.

9 Q. Right.

10 Just so I know, it says, "He reported that he had not

11 isolated or found much chlorinated biphenyl."

12 What's with one through four Cl atoms?

13 A. Well, that's chlorine atoms. That goes back to

14 our drawing. The PCB that I drew, the second from the bottom

15 there, has three chlorine atoms, and you could have with four

16 or one.

17 Aroclor 1242 was mostly made up of PCBs with three or

18 four chlorine atoms.

19 Aroclor 1254 was four or five.

20 Aroclor 1260 was five or six, generally up to seven.

21 So that's what he's talking about. He's talking about

22 the lower chlorinated materials. Even though we were selling

23 a lot of them, he wasn't finding them in the environment.

24 MR. URSBOW: I'm sorry. We didn't mention the number

25 was 672, your Honor.

26 THE COURT: All right.

27 Q. BY MR. URSBOW: Okay. So Monsanto actually

28 funds some research at the Wisconsin Alumni Research

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1 Foundation. Tell us about that.

2 A. Yes. Monsanto realized that there was lots of

3 useful work going on out there and did do some selective

4 funding at research institutes.

5 Q. Now, when Monsanto decided to fund certain

6 research, did they try not to duplicate their efforts?

7 A. Right. Yeah, they didn't want to do something

8 internally that somebody else was doing externally, that's

9 correct.

10 Q. How about if one organization was doing a

11 certain kind of test and another organization or university

12 decided they wanted to do the same thing, would Monsanto

13 weight that and decide maybe not to do the same thing twice?

14 A. Right. In fact we know that actually happened

15 in one case, that the university, the proposed research was

16 proposing something that was being done by the government

17 laboratories.

18 Q. So about a week later, October 25th, 1969,

19 Monsanto designates the PCB ad hoc committee.

20 Tell us, what was the PCB ad hoc committee?

21 A. Ad hoc means "to this," so it was really a

22 committee formed to address the PCB issue specifically.

23 Lots had been going on. Dr. Kelly was involved from

24 the medical department, as well as Dr. Wheeler.

25 I think you probably don't remember, but Dr. Richard on

26 some of the memos was in the research department. Dr. Keller

27 and Dr. Tucker were analytical chemists.

28 Monsanto decided at this point, hey, we're moving on,

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1 but we need to get everybody on the same page. Make sure

2 everybody understands what everybody else was doing and come

3 up with a focused path forward.

4 Q. Okay. So this is -- just to recap just a

5 little, we're starting November of '66 or November, December

6 of '66. So we're just in August of '69, and Monsanto says we

7 have to put a committee together to handle this problem.

8 A. Well, we've got to focus.

9 They were dealing with the problem throughout that time

10 frame, but this was really to get focused and make sure

11 everybody, all the departments, were on the same page, as I

12 said, come up with a path forward.

13 Q. Now, the jury has seen Exhibit 129 and it was

14 handwritten document which were some notes from, I think, one

15 of the early meetings of the ad hoc committee.

16 Do you remember seeing that?

17 A. I do.

18 Q. And it made some comment about "sell the hell

19 out of them."

20 Do you remember that?

21 A. Right.

22 Q. Did that represent the position of the company

23 at the time?

24 A. No. It was a handwritten note. Somebody was

25 jotting down what are our options.

26 One of those options, I guess the phrasing is

27 unfortunate, but sell the hell out of them. Get the money

28 while we can, you know, before they could go out of business.

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1 But that's not what Monsanto did.

2 Q. So there was not just that one document that was

3 put out by the ad hoc committee, correct?

4 A. Oh, no. There were several drafts along the way

5 throughout that fall.

6 Q. Okay. October 15 actually they put out a

7 report, correct?

8 A. Right. That was one of the draft reports, yes.

9 Q. Okay. Now, we have it as a slide, I believe.

10 This is 133. This is one of the reports. It's just a

11 first page, right?

12 A. That's correct.

13 Q. The report was obviously longer than that?

14 A. Yes. It was quite thick, actually.

15 Q. Now, let's go to -- do you have 133? Do you

16 have a copy?

17 I think Dr. Kaley has already talked about it

18 sufficiently, so let's move on.

19 This was a draft?

20 A. Yes. It's labeled as the second draft.

21 Q. And there were several iterations of this ad hoc

22 committee report in drafts?

23 A. Yes. As the committee continued to meet, they

24 continued to update, revise as they went along, but these

25 interim reports were to keep everybody aware of what was going

26 on.

27 Q. Now, in the final recommendation, the final

28 report, was "sell the hell out of them" in that report?

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1 A. No, it was not. Actually, quite the opposite.

2 Q. And we're going to get to that.

3 So November of '69, you have your minutes of CDC noting

4 1254 and 1260 found in the environment.

5 What are you indicating for us?

6 A. Well, the CDC was the corporate development

7 committee. It was basically all the upper management

8 throughout the whole company, and they were obviously

9 interested in what was going on.

10 The ad hoc committee was making reports to the

11 corporate development committee. And they, in fact, thought

12 it was important, and it was important, to let the committee

13 know that it's the higher chlorinated materials that are being

14 found, not the Aroclor 1242 type of materials, with the

15 implication that these are the things that we should focus on,

16 what can we do to limit discharges or environmental presence

17 of these higher chlorinated materials.

18 Q. Right. Just for our record I'm showing you and

19 the jury Exhibit 615.

20 So tell us what you have here.

21 All 22 plasticizer replacement options sent to NCR in

22 March, April were turned down by NCR and this MIPB is the best

23 option.

24 What are you referring to here. What is happening with

25 NCR?

26 A. Even though 1242 was not being found in the

27 environment, our experiments had shown us that it could be

28 released if the paper were burned.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <p style="text-align: right;">110</p> <p>1           So we saw earlier that NCR was notified very early on.</p> <p>2       We had been working with NCR to come up with a replacement</p> <p>3       product to replace PCBs in this carbonless copy paper.</p> <p>4           We had sent them, according to one memo, 22 different</p> <p>5       materials, none of which worked.</p> <p>6           Finally our chemists came up with an MIBP, which is a</p> <p>7       non-chlorinated biphenyl product -- didn't have any chlorine</p> <p>8       in it at all -- that seemed to be satisfactory.</p> <p>9           So, again, we're -- even though 1242 is not there,</p> <p>10      we're still trying to help NCR get it out of their product</p> <p>11      line.</p> <p>12          Q.     And just for continuity purposes, we're up to</p> <p>13      November of 1969.</p> <p>14          Any messages from any of these researchers, any of</p> <p>15      these governments, that levels of PCBs in the environment are</p> <p>16      causing an environmental danger?</p> <p>17          A.     Well, just the speculation we talked about in</p> <p>18      the Risebrough report about eggshell thinning.</p> <p>19          Q.     And that was found not to be PCBs?</p> <p>20          A.     Correct.</p> <p>21          Q.     Anything else from any of these researchers or</p> <p>22      any of these universities that PCBs are causing harm to humans</p> <p>23      or cancer in humans or non-Hodgkin's lymphoma in humans?</p> <p>24          A.     Certainly nothing in humans, no.</p> <p>25          Q.     So Monsanto in November of 1969, after the ad</p> <p>26      hoc committee has met and reported, adopts a 12-point plan of</p> <p>27      action, correct?</p> <p>28          A.     That's correct.</p> | <p style="text-align: right;">112</p> <p>1           A.     Yes, it was.</p> <p>2          Q.     This is how Monsanto moved forward from this</p> <p>3      point?</p> <p>4           A.     Yes, absolutely.</p> <p>5          Q.     Okay. So let's go back to our timeline here.</p> <p>6           We're in 1970 now. There is a 12-point plan. And</p> <p>7      Monsanto meets with GE.</p> <p>8           Why are they meeting with GE right now?</p> <p>9           A.     Well, GE is our biggest customer.</p> <p>10          Again, the electrical uses are by far the biggest</p> <p>11      proportion of where all the PCBs are going.</p> <p>12          One of the aspects of the plan was possibly to reduce</p> <p>13      manufacture of some of the PCBs that were going into</p> <p>14      transformers. So Monsanto and GE were getting together to</p> <p>15      discuss, you know, what Monsanto's plans were, what General</p> <p>16      Electric's needs were, what their experiences were.</p> <p>17          So it was quite an important meeting.</p> <p>18          Q.     So just so our jury is clear, GE wasn't invited</p> <p>19      to discuss the 12-point plan, right?</p> <p>20          A.     Oh, no, no.</p> <p>21          Q.     So they had to inform GE what they were going to</p> <p>22      do?</p> <p>23          A.     Right.</p> <p>24          Q.     And these are the minutes of the meeting</p> <p>25      with GE?</p> <p>26          A.     That's correct, yes.</p> <p>27          Q.     And basically it says exactly what you just</p> <p>28      said. They say what you just said about what happened at the</p>                                                                          |
| <p style="text-align: right;">111</p> <p>1          Q.     And what is the -- tell the jury a little bit</p> <p>2      about the 12-point plan.</p> <p>3          A.     Well, basically, as it says, the committee</p> <p>4      recommended, after considering all the information they had,</p> <p>5      both internally and externally, that there were 12 things that</p> <p>6      Monsanto needed to do right away to get their arms around this</p> <p>7      problem and try to, you know, do what they can to minimize the</p> <p>8      effects.</p> <p>9          So this final report, the outline of the minutes of the</p> <p>10      meeting specifies what those 12 points were.</p> <p>11          Q.     Okay. So one of the points -- well, here's a</p> <p>12      front page. This was the recommendation, why they even put</p> <p>13      the plan together?</p> <p>14          A.     Exactly. You know, to establish a program for</p> <p>15      each business group and each customer to make sure that our</p> <p>16      efforts are focused in the right place with the right people.</p> <p>17          Q.     And these were the 12 points, correct?</p> <p>18          A.     That's correct.</p> <p>19          Q.     The first one being appoint a project manager.</p> <p>20      And who was that?</p> <p>21          A.     That was Dr. Papageorge. Bill Papageorge, who</p> <p>22      had been the plant manager at our Anniston plant, was brought</p> <p>23      to St. Louis to basically take over all responsibility for the</p> <p>24      PCB issues at Monsanto.</p> <p>25          Q.     So this plan was set up for approval by the</p> <p>26      board, right?</p> <p>27          A.     Yes, that's correct.</p> <p>28          Q.     And, in fact, was it approved?</p>                          | <p style="text-align: right;">113</p> <p>1      meeting, these minutes here?</p> <p>2          A.     Yes. That's really what the purpose of the</p> <p>3      meeting was, was that, yes. There were some important</p> <p>4      outcomes, but, yes.</p> <p>5          Q.     And GE's response to this meeting was what?</p> <p>6          A.     Well, once they found out that Monsanto might</p> <p>7      discontinue the sale of these higher chlorinated materials,</p> <p>8      they said you can't do that. That's impossible. It will shut</p> <p>9      down the power grid in the country. We don't have a</p> <p>10      replacement, and you need to keep making them.</p> <p>11          Q.     By the way, they also told them --</p> <p>12          A.     Right. And then also health issues were</p> <p>13      discussed.</p> <p>14          And they said, and Monsanto already knew this, but that</p> <p>15      GE hadn't had any health problems with their workers for</p> <p>16      40 years. And their workers were being exposed at much higher</p> <p>17      levels than Monsanto's.</p> <p>18          Q.     Now, Monsanto's work at this time is being</p> <p>19      recognized as kind of cutting edge, correct?</p> <p>20          A.     Yes, absolutely.</p> <p>21          Q.     In fact, you have here Monsanto sent its</p> <p>22      analytical methods.</p> <p>23          Who is the National Air Pollution Control</p> <p>24      Administration?</p> <p>25          A.     Well, obviously, I think, from the name, they</p> <p>26      are the people who are responsible for air quality in the</p> <p>27      United States.</p> <p>28          Q.     Okay. Is there a need for uniformity around</p> |

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1 this time amongst people like you, analytical chemists?

2 A. Yes, there is. It's very important, and I

3 mentioned earlier, Monsanto had set on a path to become the

4 world-class laboratory, which they did.

5 But it's very important that if you're going to look at

6 results from one laboratory and compare them to results from a

7 different company or a different university, you have to have

8 standardized methods. You have to be sure that everyone is on

9 the same page, so to speak, that they're using the same

10 methods.

11 So that if one person says X, the other person says X,

12 you know it's the same. Or if one says X and one says Y, you

13 can be sure it's different.

14 So it's very important that people are using the same

15 methods.

16 Q. When you say "method," what do you mean?

17 A. It's basically a cookbook on how you analyze for

18 PCBs. So it's a step even more detailed than a cookbook, but

19 a step-by-step procedure how you take your sample, how you

20 treat the sample, how you measure the sample, how you

21 calculate the results, how you report the results.

22 So the chemists follow that very carefully so that they

23 know that when they're talking to each other, they can, you

24 know, trust each other's results.

25 Q. So part of the 12-point plan was to get out of

26 certain businesses, correct?

27 A. Yes, absolutely.

28 Q. And they're telling GE they plan to stop making

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1 PCBs, and GE says no?

2 A. Well, they weren't -- they really weren't -- for

3 the electrical equipment manufacturers, they weren't telling

4 them they were going to quit making PCBs. They told them they

5 were thinking about some product lines; specifically Aroclor

6 1254 and Aroclor 1260. Those were the two that were most

7 prevalent in transformers, which was the biggest business.

8 And GE was saying, look, you know, 1242, you may keep

9 making that, but it's not that great for transformers. We

10 need this other stuff.

11 So eventually Monsanto did continue to make 1254, but

12 they stopped making 1260, which was the most chlorinated.

13 So that's really what that is about.

14 Q. So in February of 1970, of all the other

15 customers other than the transformer and capacitor customers,

16 Monsanto alerts distributors regarding PCBs, right?

17 A. Yes, correct.

18 Q. And what do they tell them?

19 A. Pardon?

20 Q. What are they telling them?

21 A. Well, as I mentioned, a lot of the PCBs

22 specifically in the plasticizer business group were sold to

23 distributors who then sold them to other customers. So

24 Monsanto didn't necessarily know where the product was going

25 of that point.

26 So Monsanto was saying, hey, we're getting out of these

27 businesses. We have or we're going to tell our direct

28 customers, but you guys need to tell your customers about our

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1 decision.

2 Q. Okay. And they actually alert their direct

3 customers?

4 A. Exactly, yes.

5 Q. So what are we looking at here, Dr. Kaley?

6 A. Well, this is the letter to the suppliers or to

7 the distributors, I believe, that, you know, we're selling you

8 these materials, and we're going to let you know that there is

9 an environmental issue and we want you to be aware of it.

10 THE COURT: What exhibit is this?

11 MR. UPSHAW: This is Exhibit 641, your Honor.

12 THE COURT: Okay.

13 Q. BY MR. UPSHAW: Okay. So is Monsanto telling

14 everyone about environmental warnings now, these technical

15 bulletins?

16 A. Yes. One of the -- I believe one of the 12

17 points of the 12-point plan was to tell our customers how to

18 behave when they were using this material, how to dispose of

19 it. Be careful you don't dispose of it near any body of

20 water, things like that.

21 So Monsanto said the best way to do this is to put a

22 warning on our product bulletins and on our labels so

23 everybody that's getting our product sees that warning.

24 Q. Again, anyone out of all of the researchers and

25 universities and independent researchers who were doing

26 research now, any indication from any of them to Monsanto

27 that, hey, your PCBs are having an effect or causing illness

28 in humans?

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1 A. No, there was no such.

2 Q. Or animals at this point?

3 A. No. Not at this point, no.

4 Q. So if we move forward, what are we looking at

5 here in March of 1970, Doctor?

6 This is Exhibit 618. This is including the

7 environmental warning, I believe?

8 A. Yes. This is a product bulletin that had been

9 adapted to include that new warning.

10 Q. All right. And is this the warning here?

11 A. Yes, it is.

12 Q. Okay. Now, are they also not only including the

13 warning, but talking to customers about best practices at this

14 as well?

15 A. Yes, absolutely. We're working with our

16 customers very closely to be sure they understand the issue

17 and making suggestions on how to deal with the issue.

18 Q. Monsanto is sharing its analytical techniques

19 with government agencies?

20 A. Right, yes.

21 Q. Why?

22 A. Again, it's the same issue we talked about

23 before, that Monsanto had developed probably at that time the

24 best in the country way of analyzing for PCBs, so they were

25 selling their methodology.

26 Q. I'm showing Exhibit 617.

27 Thank you, Mr. Aquino.

28 And Monsanto is discussing its analytical -- having to

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1 discuss its analytical work.

2 Who is Jay Telling of Unilever?

3 Can you read that first sentence?

4 A. He's somebody -- one of our customers.

5 Unilever was another manufacturer in Great Britain. He

6 was coming to the United States for a visit and had inquired

7 about talking to our people in the U.S. about analytical

8 methods for PCBs.

9 Q. What is this?

10 I'm sorry. In April of 1970 Monsanto urges the USDA to

11 block registration.

12 Registration of what?

13 A. Registration of pesticides that might -- if they

14 did, might contain PCBs. Actually Dr. Kelly wrote a letter to

15 the U.S. Department of Agriculture saying we're not really

16 aware that people are using PCBs in pesticides, but if they

17 are, you should not re-register those products. Should not

18 allow them to be used anymore.

19 Q. Okay. Fish and Wildlife gets the analytical

20 methods for testing. That's the same thing we've been talking

21 about, another example of passing on our expertise?

22 A. Exactly, yes.

23 Q. And this is Exhibit 620.

24 If you could just blow that up really quick.

25 What is FWPCA?

26 A. That's the Federal Water Pollution Control

27 Association, so another federal regulatory agency.

28 THE COURT: What exhibit is that?

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1 MR. UPSHAW: It's 6 --

2 THE COURT: 20.

3 MR. UPSHAW: 620. Okay.

4 Q. So also in April, "Corporate management

5 committee requests development of NCR replacement on a crash

6 basis."

7 What does that mean?

8 A. Well, basically, although they had already

9 identified a potential replacement product for PCBs, the

10 corporate management committee told the business group they

11 weren't moving fast enough to get, you know -- to get the PCBs

12 out of those products.

13 Q. So NCR is rejecting everything that Monsanto

14 suggests for them?

15 A. Well, they had accepted MIPB by that time, but

16 we really didn't have a facility available to make it in the

17 quantities they needed.

18 Q. So in fact does Monsanto build a facility to

19 accommodate this customer?

20 A. Yeah. I think there may actually be a bullet on

21 that a little later, but, yes, that did occur.

22 Q. Okay. So this is part of that, right, "We're

23 urging NCR to expedite the changeover"?

24 A. Right. Exactly.

25 Q. What's happening in May of 1970?

26 A. Well, May, 1970 we announced to our plasticizer

27 customers and some others that we're going to quit making PCBs

28 for the purposes that you're using them.

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1 Q. Okay. And this is what we tell them, "Monsanto

2 is discontinuing PCB sales for most applications."

3 This is Exhibit 626, correct?

4 A. Right.

5 Again, this is a report to the corporate management

6 committee, basically another name for the corporate

7 development committee, saying that's what we're going to do.

8 We're going to quit selling for these applications.

9 Q. And, in fact, they're saying they want it done

10 by August?

11 A. I believe that's correct, yes.

12 Q. This is May.

13 A. It happened fast.

14 Q. Okay. Let's talk a little bit about open versus

15 closed application and the use of those words.

16 The jury here has seen slides saying that Monsanto was

17 selling PCBs for open applications in the 1930s.

18 Did Monsanto ever call any of its applications open or

19 uncontrolled uses prior to 1966 and the finding of Jensen and

20 Widmark?

21 A. No. Those terminologies really grew out of the

22 environmental awareness around PCBs and what uses were

23 enclosed in whether heat transfer system or transformers or

24 were in plasticizers or some other, you know, non-contained

25 application.

26 Q. Any documents that referred to plasticizers or

27 anything else as an open application in the '30s?

28 A. No.

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1 Q. Or the '40s, for that matter?

2 A. No, not that I've ever seen, no.

3 Q. Or the '50s?

4 A. Right.

5 Q. So when Monsanto sold plasticizers in the

6 '40s -- in the '40s to the '60s, actually, did Monsanto think

7 of those plasticizers as open, like they would get in the

8 environment or be widespread in any way?

9 A. No. They were intended to be integrated into

10 the plastic itself and stay in that plastic, which, in fact,

11 they largely did. Otherwise the plastic wouldn't have worked

12 anymore.

13 Q. Remind the jury what percentage of PCB sales

14 were for sealed systems.

15 A. Well, if you include -- depending on how you

16 calculate it, 77 percent certainly for electrical and another

17 couple percent for heat transfer systems.

18 The hydraulic systems were kind of in between

19 somewhere. So about 85 percent were really for closed

20 systems.

21 Q. All right. So let's move on.

22 Monsanto notifies customers of termination of PCB

23 plasticizer sales."

24 So they're getting out of the PCB plasticizer business?

25 A. That's correct. Yes. That was one of the first

26 product lines to be eliminated.

27 Q. They notify food industry customers of

28 termination of Therminol FR?

1 A. That's correct.

2 Q. But not all Therminol?

3 A. No. At this point it was just those -- simply

4 the food industry customers.

5 Q. Okay. Were there any indications at this time

6 that either plasticizers or Therminol were in high levels in

7 the environment?

8 A. No. The levels in the environment of PCBs

9 generally were relatively low compared to what people had been

10 used to considering.

11 Q. Okay. How about, was there any indication at

12 this point they're harmful to humans or animals?

13 A. No.

14 Q. So why is it that Monsanto is voluntarily

15 getting out of the PCB plasticizer business and voluntarily

16 getting out of the food contamination -- I'm sorry, getting

17 out of the food industry use of Therminol?

18 A. Well, it was clear that PCBs were involved in

19 the environment. They were there.

20 It's an industrial chemical. Part of the environmental

21 awareness was, you know, some things don't really belong in

22 the environment.

23 So Monsanto was doing everything it could to be sure

24 that its product line, you know, was not being used in

25 applications where it could easily get into the environment.

26 Q. Anybody forcing Monsanto, a government or

27 anyone, forcing Monsanto to get out of the business of PCB

28 plasticizers or Therminol?

1 A. No, there was no such pressure.

2 Q. So NCR chooses this MIPB as a replacement for

3 1242?

4 A. Right.

5 Q. And MIPB is just another chemical, right?

6 A. Yes. Like I said, it's a biphenyl. The B

7 stands for biphenyl, but it's not chlorinated.

8 Q. And it took them how long to find this and

9 accept this replacement?

10 A. Well, it's been going on for a year or so.

11 Q. And as we said, Monsanto had to actually develop

12 a facility to make enough of this MIPB for commercial use?

13 A. Right. They did not have a plant big enough to

14 make it.

15 Q. So what is the takeback program that you're

16 referring to here?

17 A. Well, one of our early documents talked about

18 that a little bit, but Monsanto had for some time -- had a

19 program to take back used product or old heat transfer fluids

20 or whatever that would otherwise have been disposed of, to

21 take those back under Monsanto's control.

22 And at this point in time Monsanto basically

23 accelerated that program and extended it so we could get

24 control of more of those materials.

25 Q. Okay. So we're looking at Exhibit 627. If you

26 go right to the top of that.

27 This is the policy concerning distributor's return of

28 Aroclors. So distributors as well as customers could return?

1 A. Right. This is specific to distributors, but

2 the customers were also included.

3 Q. Now, would this have been called an incentive

4 program?

5 A. Yeah. Because if you read it carefully, you'll

6 note that the sooner they can send them back, the more of

7 their purchase price would be refunded.

8 So it was an incentive to get them back fast, get them

9 out of their systems.

10 Q. And what did Monsanto do with the materials it

11 got back?

12 A. Well, for a while they stored them, but one of

13 the things on the 12-point plan was to study incineration as a

14 way of getting rid of PCBs.

15 And I might make a little digression here.

16 Q. Sure.

17 A. Okay. We've been talking PCBs are

18 non-flammable. They won't burn. Well, then, how do you get

19 rid of them by incineration?

20 The distinction is that PCBs by themselves will not

21 burn. If you hold a match to a can of PCBs, nothing is going

22 to happen. But if you put PCBs in a fire that's already very

23 hot, already has a lot of heat energy in it, then there is

24 enough energy in there to destroy PCBs.

25 In fact, even today, the recommended way to get rid of

26 PCBs is incineration. So it sounds, like, a little

27 disjointed, but in fact that's the situation.

28 You have to have an external fuel to get the fire hot

1 enough. It actually takes almost 2000 degrees to get rid of

2 PCBs.

3 So back to your question. Pardon the interruption or

4 the digression.

5 Q. It's okay.

6 A. So Monsanto was looking at incineration, in

7 fact, eventually built an incinerator. So Monsanto was

8 storing these materials until they could dispose of them

9 correctly.

10 Q. And did customers actually take Monsanto up on

11 this?

12 A. Oh, they sure did, yes.

13 Q. Was this a voluntary program?

14 A. Oh, yes, it was. Sure.

15 Q. The government didn't order Monsanto take back

16 these materials that were in use?

17 A. No.

18 Q. How about the incineration technology. Did

19 Monsanto actually develop on its own?

20 A. Well, it developed it in conjunction with an

21 incineration company, a company that knew how to build

22 incinerators.

23 Monsanto knew what they needed to do to make it work

24 correctly and to help them ensure that it did work correctly.

25 So it was really in conjunction with an incinerator

26 manufacturer.

27 Q. And the creation of this incinerator technology,

28 was that voluntary as well?

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1 A. Sure. Yes, it was.

2 Q. Not ordered by any government to do so?

3 A. No.

4 Q. So Monsanto in '71 sends a letter to customers  
5 regarding the discontinuation of Themminol FR. I think we've  
6 talked about that.

7 So they're completely pulling out of the heat transfer  
8 market then?

9 A. Well, the Themminol -- the PCB heat transfer  
10 market, yes.

11 Q. Right. Nothing that was required for them to do  
12 so?

13 A. No.

14 Q. In 1971 you have here an interdepartmental task  
15 force is formed.

16 Tell the jury about what the interdepartmental task  
17 force was.

18 A. Well, this was kind of the U.S. Government's  
19 response or reaction similar to the Monsanto ad hoc committee.

20 This was a group of various federal agencies that sent  
21 representatives to this task force to study everything that  
22 was known about PCBs at the time, accumulate that together and  
23 make some recommendations on how the government should be  
24 considering to deal with this PCB issue.

25 Q. So in September of '71, this is not the first  
26 time the government decides to take a look at PCBs?

27 A. Oh, no.

28 As you've seen from earlier documents, we've been

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1 sending samples to government laboratories. They've been  
2 publishing data in the open scientific literature, but this is  
3 really the first time to get them all together and make sure  
4 there was a unified path forward.

5 Q. So remember I said remember the date in 1968?

6 A. Yes.

7 Q. The first time it was sent?

8 A. Yes.

9 Q. And we saw several dates, as you've pointed out,  
10 to different U.S. agencies?

11 A. Right.

12 Q. Were those agencies part of the  
13 interdepartmental task force?

14 A. Oh, yes, definitely. The department of the --  
15 the USDA, the Department of Interior, absolutely.

16 Q. So this is the cover --

17 MR. UPSHAW: It's Exhibit 630, your Honor.

18 Q. This is the cover of the interdepartmental task  
19 force report, correct?

20 A. Yes, it is.

21 Q. It came out in May of 1972?

22 A. Correct.

23 Q. Government document, not a Monsanto document?

24 A. Correct.

25 Q. Were these the agencies that made up that task  
26 force?

27 A. Yes.

28 Q. Some of the same ones we saw previously that

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1 asked for samples?

2 A. Right, the FDA, the Department of Interior, the  
3 Department of Agriculture, yes.

4 Q. Now, did Monsanto have input into the findings  
5 of the task force?

6 A. Yes. Monsanto and other users, the user  
7 community, were invited to make presentations, yes.

8 Q. So not the -- Monsanto wasn't the only one.  
9 There were a lot of companies that provided data and made  
10 presentations?

11 A. That's correct. Yes, absolutely.

12 Q. Okay. Now, the report wasn't just -- was it  
13 just a report or was it more to the entire document?

14 A. Well, no. Each of these agencies or parts of  
15 each of these agencies had prepared reports within their own  
16 agency. Those were submitted to the task force and then were  
17 included into the final report.

18 The final report's, I think, only maybe a quarter or a  
19 third of the whole document.

20 Q. All right. So this wasn't the entire report and  
21 the appendices were not just six months of work then?

22 A. Oh, no. As we've seen, these agencies have been  
23 working on these issues for years.

24 Q. So what was the conclusion of this U.S.  
25 interdepartmental task force?

26 A. Well, there were several, but one of them was,  
27 as it says, "The continued use for transformers and capacitors  
28 in the electrical industry is necessary for the near future

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1 because of risk of fire and explosion."

2 Q. This is May of '72?

3 A. Yes, correct.

4 Q. Was this another conclusion?

5 A. Yes.

6 They did iterate or report that there was no data,  
7 either toxicological or ecological, available that the levels  
8 currently in the environment were a threat to human health.

9 Q. This is not a Monsanto report. This is a U.S.  
10 Government report?

11 A. That's correct, yes.

12 Q. What about diet?

13 A. Well, again, along that line, they concluded at  
14 that point that dietary intake of PCBs was low and didn't  
15 present a health hazard.

16 Q. Did Monsanto have any information that was  
17 contrary to anything we've just seen or any of the conclusions  
18 that we've just looked at?

19 A. No, they did not.

20 Q. Now, about this -- actually, let me show you the  
21 appendix, please. That would be great.

22 Just so we have an idea that this wasn't something that  
23 was put together in six months.

24 May I have the Elmo.

25 This is page 31 of Exhibit 630. I'll zoom in a little  
26 bit.

27 Can you see that?

28 A. Yes.

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1 Q. So let's see.

2 Someone like the National Bureau of Standards put out

3 approximately a 30-page report?

4 A. Correct, yes.

5 Q. And someone -- I'll just skip around.

6 Food and Drug Administration Department. E, Occurrence

7 and Source of PCBs in Food, was a little less than 20 pages?

8 A. Correct.

9 Q. And someone like, G, Biological Data on PCBs in

10 Animals Other Than Man by the Bureau of Sport Fisheries,

11 another 20 some-odd pages?

12 A. Yes, 15, 20. Yes.

13 Q. 15, 20. Okay.

14 Thank you.

15 So in 1972, even after this report, is Monsanto still

16 required to sell PCBs to certain government agencies?

17 A. Yes.

18 Q. Actually a better question.

19 Was Monsanto required to continue sale of PCBs to

20 certain companies?

21 A. Yes, they were.

22 Q. And you've put up here, "The government requires

23 sale of 1242 under the Defense Production Act."

24 Are you aware of what the Defense Production Act is?

25 A. Generally, yes.

26 Q. And tell the jury.

27 A. Well, basically it's an act that gives the

28 government the power to require companies to make and sell to

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1 them products that are necessary for defense, for the defense

2 of the country.

3 Q. Okay.

4 MR. UPSHAW: And if you could blow that up, please,

5 Mr. Aquino.

6 THE COURT: It's 314?

7 MR. UPSHAW: 814. Because I keep missing it before I

8 blow it up.

9 814, your Honor.

10 Q. Okay. So what are we looking at here? It's a

11 U.S. Department of Commerce -- it looks like a letter?

12 A. Right. Well, this is one example of those

13 requirements from the government. It's from the Department of

14 Commerce. It says you are directed to be a accept this

15 purchase order, and you need to notify the federal officers

16 that you're actually going to do what this letter requires.

17 Q. Okay. It doesn't look to me as if it's

18 voluntary; like they cannot do what they're being asked to do.

19 A. No. The bottom line, it's required.

20 Q. Okay. And here, 1972, another letter.

21 A. Right.

22 Q. Actually this is a response to the Department of

23 Commerce.

24 A. Right. This is basically Monsanto saying, you

25 know, we got your letter. We understand. We want you to know

26 there's these environmental concerns with PCBs, but it's our

27 understanding that we don't have any choice. So we will

28 comply.

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1 Q. Okay. I think that's what they say here at the

2 bottom paragraph as well, right?

3 A. Right.

4 Q. They're sending enclosed documents to Emerson

5 and Cuming?

6 A. Right.

7 Q. I think that's just the last page.

8 A. Right. They're required to do that.

9 Q. And this is the actual bill of lading or the

10 purchase order?

11 A. That's correct. Yes, it is.

12 Q. So 1974, again, Monsanto's analytical methods

13 are being adopted by which organization? Do you recall?

14 A. Yes. It's called the ASTM. It's the American

15 Society for Testing and Materials.

16 It's a nationwide organization that has existed for

17 decades that basically develops standardized test methods,

18 standardized products.

19 The ASTM is one of the reasons why if you have an

20 electrical appliance, it always fits in the plug. They

21 standardized those kind of things to be sure that, again,

22 everybody is doing the same thing for the convenience and the

23 safety of the consumer.

24 Q. So not just Emerson, but even another group has

25 made a request and Monsanto has to comply for 1242?

26 A. Right. This is another request from the

27 government that Monsanto ship these materials, Aroclor 1242,

28 to a government contractor.

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1 Q. And that is Raytheon Missile Systems?

2 A. Correct, yes.

3 Q. And I think they give you two choices here.

4 You can check one box or the other.

5 A. Right. Exactly.

6 Q. And Monsanto complies, correct?

7 A. That's correct, yes.

8 Q. All right. So let's talk about 1975, if we can,

9 as we move forward.

10 The Kimbrough study.

11 A. Yes.

12 Q. Tell the jury about the Kimbrough study and why

13 it's important.

14 A. Yes.

15 Well, Renate Kimbrough was a researcher at the Centers

16 for Disease Control in Atlanta.

17 They were interested, as were other government

18 agencies, in PCB toxicology. She was studying the effects of

19 Aroclor 1260 in rats.

20 In 1975 published a paper that said Aroclor 1260 caused

21 liver cancer at high doses in the rats in her study.

22 This was really the first report of PCBs as

23 cancer-causing in rats in the literature.

24 Q. So we saw earlier that Monsanto had commissioned

25 IBT to do a long-term study. And what were the results of

26 their study?

27 A. Yes. They had actually studied three Aroclors,

28 1242, 1254 and 1260.

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1 In contrast to what Dr. Kimbrough had reported, their  
2 studies of Aroclor 1260 did not indicate that there was cancer  
3 present.  
4 Q. And there was a slight issue with how that was  
5 worded, right?  
6 A. I'm sorry?  
7 Q. A slight issue with the wording between  
8 "slightly tumorigenic" versus "does not appear to be  
9 carcinogenic"?  
10 A. Yes. There were some different wording in the  
11 final reports to Monsanto on those various Aroclors.  
12 Q. Now, the phrase "does not appear to be  
13 carcinogenic," was that incorrect regarding their finding?  
14 A. No. It was correct. They did not find cancer  
15 in the laboratory animals.  
16 Q. Okay. So Dr. Kimbrough's study actually found  
17 liver cancer, right?  
18 A. That's correct.  
19 Q. You've met Dr. Kimbrough?  
20 A. Yes, I know Dr. Kimbrough. I actually consider  
21 her a friend.  
22 Q. Now, even though it found liver cancer in  
23 those -- was it female rats?  
24 A. It was female rats, yes.  
25 Q. Did she use high doses?  
26 A. Yes. They were, like, 100 parts per million,  
27 which is quite high.  
28 Q. Okay. More than what the general population is

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1 subjected to?  
2 A. Yes, by many orders of magnitude, yes.  
3 Q. Did she find any lymphoma?  
4 A. No.  
5 Q. Did she find any non-Hodgkin lymphoma?  
6 A. No.  
7 Q. Did Monsanto stop her from reporting her results  
8 at all?  
9 A. No. They had no way of doing that so, no,  
10 absolutely not.  
11 Q. What are we looking at here?  
12 This is -- so let me finish -- let's finish the story.  
13 So Monsanto has the IBT study?  
14 A. Right.  
15 Q. And then Dr. Kimbrough comes out with her study?  
16 A. Right.  
17 Q. Which disagrees with what the IBT study said?  
18 A. It's different, yes.  
19 Q. Different. Different studies?  
20 A. Right.  
21 Q. So what does Monsanto do then?  
22 A. Well, they did several things.  
23 First they actually met with Dr. Kimbrough and compared  
24 slides. The IBT people met.  
25 They basically agreed maybe she really did see cancer.  
26 But then Monsanto also contracted with the Eppley  
27 Institute at the University of Nebraska to have one of the  
28 toxicologists there evaluate both sets of slides.

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1 Q. And what was his result?  
2 A. His conclusion was that Dr. Kimbrough, although  
3 she did see changes in the liver, that they really weren't  
4 cancers.  
5 Q. And this was his opinion here?  
6 A. Yes.  
7 Q. All right. So Monsanto announces a complete  
8 shutdown of PCB production in --  
9 I'm sorry. That was 695, the other slide I showed,  
10 your Honor.  
11 THE COURT: All right.  
12 MR. URSHAW: Ms. Buck is keeping me in line with my  
13 exhibit numbers. I appreciate it.  
14 Q. So in January of 1976 Monsanto announces a  
15 complete shutdown of PCB production.  
16 Tell the jury what's really happening with Monsanto at  
17 this time. What's really happening?  
18 A. Basically, you know, four or five years earlier,  
19 Monsanto had shut down all their production or all their sales  
20 to what were then called open uses and were only selling to  
21 the electrical industry.  
22 But Monsanto had made it clear that they and others  
23 needed to be looking for replacements in electrical  
24 applications.  
25 And Monsanto basically said at this point that once we  
26 are notified by our electrical customers that there are  
27 suitable applications, we're going to go completely out of the  
28 business.

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1 Q. So in November Congress passes -- it's called  
2 Tosca, but it's TSCA. What's that?  
3 A. That's the Toxic Substances Control Act. It was  
4 basically a new piece of legislation that gave the EPA the  
5 authority to regulate chemicals that were in commerce.  
6 Q. And this is passed by Congress 11 months after  
7 Monsanto had announced it was getting out of the business,  
8 correct?  
9 A. That's correct, yes.  
10 Q. Now, did Monsanto stop manufacturing PCBs in the  
11 summer of 1977?  
12 A. Yes, they did. That's when the -- the actual  
13 production stopped in July of '77, after they were notified by  
14 their customers that there were substitutes available.  
15 Q. Was this on time? Is this what they told their  
16 customers, they would get out by July?  
17 A. I think it was actually a little bit ahead of  
18 time.  
19 Q. And the last shipment was, I believe, in October  
20 of '77?  
21 A. That's correct, yes.  
22 Q. So moving forward, in January of 1978 there is  
23 the NCI, National Cancer Institute, and they have a press  
24 release, right?  
25 A. That's correct.  
26 Q. Tell the jury why that press release is  
27 important and why we should talk about it today.  
28 A. Well, the National Cancer Institute by this time

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1 had undertaken a two-year feeding study of Aroclor 1254, kind  
 2 of the moderately chlorinated material.

3 Basically the press release was accompanying the  
 4 release of that report.

5 Q. Okay. Now, was Monsanto still in the business  
 6 of PCBs at the time?

7 A. No. They had been out for, you know, six  
 8 months.

9 Q. And Monsanto had voluntarily ceased its  
 10 production?

11 A. Yes, absolutely.

12 Q. TSCA had passed by this time?

13 A. Yeah. TSCA had passed, but the regulations had  
 14 not been developed to regulate PCBs.

15 Q. So talk about that a little bit.  
 16 The regulations hadn't come out.

17 What did TSCA actually tell some agency to do?

18 A. Well, basically TSCA authorized or told the EPA  
 19 that they needed to develop regulations regarding the  
 20 manufacture and use of PCBs.

21 So, you know, you'll later hear that PCBs were banned  
 22 by TSCA. That's not quite true.

23 The EPA was given the authority to develop those  
 24 regulations, which, as we'll see, didn't come out until a  
 25 number of years later.

26 Q. So I didn't want to skip over the NCI press  
 27 release too much. I know we got a little ahead because that  
 28 comes a little later.

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1 But this is what Monsanto said, correct?  
 2 This is an NCI release, I'm sorry.

3 A. Right. This is the NCI release, the National  
 4 Cancer Institute.

5 Q. And their finding was what?

6 A. Well, that you can read, according to the  
 7 summary of the report included in the announcement, so they  
 8 were sending out the report, everybody could read the report,  
 9 "Aroclor 1254 was not carcinogenic to rats under the test  
 10 conditions."

11 Q. Okay. So this is what we were talking about  
 12 with EPA issuing a final rule, right?

13 A. Right, yes.

14 Q. And it did not ban PCBs, did it?

15 A. No. The final rule is quite complicated, but  
 16 it's called the ban rule in common usage, but it really didn't  
 17 ban PCBs.

18 It essentially banned the manufacture of PCBs at  
 19 commercial levels. Some people can still make PCBs for  
 20 research reasons.

21 And it highly regulated the use of PCBs. But, in fact,  
 22 some PCBs can still legally be used today in some electrical  
 23 equipment.

24 Q. In fact, aren't PCBs today being used in  
 25 transformers and capacitors?

26 A. Not in capacitors anymore. In transformers they  
 27 are still used to some extent.

28 Q. To some extent.

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1 I mean, we could actually find PCBs in a transformer if  
 2 you really looked for it, right?

3 A. Well, it's not even -- we don't have to look for  
 4 it. Because if they're in there, they have to be labeled  
 5 under the regulations.

6 So they're very tightly controlled.

7 One point, if I could add a point, Mr. Upshaw.

8 Q. Yes.

9 A. One point we didn't make, and I don't know if  
 10 anybody has, is that PCBs were only used in about 5 percent of  
 11 transformers.

12 By far the majority of transformers didn't contain  
 13 PCBs. They only contained -- they were only used where there  
 14 was a real threat of fire. So they were used in office  
 15 buildings. They were used in electrical railroad systems, for  
 16 instance, in the northeast, and things like hospitals. They  
 17 were actually in the White House.

18 So wherever there was a threat of fire that would be  
 19 devastating to a property or people, PCBs were used.

20 The ones you see out in power stations along the  
 21 highway with all the wires and things, those don't now and  
 22 never did contain PCBs.

23 So it was a small market, actually.

24 Q. All right. Thank you for adding that.

25 In fact, hopefully the jury is going to hear from  
 26 Dr. Kytmaa, who you are familiar with, correct?

27 A. Yes, I've met him.

28 Q. And talk about the use of PCBs in the electrical

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1 system.

2 A. Right.

3 Q. So, Dr. Kaley, I want to ask you this question.  
 4 When Monsanto left the business in 1977, was there a  
 5 clear, consistent message from the animal testing folks,  
 6 researchers, that PCBs caused cancer in animals?

7 A. No, there was not. There was different  
 8 evidence.

9 One study said, yes. The NCI study on a different  
 10 Aroclor said no. The IBT study said no.

11 So there were some studies in Japan on mice, some of  
 12 which said yes, some of which said no. So there was no clear  
 13 picture at all.

14 THE COURT: How much more do you have?

15 MR. UPSHAW: I should be done in three to four minutes.

16 THE COURT: Okay. Good.

17 Q. BY MR. UPSHAW: We're looking at here --

18 THE COURT: Exhibit 663?

19 Q. BY MR. UPSHAW: Exhibit 663, which is a letter  
 20 from the Environmental Defense Fund.

21 Can you explain to the jury what the Environmental  
 22 Defense Fund was and what they were doing about this time.

23 A. Yes.

24 The Environmental Defense Fund is one of the -- was and  
 25 still is one of the most active environmental groups in the  
 26 country.

27 As this environmental awareness was developing in the  
 28 United States and really worldwide, the Environmental Defense

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1 Fund was formed first as a small group, and then got much  
2 larger to kind of put the heat on industry, on the government,  
3 to move things faster. You're not doing enough. You're not  
4 doing it fast enough, actually resorted to litigation in some  
5 particular cases to make the EPA move faster.  
6 So they were a very active environmental organization.  
7 Q. So they were like the environmental rights  
8 movement. They put pressure on companies to try to clean up  
9 their acts and be better companies?  
10 A. Companies and the government, yes.  
11 Q. And so they wrote a letter to Monsanto, correct?  
12 A. Yes, they did.  
13 Q. And if we can, Mr. Kaley, let's look at that  
14 entire letter, the body of that letter.  
15 Okay. So I'm going to start with the first paragraph.  
16 They received a letter dated August 13 to Mr. Marston of  
17 Robert Marston Associates, Inc.  
18 And, "Your letter expressed concern about a newspaper  
19 article written by Joe Wing which asserts that Monsanto makes  
20 DDT in Anaheim California."  
21 Can you explain the back story to that?  
22 A. Well, yes.  
23 Apparently at this point in time there was -- it became  
24 known that there was DDT contamination in the Bay, Los Angeles  
25 Bay, basically, or whatever, Los Angeles Harbor and the  
26 newspaper article basically had misstated that Monsanto was  
27 the manufacturer of that -- of those -- of that DDT.  
28 Q. And the Environmental Defense Fund writes:

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1 "We're sorry for whatever distress this  
2 factual error has caused you. Apparently  
3 your name got confused with that of the  
4 Montrose Corporation which does operate a  
5 very large manufacturing plant in Torrance,  
6 California. I do not know what the source  
7 of that confusion is."  
8 The next paragraph says:  
9 "At EDF we have been most impressed by  
10 Monsanto's willingness to be responsible  
11 where the environment is concerned. We  
12 have closely watched the development of  
13 information concerning the environmental  
14 impact of Monsanto's product,  
15 polychlorinated biphenyls, PCBs. What  
16 impressed us most was Monsanto's attitude  
17 and finally its action to lessen the  
18 environmental degradation caused by its  
19 product.  
20 "We continue to watch your PCB cleanup  
21 program to be sure that your action is as  
22 good as your word. But, in the meantime,  
23 we are impressed by your sensitivity and  
24 responsibility.  
25 "Indeed, in many informal conversations, we  
26 have signaled out -- singled out your  
27 company as being one capable of acting in  
28 its own long-term interest and that of

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1 society rather than its short-term economic  
2 interest. We have great respect for you."  
3 This was received by Monsanto?  
4 A. Yes, it was.  
5 Q. Did Monsanto provide products -- its products to  
6 outside researchers from 1966 forward?  
7 A. Oh, yes, they did. Absolutely.  
8 Q. Did they develop and share their analytical  
9 methods for detecting PCBs in the environment?  
10 A. Yes, they did.  
11 Q. Did they implement a takeback program that took  
12 back their product?  
13 A. Correct, yes.  
14 Q. Did they work with customers to contain and  
15 dispose of PCBs in an environmentally appropriate manner?  
16 A. Absolutely, yes.  
17 Q. Did they voluntarily stop selling PCBs for all  
18 but electrical uses in 1970, '71?  
19 A. Yes.  
20 Q. Voluntarily stopped selling all PCBs in 1977?  
21 A. That's correct.  
22 Q. Do you know of any other company that by the  
23 1970s that had stopped production and sale and completely  
24 discontinued a valued profitable product purely out of  
25 environmental concerns?  
26 A. I'm not aware of any.  
27 Q. Was Monsanto the first one to do that?  
28 A. As far as I know, yes.

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1 MR. URSHAW: All right. Pass the witness.  
2 THE COURT: Let's take our noon recess now.  
3 Keep in mind the admonition.  
4 See you all back at 1:30.  
5 (The following proceedings were held  
6 outside the jury's presence.)  
7 THE COURT: In the case of Dauber versus Monsanto, the  
8 record will reflect that all counsel are present. All jurors  
9 and alternates are out of the courtroom.  
10 Mr. Frieling, Mr. Paul?  
11 MR. PAUL: Very quickly, your Honor.  
12 I want to indicate to the Court that I have gone  
13 through the jury instructions. I pulled out the ones that the  
14 Court has requested.  
15 You'll notice some tabs on the sides. The greens ones,  
16 both sides to agreed to those instructions.  
17 The pinkish or red ones are plaintiffs' requested.  
18 I have also indicated on your little tabs whether or  
19 not we agree or disagree on whether that instruction is  
20 necessary.  
21 I know Mr. Blakey is going to be looking at it as well.  
22 I don't want to keep holding onto it. So what I would  
23 like to do is return this to Helen if I can.  
24 THE COURT: Sure.  
25 MR. PAUL: For safekeeping.  
26 THE COURT: Has Mr. Blakey seen it?  
27 MR. PAUL: He has already gone through it. I know he  
28 is going to be doing some extra looking at it.

1 He does have some other instructions or special  
 2 instructions he does want to talk to the Court about.  
 3 What I will do is I'll tell Mr. Blakey I've given them  
 4 to Helen, and he can look through them.  
 5 THE COURT: Sounds good. Is that it?  
 6 MR. FRIELING: No. I have one issue, your Honor --  
 7 THE COURT: Okay.  
 8 MR. FRIELING: -- that concerns me. It's sensitive.  
 9 It involves potentially privileged materials that Monsanto has  
 10 produced to us in the past and that we have returned to them.  
 11 And these materials, your Honor, I believe they directly  
 12 contradict what their witness just said on the stand.  
 13 I know he's in the courtroom now. I don't want to get  
 14 into specifics.  
 15 THE COURT: Have you talked to the other side about  
 16 this issue?  
 17 MR. FRIELING: I have not.  
 18 THE COURT: Talk to other side about this issue.  
 19 MR. FRIELING: It was the subject of --  
 20 THE COURT: And see if you can work it out.  
 21 MR. FRIELING: Yes, your Honor.  
 22 THE COURT: And let me know.  
 23 How long is cross?  
 24 MR. FRIELING: It's substantial. It's going to be a  
 25 long --  
 26 THE COURT: Mr. Upshaw went through several decades in  
 27 real time.  
 28 MR. FRIELING: I know. I will try and hit the high

1 points.  
 2 THE COURT: I don't know if you guys noticed. We were  
 3 losing them about an hour and 15 minutes ago.  
 4 MR. UPSHAW: It's a lot of material.  
 5 THE COURT: All right. See you guys at 1:30.  
 6 MR. FRIELING: Thank, you your Honor.  
 7 (At 12:00 noon, a recess was taken until 1:30 p.m.  
 8 of the same day.)  
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1 SUPERIOR COURT OF THE STATE OF CALIFORNIA  
 2 FOR THE COUNTY OF LOS ANGELES  
 3 DEPARTMENT 3 HON. J. STEPHEN CZULEGER, JUDGE  
 4  
 5 ROSLYN DAUBER, et al.,  
 6 Plaintiffs,  
 7 vs.  
 8 MONSANTO COMPANY, et al.,  
 9 Defendants.  
 10  
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SUPERIOR COURT  
 CASE NO. BC 483342, ETC.

I, DAVID A. SALYER, Official Pro Tem Reporter of the  
 Superior Court of the State of California, for the County of  
 Los Angeles, do hereby certify that the foregoing pages, 1  
 through 147, inclusive, comprise a true and correct transcript  
 of the proceedings taken in the above-entitled matter reported  
 by me on March 22, 2016.

DATED: March 22, 2016.



DAVID A. SALYER, CSR, RMR, CRR  
 Official Pro Tem Court Reporter  
 CSR No. 4410

|                                                                                                              |                                                                        |                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
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