

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
BEAUMONT DIVISION

CECIL SCOTT, ET AL

]

v.

]

No. B-84-1103-CA

MONSANTO COMPANY

]

DEPOSITION OF

ROBERT KALEY

May 13, 1987

1300 Post Oak Boulevard

Houston, Texas

Jerry Kelley, Court Reporter

Nell McCallum & Associates Inc.

2900 Smith, Suite 104

Houston, Texas 77006

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NELL MC CALLUM & ASSOCIATES, INC.

APPEARANCES

For the Plaintiffs:

David M. Lacey

Attorney at Law

Gilpin, Pohl & Bennett

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For the Defendant:

Mark A. Freeman

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NELL MC CALLUM & ASSOCIATES, INC.

1 Deposition of Robert G. Kaley II, taken on
2 May 13, 1987, at 1300 Post Oak Boulevard, Houston,
3 Texas, between the hours of 9 a.m. and 3:30 p.m. before
4 Jerry Kelley, CSR No. 2004 and Notary Public in and for
5 the State of Texas.

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11 [Exhibit 1 marked]

12 [Exhibit 2 marked]

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17 ROBERT G. KALEY II,
18 being duly sworn, testified as follows:

19
20 EXAMINATION BY

21 MR. LACEY:

22 Q Will you state your full name for the record,
23 please?

24 A Robert George Kaley II.

25 Q And where do you live, Mr. Kaley?

1 A My home address is 1965 Schoettler Valley
2 Drive, Chesterfield, Missouri.

3 Q How are you employed?

4 A I'm employed by Monsanto Company.

5 Q And how long have you been so employed?

6 A Since December of 1973.

7 Q Prior to your employment by Monsanto how were
8 you employed?

9 A I joined Monsanto directly out of graduate
10 school at the University of Illinois.

11 Q So the first full-time normal business job
12 you had was with Monsanto?

13 A That's correct.

14 Q Tell me a little bit about your educational
15 background after high school.

16 A I attended undergraduate school at Purdue
17 University, received a BS in chemistry; from there I
18 went to the University of Illinois, received an MS in
19 analytical chemistry in 1971 and a Ph.D. in analytical
20 chemistry which was awarded in January of 1974.

21 Q What area did you specialize in in your Ph.D.
22 work?

23 A Primarily atomic spectroscopy.

24 Q And what was your dissertation.

25 A The title was something resembling Automated

1 Atom Reservoir for Atomic Florescence Spectrometry, or
2 something like that. It may be on my CV, I'm not sure.

3 Q Let me hand you a copy of what the court
4 reporter has marked as Deposition Exhibit No. 1 and ask
5 if that is your CV.

6 A Yes, it is.

7 Q Is it current?

8 A Yes, as far as I can tell.

9 Q Do you have a file of materials that you have
10 collected in connection with this case?

11 A Not anything specifically for this case, no,
12 I do not.

13 Q Have you reviewed any individual document in
14 connection with this lawsuit?

15 A I have reviewed materials available in the
16 open literature, yes.

17 Q What literature have you reviewed?

18 A A variety of articles relating to detection
19 of dibenzofurans and polychlorinated biphenyl products,
20 and some literature involved in the pyrolysis products
21 of polychlorinated biphenyls.

22 Q When you talk about pyrolysis, you're talking
23 about what happens on the application of heat?

24 A Yeah. Most of the studies -- they're
25 laboratory studies where controlled heating is applied,

1 that's correct.

2 Q Pyrolysis refers to the addition of heat,
3 does it not?

4 A Yes, in general, without flame.

5 Q Okay. Do you recall or do you have a list
6 anywhere of the publications that you have reviewed?

7 A Not listed in a bibliography or anything like
8 that.

9 Q Do you have a source of publications you went
10 to?

11 A I have a variety of publications in my
12 personal files that I have collected on those topics.
13 So that's what I used, yes.

14 Q Are these publications that you referred to
15 previously in giving similar opinions to those you are
16 giving in this case?

17 A Yes.

18 MR. LACEY: I want a copy of the file or
19 files that he referred to that contain those
20 publications.

21 MR. FREEMAN: Dr. Kaley, is there a separate
22 file of material? Or are you able to tell us today what
23 documents you reviewed?

24 THE WITNESS: Not specifically. I mean it's
25 just a general updating of what's available in the

1 literature on those general topics. I don't --

2 MR. LACEY:

3 Q How many files would you have to reach into
4 in your file drawer in your office to get copies of the
5 literature that you reviewed?

6 A Two to three.

7 Q The total thickness of the files would be --

8 A Something like three or four inches probably.

9 Q Those are identifiable files at your desk at
10 Monsanto?

11 A That's correct.

12 MR. LACEY: I want a copy of those files and
13 those documents.

14 MR. FREEMAN: We'll provide those. Just so I
15 understand, we're talking about the articles in the open
16 literature?

17 THE WITNESS: That's correct.

18 MR. LACEY:

19 Q And I understand there is nothing else that
20 you have reviewed other than that in preparation for
21 forming the opinions that you have formed in connection
22 with this case. Is that correct?

23 A That's correct.

24 Q Okay. Did you obtain any source of
25 information that didn't involve reviewing documents?

1 A Well, just my background knowledge from the
2 work I had done at Monsanto Company.

3 Q Okay. But you didn't talk to somebody who
4 gave any information about the case?

5 A Well, I've had general discussions with
6 counsel on the general outline of the case and what the
7 case is about, but not --

8 Q Okay.

9 A -- what my opinion was.

10 Q Well, tell me what you have been advised by
11 counsel, then, that, coupled with your review of these
12 articles, has led to your opinion.

13 MR. FREEMAN: That's an awfully general
14 question. Can you narrow the question any, David?

15 MR. LACEY:

16 Q I want to know everything that the lawyers
17 have told you about this case.

18 MR. FREEMAN: I object to the form of the
19 question, then.

20 MR. LACEY: Fine.

21 You can go ahead and answer it now.

22 A They basically told me there was a large
23 group of plaintiffs from several geographical areas in
24 the United States who have filed a suit in court here
25 claiming certain health effects from exposure to

1 polychlorinated biphenyls. I think ten of those
2 plaintiffs have been selected for trial. And based on
3 my background knowledge of certain issues, I was
4 selected to testify on the issues of dibenzofuran
5 contamination of PCB products and combustion products of
6 PCBs.

7 MR. LACEY: Okay.

8 Q Did the number of plaintiffs have anything to
9 do with or add to or subtract from your opinion?

10 A No, sir.

11 Q Totally irrelevant?

12 A Yes.

13 Q Where these plaintiffs might have come from,
14 is that relevant or irrelevant to your opinion?

15 A It's irrelevant.

16 Q Whether or not they're claiming health
17 effects or not, is that relevant or irrelevant to your
18 opinion?

19 A Irrelevant.

20 Q The number of plaintiffs that might be going
21 to trial, is that relevant or irrelevant to your
22 opinion?

23 A It's irrelevant.

24 Q Okay.

25 I guess now my question to you is: Did

1 counsel provide you with any information you considered
2 relevant to forming your opinion?

3 A No, they did not.

4 Q Okay.

5 You are not an expert in what the health
6 effects of exposure to PCBs are, are you?

7 A That's correct, I am not.

8 Q And you are not prepared nor qualified to
9 render an opinion about whether any particular health
10 effect could or could not be caused by PCBs. Is that
11 correct?

12 A That's correct.

13 Q You're not in a position to offer any opinion
14 about whether any health effect could or could not be
15 caused by any contaminant that might be in PCBs. Is
16 that correct?

17 A That's correct.

18 Q The only thing that you are qualified to do
19 is to describe specifically what you know about furan
20 contamination of PCBs and what you know about combustion
21 of products. Is that correct?

22 A That's correct.

23 Q Okay. And you did not obtain from the
24 lawyers any relevant information that would effect your
25 opinion on those two matters. Is that correct?

1 A That is correct.

2 Q You do not know how the products were used.

3 Is that correct?

4 A That is probably not correct.

5 Q Well, what do you know about how the products
6 were used?

7 A I know that certain -- that some of the
8 products were used in a capacitor manufacturing plant,
9 some of the products were used in transformers and I
10 believe a service shop, and I also believe that one of
11 the purported exposures involves hydraulic fluids.

12 Q Okay. Do you consider any of that relevant
13 to your opinion?

14 A No, I do not.

15 Q Okay.

16 Do you know the actual circumstances of the
17 use of PCB-containing products in a capacitor
18 manufacturing operation?

19 A I have a general understanding of what I've
20 heard to be the processes. I've not seen a plan. I've
21 been told how capacitors are manufactured.

22 Q Explain to me what your understanding is of
23 how PCBs are used in a capacitor-manufacturing shop.

24 A Okay. My understanding is that in the days
25 when they were used that the capacitors were assembled

1 without the PCBs. In other words, the paper or whatever
2 was used was put in a cannister, these cannisters were
3 then submerged in polychlorinated biphenyls fluids to
4 impregnate the capacitors, and the capacitors were then
5 removed and sealed and cleaned, made ready for use, I
6 assume tested, I don't know.

7 Q Do you know anything about the circumstances
8 under which the capacitors were impregnated with PCB
9 fluids?

10 A Not specifically, other than the fact that my
11 understanding is that it was a submerging process and
12 impregnation of it.

13 Q You don't know whether heat was applied?

14 A No, I don't.

15 Q You don't know how much heat might have been
16 applied?

17 A No, I don't.

18 Q You don't know whether oxygen was present, if
19 heat was applied, in the area where heat was applied?

20 A Not specifically, no.

21 Q You don't know whether after the capacitors
22 were prepared there was any sort of testing which might
23 be applied to them. Is that correct?

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

25 Q You don't know whether or not there was any

1 burning or explosive force applied to PCB oils in a
2 capacitor-manufacturing plant. Is that correct?

3 A That is correct.

4 Q Okay. So the actual circumstances of use in
5 a capacitor-manufacturing plant that might result in the
6 addition of heat with or without oxygen, that might
7 result in a burning process or explosive process with
8 PCBs is beyond the scope of your knowledge?

9 A I have no specific knowledge of that.

10 Q And your opinion therefore cannot reach those
11 matters and what the effect of those matters might be.
12 Correct?

13 A Well, my opinion will address the effects of
14 application of heat to polychlorinated biphenyls should
15 that situation be relevant.

16 Q But the particular circumstances that might
17 have applied in any capacitor shop you cannot address,
18 can you?

19 A Not the specifics, no.

20 Q Okay.

21 Now, what do you know about the use of PCBs
22 in transformers?

23 A Basically I know that they were used in
24 certain transformers which were intended for use in high
25 fire risk situations; a variety of products were used,

1 sometimes in mixtures with other materials, to fill
2 these transformers; the transformers were then capped
3 and used.

4 Q Do you know what materials may have been used
5 in conjunction with PCBs in transformers?

6 A Yes.

7 Q What materials?

8 A Certainly trichlorobenzenes, to a certain
9 extent tetrachlorobenzenes, and generally there were
10 very small amounts, less than a percent, of electron or
11 chlorine scavengers added.

12 Q I've got a big chart here. I'm always
13 intrigued by knowing what chemicals look like and that
14 sort of thing. Did anybody tell you I might be
15 interested in knowing what the chemicals looked like and
16 you might get a chance to do some drawing?

17 A No.

18 Q Well, this will sort of hit you cold, then.
19 I'd like for you to draw for me a trichlorobenzene
20 molecule. I'm going to pull out some drawings that --
21 Do you know Ralph Munch?

22 A Yes, I do.

23 Q Do you know William Richard?

24 A Yes, I do.

25 Q We've had the pleasure of taking Mr. Munch's

1 deposition and the pleasure of beginning but not yet
2 concluding -- I say Mr. Munch. It's actually Dr.
3 Munch, isn't it?

4 A That's correct.

5 Q And Dr. Richard?

6 A That is also correct.

7 Q And Dr. Kelly?

8 A That is also correct.

9 Q Okay.

10 We've had the pleasure of taking Dr. Munch's
11 deposition and the pleasure of beginning but not
12 concluding Dr. Richard's deposition. And in the course
13 of those depositions -- They're also chemists, are they
14 not?

15 A Certainly Dr. Munch is. I think Dr. Richard
16 is. I'm not sure.

17 Q We've discussed chemical compositions. I'm
18 just going to pull out here what is Munch Exhibit 1 sort
19 of to give you an idea of the types of drawings we've
20 done. I'll probably ask you about the accuracy, but we
21 used, for example, when we drew benzene, a red marker to
22 signify the carbons, and a black to signify the hydrogen
23 atoms, and we used blue to signify chlorine atoms, if
24 you can look down here. A PCB. And I guess I'm going
25 to see if we can use sort of a similar coloring scheme

1 to draw a trichlorobenzene molecule and let you have
2 your hand at drawing. Is that understandable?

3 A Yes, sir.

4 Q Very good.

5 A If I can remember the colors.

6 Q I'll leave this right here so you can look at
7 it. Red, black, and blue.

8 A All right. Would you like these labeled as
9 trichlorobenzene, or do you want me just to draw the
10 structures?

11 Q Why don't you just draw the structures. We
12 will label it. That will be fine. My memory works a
13 lot better if it has a label that will help me remember.
14 Otherwise I might have some difficulty.

15 A [Drawing]

16 Q Do you want to label that for us?

17 A Certainly.

18 MR. LACEY: Let me get the court reporter to
19 mark that as our next exhibit.

20 [Exhibit 3 marked]

21 MR. LACEY:

22 Q Let me ask you if what the court reporter has
23 now labeled as Exhibit 3 is your drawing of a
24 trichlorobenzene molecule.

25 A That's correct.

1 Q If I understand the drawing correctly, we
2 take a regular benzene molecule and replace three of the
3 hydrogen atoms with three chlorine atoms.

4 A That is correct.

5 Q Now, the reason we looked at this is because,
6 as I understand it, there were certain transformer
7 fluids that had some trichlorobenzene in them. Is that
8 correct?

9 A That is correct.

10 Q Okay.

11 Now, you mentioned another type of benzene.
12 Did you say tetrachlorobenzene?

13 A That is correct.

14 Q Can you draw us a tetrachlorobenzene
15 molecule?

16 A [Drawing]

17 Q You might label that for us as well.

18 A [Marking]

19 MR. LACEY: I'll ask the court reporter to
20 mark that as the next exhibit.

21 [Exhibit 4 marked]

22 MR. LACEY:

23 Q Is Exhibit No. 4 your drawing of a
24 tetrachlorobenzene molecule?

25 A That is correct.

1 Q Okay.

2 I understand tetrachlorobenzene was also
3 sometimes added to PCBs and transformer fluids. Is that
4 correct?

5 A Yes. Usually not by itself but usually a
6 mixture with trichlorobenzenes.

7 Q Okay. So normally what you would have, if
8 you had a tetra- or trichlorobenzene added to PCBs as
9 transformer fluid, both of these molecules that are
10 drawn as Exhibit 3 and 4 would be a part of the mixture
11 added to PCBs?

12 A My understanding is that either
13 trichlorobenzene was used by itself as an additive or a
14 mixture of trichloro- and tetrachlorobenzenes were used.

15 Q So in some transformers we would find PCBs
16 plus trichlorobenzene. Correct?

17 A That's my understanding.

18 Q In some we would find PCBs plus trichloro-
19 and tetrachlorobenzene?

20 A That's my understanding.

21 Q Is it your understanding that all transformer
22 PCB oils had in them tri- or tetrachlorobenzene?

23 A No.

24 Q Only some?

25 A That's correct.

1 Q Do you know anything about the differences
2 between those that had them and those that didn't? I
3 mean in terms of the reasons for it.

4 A No, I do not.

5 Q Were there any other chemicals that were
6 present in transformer fluids containing PCBs other than
7 PCBs and either possibly trichloro- or
8 tetrachlorobenzene?

9 A As I mentioned previously, there were very
10 small amounts of materials which were used in either
11 electron or chlorine scavengers.

12 Q And what would those materials be?

13 A I can't recall their names. I just really
14 don't know. The information is available, but I don't
15 recall offhand.

16 Q Do you know whether they were organic
17 compounds?

18 A I believe some of them were. And I believe
19 some were what we call organometallic compounds,
20 compounds that contain both an organic portion of a
21 molecule and a metal.

22 Q Do you know what concentrations we would find
23 tetrachloro- or trichlorobenzene in a transformer that
24 contained that additive?

25 A In the range of 50 percent. I think it could

1 range from 60 to 30 percent, is my general
2 understanding.

3 Q Do you know what concentration we would find
4 scavengers present, if they were present?

5 A My recollection is that it's in the tenth of
6 percent range.

7 Q One tenth of one percent?

8 A That's correct.

9 Q Do you know whether or not all transformer
10 fluids had these scavengers in them?

11 A I don't know for sure.

12 Q Okay.

13 Do you know whether or not capacitor fluids
14 had in them tetrachloro- or trichlorobenzene?

15 A My understanding is they did not.

16 Q Okay.

17 Do you know whether or not the capacitor
18 fluids had in them scavengers?

19 A I do not know for sure, no.

20 Q Okay.

21 A Let me clarify my answer to the previous
22 question. The capacitors that contained PCBs did not
23 contain tri- or tetrachlorobenzene, is my understanding.
24 It is possible -- I do not know, but it is possible that
25 capacitors contained tri- or tetrachlorobenzene by

1 themselves.

2 Q In other words, tri- or tetrachlorobenzene
3 could be used, as you understand from a chemist's
4 standpoint at least, as a capacitor fluid?

5 A Yeah. I don't want to exclude that
6 possibility.

7 Q Okay.

8 If there were scavengers present in PCB oils
9 used as capacitor fluids, do you know what percentage
10 they would be present in?

11 A I have no idea.

12 Q Do you know whether or not any chemicals
13 other than possibly scavengers were ever mixed with PCB
14 oils that were used for capacitor purposes?

15 A To my knowledge, there were none.

16 Q Okay. So we've covered what you know about
17 PCBs used as capacitor fluid, and that is they were used
18 without any other mixture except possibly scavengers.
19 Correct?

20 A That's correct.

21 Q We've covered what you know about the use of
22 PCB oils in transformers, which is they could be used by
23 themselves with possibly a scavenger. Correct?

24 A That's correct.

25 Q Or they could be used in a mixture of

1 trichlorobenzene and scavengers?

2 A That's correct.

3 Q Or in a mixture of tri- and
4 tetrachlorobenzene and scavengers?

5 A That's correct.

6 Q Are there any other mixtures used?

7 A Not to my knowledge.

8 Q Now, you also mentioned hydraulic fluids. Is
9 that correct?

10 A That's correct.

11 Q What do you know about the use of PCB oils in
12 hydraulic fluids?

13 A Okay. They were used in a variety of
14 combinations of materials. I don't know for sure
15 whether they were used without mixing with some other
16 materials, but I know some of the fluids, for instance,
17 contained phosphate esters as well as PCBs.

18 Q Well, how many different hydraulic fluid
19 compositions were there?

20 A Many. Tens or maybe twenties.

21 Q That contained PCBs?

22 A That's my understanding, yes.

23 Q I see. And you're not sure what those
24 different formulations may have contained except for
25 phosphate esters?

1 A Yes. Certainly they contained phosphate
2 esters. Some of them, I believe, contained things like
3 mineral oils or hydrocarbon oils also.

4 Q Did all of the fluids also contain phosphate
5 esters that contained PCBs?

6 A I don't know the answer to that offhand.

7 Q I see.

8 Can you draw a phosphate ester for us?

9 A Certainly. What color do you want to use for
10 phosphorus, green?

11 Q Yeah, let's use green.

12 A Well, we need oxygen. We've got yellow.

13 Q Let's see. Actually, we used green for
14 oxygen. Why don't we use the yellow for the phosphorus.
15 Actually, that's a pretty good color for phosphorus,
16 isn't it?

17 A No. Well, I guess there is yellow
18 phosphorus. I'll label this a generic phosphate ester.

19 MR. LACEY: Let me ask the court reporter to
20 mark that as the next exhibit.

21 [Exhibit 5 marked]

22 MR. LACEY:

23 Q Is Exhibit 5 your drawing of a generic
24 phosphate ester?

25 A That's correct.

1 Q Do you want to explain that to me?

2 A Okay. A phosphate ester is based essentially
3 on phosphoric acid. If the groups which I've labeled R
4 here were in fact hydrogens, that would be phosphoric
5 acid. If phosphoric acid is reacted with an organic
6 chemical of the right composition, the hydrogens can be
7 replaced by organic groups. These R's signify a generic
8 organic chemical grouping onto there. So the R could
9 signify a benzene ring, for instance, or just anything.

10 Q Okay. The base structure for the phosphate
11 ester, I understand, is a phosphorus atom surrounded by
12 four oxygen molecules, one of which is double bonded,
13 three of which are single bonded.

14 A That's correct.

15 Q The three single bonded have the capability
16 of bonding to other molecular or submolecular
17 structures?

18 A That's correct.

19 Q Now, when phosphate esters were used in
20 hydraulic fluids, do you know what particular organic
21 compounds or other compounds were substituted in place
22 of these R's that you've shown as the generic drawing of
23 a phosphate ester?

24 A I do not know specifically, but there were a
25 wide range of groups used in place of the R's.

1 Q I see.

2 A But I cannot give you specifics with the
3 information I have in my head.

4 Q Okay. Some of those might include benzene
5 ring compounds?

6 A That's possible.

7 Q When we talk about a benzene ring, we're
8 talking about a six-carbon ring with this odd
9 arrangement of three double bonds and three single
10 bonds. Correct?

11 A Yes, that's correct.

12 Q Okay.

13 Somebody -- I think it was Elmer Wheeler. Do
14 you know Mr. Wheeler?

15 A I know about him. I can't recall having ever
16 met him.

17 Q Mr. Wheeler in his deposition described to me
18 a compound known as 2,4,5-T. Can you draw that for me?

19 A If I thought about it I probably could, yes.

20 Q Let me ask you to think about it.

21 MR. FREEMAN: Do you want a scratch pad?

22 THE WITNESS: We can throw one of these away,
23 can't we?

24 MR. LACEY: Absolutely. Absolutely.

25 Off the record.

1 [Discussion off the record]

2 [Exhibit 6 marked]

3 MR. LACEY:

4 Q We've taken a break and you have drawn a
5 sketch of 2,4,5-T which is labeled as Exhibit No. 6. Is
6 that correct?

7 A That's correct.

8 Q And 2,4,5-T consists of a benzene ring with
9 three chlorine atoms attached. Correct?

10 A Correct.

11 Q And two hydrogen atoms. And in place of the
12 third hydrogen that we would find in a trichlorobenzene
13 molecule we instead have an oxygen molecule that is
14 bonded to both the benzene ring and also a two-carbon
15 chain additionally. Correct?

16 A That is correct.

17 Q What is the name for the two-carbon chain
18 along with the oxygen and hydrogens bonded to it? Does
19 that have a chemical name?

20 A Okay. If the O benzene ring material were
21 removed and another hydrogen was placed here, it would
22 be acetic acid.

23 Q Okay. So basically the 2,4,5-T then consists
24 of a benzene ring -- a trichlorobenzene ring bonded to
25 acetic acid. Right?

1 A Consists of a trichlorophenol molecule bonded
2 to acetic acid.

3 Q And we call it a phenol because there is an
4 oxygen bonded to the benzene ring?

5 A That's correct.

6 Q Okay.

7 Now, let me ask you to look at, and I won't
8 get you to draw it unless you have a disagreement as a
9 chemist with Dr. Munch -- let me get you to look at his
10 drawings on Munch Exhibit No. 1. First he has drawn a
11 benzene ring. Do you agree with that?

12 A Yes, I do.

13 Q He has also drawn a biphenyl or diphenyl
14 ring. He said those two are synonymous. Is that
15 correct?

16 A That's correct.

17 Q Do you agree with his drawing of the biphenyl
18 or diphenyl?

19 A Yes, I do.

20 Q Okay. Then he has drawn for us a
21 polychlorinated biphenyl. And we discussed the fact
22 that being technically polychlorinated you would have at
23 least two carbon atom -- I mean two chlorine atoms
24 replacing two hydrogen atoms on a diphenyl molecule. Is
25 that correct?

1 A That's correct.

2 Q He also indicated to me sometimes in some
3 definitions people would refer to a diphenyl ring with
4 only one chlorine atom as a PCB. I think there's some
5 government work where that is done. Is that your
6 recollection?

7 A That's correct.

8 Q Now, stopping on that portion of his chart
9 right there for a minute, he indicated to me that there
10 were a wide variety of individual molecules that might
11 be called PCBs, or polychlorinated biphenyls.

12 A That's correct.

13 Q Can we just use the term PCB from here on out
14 to refer to a polychlorinated biphenyl?

15 A Unless we need to specify more distinctly,
16 yes.

17 Q But just generically can we use PCB?

18 A Yes, that's fine with me.

19 Q How many different molecular structures are
20 possible in what we refer to as PCBs?

21 A 209.

22 Q 209. It would probably take you a long time
23 to draw all 209, so I'm not going to ask you to do that.

24 A Thank you.

25 Q Are any of the 209 mirror images of each

1 other?

2 A I'm not sure what you mean by mirror images.

3 Q Well, let me see if I can illustrate what I
4 mean. If we have a diphenyl molecule, there are two
5 benzenes hooked together.

6 A Correct.

7 Q If I put a chlorine molecule in one spot and
8 I used the generic conception that's a PCB, I had one
9 chlorine molecule there and I had another one over here
10 that had a chlorine molecule on the opposite side of the
11 second benzene ring and I turned them over, they would
12 look like each other face-to-face. By mirror image,
13 that's what I mean.

14 A Do you mean turn the whole molecule around?

15 Q Yes.

16 A No. The 209 exclude those kind of
17 symmetrical molecules. Because of the numbering system,
18 those are essentially the same term.

19 Q That's what I was trying to find out. The
20 209 is not including mirror images but is 209 chemically
21 different molecules?

22 A That is correct.

23 Q And the difference with regard to those 209
24 different PCBs is either in the number or in the
25 location of the chlorine molecules attached to the

1 diphenyl ring. Correct?

2 A That's correct.

3 Q Now, we discussed with Dr. Munch what a
4 dibenzofuran is. And he has drawn here a dibenzofuran.
5 Do you agree with his sketch of a dibenzofuran? And for
6 the sake of simplicity there we've left off any either
7 hydrogen or chlorine molecules that might be bonded to
8 the carbons on the benzene rings.

9 A That is the correct base structure for
10 dibenzofurans.

11 Q Okay. And where we have the carbons that
12 don't already have all of their bonds fulfilled, they
13 could be fulfilled with hydrogen atoms. Correct?

14 A Yes.

15 Q They could be fulfilled with chlorine atoms?

16 A Correct.

17 Q Or any other atom that's a single bonding
18 atom, I guess.

19 A That's also correct.

20 Q Okay.

21 We also had a discussion about dibenzodioxin,
22 and Dr. Munch has drawn on Munch Exhibit 1 a
23 dibenzodioxin molecule. Do you agree with his base
24 structure there?

25 A To be completely specifically, I would call

1 that dibenzoparadioxin. But generically that is the
2 term that is used, and that is the correct structure for
3 that generic molecule.

4 Q Okay. Why the reference to the paradioxin?

5 A Basically the para refers to the fact that if
6 we look at the central ring containing the two oxygen,
7 the benzo parts, the benzene ring parts are on opposite
8 sides of that ring.

9 Q Would it be possible to have a dioxin
10 molecule with both benzenes attached on the same side
11 and the two oxygens bonded to each other?

12 A It is possible to draw that structure. I'm
13 not sure whether it exists in reality or not.

14 Q The structure that exists in reality is the
15 one that Dr. Munch has drawn?

16 A The one I know that exists.

17 Q That has the same base structure that Dr.
18 Munch has drawn on Munch Exhibit 1?

19 A That's correct.

20 Q You can hypothesize a form of molecule you
21 would refer to as a dibenzodioxin that would be drawn
22 differently?

23 A That's correct.

24 Q But you don't know if it actually occurs?

25 A That's correct.

1 Q Okay.

2 And again on the dibenzodioxin molecule that
3 Dr. Munch has drawn we've left off the hydrogens or
4 chlorines or other single-bonding atoms that might be
5 attached to the dioxin molecule, and there could be a
6 variety of things that could attach. Is that correct?

7 A That's correct.

8 Q Now let me talk a little bit about the
9 process by which chemicals are in fact made. And the
10 first thing I guess we need to establish is which
11 compounds that we've discussed today are naturally-
12 occurring compounds. Is benzene a naturally-occurring
13 compound?

14 A Yes.

15 Q Is diphenyl a naturally-occurring compound?

16 A I suspect so. But I don't know for sure.

17 Q Are PCBs a naturally-occurring compound?

18 A For all practical purposes, no. There are
19 some references that there might be small levels, but
20 for all practical purposes, no, they're not.

21 Q Are dibenzofurans a naturally-occurring
22 compound?

23 A The unchlorinated material might very well
24 be. I don't know about the chlorinated materials, if
25 that's where you're going.

1 Q Well, I guess I'm trying to find out whether
2 the base structure, whether chlorinated or not, is a
3 compound you know to be naturally occurring.

4 A It is possible, but I do not know that it
5 does naturally occur.

6 Q Okay.

7 What about dibenzodioxin? Is that a
8 naturally-occurring compound?

9 A My answer would be the same. I do not know
10 for sure. I do not know, but it is possible.

11 Q Okay.

12 I guess what I've heard you say with regard
13 to PCBs, furans and dioxins are that you don't know if
14 any of those occur naturally. Correct?

15 A If by naturally you mean in nature, without
16 any input by man, I would say that that is generally
17 correct, yes.

18 Q But you can't rule out that conceivably any
19 of those three compounds may under certain circumstances
20 occur in nature without man's intervention?

21 A That's correct.

22 Q Now let's talk about trichlorobenzene. Is
23 that a naturally-occurring compound?

24 A I do not know.

25 Q Tetrachlorobenzene.

1 A I do not know.

2 Q The basic phthalate ester, is that a
3 naturally-occurring compound?

4 A I don't know for sure.

5 Q 2,4,5-T. Naturally-occurring compound?

6 A Probably not.

7 Q Okay. So the 2,4,5-T gets off in the same
8 category as the PCBs, the furans and the dioxins?

9 A That would be correct.

10 Q Benzene definitely is a naturally-occurring
11 compound, you anticipate that diphenyl is. Correct?

12 A Correct.

13 Q But you don't know about trichloro- or
14 tetrachlorobenzene?

15 A That's correct.

16 Q Okay.

17 Now, I take it you basically are a
18 theoretical chemist as opposed to one who actually works
19 out in plants working with particular processes.

20 A I am an analytical chemist. Based on your
21 construct, I would put myself between those two
22 extremes.

23 Q Okay. Let me see if I can try to understand
24 maybe your work history, then, to figure out how I would
25 understand what you do.

1 A Fine.

2 Q You joined Monsanto in 1973?

3 A That's correct.

4 Q And I understand from your CV your first job
5 was as a senior research chemist.

6 A That is correct.

7 Q What did you do as a senior research chemist?

8 A I joined a group that was primarily made up
9 of analytical chemists. In other words, we do chemical
10 analyses. At the time I joined the group, the major
11 thrust of their work was studying the environmental
12 characteristics of a variety of chemicals made by -- at
13 the time it was Monsanto Industrial Chemicals Company.

14 Q And what sort of study did you personally
15 involve yourself in?

16 A I primarily was involved in gas
17 chromatography early in my career, and after about two
18 years mass spectrometry to analyze samples in our
19 laboratory or elsewhere in the company to determine
20 their chemical composition.

21 Q That was not the sort of person who was
22 basically a chemist helping a plant manager fine tune
23 production or anything like that?

24 A No. We were a research group and did not
25 have very much direct involvement with the plants.

1 Q Then January of '78 through February '81 you
2 became a research group leader?

3 A That is correct.

4 Q And were you basically carrying out the same
5 types of functions?

6 A Yes, I assumed a pseudomanagement group
7 leader role for a group doing essentially those types of
8 analyses, that is correct.

9 Q Okay. And again you weren't performing the
10 type of chemical assistance that a plant manager might
11 need to fine tune his process or anything like that?

12 A In general, no.

13 Q Then in February of 1981 through May '85 you
14 got a research specialist's position with regard to mass
15 spectrometry?

16 A Yes.

17 Q Again that's not the sort of thing that
18 people fine tune the plants with, is it?

19 A In general, no.

20 Q Okay.

21 And then in May of '85 you became the product
22 and environmental safety manager?

23 A That's correct.

24 Q What did that involve?

25 A That job primarily involved working with

1 another person to handle questions that came into
2 Monsanto regarding polychlorinated biphenyls.

3 Q I see. Who else did you work with?

4 A A gentleman named Dr. John Craddock.

5 Q Craddock?

6 A [Moving head up and down]

7 Q That's a significantly different job than the
8 technical-type jobs you had had previously?

9 A That's correct.

10 Q The job you had with regard to mass
11 spectrometry, that was a technical job too?

12 A That is also correct.

13 Q Then in September of this past year, 1986,
14 you became the manager of environmental technical
15 support?

16 A That is correct.

17 Q What is that?

18 A Okay. We have a small group which provides
19 on a corporate basis information on chemicals and their
20 environmental characteristics to various groups within
21 the corporation.

22 Q Okay.

23 Now, if I understand it, from May of '85 to
24 September of '86 your work dealt substantially with
25 PCBs.

1 A That's correct.

2 Q Was it almost exclusively with PCBs?

3 A That's correct.

4 Q Now, what about your work since September of
5 '86? Has that dealt with PCBs?

6 A Yes, to a certain extent.

7 Q What percentage of your time has been related
8 to PCBs?

9 A Probably 50.

10 Q Okay.

11 When you got this job of environmental safety
12 manager in May of '85 were you stepping into the line
13 that had been established first by Mr. Pappageorge?

14 A No. No, that is not correct.

15 Q Okay. You know who Mr. Pappageorge is?

16 A Yes, I do.

17 Q Mr. Pappageorge had some environmental role
18 for explaining PCBs with Monsanto, did he not?

19 A That is correct.

20 Q He obtained that job around 1970, did he not?

21 A That would be my understanding.

22 Q And he held that job until about 1976 or '77?

23 A That was when we ceased production, so that
24 would be a legitimate -- I do not know for sure exactly
25 when he stopped that job, but that would be the

1 appropriate time frame.

2 Q Well, did somebody succeed him in that job?

3 A No, they did not.

4 Q Was there somebody holding a job like you
5 held in the 1970s? I guess I'm trying to figure out how
6 his job was related to the job you had. I mean he had
7 had a job with regard to answering questions about PCBs,
8 and you've got that job, and you've told me they aren't
9 successors to each other. I'm trying to find out the
10 relationship.

11 A When Monsanto ceased production in 1977, Mr.
12 Pappageorge was given other responsibilities because we
13 no longer made the product.

14 Q What made his job --

15 A Well, his job was primarily to manage the
16 phase-out of our PCB process.

17 Q Okay.

18 A All right?

19 Q Once that was done --

20 A And an ancillary part of that job was to
21 handle inquiries about our PCB business. We went out of
22 the PCB business, and there was no longer a conceived
23 need -- this is my understanding, not personal
24 knowledge -- a conceived need to -- obviously we were
25 out of the business, he didn't need to manage the

1 business. And so for a period up to about 1980 there
2 was really nobody in the company responsible for PCBs.

3 Q Okay.

4 A At about that time it was realized that there
5 were still a lot of PCB questions coming into Monsanto.
6 So essentially a new job was created which Dr. John
7 Craddock then took to handle PCB questions for the
8 corporation.

9 Q Okay. So from about 1980 forward there's a
10 gap, as you understand it, at least, from, say, '77 to
11 1980 and somebody being specifically assigned to deal
12 with PCB questions?

13 A That is correct.

14 Q In about 1980 a new position was created to
15 deal with PCB questions, and that was Dr. Craddock's
16 position?

17 A That's correct.

18 Q What was Dr. Craddock's background?

19 A He's a chemist also.

20 Q Okay. And then Dr. Craddock worked by
21 himself from about 1980 up until May of '85?

22 A Basically correct, yes.

23 Q And you joined him as a second person to help
24 answer questions?

25 A That's correct.

1 Q Did Dr. Craddock continue in that position up
2 through September of 1986?

3 A Yes.

4 Q Is he still in that position?

5 A Yes, he is.

6 Q Why did you leave your assistance role to
7 Dr. Craddock in September of 1986?

8 A There was another position open within the
9 same group with slightly different responsibilities,
10 which was a promotion.

11 Q Did somebody assist you in replacing Dr.
12 Craddock?

13 A Yes, they did.

14 Q Who was that?

15 A Dr. Paul Michael.

16 Q Okay. Now I guess I'm interested in knowing
17 what sort of things could keep two people occupied full
18 time answering questions about a product that Monsanto
19 hadn't made for almost ten years.

20 A Okay. There are several responsibilities of
21 that job. John works very closely with the Chemical
22 Manufacturers Association, which has a special panel on
23 polychlorinated byphenyls. That panel takes an
24 industrywide view of regulations and how the industry
25 relates to, for instance, environmental groups and

1 regulatory agencies. We also have over 50 plants in the
2 United States, some of which still have polychlorinated
3 biphenyls equipment. We're responsible for being sure
4 that those plants are in compliance with the existing
5 PCB regulations. We also receive many, many phone calls
6 from former customers or interested outside parties,
7 media personnel or electrical industry personnel,
8 wanting to know things like physical properties and
9 state of regulations and things like that. It's a very
10 time-consuming task.

11 Q So one of the aspects of that job was to be
12 familiar with what the state of regulations were and to
13 consult with other industry people about that?

14 A That's correct.

15 Q Another aspect was to -- I'm not quite sure
16 what you were doing with existing plants.

17 A Well, some of the regulations affect the
18 use -- the continued use and the disposal of
19 polychlorinated biphenyls, and certain of our plants
20 still have electrical equipment containing
21 polychlorinated biphenyls, so we have to be sure that
22 those plants are in compliance with the regulations.

23 Q Okay. I understand. You're not making PCBs
24 anymore?

25 A Absolutely not.

1 Q You are just making sure you comply with the
2 government regulations so that the transformers or
3 capacitors that you have don't leak the PCB oils, et
4 cetera?

5 A That's correct.

6 Q And I guess one of the reasons you want to
7 make sure that you comply with that is that there are
8 some teeth in those federal regulations.

9 A Well, Monsanto's position is to comply with
10 regulations.

11 Q But I mean there are some teeth in those
12 regulations?

13 A Yes.

14 Q Penalties and all that sort of stuff if you
15 don't do what you're supposed to do?

16 A That's correct.

17 Q And then also we've got the issue of the
18 regulations themselves and consulting with industry
19 about them, and environmental groups and that sort of
20 thing; we've got monitoring your existing electrical
21 equipment to make sure you handle those PCB materials
22 correctly; then you've got answering questions from
23 former customers and other folk?

24 A That's correct.

25 Q Is that basically the line-up of the job

1 duties?

2 A That's correct.

3 Q What are the regulations that relate to the
4 existing plants of Monsanto and what they've got to do
5 with regard to their own electrical equipment?

6 A Well, there are a whole litany of them.

7 Q Can you sort of summarize them generally?
8 What have you got to do?

9 A Well, first of all is the disposal rules. If
10 we have electrical equipment that goes out of service,
11 we're taking out of service for whatever reason, any
12 polychlorinated biphenyls that might be associated with
13 that equipment have to be disposed of in strict
14 compliance with the regulations, they have to be
15 labeled, et cetera, et cetera. So they have to apply
16 for labeling disposal.

17 Q Can you tell me how they're disposed of? Or
18 do you know?

19 A The materials which are essentially graded in
20 500 parts per million PCBs are incinerated in an
21 EPA-approved PCB incinerator.

22 Q 500 parts per million?

23 A Or greater.

24 Q What percent is that?

25 A .05 percent.

1 Q .05. So it's not half of one percent but --

2 A 100th of one percent.

3 Q Okay.

4 A Excuse me. 500ths of one percent.

5 Q Okay.

6 Does Monsanto dispose of its own PCBs?

7 A No. There are only three improved
8 incinerators in the country. Monsanto is not one of
9 them.

10 Q Who has approved incinerators?

11 A Rollins Environmental Services here in Texas,
12 Chem Waste Management based in Chicago, and Ensco.
13 Their incinerators are in El Dorado, Arkansas. I think
14 there may be a new one in Kansas.

15 Q So Rollins, Chem Waste and Ensco are the ones
16 you're familiar with?

17 A Yeah. I think National Electric has one that
18 just got approved in Kansas.

19 Q Okay.

20 Now, when Monsanto replaces a transformer,
21 can it put a new PCB transformer back in the place of an
22 old one?

23 A There's no such thing as a new PCB
24 transformer. If we have a PCB transformer in storage in
25 one of our plants, it is legal to replace that

1 transformer in our plant, yes, with a PCB transformer.

2 Q If you don't have an appropriate PCB
3 replacement, what do you do? Is that your problem or --

4 A No, that's a plant problem.

5 Q Are there transformers available the plants
6 can use?

7 A Certainly.

8 Q You haven't shut down any plants because of
9 lack of PCB transformers or anything like that?

10 A No.

11 Q The only thing that Monsanto has shut down
12 relating to PCBs is its actual production. Correct?

13 A We also had an incinerator up till about 1977
14 at one of our plants that was associated with the
15 process. But that has also been shut down.

16 Q Okay. So Monsanto has stopped PCB
17 production, also stopped an incinerator it had for PCB
18 destruction?

19 A That's correct.

20 Q But it hasn't had any plant shutdowns,
21 failures or anything else because of unavailability of
22 PCB transformers?

23 A That's correct.

24 Q Okay.

25 We've got the disposal part of what the

1 regulations are. - What else do you have to do, if
2 anything, with regard to PCB electrical equipment?

3 A Okay. There's a scheduled phase-out by the
4 EPA to get rid of capacitors by 1988. So we work with
5 our plants to be sure they're aware that that phase-out
6 is approaching. There are inspection programs for
7 transformers. We don't do that. The plants have to
8 inspect their transformers, report any leaks and clean
9 up any leaks and dispose of the leaked material in
10 accordance with regulation. There was a transformer
11 rule in 1985 that required the removal by 1990 of
12 certain types of PCB transformers near commercial or
13 essentially --

14 Q Populated areas?

15 A Well, commercial buildings is the term used.
16 It's anything aside from an electrical substation or a
17 manufacturing plant. So some of our office buildings on
18 our plant sites would come into that definition of
19 commercial buildings. So we need to be sure that if we
20 have transformers which meet those criteria they're
21 removed. So there's a wide range of -- there's also
22 incidental generation rules. PCBs can be generated
23 unintentionally in other chemical processes. And our
24 plants have to be aware of those regulations.

25 Q How to dispose of that?

1 A That's correct.

2 Q Are you responsible or was your group
3 responsible, I guess is the better way to put it, for
4 making sure that if you had spills of PCB oils and
5 things like that your workmen handled them properly?

6 A The actual responsibility for that was at the
7 plant level.

8 Q Were you the source that provided the plant
9 with the information on what they had to do to handle
10 it?

11 A In general, that's true, yes.

12 Q Let me ask you a little bit about that. What
13 were workmen required to do in cleaning up, for example,
14 a spill of PCB oil?

15 A I think in general we would recommend that
16 they wear a -- well, certain of the requirements were --
17 are regulated by the EPA.

18 Q Okay.

19 A For instance, the type of gloves you use and
20 things like that. So that's regulated. But we would
21 recommend an impermeable glove, probably boots. If it's
22 in an enclosed area where the PCBs might be heated, we
23 might require respiratory protection.

24 Q Did Monsanto have any of these space suits
25 that I have seen sometimes in pictures for dealing with

1 these chemicals?

2 A Not to my knowledge, no.

3 Q So your recollection is that the
4 recommendations that you advised people about it then at
5 Monsanto were impermeable gloves, impermeable boots --

6 A If it was a major situation maybe disposable
7 outer wear.

8 Q Okay. All of that designed to ensure that
9 none of the PCBs come into contact with the Monsanto
10 employee?

11 A Basically that's correct.

12 Q And that's the goal of the regulations, that
13 none of the PCBs come into contact with the employee?

14 A That would be my understanding.

15 Q Did Monsanto have its own maintenance
16 departments where these transformers were serviced or
17 anything like that?

18 A I don't know the answer to that.

19 Q Okay. And you don't know, therefore, what --

20 A That would have been a plant --

21 Q I guess what I'm trying to find out is
22 whether they ever consulted with you about what was
23 required to meet regulations if plant people were going
24 to try to service PCB-containing transformers.

25 A I don't think they would have, no. Generally

1 we wouldn't have done that type of thing. You know, our
2 electricians are hook-up types, not service types.

3 Q Okay.

4 Did you make any recommendations on air
5 concentrations for PCBs where respirators might be
6 required or what level of air concentration would be
7 appropriate for your workmen to encounter?

8 A The only thing we would have done is make
9 sure they were aware of the OSHA requirement.

10 Q Nothing more than OSHA?

11 A No.

12 Q Okay.

13 Did you actually provide analytical testing
14 ability to ensure that any applicable requirements were
15 met in terms of air concentration?

16 A That would have been a plant responsibility.

17 Q Okay.

18 Now, with regard to this group of the
19 Chemical Manufacturers Association that kept up with
20 regulations related to environmental groups and things
21 like that, what sort of functions did your department
22 have vis-a-vis that group?

23 A Well, that was primarily John Craddock's
24 responsibilities. Basically it was just to work within
25 that group to work with other people interested in PCB

1 regulations to determine how best they could be drafted
2 or complied with on an industrywide basis.

3 Q Is the government still from time to time
4 issuing new regulations regarding PCBs?

5 A Yes, they are.

6 Q And I take it the chemical industry is trying
7 to influence what those regulations say.

8 A In a sense. Most of the work now is actually
9 done as a consensus group with industry and the
10 environmental groups like the Environmental Defense Fund
11 and National Resource Defense Council working together
12 to find compromise rules which then they present to the
13 agency as a proposal.

14 Q I guess the way this works is that the
15 Environmental Defense Fund proposes the stricter rules
16 and the Chemical Manufacturers Association proposes the
17 more lenient rules, they try to find a compromise and
18 submit it to the EPA.

19 A That would in general be true, but not
20 necessarily always true.

21 Q Okay. You're telling me there are some
22 circumstances where the Chemical Manufacturers
23 Association proposes more stringent rules and
24 regulations than the Environmental Defense Fund?

25 A That would be potentially possible for

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1 certain areas.

2 Q Any circumstance where that's ever happened?

3 A Not specifically, no.

4 Q In general?

5 A As I said, generally your original
6 characterization was correct.

7 Q Is the Chemical Manufacturers Association
8 seeking any way to overturn the federal ban on the
9 manufacture of PCBs?

10 A Absolutely not.

11 Q Is the Chemical Manufacturers Association
12 seeking in any way to overturn the regulations with
13 regard to safety practices and handling PCBs?

14 A To my knowledge, there are no regulations
15 that would fall under that, what you've just described
16 as safe practices and handling.

17 Q I see. Well, I thought you told me there
18 were some rules that had been issued.

19 A Well, but they're on the use of PCBs, not how
20 to handle them particularly.

21 Q Well, isn't use handling them?

22 A Not necessarily, no.

23 Q Well, let me see if I can make my question
24 one that you understand. Is the Chemical Manufacturers
25 Association group in any way seeking to overturn any

1 governmental regulations regarding the use of PCBs?

2 A Absolutely not.

3 Q Is the Chemical Manufacturers Association
4 seeking to overturn government regulations in any way on
5 the phase-out of PCBs?

6 A Absolutely not.

7 Q Now let me ask you about these calls you
8 would field from customers and others in this group.
9 What sort of information would be sought of Monsanto
10 about PCBs?

11 A Well, it's wide ranging, ranging from people
12 wanting to buy PCBs --

13 Q Who was the last person who called wanting to
14 buy PCBs?

15 A I don't know specifically. I've had calls
16 within the last few months of people wanting to buy
17 PCBs.

18 Q Do you recall who?

19 A No.

20 Q For what purpose?

21 A I think the last one was somebody who had
22 come across a reference in a research article on
23 plasticizers. In general the people that do that want
24 to buy Aroclor products, not knowing that they're PCBs.

25 Q I see. You don't get too many people who are

1 actually calling saying, "I'd like to get some PCBs"?

2 A No. We do get requests for analytical
3 purposes, yes. But in any case, Monsanto does not
4 supply those.

5 Q You do not?

6 A Absolutely not. We sold our existing stocks
7 to a company called Analabs. And they have those
8 materials, or did have them, for distribution for
9 analytical standards.

10 Q I see.

11 When was the last time Monsanto actually had,
12 and I'm now talking outside -- within transformers --
13 stocks of PCBs in its hands from which samples could be
14 obtained or anything else?

15 A Shortly after the 1977 shutdown of the
16 facility.

17 Q I see.

18 A When we shut down the facilities, the stocks
19 that were on hand were shipped with the rest of the
20 material for proper destruction in an incinerator.

21 Q So you get, from time to time, calls seeking
22 primarily samples for scientific research?

23 A That's correct.

24 Q You refer people to this Analab outfit?

25 A That's correct.

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1 Q What other sorts of calls do you get?

2 A We often get calls from people wanting to
3 know physical properties, people who are interested in
4 cleaning up a site, doing an engineering study, need to
5 know vapor pressures, viscosities, things like that.

6 Q Talking about cleaning up a site, Superfund-
7 type things?

8 A Well, not necessarily Superfund, but a site
9 where there has been a spill or a facility where there's
10 been a spill, that's correct.

11 Q Do you provide them information on not only
12 the technical properties of PCBs but also how to safely
13 handle them to avoid any human health hazards?

14 A If we are asked a question, in general what
15 we will do is send them a copy of the MSDS, which does
16 contain some safe-handling information.

17 Q Material safety data sheet?

18 A That's correct.

19 Q The MSDS, or material safety data sheet, that
20 you send them, is that a generic one for all PCBs or --

21 A That's correct. For polychlorinated
22 biphenyls, that's correct.

23 Q Do you give them any information besides
24 what's on the material safety data sheet?

25 A If they ask a specific question which we know

1 the answer to, we'll answer it. I can't give you an
2 example. There are a wide variety of them. But yes, if
3 they have a specific question, we try to answer their
4 question to the best of our ability.

5 Q Have you ever had somebody ask what
6 protective gear should be supplied to the workmen in
7 order to keep them from possibly being harmed by PCBs?

8 A Yes.

9 Q What's the answer you give to that question?

10 A I would generally say our position now is
11 that the people should wear disposable gloves, possibly
12 disposable outer wear, and if it's in a poorly
13 ventilated area respiratory protection might be
14 appropriate.

15 Q How long have you been giving that answer?

16 A How long have I been giving it?

17 Q Yes.

18 A Probably since September of 1985.

19 Q Since you got in that job?

20 A That's correct.

21 Q Do you know how long Mr. Craddock has been
22 giving that answer?

23 A I wouldn't know for sure, no.

24 Q You've never talked with him about that?

25 A Not when he started giving that answer, no.

1 Q Do you believe that answer is a sound answer
2 from a technical standpoint?

3 A I believe -- you know, I believe it is
4 probably a conservative, meaning overprotective, way to
5 treat a situation.

6 Q Do you believe it's an appropriate
7 conservative way to treat PCBs?

8 A That's correct.

9 Q And the way to handle any chemical is to
10 handle it conservatively. Wouldn't you agree?

11 A I would agree with that.

12 Q It's far better to be overprotected than
13 underprotected?

14 A That's correct.

15 Q You don't get hurt from being overprotected,
16 you can conceivably get hurt from being underprotected
17 around chemicals. Is that correct?

18 A That's correct.

19 Q So the answer that Monsanto gives is one that
20 is a conservative answer that would tend, if anything,
21 to overprotect?

22 A That's correct.

23 Q And you, at the time you were the product and
24 environmental safety manager, thought it appropriate to
25 give such conservative directions on safe handling of

1 PCBs?

2 A That's correct.

3 Q Okay.

4 What other sorts of calls do you get from
5 former customers or other groups?

6 A Well, we get calls from, for instance, the
7 media for just general information. Somebody wants to
8 do a story on PCBs and they want to know da de da dau
9 dau, what were they, when were they made, what were they
10 used for.

11 Q Historical information?

12 A Historical information. We've mentioned the
13 possibility if somebody has had a spill on a site or
14 something they'll call to get an MSDS. A lot of the
15 calls are just to get MSDSs. Because under the OSHA
16 rulings, the new regulations require that they have an
17 MSDS on site if they still have the equipment. So a lot
18 of the calls are simply to transmit MSDSs.

19 Q Why do calls for MSDS come to Monsanto
20 instead of the manufacturer for equipment?

21 A Because Monsanto has an MSDS for
22 polychlorinated biphenyls, and the manufacturers of the
23 equipment that contain those PCBs do not.

24 Q Why not?

25 A Well, in the first place, MSDSs are only

1 required for existing products.

2 Q Okay.

3 A Okay. Monsanto no longer makes PCBs. The
4 MSDS is primarily a courtesy that we have done for
5 former customers and people that have equipment on site.
6 There is no legal requirement to have an MSDS for
7 polychlorinated biphenyls.

8 Q I appreciate that. I'm still trying to find
9 out why it is that Monsanto would have MSDSs on PCBs
10 used as electrical fluids, and people like Westinghouse
11 and General Electric would not.

12 A I can tell you why Monsanto does. I cannot
13 tell you why the other manufacturers of the equipment do
14 not.

15 Q Okay. But you are aware of the fact that
16 they do not?

17 A I'm aware of the fact that they refer those
18 calls to us, yes.

19 Q I see. Is it logical to you that in part the
20 reason those calls get referred to Monsanto is because
21 Monsanto was the manufacturer and seller of PCB products
22 used as electrical fluids?

23 A There's certainly some logic to that, yes.

24 Q It is relatively customary in the chemical
25 business for people to look to the manufacturer and

1 seller of the chemical for basic information about it?

2 A That's correct.

3 Q And if you happen to be a customer purchasing
4 a chemical, even if you yourself make chemicals or use
5 chemicals, you are still likely to look to the seller of
6 that chemical for information on the particular chemical
7 you purchase?

8 A I would think that would be true.

9 Q Okay. And so it makes some sense to you why
10 GE and Westinghouse as purchasers of PCBs for electrical
11 fluid would refer people to Monsanto, the manufacturer
12 and seller, for information about the fluids?

13 A Except for the fact that the fluids also
14 contained materials that we didn't manufacture. But
15 that may be a small point.

16 Q Okay. Well, let's just stop and graze at
17 that point for a minute. What materials were contained
18 in PCB electrical fluids that Monsanto didn't
19 manufacture?

20 A Nothing in the PCB electrical fluids.

21 Q All right. Well, what materials were
22 contained in PCB-containing electrical fluids that
23 Monsanto did not manufacture?

24 A Chlorobenzenes that we've previously talked
25 about, as well as the scavenger materials.

1 Q From whom did Monsanto acquire the
2 chlorobenzenes?

3 A I have no definite knowledge of that.

4 Q Do you know whether Monsanto made it?

5 A No, we did not.

6 Q From whom did Monsanto acquire the
7 scavengers?

8 A I do not know.

9 Q Do you know whether or not Monsanto made it?

10 A I don't know for sure. My guess is we did
11 not.

12 Q Okay.

13 The final product, that is, electrical fluid
14 that may have contained chlorobenzenes and scavengers,
15 was put together by Monsanto and sent as a finished
16 product to the customer, was it not?

17 A In some cases that is true.

18 Q In most cases that is true, is it not?

19 A I don't know if it's most or not. I don't
20 really know the answer to that. I know it is true in
21 some of the cases, that we did some of it; I do not know
22 if we did all of it or most of it.

23 Q Do you know of any customer who blended their
24 own transformer fluids?

25 A I cannot give you a definite answer to that.

1 Q The answer is you don't know?

2 A That's correct.

3 Q Okay.

4 Now, to the extent that electrical
5 manufacturers purchased PCB-containing dielectric fluids
6 that also had other materials blended into them from
7 Monsanto, they would still be looking to Monsanto as the
8 seller of those fluids, would they not?

9 A I guess. You know, we were making those to
10 General Electric and Westinghouse specifications. So,
11 you know, obviously we were doing some blending. The
12 material had left our plant, and then, you know, your
13 question phrased that way, the answer is yes.

14 MR. FREEMAN: Dr. Kaley, let me ask you not
15 to guess anything. If you know the answers to his
16 questions or if you have an opinion based upon
17 reasonable probability, fine, but this is not a guessing
18 game.

19 THE WITNESS: All right.

20 MR. LACEY:

21 Q So with regard to questions about dielectric
22 fluids that contain PCBs but also other products,
23 General Electric, Westinghouse and others still refer
24 questions to Monsanto on those products. Is that
25 correct?

1 A Certainly to get copies of MSDSs.

2 Q Does Monsanto maintain MSDSs on electrical
3 products that had PCBs plus other things blended in
4 them?

5 A No, they don't.

6 Q When somebody called and asked for an MSDS on
7 a particular transformer fluid, did you determine
8 whether or not it contained anything other than PCBs?

9 A In general, no. We determined if it
10 contained PCBs, but --

11 Q And if it did you sent them an MSDS on PCBs?

12 A With the explanation that that is exactly
13 what it is, yes, it's an MSDS for PCBs.

14 Q And tell them it may or may not contain other
15 fluids that you don't have an MSDS on?

16 A If we know the facts relating to that
17 particular fluid, we would give them our information,
18 that's correct.

19 Q I see. Okay.

20 Was it your thought in providing MSDS on PCBs
21 that if the steps taken there to protect workmen from
22 the hazards of PCBs were followed it would also provide
23 whatever protection was necessary from the other
24 materials in a PCB-containing transformer fluid?

25 A I don't think that's specifically true, no.

1 Q Okay. So it may be that a transformer fluid
2 that contained something other than PCBs has a chemical
3 that needs greater caution exercised than would be true
4 for just the PCBs themselves. Correct?

5 A That's potentially true.

6 Q Okay.

7 Your information that this group gave out
8 about safe handling was for safe handling of PCBs?

9 A That's correct.

10 Q And if somebody were encountering a
11 transformer fluid that had other chemicals in it besides
12 PCBs that made it more hazardous than handling straight
13 PCBs, you would not be setting forth to give them advice
14 on what safe handling was required beyond what was
15 required for PCBs?

16 A That is correct.

17 Q Okay. Obviously they would need to get that
18 source of information from somewhere.

19 A That is correct.

20 Q And they had to look to others to get it?

21 A That's correct.

22 Q Okay.

23 Did you give any thought as you answered
24 these questions from others about safe handling,
25 especially in the clean-up phases, to what changes might

1 have occurred to the PCBs in use?

2 A Not particularly, no.

3 Q PCBs can be changed by use, can they not?

4 A Possibly slightly.

5 Q Okay. Is the answer you don't know or --

6 A In general, my answer would be that one of
7 the characteristics of PCBs was they were not changed by
8 use. So there is -- you know, I can't testify they
9 never were, but potentially, if there were changes, they
10 would be very slight.

11 Q Let's ask about that. Are you familiar with
12 the Binghamton, New York, office fire?

13 A Yes, I am.

14 Q That fire involved a building served by a PCB
15 transformer, did it not?

16 A Yes, it is.

17 Q That transformer had an unfortunate
18 experience, did it not?

19 A It was an unfortunate experience associated
20 with the transformer, that is true.

21 Q Well, the transformer blew up.

22 A To my understanding, that is not true.

23 Q What is your understanding of the transformer
24 involved in that office building in Binghamton, New
25 York?

1 A That there was a fire, associated with that
2 fire there was some leakage of PCB-containing
3 transformer fluids which then became involved in the
4 fire. I don't think there was an explosion.

5 Q The difference between an explosion and fire
6 is the rapidity of the burning?

7 A Yes.

8 Q You understood it was a slower-burning fire
9 than would be characterized as an explosion?

10 A That's correct.

11 Q Have you followed any of the literature that
12 has discussed the effects or the changes that occurred
13 to PCBs as a result of that situation?

14 A Yes.

15 Q There were studies made of that office
16 building after the fire, were there not?

17 A Yes, there were.

18 Q And several things occurred as a result of
19 that. No. 1, there were products found in the building
20 that were generated by the use of PCBs in the
21 transformer and then the fire that succeeded, were there
22 not?

23 A You're using "use" in a strange way. I don't
24 think that the fire was using PCBs.

25 Q Okay. Let me go at it another way, then. I

1 don't want to get hung up on the word "use." PCBs were
2 used in that transformer in that office building?

3 A That's correct.

4 Q That transformer had a problem that caused it
5 not to function correctly. Right?

6 A I don't know if that was the result -- I
7 don't know if a transformer malfunction was the
8 initiating event or not.

9 Q I'm talking about ultimately we wound up with
10 a transformer that didn't function the way you would
11 expect it to entirely.

12 A I guess that's true.

13 Q And one of the results of that was that PCBs
14 were involved in what you would characterize as a fire?

15 A That's correct.

16 Q. Okay. Now, measurements were made in that
17 building of the products of that fire, were they not?

18 A Yes, they were.

19 Q And there were products found in that
20 building that are furans. Correct?

21 A There were chlorinated dibenzofurans found in
22 the soot of that fire, yes.

23 Q There were also chlorinated dibenzodioxins
24 found in the soot of that fire, were there not?

25 A Yes.

1 Q It is readily apparent to you as a chemist,
2 is it not, that the feedstock or source material that
3 led to the formation of those dibenzofurans and those
4 dibenzodioxins were the PCBs in the transformer?

5 A I would not agree with that at all.

6 Q Where do you think those chlorinated
7 dibenzofurans and chlorinated dibenzodioxins came from?

8 A I think it is likely that some of the
9 chlorinated dibenzofurans came from incomplete
10 combustion of the PCBs. It is my understanding or my
11 belief that some of the chlorinated dibenzofurans and
12 the chlorinated dibenzodioxins came from the incomplete
13 combustion of the PCBs in that fluid.

14 Q It came from the fluid, not the PCBs?

15 A That's correct.

16 Q Let's go back to our drawings, then. If I
17 understand what you are saying correctly --

18 A Is this a good place to take a break?

19 MR. LACEY: Sure. Whenever you want.

20 [Recess]

21 MR. LACEY:

22 Q Now, at the point we took the break we were
23 discussing the office fire in Binghamton, New York. If
24 I understand your testimony correctly, it is your
25 opinion that in that transformer fire, No. 1, the

1 transformer contained fluids that had in it both PCBs
2 and trichlorobenzenes. Is that correct?

3 A That's my understanding, yes.

4 Q That's one of the types of transformer fluids
5 that was manufactured, that is, the PCBs manufactured
6 and blended by Monsanto and sent to customers, was it
7 not?

8 A Potentially, yes. I can't speak to that
9 particular fluid.

10 Q Who manufactured the transformer in that
11 fire?

12 A I don't recall specifically.

13 Q It was a U.S.-made transformer, was it not?

14 A That was my understanding, yes.

15 Q Monsanto was the sole manufacturer of PCBs in
16 the United States, was it not?

17 A For all practical purposes.

18 Q And for all practical purposes Monsanto was
19 the sole supplier to U. S. manufacturers of the fluid
20 used in transformers, was it not?

21 A They were the sole supplier of the
22 polychlorinated biphenyls used in those types of
23 transformers, that's correct.

24 Q So we can be assured that the PCBs that were
25 in that transformer were Monsanto PCBs?

1 A That's a safe position, I think, to take.

2 Q Okay. And the only open position is whether
3 or not the trichlorobenzenes that were also in that PCB
4 transformer fluid were bought by Monsanto and blended in
5 Monsanto facilities as a finished product before it was
6 sold to whoever manufactured the transformer versus
7 whether Monsanto sold only the PCB portion and somebody
8 else blended the fluid. Correct?

9 A Yes, that's correct.

10 Q And you do not know whether U. S.
11 manufacturers of transformer fluid containing PCBs
12 bought PCBs from Monsanto and blended their own or
13 whether they always bought the blends from Monsanto?

14 A I don't know for sure, no.

15 Q You do know that many times blends were
16 bought from Monsanto, do you not?

17 A Yes.

18 Q So certainly Monsanto made a transformer
19 fluid and sold it. Again, "made" at least involves
20 manufacturing the PCBs and then blending it. Made and
21 sold a transformer fluid that contained a blend of
22 chemicals like that in the office building in
23 Binghamton, New York?

24 A I would agree with that, yes.

25 Q Okay.

1 Now, it is your opinion that some of the
2 dibenzofurans found in that office building after the
3 transformer fire were generated by the heating of PCBs
4 in the presence of oxygen. Is that correct?

5 A Yes.

6 Q If I understand correctly, it is also your
7 opinion that some of the dibenzofurans found in the
8 Binghamton, New York, office building were generated as
9 a result of heating trichlorobenzene that was present in
10 that PCB-containing transformer fluid.

11 A That is correct.

12 Q So that there were two sources of chlorinated
13 dibenzofurans present in that building, one from the
14 PCBs and one from the trichlorobenzene?

15 A From my understanding of the literature, that
16 would be correct, yes.

17 Q All right. Was there any significant
18 difference between the chlorinated dibenzofurans that
19 came from the PCBs and the chlorinated dibenzofurans
20 that came from the trichlorinated benzene?

21 A I don't know the answer to that.

22 Q If we have two identical chemicals, the
23 feedstocks from which they started are immaterial, are
24 they not?

25 A If they were identical molecules, you could

1 not tell, that's correct.

2 Q Now, in your review of the literature, were
3 you ever able to determine which particular isomers of
4 the dibenzofurans you thought came from PCBs?

5 A No.

6 Q Were you ever able to determine which
7 particular isomers came from the trichlorobenzene?

8 A No.

9 Q These articles that you reviewed, did the
10 authors there conclude the source of the dibenzofurans?

11 A No. Not to my recollection.

12 Q Now, there was also dibenzodioxin present as
13 a result of that fire, was there not?

14 A That's correct.

15 Q And it is your opinion that that resulted
16 from the heating of trichlorobenzene in the presence of
17 oxygen. Correct?

18 A That's correct.

19 Q Is it your position that it is not possible
20 to heat PCBs in the presence of oxygen and attain
21 dichlorobenzene? I'm sorry. Obtain dibenzodioxin.

22 A I would use the term "highly unlikely."

23 Q Okay. Well, let me separate those two apart.
24 For example, there may be something that chemically is
25 impossible because the elements are not present.

1 Correct?

2 A If the elements are not present, I would
3 consider that chemically impossible.

4 Q Okay. Is it chemically impossible to
5 generate dibenzodioxin by heating PCBs in the presence
6 of oxygen?

7 A The elements are present. I can't determine
8 whether there would be circumstances which would make it
9 chemically impossible.

10 Q Okay. So you can't say one way or the other
11 whether it's possible or not?

12 A From one molecule, I would stick with my term
13 "highly unlikely."

14 Q Okay. And why is it in your opinion highly
15 unlikely that the heating of PCBs in the presence of
16 oxygen would generate dibenzodioxin?

17 A Because it would require the breakage of the
18 carbon-carbon bond and the biphenyl molecule. It's a
19 very stable bond. The literature says that
20 dibenzofurans are formed by cyclization of the PCBs.

21 Q By adding an oxygen?

22 A By adding an oxygen and closing the ring.

23 Q Which doesn't require breaking the
24 carbon-carbon bond?

25 A That's correct.

1 Q Just an added bond?

2 A That's correct.

3 Q Whereas going from a dibenzofuran to a
4 dibenzodioxin you have to break the carbon-carbon bond
5 and replace it with another oxygen-oxygen bond?

6 A That's correct.

7 Q I take it it is not your opinion that it is
8 highly improbable that dibenzofurans will be created by
9 heating PCBs in the presence of oxygen. Is that
10 correct?

11 A Would you restate that, please?

12 Q Yes. I take it that it is not your opinion
13 that the creation of dibenzofurans by heating PCBs in
14 the presence of oxygen is highly unlikely.

15 A Not if the temperature is correct, it is not
16 my opinion.

17 Q To put it in the positive, it is highly
18 likely that I will create dibenzofurans if I heat the
19 PCBs at the appropriate temperature in the presence of
20 oxygen?

21 A I wouldn't say it's highly likely, in that
22 the yields, I would think, would be extremely low.

23 Q I didn't ask about quantities yet. I'm
24 asking about the doing of it. If I heat PCBs to the
25 correct temperature in the presence of oxygen, it's

1 highly likely that will create some dibenzofurans, isn't
2 it?

3 A Small amount, yes.

4 Q So that's on the other end of the spectrum
5 from creating, in your opinion, dioxins. Correct?

6 A If the conditions are exactly right for the
7 formation of those furans, a small amount will be formed
8 probably, yes.

9 Q All right.

10 Now, what are the correct conditions for the
11 formation of furans from PCBs?

12 A I don't know the specific answer to that
13 question.

14 Q Do you have a range within which you believe
15 the conditions may be appropriate?

16 A I am aware of various ranges that have been
17 reported in the literature.

18 Q Why don't you report to me those various
19 ranges.

20 A Okay. There is a study out of Japan which
21 reports the formation at 300 degrees centigrade with
22 rapid destruction at 330 degrees centigrade.

23 There are reports from United States workers
24 which report for their laboratory conditions optimum
25 conditions, I think, at about 625 degrees centigrade,

1 again a fairly sharp peak, with destruction beginning to
2 occur rapidly at about 675, 700 degrees centigrade.

3 I think the Swedish workers have reported
4 optimum closer to 700 degrees centigrade.

5 Q So we've got one possibility at about the 300
6 centigrade level?

7 A That's correct.

8 Q Another possibility at about the 600
9 centigrade level?

10 A That's correct.

11 Q Another possibility about the 700 centigrade
12 level?

13 A That's my recollection, yes.

14 Q Are there any other --

15 A Not that I can recall specifically right now.

16 Q Can you give me a rough translation what 300
17 centigrade is in Fahrenheit?

18 A Very roughly. You can do it very roughly by
19 multiplying by two. So it would be about 600 degrees
20 Fahrenheit.

21 Q To be more specific, we need to what,
22 multiply by nine, divide by five and subtract 32?

23 A Add 32 if you are going from centigrade to
24 Fahrenheit.

25 Q Let's do 300. I'll get a calculator.

1 A I don't need a calculator. 300?

2 Q Yes.

3 A 582 degrees Fahrenheit.

4 Q Okay. And 600 I guess is going to be double
5 that.

6 A No. It won't be exactly double, it will be
7 close to double. 600 would be 1112, if I do my
8 calculations correctly.

9 Q Fahrenheit?

10 A That's correct.

11 Q Then to do 700 we'll add another 40 or so
12 degrees Fahrenheit?

13 A Sure.

14 Q Okay.

15 Now, were you able to determine from the
16 literature you read on the Binghamton, New York, office
17 fire what temperatures were generated there?

18 A No.

19 Q So all you know is that the temperatures must
20 have been in the range of either 300, 600 or 700 degrees
21 centigrade to have furans formed from PCBs. Is that
22 correct?

23 A Well, that's a wide range, obviously, if you
24 use all those values. And I would be hesitant to
25 directly correlate laboratory studies with an

1 uncontrolled study. But I think that's a relatively
2 safe supposition, that within that range at some time in
3 that fire there was a temperature within that range.

4 Q Are you saying we may actually find the
5 creation of dibenzofurans at PCBs at temperatures other
6 than measured in the laboratory?

7 A Well, since the laboratory values range over,
8 say, 400 degrees centigrade, I mean -- yes.

9 Q In the real world, it might be 400 degrees
10 centigrade?

11 A That's potential. I don't know. I don't
12 know the answer to that, I don't think anybody else
13 does.

14 Q Okay. That's just a matter about which
15 nobody can really offer an opinion that's conclusive?

16 A I think that's true.

17 Q Okay. Certainly you cannot offer an opinion
18 that's conclusive?

19 A That's true.

20 Q Okay.

21 Now, what about the temperatures at which
22 furans are created from trichlorobenzene?

23 A The studies that I have seen have been mostly
24 done at temperatures where PCBs are converted. And that
25 excludes the 300 number. That is primarily the 600 to

1 700 degrees centigrade range where the studies were
2 conducted and they were formed.

3 Q So you are assuming that the Binghamton, New
4 York, fire got up to 600 to 700 degrees centigrade in
5 order for some of the dibenzofurans to be created from
6 trichlorobenzene?

7 A Well, that goes back to my answer to your
8 previous question. I think what I would be willing to
9 say was that if the conditions were such that PCBs could
10 be converted to dibenzofurans that, based on my
11 understanding of the literature, the chlorines would
12 also be converted under those identical circumstances.

13 Q Do you know which chemical would be more
14 readily converted? If I had equal quantities of PCB and
15 trichlorobenzene, which would be more readily converted
16 to dibenzofurans?

17 A I don't know.

18 Q So it could be three times more likely to be
19 converted or vice versa?

20 A Based on what I know, yes. I don't know the
21 answer.

22 Q Might even be 100 to 1. Is that correct?

23 A I don't know.

24 Q That's my point. It's kind of like you ask a
25 guy: How far is it over to that building? Less than a

1 mile, more than ten feet.

2 A I wouldn't even venture a guess on what the
3 range is.

4 Q It could be anything and you wouldn't have an
5 opinion one way or the other about it?

6 A Not as I sit here today, no.

7 Q Okay.

8 And the only reason that you believe some of
9 the dibenzofurans were created from trichlorobenzene is
10 because you know that that is a possible combustion
11 product?

12 A It's been demonstrated in the laboratory.

13 Q And that's the same reason you believe that
14 dibenzofurans were obtained from PCBs, because it's been
15 demonstrated in the laboratory?

16 A That's correct.

17 Q Now let's talk about the dibenzodioxin. Have
18 laboratory tests been done to determine under what
19 circumstances PCBs can become dibenzodioxins?

20 A People have attempted to carry out that
21 conversion and failed.

22 Q I see. So it's your testimony that there has
23 been no scientific work to establish that PCBs can be
24 converted into dibenzodioxins. Is that correct?

25 A Under combustion situations that's my

1 understanding from the literature, yes.

2 Q What do you define as combustion
3 circumstances?

4 A Well, under conditions of elevated
5 temperatures in the presence of oxygen, laboratory
6 studies have demonstrated that dibenzodioxins are not
7 formed from PCBs.

8 Q Okay. And the opinions that you are
9 rendering in this case are based in part on your
10 understanding that there are no laboratory studies
11 establishing that dibenzodioxins can be generated from
12 PCBs. Correct?

13 A That's correct.

14 Q Okay. Just so I can be sure we understand,
15 let me hand you what has been marked as Exhibit No. 2
16 and ask if that is your opinion in this case.

17 A Yes, it is.

18 Q Okay.

19 Now, have there been laboratory studies done
20 to demonstrate that dibenzodioxin can be created from
21 the heating of trichlorobenzene in the presence of
22 oxygen?

23 A Yes.

24 Q And you have no quibble over those studies at
25 all?

1 A I don't know what you mean by quibble.

2 Q Well, do you accept them as correct?

3 A I accept that that is what they have
4 demonstrated in their experiment, yes.

5 Q Well, let me try to get at it this way. We
6 know in the real world, the Binghamton, New York, office
7 fire, that a mixture containing PCB and trichlorobenzene
8 which was heated in the presence of oxygen generated
9 both furans and dioxins. Correct?

10 A That's my understanding, yes.

11 Q So one or the other of those compounds under
12 heat in the presence of oxygen must generate
13 dibenzodioxins. Correct?

14 A I don't know that I would agree with that. I
15 mean I don't know what else was involved in that fire.

16 Q I guess that's what I'm trying to find out
17 about. You have now hit on exactly the point I want to
18 be sure of. I want to find out whether it's your
19 opinion as a Monsanto chemist testifying in this case
20 that trichlorobenzene in the presence of oxygen,
21 application of heat, will generate dibenzodioxins.

22 A In the laboratory that has been demonstrated
23 by laboratory experiments under conditions which were
24 conducive to that transformation.

25 Q And is it your opinion that same thing can

1 happen in the real world, outside the laboratory?

2 A It is potentially possible. That is a
3 potential possibility. That's also redundant.

4 Q We'll excuse redundancy.

5 A That is possible, yes.

6 Q I'm not an English major, I can say that, and
7 I'll excuse that. I do it, too, I'm sure.

8 Now, is it your opinion that in fact happened
9 in Binghamton, New York?

10 A I think it is likely.

11 Q Okay. A matter of reasonable probability?

12 A Yes.

13 Q Okay.

14 It does not require an atmosphere of pure
15 oxygen for there to be sufficient oxygen available to
16 convert PCBs into dibenzofurans under heat, does it?

17 A Okay. You said PCBs to dibenzofurans?

18 Q Yes.

19 A No, it does not require a pure oxygen
20 atmosphere.

21 Q And it does not require a pure oxygen
22 atmosphere to convert trichlorobenzene into
23 dibenzofurans under heat, does it?

24 A No, it does not.

25 Q And it does not require a pure oxygen

1 atmosphere to convert trichlorobenzene into
2 dibenzodioxins under heat, does it not?

3 A No, it does not.

4 Q In fact, the percentage of oxygen in the
5 regular atmosphere we breathe is sufficient to lead to
6 the formulation of dibenzofurans from PCBs. Correct?

7 A That would be my understanding.

8 Q The percentage of oxygen readily available in
9 the atmosphere we breathe is sufficient to allow for the
10 formation of dibenzofurans from trichlorobenzene under
11 heat --

12 A Based on laboratory studies, that is correct.

13 Q And that is your opinion?

14 A That's my opinion.

15 Q And am I correct it is also your opinion that
16 the percentage of oxygen readily available in the
17 atmosphere is sufficient to permit the transformation of
18 trichlorobenzene to dibenzofurans under heat?

19 A That is correct, based on my understanding of
20 the literature.

21 Q Okay.

22 And with regard to the percentage of oxygen
23 that's required for the transformation of either PCBs or
24 trichlorobenzene into either dibenzofuran or
25 dibenzodioxin under heat, all of those are based on your

1 reasonable scientific probability, are they not?

2 A Based on my understanding of the literature
3 that's been produced. That has been referred to.

4 Q Sure. And that's something that reasonable
5 chemists rely on --

6 A That's correct.

7 Q -- in forming their opinions?

8 A That's correct.

9 Q And giving their opinions?

10 A That's correct.

11 Q And you are relying on that in giving the
12 opinion that's Exhibit 2, are you not?

13 A That's correct.

14 Q Okay.

15 While you were in this job from May of '85 to
16 September of '86 did you ever get any inquiries about
17 what could be done with regard to safety around a
18 situation where PCBs or a transformer fluid containing
19 PCBs and trichlorobenzene had burned?

20 A I don't have any specific recollection of
21 that situation at all.

22 Q I see.

23 What were the steps taken to deal with the
24 Binghamton office fire, as you understand it?

25 A As I understand it?

1 Q Yes.

2 A My understanding was that immediately after
3 the fire was extinguished, clean-up was initiated, that
4 sometime later than that the soot was analyzed for
5 dibenzodioxins and dibenzofurans, they were detected at
6 low levels, at that point some sort of committee, I
7 think, was appointed to oversee the clean-up of that
8 building, set standards for the clean-up of that
9 building, and that that clean-up has gone on and is
10 continuing to go on.

11 Q That fire happened a number of years ago, did
12 it not?

13 A Yes, it did.

14 Q That building still hasn't been
15 satisfactorily cleaned up to allow people to reoccupy
16 it, has it?

17 A The last firm knowledge I have of that is as
18 of last summer. And as of last summer that is correct.

19 Q This is a what, 25-story office building?

20 A It's a tall office building.

21 Q It's been vacant for a number of years
22 because of the problems of cleaning up after a
23 combustion process with a transformer fluid containing
24 PCBs and trichlorobenzene?

25 A It's been vacant because of the lack of

1 agreement as to at what level or at what point it should
2 be reoccupied.

3 Q And that has to do with at what point can you
4 safely encounter these low levels of furans and dioxins,
5 doesn't it?

6 A It has to do with people's opinions about
7 that, yes.

8 Q But that's the issue that's kept it from
9 being reoccupied. Correct?

10 A Yes.

11 Q I mean the building didn't burn down, did it?

12 A No.

13 Q The fire was all contained right in the
14 transformer vault, wasn't it?

15 A That's correct.

16 Q On one portion of one floor of the building?

17 A That's correct.

18 Q Are you aware of any other fires similar to
19 the one at Binghamton, New York, that have occurred
20 where there's been a product of the combustion of
21 PCB-containing fluids?

22 A Yes.

23 Q Tell me about the others you are aware of.

24 A There was a fire in San Francisco,
25 California.

1 Q I see. Was that a transformer?

2 A Yes, it was.

3 Q Did it contain PCBs?

4 A Yes, it did.

5 Q Did it contain any other materials?

6 A To the best of my knowledge, it did not.

7 Q Where did the fire take place?

8 A [No reply]

9 Q The building.

10 A The building?

11 Q Yes.

12 A The name of the building was One Market --
13 well, it's referred to as One Market Plaza.

14 Q Okay. And what was discovered on the
15 analysis of the products of that combustion?

16 A Dibenzofurans were detected at low levels.

17 Q Similar to the levels found in Binghamton,
18 New York?

19 A As I recall, yes. I don't recall the exact
20 relationship.

21 Q I see. Were any dibenzodioxins discovered?

22 A Initial reports said there were. Later
23 reports have not confirmed that.

24 Q I see. So there's a dispute about whether
25 there were dibenzodioxins?

1 A I don't think a dispute exists anymore, I
2 think it's fairly well accepted certainly by EPA that
3 dibenzodioxins were not detected.

4 Q Was there a scientist who did a study and
5 reported that there were?

6 A I'm sure that information came from somebody.
7 Somebody did an analysis and reported them, but further
8 analyses have not substantiated that.

9 Q Have you reviewed the studies that found the
10 dioxins?

11 A No, I have not.

12 Q Have you reviewed the studies that didn't
13 find the dioxins?

14 A No. I'm relying on an EPA report.

15 Q I see. When did that fire take place?

16 A 1983, I think.

17 Q Did any of the products of combustion escape
18 outside the transformer vault?

19 A Yes, it did.

20 Q Was the building cleaned up?

21 A Yes, it was.

22 Q When was it cleaned up?

23 A Well, I'll give you what's a smart-ass
24 answer, I guess, but subsequent to the fire.

25 Q I guess what I'm saying is: Has the clean-up

1 been completed?

2 A Yes.

3 Q Has the building been reoccupied?

4 A Yes, it has.

5 Q Do you know the reason for the difference
6 between the One Market Square situation and the
7 Binghamton, New York, situation?

8 A Different people making the reoccupation
9 decisions.

10 Q Anything else that accounts for of it?

11 A Not that I know of.

12 Q Are you aware of any other similar
13 circumstances to Binghamton, New York, or One Market
14 Square in San Francisco?

15 A There's also been, I think, one or --
16 probably two fires in Tulsa, Oklahoma.

17 Q Okay. Tell me what you know about those
18 fires.

19 A Basically again transformer vault fires. In
20 both of those cases my understanding is that the fires
21 and soot were primarily confined to the transformer
22 vault areas. And I don't know about detection of
23 dibenzofurans or the composition of transformer fluid in
24 those cases.

25 Q You just know they were fires in transformer

1 vaults?

2 A Yes.

3 Q Were PCBs involved? Or do you know?

4 A Yes, PCBs were involved, yes.

5 Q But you don't know of any studies to detect
6 what the combustion products were?

7 A I don't have any specific recollection right
8 now.

9 Q Okay. Do you even know whether there were
10 studies on that point?

11 A I'm sure that measurements were made, yes.

12 Q And do you know whether or not you ever saw
13 the studies?

14 A It's possible I've seen them. I just don't
15 recall the results.

16 Q So they may or may not be in your file that
17 you have got?

18 A They are not in the file that I have, no,
19 they're not.

20 Q I see. So you did not review the literature,
21 if any, on those fires before you rendered the opinion
22 that's marked as Exhibit No. 2. Correct?

23 A No, I did not.

24 Q Okay.

25 Are you aware of any other similar situations

1 besides the Binghamton, New York, situation; the One
2 Market Square in San Francisco; and the two Tulsa,
3 Oklahoma, situations?

4 A Okay. There have been reported fires
5 involving PCB transformers in Chicago and Miami, and I
6 have no information about those other than I know that
7 they've been reported.

8 Q Okay. Are you aware of any other fires
9 besides Binghamton, New York; One Market Square, San
10 Francisco; two in Tulsa, Oklahoma; Chicago and Miami?

11 A Assuming you're talking about PCB transformer
12 fires, no, I'm not.

13 Q I thought these PCBs weren't supposed to
14 burn.

15 A The PCBs probably did not burn.

16 Q How come we have all these fires?

17 A Because there are other materials in
18 transformer vaults besides PCBs.

19 Q What is it that's burning? Do you know?

20 A I do not know specifically in particular
21 cases. I know there have been reports of stored
22 materials in the Binghamton situation. I don't know
23 about One Market Plaza. But certainly the transformer
24 rule requires removal of stored combustibles from
25 transformer vaults. So apparently the EPA had some

1 justification for feeling that those materials ought not
2 be in there. PCBs will not support combustion; they're
3 self-extinguishing.

4 Q What do you mean by that?

5 A They will not support a fire. If a fire is
6 applied to PCBs or something like that, the PCBs will
7 tend to self-extinguish.

8 Q So if I had a bowl of PCBs on the table here
9 in front of us and we got a fire started in it, it would
10 go out on its own?

11 A Absolutely. That's my understanding.

12 Q Okay. How did you say they destroy these
13 PCBs again?

14 A Excuse me.

15 Q How did you say they destroy these PCBs
16 again?

17 A They incinerate them.

18 Q Burn them?

19 A Yes. That requires fuel.

20 Q What's the fuel?

21 A I think in most cases they're mixed with
22 mineral oil before they're fed to the incinerators.

23 Q And then they burn up?

24 A Yeah. The fuel maintains the high
25 temperature to thermally destroy the PCBs, that's

1 correct.

2 Q And they are reduced to what, water and
3 carbon? Or what?

4 A Water and carbon dioxide and hydrochloric
5 acid.

6 Q So at some temperature they will burn?

7 A [No reply]

8 Q I'm just trying to reconcile in my own mind
9 how --

10 A Well, they can be incinerated. They can be
11 thermally destroyed by incineration. If I ask you if
12 that tin can will burn, you'll say no. But it can be
13 thermally destroyed. I can put it in an incinerator hot
14 enough that I can make it go away. So I'm trying to
15 differentiate between common understanding of the word
16 "burn" and intentional incineration at high temperatures
17 to destroy an organic compound.

18 Q Okay. And PCBs will not burn, they can only
19 be incinerated?

20 A That is my understanding, that's correct.

21 Q Okay. And I take it, then, when we create
22 dibenzofurans from heating PCBs it's not because we burn
23 them but just because we reach a temperature where we
24 can have a chemical transformation take place. Is that
25 correct?

1 A That is correct.

2 Q Now, that chemical transformation occurs at a
3 certain temperature in the presence of oxygen like as in
4 the atmosphere. Correct?

5 A That's a safe assumption, yes.

6 Q You've indicated that the conversion occurs
7 in what you've referred to as small quantities.

8 A That's correct.

9 Q Why is it that in the presence of oxygen in a
10 specific heating situation the conversion only occurs in
11 small quantities?

12 A Well, it's not a very likely reaction to
13 happen. It requires a specific set of conditions. It
14 requires the oxygen atom to be placed in a specific
15 position on the biphenyl ring, it requires that ring to
16 come in specific confirmation to the other ring to allow
17 the other bond to form. There's a lot of unlikely
18 things going on that are required for that
19 transformation to occur.

20 Q So if I have a random assortment of PCBs and
21 a random assortment of oxygen atoms in the atmosphere,
22 some will react and some won't?

23 A That's correct. My guess is that in the
24 atmosphere they will get far away from each other so
25 there it would not be likely.

1 Q If I had oxygen present in the process by
2 which I was manufacturing diphenyl from benzene, I could
3 also have some furans created, could I not?

4 A Would you repeat that?

5 Q Sure. If oxygen were present while I am
6 transforming benzene into diphenyl, I might also
7 generate some furans. Correct?

8 A I don't know. I really don't know what that
9 process is, whether it's high temperature -- I don't
10 know the process, so I really can't render an opinion on
11 that.

12 Q I see. You don't even know how Monsanto
13 makes diphenyl from benzene?

14 A No, I don't.

15 Q You're not familiar whether heat is even
16 applied to the process?

17 A That's correct.

18 Q I see.

19 Now, in the process by which diphenyl is
20 chlorinated to make PCBs, if oxygen is present, it's
21 possible to also create chlorinated dibenzofuran, is it
22 not?

23 A I would think that would be potential.

24 Q And as a matter of fact there was sufficient
25 oxygen present in the process by which Monsanto

1 manufactured PCBs that they were contaminated with
2 dibenzofurans. Isn't that correct?

3 A You're asking two questions. If you are
4 asking "Did Monsanto's PCBs contain low levels of
5 dibenzofurans?" the answer to that, with the exception
6 of Aroclor 1016, is "Yes, they did."

7 If you're asking "Were they formed from
8 excess oxygen in the process?" I don't know the answer
9 to that. They could have been formed from residual
10 dibenzofuran and the starting material, for instance. I
11 don't know which, or where they came from.

12 Q So you don't know whether it's created in the
13 manufacturing process or simply not well refined
14 initiating materials?

15 A Yes, that's correct. That's what I'm saying.

16 Q Okay.

17 Now, what relationship, if any, did you ever
18 have from a professional standpoint with evaluating
19 contamination in Monsanto's PCB products?

20 A I did some analyses related to that.

21 Q When did you do that analysis?

22 A I would guess in the mid-Seventies, '75, '76
23 time frame.

24 Q And when was the material that you analyzed
25 produced?

1 A I really don't know the answer to that.

2 Q Well, was it relatively current production
3 runs or was it stores of material produced 10 or 15
4 years earlier?

5 A I really don't know the answer. I don't know
6 specifically the answer to that.

7 Q I see. Is there some way that that answer
8 can be determined?

9 A I guess if the analyses can be retrieved and
10 the lot numbers are on the analyses somebody could make
11 that determination.

12 Q I see. What happened to the analysis you
13 did?

14 A My honest answer is that they're probably in
15 the hands of the law department at Monsanto.

16 Q Why would they be there?

17 A Because the law department has collected the
18 files relating to PCBs.

19 Q Even files that just involve scientific
20 analyses like you did?

21 A Yes.

22 Q Let me see if I understand this. While you
23 were in this job where you were answering questions for
24 people --

25 A Yes.

1 Q -- if they had a question that required you
2 to hit the books, so to speak, go back and look up the
3 answer, would you take the effort to do that?

4 A What books?

5 Q Well, I'm using that --

6 A The scientific literature?

7 Q No. I'm using it to say go back to the
8 source documents instead of shoot from the hip, what you
9 knew in your head. Do you follow what I'm saying?

10 I'll try another way. I'll take out the "hit
11 the books." I was trying to convey a concept, and it
12 didn't work very well.

13 If somebody asked you a question in May of
14 1985 through September of 1986 that you didn't know off
15 the top of your head -- okay? Do you understand that?

16 A Yes.

17 Q And it would be necessary for you to go back
18 and review Monsanto files to come up with the answer,
19 would it have been part of your job duties to go back
20 and look at files to come up with the answer for them
21 or, if it's a hard question, would you just say, "I'm
22 sorry, I can't answer it," and go on to the next easy
23 one?

24 A I think in general any questions referring to
25 research done on Monsanto PCB products that would come

1 to me would be referred to the law department.

2 Q I see. So those you wouldn't answer, you
3 would send them to the law department to answer?

4 A If it was specifically related to material
5 that was in Monsanto reports relating to PCBs, I would
6 refer them to the law department, that's correct.

7 Q And the reason you would refer them to the
8 law department is because all those documents wound up
9 in the law department, not in your hands?

10 A That's correct.

11 Q Was there some point in time where the law
12 department came to you and got from you the work you had
13 done on PCBs?

14 A Yes.

15 Q When did that happen?

16 A I don't have a specific recollection.
17 Mid-Seventies, around the time of the phase-out.

18 Q Just cleaned out your files?

19 A I wouldn't say they cleaned them out. They
20 searched the files, absolutely, yes.

21 Q You didn't look, yourself, to find the
22 documents, somebody from the law department actually
23 went through your files to find every PCB document?

24 A They asked me which of my files would have
25 information relating to PCB analyses, things like that,

1 looked through those and determined what was relevant to
2 their purposes, yes.

3 Q Did they actually leave you with the
4 documents and just take a copy or did they take the
5 original documents?

6 A As far as the research stuff, they took the
7 original documents.

8 Q Okay. After the law department got through,
9 did you have any documents that had anything to do with
10 PCBs left in your hands?

11 A Not from actual research-type documents, no.

12 Q Did you have any other documents?

13 A I had literature files.

14 Q Copies of articles that have been published?

15 A Uh-huh.

16 Q Anything else that they left in your hands
17 besides that?

18 A No.

19 Q Have you ever had occasion to want to go back
20 and see any documents yourself within Monsanto's files
21 relating to PCBs?

22 A Not that I can recall.

23 Q Okay. So that what that means is that the
24 opinion that you've rendered in this case has been based
25 solely on published literature or what you can remember

1 about the work you did more than ten years ago?

2 A That's correct.

3 Q The last time you saw the work you did was
4 more than ten years ago?

5 A I can't recall if I've seen a summary of
6 Monsanto's results within the last ten years or not.
7 The last time I saw my actual chromatograms and
8 calculations and stuff was probably in that time frame,
9 that's correct.

10 Q Or your report?

11 A That's correct.

12 Q Almost ten years ago?

13 A That's correct.

14 Q And I take it one of the reasons that you
15 didn't review that before you wrote the report
16 containing your opinion in this case is because it's not
17 real easy to go back to the law department and review
18 those documents.

19 A I haven't tried. I have no idea.

20 Q I see. You don't know whether you would be
21 welcome over there or not?

22 A That's true.

23 Q Are they located very far from where you are?

24 A No.

25 Q Down the hall?

1 A No. Across the street.

2 Q Across the street. But you've never, since
3 they took all your documents on PCBs other than
4 published literature, had occasion to ask to see any
5 document that's in the files of the company on PCBs?

6 A I have been asked to review documents that
7 are in there.

8 Q How did you happen to come into possession of
9 those documents?

10 A Well, they would say, you know, "We have this
11 document. Would you take a look at it? Is this your
12 work? What do you remember about this work?"

13 Q Okay. Good. When you reviewed those
14 documents, did they have any numbering system?

15 A I don't recall.

16 Q When was the last time you were asked to
17 review a document that the law department sent to you
18 about PCBs?

19 A Probably three or four years ago.

20 Q And why did they send you a document for
21 review at that time? What was the purpose of your
22 review?

23 A Shoot, I don't even remember.

24 Q I see. Did it occur to you that it might be
25 worthwhile for you to review the reports that you did

1 before you rendered the opinion you've given in this
2 case?

3 A No. My opinion is based on an accurate
4 recollection of the general theories. You know, my
5 opinion is that there are low levels of dibenzofurans in
6 PCBs. And that is my accurate recollection of the work
7 I did.

8 Q How many parts per million?

9 A They were in the two part per million range
10 total dibenzofurans.

11 Q Okay. On the specific lots that you
12 reviewed?

13 A That's correct.

14 Q And you do not know when those lots were
15 produced?

16 A No.

17 Q How many lots did you perform tests on?

18 A I would say a few. Probably less than ten.
19 Certainly less than ten.

20 Q Which Aroclor products did you review?

21 A As I recall, probably 1242 and 1254 and 1016.

22 Q So in 1975 or '76 you reviewed -- and by
23 reviewed we mean tested -- certain lots of PCBs that
24 were denominated by Monsanto, Aroclor 1242, 1254 and
25 1016?

1 A That's my recollection, yes.

2 Q And you found low levels, as you used the
3 word, of dibenzofuran contamination in the 1242?

4 A That's correct. As I recall.

5 Q You found low levels of dibenzofuran
6 contamination in the 1254?

7 A That's correct.

8 Q And you did or did not --

9 A My recollection is that we did not find it in
10 Aroclor 1016.

11 Q I see. How firm is that recollection?

12 A 70 to 80 percent.

13 Q Did it occur to you it might be worthwhile to
14 look at your reports so your recollection could be 100
15 percent before you testified in this case?

16 A No, it did not.

17 Q Are you aware of the fact these plaintiffs
18 have a serious interest in this case and it's very
19 important to them?

20 MR. FREEMAN: I'm going to object to the form
21 of the question. You are badgering the witness. I'll
22 instruct him not to answer.

23 Dr. Kaley, you don't have to answer that
24 question.

25 Go on to something else.

1 MR. LACEY:

2 Q Are you going to refuse to answer the
3 question?

4 A I will listen to my attorney, yes.

5 Q How sure are you about the percentages of
6 concentration of dibenzofurans in 1242?

7 A I'm sure that they were within a part per
8 million or so of two parts per million.

9 Q How sure are you of the levels of
10 contamination within 1254?

11 A Same.

12 Q A part per million one way either side of two
13 parts per million?

14 A Two parts per million -- one part per million
15 either side of two parts per million or so.

16 Q Okay. Just so we're clear on how parts per
17 million and things relate, two parts per million is
18 2,000 parts per billion. Is that correct?

19 A That's correct.

20 Q Now, you tested three different products,
21 and you may have had two or three different specimens of
22 those products?

23 A That would be my recollection.

24 Q So you tested nine different samples.
25 Correct?

1 A Something less than ten. I don't know
2 whether it was nine or seven or eight or -- something
3 less than ten, yes.

4 Q Is that something you would have been able to
5 determine from looking at your report?

6 A I'm sure I would have, yes.

7 Q And you don't know whether the samples of
8 1242 you tested all came from the same lot or from
9 different lots?

10 A I don't know specifically, no.

11 Q You don't know when those lots were produced?

12 A That's correct.

13 Q Now, we know that Aroclor 1016 was a product
14 that had to have been produced sometime after 1970,
15 don't we?

16 A That's correct.

17 Q So we know the 1016 you were testing could
18 not have been in a 1950s or 1960s product?

19 A That's correct.

20 Q Aroclor 1242 had been made by Monsanto for
21 many decades. Correct?

22 A Presumably. I don't know the exact date it
23 started, but it had been around a while.

24 Q Longer than 1016?

25 A Absolutely.

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1 Q Same thing for 1254?

2 A That's correct.

3 Q So it is at least theoretically possible that
4 somebody might have maintained a sample of Aroclor 1242
5 from the 1950s or '60s and had you test that?

6 A Obviously the way you put the question it's
7 theoretically possible, yes.

8 Q How likely is that, in your opinion?

9 A I have no idea.

10 Q I see.

11 Do you know whether or not as Monsanto
12 continued its production of PCBs in the 1970s it made a
13 strenuous effort to clean up its product?

14 A To my knowledge, no.

15 Q Are you aware of the fact that there were
16 contamination problems with Monsanto's PCB products?

17 A I don't know what you mean by contamination
18 problems.

19 Q Where contamination created a problem from
20 the sales perspective with the product.

21 A No, I didn't realize that.

22 Q Did you in your testing of your products that
23 you did attempt to determine whether they met electrical
24 specifications or not?

25 A No, I did not.

1 Q Would it surprise you to hear someone from
2 Monsanto saying in April of 1967, "We have high
3 electrical specs on overseas shipments set arbitrarily
4 but without assurance they could be met"?

5 A Would it surprise me?

6 Q Yes.

7 A I have no idea what that statement even
8 means.

9 Q How about this statement? Would you be
10 surprised to find someone in Monsanto saying in April of
11 1967, "We have a quality control program but no control
12 of quality"?

13 MR. FREEMAN: I object to the form of the
14 question. Mr. Lacey, if you've got a document or
15 something you want to identify to the witness or give
16 him some details, fine, but you're quoting out of
17 context. I don't know what the document is, the witness
18 doesn't know what it is. If you can be more specific in
19 your questions or define the parameters --

20 MR. LACEY:

21 Q Let's just work on that, then, Mr. Freeman is
22 so insistent about you looking at this document. It's
23 dated April 26, 1972, produced by Monsanto, written by
24 P. G. Benignus. Do you know him?

25 A I know the name, yes.

1 Q He was a marketing fellow with Monsanto
2 regarding PCBs, was he not?

3 A That's my understanding.

4 Q Document No. 98759876. Let me show you. Mr.
5 Benignus is writing with regard to aroclors of
6 electrical quality for overseas shipment. Correct?

7 A I haven't read it. May I have time to read
8 it?

9 Q Surely. Feel free. Take all the time you
10 need.

11 Have you had a chance to read it?

12 A Yes, sir.

13 Q Now, this is a memo from Mr. Benignus talking
14 about the electrical quality Aroclor that was being
15 shipped overseas from Anniston, Alabama. Is that
16 correct?

17 A That's correct.

18 Q And there were some problems with meeting the
19 quality of the competitor's products. Correct?

20 A That would be my assumption from reading this
21 letter, yes.

22 MR. FREEMAN: I'm going to object to this
23 line of questioning. The document speaks for itself.
24 If the witness has any peculiar knowledge outside the
25 document or if he was involved in any document

1 preparation or any of the routing of the document, he
2 can possibly testify to that. Other than that, the
3 document is there.

4 MR. LACEY: Fine.

5 Q Now, at this point in time, in 1967, there
6 were problems with contamination in the aroclors, were
7 there not?

8 A That's what the memo says.

9 Q And you certainly don't know of any
10 information from your personal knowledge that would
11 contradict that at all, do you?

12 A Not from my personal knowledge, no.

13 Q At the time you were doing your testing of
14 aroclors for dibenzofuran contamination, are you aware
15 of any problems that Monsanto was having from a
16 competitive standpoint with contaminants in its product?

17 A I've already answered I was not aware of
18 that, no.

19 Q So you weren't aware in 1975 or '76, when you
20 did your testing, of any contamination problems like
21 those mentioned by Mr. Benignus in this 1967 memo.
22 Correct?

23 A That's correct.

24 Q Now, one of the things that Mr. Benignus
25 noted was that Monsanto didn't know what the

1 contaminants in their production were. Isn't that
2 correct?

3 A That's what the memo says.

4 Q And in fact, to your knowledge, when you
5 tested for dibenzofuran contamination in 1975 or '76,
6 that was the first time Monsanto had ever undertaken
7 testing of its PCBs for that contaminant. Isn't that
8 correct?

9 A For dibenzofuran?

10 Q Yes.

11 A The capability didn't exist in 1967. It was
12 the first time we could have done it.

13 Q Okay. Well, let's stop there for a moment.
14 Are you telling me that it would not have been possible
15 to detect dibenzofurans at the rate of one part per
16 thousand in 1967?

17 A I have no idea.

18 Q Well, you just told me earlier it was
19 impossible to do it. The answer is you really don't
20 know that at all, do you?

21 A No, you said one part per thousand. That's a
22 thousand parts per million. There may have been some
23 other technique available that I'm not aware that could
24 have done that, I don't know.

25 Q Well, that's exactly my point. When you said

1 it's possible to test it for dibenzofuran contamination
2 in 1967, that's a statement that's a little too broad,
3 isn't it?

4 A Under the way you are interpreting it, yes.

5 Q What you are saying is the testing technique
6 you used in 1975 or '76 didn't exist in 1967?

7 A That's correct.

8 Q Okay. There may well have been other testing
9 techniques available in the Sixties. Correct?

10 MR. FREEMAN: To test at what levels?

11 MR. LACEY: Dibenzofuran contamination,
12 period.

13 A I don't know.

14 MR. LACEY: Okay.

15 Q So there may have been, there may not have
16 been. You just have no idea?

17 A That is true.

18 Q Okay. And you do not know whether Monsanto
19 ever attempted to test for dibenzofuran contamination in
20 the 1960s?

21 A No, I do not know.

22 Q Okay.

23 Now, do you know whether or not Monsanto made
24 any effort in the 1960s to respond to the problem of
25 excess contamination by cleaning up their production?

1 MR. FREEMAN: This is before you went to work
2 there. Do you understand the question, Dr. Kaley?

3 A Well, I mean you are going with the
4 implication that the impurities they were talking about
5 is dibenzofurans, which that memo has nothing to say
6 about. I don't know if they cleaned it up for -- I mean
7 they're talking about electrical testing. I don't think
8 that dibenzofuran contamination would affect the
9 electrical properties of the product. So that my guess
10 is that, you know, whether they went after the
11 impurities trying to clean up the electrical properties
12 I do not know.

13 MR. LACEY: Okay.

14 Q Let me stop and sort this out. No. 1, my
15 question didn't ask you about whether there was --

16 A I understand your question did not say that.

17 Q I'd like a straight answer to my question
18 first. Do you know whether or not Monsanto made any
19 effort to clean up its impurities problems that existed
20 in the 1960s?

21 A I do not know.

22 Q Now I do want to know your opinion as a
23 chemist about whether or not the presence of
24 dibenzofurans in PCBs will affect its electrical
25 properties.

1 A My opinion as a chemist would be that at the
2 levels that they are known to occur it would not affect
3 their electrical properties.

4 Q That is not my question.

5 A My opinion is that they would not affect the
6 electrical properties.

7 Q Let me get a clear question and answer. It
8 is your opinion that dibenzofuran contamination will not
9 affect the electrical properties of Aroclor. Is that
10 correct?

11 A That is my opinion. But I'm not necessarily
12 qualified to give that opinion, because I don't know
13 necessarily what affects electrical properties. But my
14 opinion as a chemist would be that it would not.

15 Q Okay. I just want the jury to understand
16 your opinions and what you believe so they can evaluate
17 your opinion. Because, for example, if there were
18 problems with electrical properties in the 1960s and in
19 fact excess dibenzofuran contamination could cause those
20 problems with electrical properties, that might be
21 significant.

22 On the other hand, if the presence of
23 dibenzofurans could not affect electrical properties,
24 that would seem less significant. That's basically what
25 you are telling me, isn't it?

1 A Yes.

2 Q And what you are telling me is that at least
3 it is your opinion that dibenzofuran contamination does
4 not affect electrical properties.

5 A That would be my understanding.

6 Q Okay. And if that understanding is wrong,
7 then the conclusion that would necessarily follow from
8 it that the electrical property problems in the Sixties
9 were not related to dibenzofurans could also be wrong.
10 Correct?

11 MR. FREEMAN: I don't think he rendered that
12 opinion at all. He said only that that memo did not
13 have anything to do with furans.

14 MR. LACEY: But therein, Mark, comes the
15 problem. And that's what I'm trying to get to the heart
16 of.

17 Q If electrical properties are affected by the
18 presence of dibenzofuran contamination, then the
19 contaminants involved in the Sixties could be
20 dibenzofurans, couldn't they?

21 A The answer to your question as structured is
22 yes.

23 Q Okay. Well, I'm the lawyer, I get to ask the
24 questions.

25 A I understand that.

1 Q I'm trying to ask the questions to understand
2 the situation.

3 Now, if in fact there were electrical
4 property problems due to contaminants, as Mr. Benignus's
5 memo seems to suggest, and dibenzofurans could affect
6 electrical properties, then without making measurements
7 of the Aroclor as it existed in 1962, you certainly
8 can't rule out dibenzofuran contamination of those PCBs
9 at a higher level than you measured in '75 or '76, can
10 you?

11 A One more time, please.

12 Q Yes. If in fact, contrary to what you
13 believe, dibenzofurans can affect the electrical
14 properties of Aroclor, then you can't rule out
15 dibenzofuran contamination as a source of contamination
16 that adversely affected electrical properties in 1967,
17 can you?

18 A I cannot, no.

19 Q And nothing about your test that you did in
20 1975 or '76 would rule out dibenzofuran contamination of
21 Monsanto aroclors in the 1960s as a cause of electrical
22 quality problems, would it?

23 A Not my specific tests, no.

24 Q Okay. And the opinion that you have rendered
25 in this case is based upon the tests that you did in

1 1975 and '76, isn't it?

2 A Which opinion are we talking about?

3 Q The letter marked as Deposition Exhibit No.

4 2.

5 A Okay. Well, there are several opinions in
6 there. You are talking about, you know, the one about
7 low levels of PCDFs?

8 Q Yes.

9 A It's based on that work, it's also based on
10 my knowledge of the literature and other people that
11 looked at the materials.

12 Q I see. And again all of that work was done
13 after the techniques that you used were developed,
14 weren't they?

15 A Yes.

16 Q And, again, unless that work was done on
17 aroclors as they existed in the 1960s, it has nothing to
18 do with the level of furan contamination in the 1960s
19 Aroclor, does it?

20 A If they were not done on those materials, it
21 relates to the materials they were done on, that's
22 correct.

23 Q That's just a very logical statement, isn't
24 it?

25 A I would say that that's true. I'm assuming

1 that, you know, if the process had not changed there was
2 no reason to believe changes, you could make some
3 extrapolations, but in fact it only relates to the
4 materials that were tested.

5 Q And in fact when you've got a salesman saying
6 "We've got a real problem with contamination that's
7 adversely affecting our sales," you can expect some
8 changes in the process to try to resolve the problem of
9 contamination, can't you?

10 A I do not know how that memo would be
11 addressed by the manufacturing people.

12 Q Well, let me ask it this way. Are you
13 representing to the jury that you don't believe there
14 were changes in the process to try to reduce the level
15 of contamination between the time you made your
16 measurements and PCBs produced ten years earlier?

17 MR. FREEMAN: I object to the form of the
18 question. This witness is an expert in analytical
19 chemistry and has already testified he's not an expert
20 in process engineering.

21 MR. LACEY: That's really not the question,
22 Mark. The question is about the bases for his
23 opinions and what he assumes or doesn't assume about the
24 facts that might underlie relevant portions of the
25 opinion.

1 Q Let me try to get at it another way, Dr.
2 Kaley. One of the things that Monsanto was concerned
3 about in the 1970s was having as clean a PCB product as
4 possible. Isn't that correct?

5 A With regard to what?

6 Q Anything in the product other than what was
7 specifically sought to be produced.

8 A I have no knowledge that was a specific goal,
9 no.

10 Q You're not aware?

11 A The answer to your question is, I don't know
12 of any specific program to sell as clean a PCBs as
13 possible, no.

14 Q You're not aware of the fact that the whole
15 purpose of developing 1016 was to even reduce the number
16 of isomers and homologs in the PCB products that were
17 sold?

18 A That's an entirely different question. That
19 was to make it more environmentally compatible. It had to
20 do with intentionally manufactured PCBs which were being
21 removed to make the material more environmentally
22 compatible.

23 Q My question doesn't relate to the whys, it
24 relates to the whats. And the question I've got is
25 whether you are aware that in the 1970s Monsanto made an

1 effort to produce as clean and homogeneous a product as
2 possible.

3 MR. FREEMAN: Objection. You've asked it
4 twice, he's answered it twice that he wasn't aware of
5 any specific problem. Now ask the question again, he'll
6 give you an answer again, and we're not going to talk
7 about it anymore.

8 MR. LACEY:

9 Q I guess I'm going to leave it that you don't
10 have any knowledge, then, that the whole purpose of
11 developing Aroclor 1016 was to get rid of even certain
12 isomers, higher-chlorinated isomers of PCBs.

13 A That isn't the way you phrased your original
14 question. Your original question was phrased to remove
15 impurities. The isomers removed from 1242 to make 1016
16 were not impurities, they were part of the product. The
17 process removed part of the product which was thought to
18 be environmentally noncompatible.

19 Q Okay. Now let me see if I can go back and
20 sort that one out. Aroclor 1016 has what percentage of
21 chlorine by weight?

22 A Approximately 41.

23 Q And Aroclor 1016 was designed to replace
24 Aroclor 1242, was it not?

25 A In capacitor applications, that is correct.

1 Q And Aroclor 1242 had approximately 42 percent
2 chlorine by weight, did it not?

3 A That is correct.

4 Q The two products were designed for the same
5 application and had approximately the same chemical
6 composition?

7 A That is correct.

8 Q What the difference was was that Aroclor 1242
9 as initially structured had a whole wide range of these
10 209 different variables of PCBs. While you were seeking
11 to produce a product that had three chlorine molecules
12 per PCB molecule, you wound up with a product that also
13 had four chlorine molecules, five chlorine molecules,
14 and six chlorine molecules. Isn't that correct?

15 A That is not correct.

16 Q I see. What's incorrect about that?

17 A There has never been and is no intention to
18 produce a material which is pure trichlorobiphenyl. A
19 pure isomer is a solid, white solid, it could not ever
20 have been used as a transformer or capacitor fluid. The
21 properties are based on the distribution among a variety
22 of isomers and congeners within that product. And
23 that's what gives it its properties.

24 Q And in going from 1242 to 1016, which have
25 approximately the same chemical composition, chlorine by

1 weight, what Monsanto sought to do was remove all of the
2 isomers that contained four or more of the chlorine
3 atoms?

4 A That is not true. Aroclor 1016 certainly
5 contains tetrachlorobiphenyls.

6 Q But only because the effort to take all of
7 them out was unsuccessful. Isn't that correct?

8 A No, I don't think that's necessarily true.
9 If you have more information on what the goal was than I
10 do -- I don't know what cutoff goal there was. I know
11 there was a distillation cut that removed the higher
12 chlorinated material. If there was a goal to get to
13 three, then you know more than I do.

14 Q Let's go back to that same point. The whole
15 point of 1016 was to reduce certain elements of PCBs in
16 that 1016 and to reduce the higher chlorinated
17 compounds. Correct?

18 A That is correct.

19 Q Okay. And you're telling me you are not
20 aware of whether there was any effort by distillation or
21 further refining to get anything out other than the
22 higher chlorinated PCBs. Is that correct?

23 A That's correct.

24 MR. LACEY: Let's go to lunch.

25 [Recess]

1 MR. LACEY:

2 Q Dr. Kaley, what were the levels of detection
3 in terms of parts per million of the equipment that you
4 were using in 1975 or 1976 to look for contaminants in
5 PCBs produced by Monsanto?

6 A It was approximately .1 to 1 part per million
7 for dibenzofurans and PCBs.

8 Q Can you translate that into parts per
9 billion?

10 A Well, it would be 100 to 1,000 parts per
11 billion dibenzofurans and PCBs.

12 Q So if dibenzofurans were present in the PCBs
13 at some level between 100 to 1,000 parts per billion,
14 you would be able to detect it?

15 A That's correct.

16 Q If it were present in levels somewhere less
17 than 100 to 1,000 parts per billion, you would not?

18 A That is also correct.

19 Q And so the question of whether furans are
20 there in the level of 500 parts per billion and detected
21 or not detected, it's hard to say?

22 A I would have to look at, you know, the exact
23 conditions of operation of the instrument on a given day
24 or something to determine what the detection limit is,
25 but the results would be reported as not detected at

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1 some given detection level.

2 Q Okay. Did the equipment have the ability to
3 detect the dioxin?

4 A Yes.

5 Q What were the limits?

6 A Similar.

7 Q 100 to 1,000 parts per billion?

8 A Something like that, yes.

9 Q So, depending on how the equipment was
10 running on a particular day, it's possible there could
11 have been dioxin present in the level of, say, 500 parts
12 per billion and shown up as not detected in the results?

13 A If the detection on the instrument for that
14 particular day was higher than that, or the conditions
15 or whatever, it would have been reported as not detected
16 at that detection level, that's correct.

17 Q I assume without your report you can't recall
18 what the reports of detection were on each experiment.
19 Is that correct?

20 A That is correct.

21 Q So it is possible that there was dioxin
22 present, simply not detected, as you would interpret the
23 results. Correct?

24 A That's conceivable.

25 Q Do you know at what level dioxin creates

1 health concerns?

2 A I do not.

3 Q Okay. Do you know at what level furans
4 create any health concerns?

5 A No, I do not.

6 Q With regard to the creation of dioxin, you
7 told me before the lunch break that you do not believe
8 it was likely that dioxin would be generated from an
9 existing PCB molecule. Correct?

10 A That's correct.

11 Q And the reason that you felt that was because
12 of the difficulty of breaking the carbon-to-carbon bond
13 between the two benzene molecules that make up the
14 diphenyl. Correct?

15 A That's correct. And then the literature that
16 proposes formation routes which involve simply
17 cyclization of that molecule for furans.

18 Q Now, you told me with regard to the formation
19 of furans, if I understood correctly, that it was
20 possible that furans could be formed during the stage
21 when benzene is being converted into diphenyl. Is that
22 correct, if heat is applied, oxygen is present?

23 A I don't think I said that. I said I didn't
24 have any idea whether it could be done.

25 Q I see.

1 A I didn't know what the process was. That's
2 my recollection.

3 Q Okay. You do not know by what process furans
4 could be created?

5 A No.

6 Q Okay. Would it be possible, in your opinion
7 as a chemist, that if oxygen were present and benzene
8 were heated for the purpose of generating diphenyl that
9 dioxin molecules might be formed at that point before
10 there is any carbon-to-carbon bond in a diphenyl?

11 A I would think it highly unlikely, but --

12 Q Why would you think that highly unlikely?

13 A You know, you've got the same process going
14 on. If you have the biphenyl molecule, whether it's
15 chlorinated or not, the oxygen would have to be applied
16 to the biphenyl ring.

17 Q No, that wasn't my question. Let me ask
18 again. Listen to my question.

19 A Okay.

20 Q My question was whether in the process of
21 having benzene and heating benzene in order to create
22 biphenyl, if oxygen were present, it would be possible
23 to create dioxin at that stage.

24 A I don't know the answer to that.

25 Q Okay. Certainly at that point in the process

1 of simply joining benzene molecules together we wouldn't
2 have the problem of breaking the carbon-to-carbon bond,
3 would we?

4 A No. If that's the process, then obviously
5 that bond doesn't exist.

6 Q And do you know what literature, if any, has
7 assessed whether or not dioxins are created in the
8 process of heating benzene in order to create diphenyl?

9 A No, I have no knowledge of any of that in the
10 literature, no.

11 Q So you don't even know if those studies have
12 been done?

13 A I certainly haven't seen them.

14 Q If they have, you don't know what they say?

15 A That's correct.

16 Q So you cannot rule out that process either
17 based on research or based on anything you personally
18 know outside of published research?

19 A Not based on my knowledge, no.

20 Q Okay. Or anything else?

21 A Well, I don't know what else there is but my
22 knowledge.

23 Q That's what I'm trying to find out. When you
24 tell me you can't rule it out based on your personal
25 knowledge, I want to know if there's some other way you

1 can rule it out.

2 A No, there's not. Only on my knowledge.

3 Q And you can't rule it out based on your
4 knowledge?

5 A That's correct.

6 MR. FREEMAN: But it is unlikely?

7 THE WITNESS: That's correct. My
8 understanding is that it would be unlikely, but I cannot
9 rule it out based on my personal knowledge.

10 MR. LACEY:

11 Q What is it that causes you to believe it is
12 "unlikely"?

13 A Well, I don't see how it could happen.

14 Q Let me see if we can try to work with that.
15 When you have benzene and you heat it in the presence of
16 a catalyst in order to create diphenyl, are you familiar
17 enough with the process to know that's how Monsanto --

18 A I do not know how they get from benzene to
19 biphenyl.

20 Q Well, can I ask you to assume with me that
21 the testimony in this case is that the way that Monsanto
22 creates biphenyl is by taking benzene and, through
23 pyrolysis, creating diphenyl, through heating, creating
24 diphenyl?

25 A Not through pyrolysis. Pyrolysis means

1 splitting. Pyrolysis is a splitting by means of fire or
2 heat. So I won't go along with the pyrolysis.

3 Q Okay. Let me show you the deposition of Dr.
4 William Richard Jr. That's the Dr. Richard that you
5 know at Monsanto, is it not?

6 A Yes.

7 Q I inquired of Dr. Richard about the process
8 for making diphenyl.

9 He went on to describe the creation of some
10 terphenyl when making biphenyl out of benzene.

11 And I asked him where this stuff came from.

12 And his answer was that it came from the
13 pyrolysis of benzene to biphenyl.

14 Now, are you telling me that that's
15 incorrect?

16 A That isn't how I would use the term
17 "pyrolysis," but, if that's the term he used, he's
18 certainly knowledgeable in the process. I would not use
19 pyrolysis in that sense.

20 Q In whatever sense he used it, let's assume
21 that Monsanto creates biphenyl by the pyrolysis of
22 benzene. What term would you use? Just so I can get
23 your nomenclature down for the way you describe it.

24 A I don't know how they do it, so I don't know
25 what term I would use. Heating or cooking or -- I don't

1 know. I mean, since I don't know how they do it, I
2 don't know if I would use a different -- what term I
3 would use. If they're really just burning the benzene
4 to make biphenyl, then maybe that's the appropriate
5 term.

6 Q Pyrolysis, at a minimum, indicates the
7 addition of heat, does it not?

8 A Yes, it certainly does that.

9 Q Okay. So if the benzene is being heated in
10 order to create the biphenyl and there is oxygen
11 present --

12 A Okay.

13 Q -- what's going to happen, at a minimum, is
14 that some of the hydrogen atoms that are attached to the
15 benzene ring are going to be removed from that ring.
16 Correct?

17 A I don't know. I suppose it's not impossible
18 that that would happen.

19 Q Well, it's almost necessary for there to be a
20 carbon-to-carbon bond to create biphenyl, isn't there?

21 A Oxygen would not be involved in that.

22 Q I didn't say oxygen.

23 A I'm sorry. I misunderstood you, then.

24 Q In order to create the biphenyl, one must
25 remove some of the hydrogen atoms from the benzene ring

1 so that the carbon-to-carbon bond can be formed.

2 Correct?

3 A Well, my understanding would be that would
4 happen basically in one step. But the hydrogen is
5 removed from two benzene rings to form biphenyl, that's
6 correct.

7 Q Okay. That's the process. And assuming that
8 Dr. Richard knows what he's talking about and he talks
9 about that taking place in pyrolysis, at least meaning
10 under heating, since one has to remove at least one
11 hydrogen atom from each benzene ring to allow the
12 desired benzene-to-benzene connection, we're going to
13 have the opportunity for something that could bond with
14 that carbon to make a bond. Correct?

15 A Okay. My understanding would be that there
16 is not a removal of hydrogen and then you have a
17 hydrogenless benzene floating around and then it finds
18 another hydrogenless benzene and bonds together. My
19 understanding is that there would probably be an
20 intermediate step where the two biphenyls -- excuse me,
21 the two benzene rings were pseudobonded to each other
22 and pseudobonded to the remaining hydrogens. It would
23 be more of a one-step process than what I conceive of
24 what you are intending.

25 Q But in fact there will be benzene rings that

1 have more than one hydrogen removed in the process, will
2 there not?

3 A Well, I don't think -- I'm not sure I'm
4 understanding what you're meaning by -- I don't think
5 they are physically removed and then just that ring with
6 no hydrogen is still floating around. I think the
7 bonding and removal is kind of a single step which goes
8 on together. So to form the terphenyl that would happen
9 twice.

10 Q That's my point. At least in that process we
11 have some of the benzene rings wind up losing more than
12 one hydrogen?

13 A I would suspect from what I read from what
14 little bit you showed me you don't get three benzenes
15 doing that. My guess would be that you have a biphenyl
16 and a benzene doing the same thing once the molecule has
17 been formed. But I don't know.

18 Q The point is that you will have benzene
19 molecules that initially had six hydrogens attached
20 which after the process have been reduced to four
21 hydrogens. Is that correct?

22 A Plus benzene rings.

23 Q But have two of the carbon atoms bonded to
24 something else?

25 A Yes.

1 Q Okay. And my question to you is: Given that
2 process, it is certainly possible, is it not, that in
3 place of a carbon-to-carbon bond where the hydrogen has
4 been removed there could be a carbon-to-oxygen bond if
5 oxygen was present?

6 A I could not say that is impossible. I don't
7 know enough about what's going on to say. I could not
8 say it's impossible.

9 Q Certainly. And if in fact oxygen is present
10 and the possibility of an oxygen molecule replacing a
11 hydrogen is present, then it is certainly possible to
12 create dioxin in that stage of the pyrolysis of benzene
13 into diphenyl, is it not?

14 A Well, from where we ended up to where you're
15 going would be a lot of unlikely steps. Again, I don't
16 think I can say it's totally impossible. From what
17 you've just described, I would suspect you would get a
18 diphenyl ether.

19 MR. LACEY: Okay. Let me see if we can
20 diagram the matter. [Drawing]

21 Let's get this marked.

22 [Exhibit 7 marked]

23 MR. LACEY:

24 Q Drawn on our sketch pad, identified as
25 Exhibit 7, two benzene rings, both of which have four

1 hydrogen atoms in place. Correct?

2 A That is what you have drawn.

3 Q Okay. Now, if in the process of the
4 pyrolysis of benzene into biphenyl one can in fact
5 result in the removal of two hydrogen atoms from a
6 benzene ring --

7 A What I've been trying to tell you is that
8 situation you have drawn as such, in my understanding of
9 organic chemistry, would not exist.

10 Q I see. But you don't even understand enough
11 about the process to know it's called pyrolysis?

12 A That's what he called it, that's what you're
13 telling me. I told you I didn't know that, that's
14 correct.

15 Q I'm relying on what Dr. Richard said. I
16 don't represent I'm an organic chemist. You are telling
17 me you cannot conceive of this situation happening?

18 A With those materials, that's correct.

19 Q Okay. I guess maybe to make this clear --
20 let's see if I can do it and note it. I'll put here
21 with kind of dots what we propose with these two oxygens
22 in the presence of these. And that's what you say is
23 impossible. Correct?

24 A No. I said you could not have those two
25 benzene rings sitting there in space with four hydrogens

1 on them and two carbons with no hydrogens on them.

2 Q Well, let me ask it this way. In your
3 opinion, is it possible or impossible that in the
4 pyrolysis of benzene into a hoped-for preparation of
5 biphenyl, if oxygen is present, I may create dioxin?

6 A I could not say it's impossible that you
7 would create a molecule of dioxin, that's correct.

8 Q Okay.

9 Now, in the measurements that you
10 performed -- or maybe it's not you. Your report
11 references Monsanto's PCBs being analyzed in the early
12 Seventies.

13 A That's correct.

14 Q And it references the level of detection then
15 achievable.

16 A That's correct.

17 Q What was the level of detection achievable in
18 the early Seventies?

19 A It was probably one to ten parts per million
20 by the people that were doing the work. That work was
21 not done at Monsanto.

22 Q I see. And do you have the reports of that
23 work?

24 A I have literature references to those
25 reports, yes.

1 Q Are they among the documents that you have in
2 your folder that you reviewed?

3 A Yes.

4 Q So I'll be getting those?

5 A That's correct.

6 Q Okay. And the early Seventies detection
7 limits -- and this was detection for dibenzofurans?

8 A That's correct.

9 Q What were the early 1970s detection levels
10 for dibenzodioxins?

11 A They would have been about the same. The
12 mode of analysis is similar, if not identical.

13 Q So in the early Seventies one would not have
14 been able to detect either furans or dioxins in PCBs at
15 levels that were less than one part per million?

16 A Not much less. You know, one in ten kind of
17 blurs. So you would not have been able to detect
18 dibenzofurans in PCBs at levels much below one to ten
19 parts per million.

20 Q And it's possible that on a given day you
21 might not detect it at ten parts per million?

22 A Given a particular sample and the particular
23 operating condition, that is conceivable.

24 Q Okay.

25 And with the detection limits that become

1 available in the mid-Seventies, when you actually
2 physically did your work, those detection limits were
3 cut roughly in half or so?

4 A Yeah, half to a factor of two to five to ten,
5 something like that.

6 Q So we drop from ten to one to one part per
7 million down to --

8 A .1 part per million, something like that,
9 that's correct.

10 Q Okay.

11 When was the first time that Monsanto itself
12 tested its PCBs for its contamination with furans?

13 A My understanding, although I don't have
14 firsthand knowledge, is that in the early Seventies some
15 preliminary investigations were made and were not
16 successful.

17 Q What do you mean by that?

18 A Well, there were interferences in the
19 analyses which wouldn't allow us to determine one way or
20 the other whether they were there.

21 Q I see. So was your work in the mid-1970s the
22 first time that Monsanto had actually tested and
23 determined the extent of contamination with furans?

24 A As far as I know, yeah. And it wasn't me
25 alone, it was me working with a group of people that

1 were doing different parts of the analyses. But that
2 was the first time --

3 Q Who was in the group that was doing that
4 analysis?

5 A Jim Mieure. And probably the sample workups
6 were being done by a gentleman named Orville Hicks.

7 Q When you say sample workups, what do you
8 mean?

9 A In order to analyze for dibenzofurans in
10 PCBs, the first step of the process is to get those two
11 materials separated physically in the laboratory. You
12 cannot inject PCBs into an instrument and measure the
13 dibenzofurans. It interferes. They give the same types
14 of signals, and you can't tell which is which, so you
15 have to, using chemistry, get the dibenzofurans away
16 from the PCBs. And that is not an easy process.

17 Q Well, explain to me how you get the
18 dibenzofurans and the PCBs away from each other..

19 A Basically, as the process developed, you
20 apply a solution of the PCBs onto a, say, one-inch
21 diameter column containing a solid material which under
22 given conditions holds on to the dibenzofurans but does
23 not hold on to the PCBs. And if you do this two or
24 three or four times you will eventually end up with a
25 solution of dibenzofurans, if they are present, that is

1 free enough of PCBs to allow them to be analyzed, allow
2 them to be measured.

3 Q In performing that separation is it assumed
4 that the material is 100 percent successful in trapping
5 the dibenzofurans?

6 A No. We would use some sort of quality
7 control measure to measure how much of the dibenzofurans
8 are trapped. We would probably take a known
9 dibenzofuran standard and put it into the PCB before we
10 started and measure that one as it came back out to tell
11 how much we had recovered from that process.

12 Q Well, what would be the margins of error in
13 that trapping process?

14 A Oh, early on, probably plus or minus 50
15 percent, a factor of two; later on, probably plus or
16 minus 20 percent.

17 Q I see. As a matter of fact, since you can't
18 measure the dibenzofurans in the PCBs directly, if for
19 some reason this separation process resulted in only
20 half of the dibenzofurans being trapped and therefore
21 measured, that would mean that your calculation of the
22 amount of contamination would be off by a factor of two?

23 A But we would know that because of the
24 material we put in ahead of time that we knew we put in.
25 We could measure that material. A single isomer rather

1 than a glob. And we could know the true answer.

2 - Q That would actually be based on measuring the
3 recovery of that particular isomer, though, wouldn't it?

4 A That's true.

5 Q Not the other isomers that might be the
6 mixture of the contaminants?

7 A That's true.

8 Q So you make some assumptions in that process?

9 A Some. As the techniques evolved into the
10 Eighties, they used several isomers. That can also be
11 done.

12 Q The point of my question is: There are a
13 fair number of assumptions and some room for error in
14 all these calculations?

15 A There are always errors associated with any
16 analytical measurement, that's true.

17 Q And when you are measuring at relatively low
18 concentrations in parts per million range, small errors
19 can make big differences in calculations. Correct?

20 A Those are relative terms.

21 Q Well, if we were to put a million balls in
22 this room and a million of them were white and we dumped
23 in -- what did you say you measured the levels at, two?

24 A Give or take one. That was why I said give
25 or take one.

1 Q Sure. Ten red balls.

2 A Okay.

3 Q To represent ten parts per million.

4 A Okay.

5 Q And we didn't count very well and there were
6 20 or 30, it wouldn't be perceptibly visibly different,
7 would it?

8 A [No reply]

9 Q You're at a very fine level.

10 A That's true.

11 Q And a small miscounting vis-a-vis the whole
12 large group can change the percentage of contamination
13 dramatically.

14 A That's absolutely true. But if you are off
15 by a factor of two, it's acknowledged that there's not
16 much difference between one part per million or two
17 parts per million. That's why I made my statement two
18 plus one. Because that builds in those uncertainties.

19 Q The analytical procedure used is not likely
20 to trap more in the process, is it?

21 A No.

22 Q So it's only going to err on the side of
23 counting too low rather than counting too high?

24 A That's not necessarily true. You get a
25 distribution about a mean.

1 Q But unless you just missed the measurement of
2 the fluids when you were making your dilutions, the
3 primary problem is going to be not trapping all of the
4 furans when you get ready to measure, and if you do
5 that, you're going to be undercounting what's there.

6 A That's true. But you will know how much you
7 are undercounting if you are doing the experiment
8 correctly.

9 Q Well, assuming certain assumptions you've
10 made about one particular isomer representing the whole
11 host of isomers of furans, that may be true.

12 A Yes.

13 Q How many isomers are there of furans?

14 A 135.

15 Q You use one?

16 A There's 135 congeners, to use the correct
17 term.

18 Q Is a congener the same thing as a homolog?

19 A I will not use the term "homolog."

20 Q One of the other Monsanto witnesses wouldn't
21 use the word "congener."

22 A We argue about it constantly.

23 Q Are they the same for us laymen?

24 A In my opinion, they're not.

25 Q Okay. Is there the old school and new school

1 of nomenclature?

2 - A I would say there's the accurate school and
3 the careless school.

4 Q What's the accurate school, congener?

5 A I would say there are 135 congeners.

6 Q And what's the inaccurate school?

7 A I do not use the term "homolog." Homolog
8 generally means the materials with the same degree of
9 chlorination, the same number of chlorination. I would
10 call that a congener class. Within each congener class
11 there are a given number of isomers.

12 Q If I translate that correctly, what you mean
13 is that out of all of the PCBs that have three chlorine
14 molecules attached, those are all isomers.

15 A That's correct.

16 Q If I compare a PCB with three chlorine
17 molecules versus one with four, those are congeners?

18 A That's correct.

19 Q Okay.

20 Now, there are 135 different congeners of
21 furans. Correct?

22 A That's correct.

23 Q How many different congeners are there of
24 dioxin?

25 A 75.

1 Q Okay. You know those numbers off the top of
2 your head.

3 A Absolutely.

4 Q You've worked with that quite a bit?

5 A Well, not quite a bit. I know those numbers
6 off the top of my head.

7 Q Have you testified a few times before?

8 A I've been deposed before.

9 Q How many times?

10 A Probably half a dozen.

11 Q All for Monsanto?

12 A All related to Monsanto; not necessarily for
13 Monsanto.

14 Q Well, all as a Monsanto employee?

15 A Yes.

16 Q Paid for the time you spent testifying in the
17 ordinary course of your business with Monsanto?

18 A Obviously I'm paid my salary.

19 Q That's what I'm saying. You didn't take a
20 vacation while you were working at Monsanto to testify
21 on behalf of Dow or Du Pont, did you?

22 A No.

23 Q All the cases you've testified for Monsanto
24 were where Monsanto was a defendant?

25 A That's not true.

1 Q What case was Monsanto not a defendant?

2 A I testified about a railroad spill in
3 Illinois. At that time Monsanto was not a party to that
4 suit.

5 Q Is that that suit that's been going on for
6 500 or 600 days now?

7 A It's another suit out of that incident.

8 Q Have you testified in the suit that's been in
9 trial for several years?

10 A Yes, I have.

11 Q Live at trial?

12 A Yes, I have.

13 Q How long did you testify up there?

14 A Three days, give or take.

15 Q Were you called by Monsanto or called by the
16 plaintiffs?

17 A Called by the plaintiffs.

18 Q I see. So you've testified on behalf of a
19 railroad that was a defendant in a case carrying
20 Monsanto products?

21 A Correct.

22 Q That was in Illinois?

23 A [No reply]

24 Q Or Missouri?

25 A The incident was in Missouri. I really don't

1 know where the suit was filed.

2 Q Fine. You testified in that case in Missouri
3 on behalf of the railroad that was carrying Monsanto
4 products, you testified on another occasion in that same
5 case on behalf of Monsanto?

6 A Yes.

7 Q All right. When else have you testified?

8 A Well, are you using depositions as the same
9 as testifying?

10 Q Sure. We'll lump them together, then
11 separate them out.

12 A Okay. I gave a deposition in two other PCB
13 cases that I can think of.

14 Q What cases were those?

15 A One involving a silo company in Michigan.

16 Q Michigan silo case?

17 A I don't think it was a Michigan silo, I think
18 it was Haley. I think that's the way the case was
19 captioned.

20 Q The other one?

21 A I've given a deposition in a case here in
22 Texas.

23 Q The Wright case?

24 A That's correct.

25 Q Were you designated as an expert witness by

1 Monsanto in the silo case in Michigan?

2 - A No.

3 Q Were you designated as an expert by Monsanto
4 in the Wright case?

5 A No.

6 Q Were you designated as an expert in these
7 cases in Missouri?

8 A No.

9 Q This is the first time you've ever done an
10 expert witness deposition, then?

11 A Where it was called that, yes.

12 Q I see.

13 What other cases have you testified in
14 besides the Wright case -- that was over in Beaumont,
15 too, wasn't it?

16 A That's where it was filed. Well, I don't
17 know. I think that's where it was. I'm not sure
18 whether it was Beaumont or Houston. I don't know where
19 it would have been tried.

20 Q Where did you testify in that case? Where
21 was your actual testimony?

22 A St. Louis.

23 Q I see. When did you testify in that case?

24 A Good question. Within the last six months.
25 I recall it being sometime before Christmas, but I don't

1 really know for sure.

2 Q Okay.

3 A I could very well be wrong.

4 Q Was your testimony in that case similar to
5 the testimony you are giving here?

6 A Similar areas of discussion, yes.

7 Q Different questions from lawyers, but similar
8 discussion?

9 A That's correct.

10 Q Your knowledge was about the contamination of
11 PCBs. Is that correct?

12 A That's correct.

13 Q And that was the subject matter of the
14 inquiry?

15 A That's correct.

16 Q And the other PCB case, the silo case, what
17 was your testimony about?

18 A Whether I knew anything about PCBs in silos,
19 which I did not.

20 Q Short examination?

21 A Very short.

22 Q And in the railroad spill case?

23 A Analytical chemistry, in particular material
24 involved in the spill.

25 Q And what was involved in the spill?

1 A Crude orthochlorophenol.

2 - Q And did that have anything to do with
3 contamination of that product?

4 A Yes, it did.

5 Q What were the contaminants?

6 A The one of concern was 2378
7 tetrachlorodibenzodioxin.

8 Q What we can refer to as dioxin generally.
9 Correct?

10 A What you refer to as dioxin.

11 Q Is it dioxin?

12 A It is a form of dibenzodioxin, yes.

13 Q I guess your testimony on behalf of both the
14 railroad and Monsanto dealt with the extent of the
15 contamination.

16 A My results on the analysis, yes, sir.

17 Q Did you analyze the actual material involved
18 in that spill?

19 A I don't think so.

20 Q You analyzed something else?

21 A Well, I analyzed -- my understanding is that
22 I analyzed a reserve of that material, a sample reserved
23 at our plant, but it was the material that went into the
24 material.

25 Q That specific lot of material?

1 A That's my understanding.

2 Q That situation is somewhat different than
3 this case, where you certainly have not tested every lot
4 of material that was sold to the employers of the
5 plaintiffs I represent.

6 A That's true.

7 Q And lots can vary from lot to lot, can they
8 not?

9 A Within certain ranges, yes, that's correct.
10 I mean this was -- the tank car stuff was crude
11 material, it was not intended as a product. So I would
12 expect the variability would be greater there than in a
13 product that we were marketing.

14 Q My point of that is: It wasn't just a
15 coincidence that what you actually sampled was the
16 reserve of the particular lot that was in that tank
17 cargo, was it?

18 A That's correct.

19 Q And certainly if one is going to give an
20 opinion about what the contaminants in a particular
21 product are, it's best to examine that particular
22 product one is testifying about?

23 A That's correct.

24 Q Okay.

25 Any other testimony you've given?

1 A Not that I can recall.

2 Q Were furans an issue in the case in Missouri,
3 or just the dioxin?

4 A Just the dioxin.

5 Q Okay.

6 Were furans an issue in the silo testimony?

7 A No.

8 Q Were furans an issue in the Wright case?

9 A Well, I thought that's what I was going to be
10 asked about, but I wasn't. There were a few questions
11 about that, yes.

12 Q Did most of the examination stay centered on
13 dioxin?

14 A No; that was even less mentioned.

15 Q Well, what was mentioned?

16 MR. FREEMAN: Not a lot.

17 A Not a lot. Whether I analyzed any samples
18 from the Forties, Fifties, Sixties, Seventies, Eighties.

19 MR. LACEY:

20 Q Similar questions to what we talked about
21 today?

22 A Similar.

23 Q And your testimony was the same, you analyzed
24 eight or nine or maybe ten samples in 1975, '76?

25 A And that I didn't know exactly where they

1 came from, what year.

2 Q What else was the examination about?

3 A I don't know. I really don't remember.

4 Q You are looking at Mr. Freeman. Did Mr.

5 Freeman present you as a witness in that case?

6 A No. But I know he has read my testimony in
7 preparation for this deposition.

8 Q Have you seen your testimony in preparation
9 for this deposition?

10 A Yes, I have.

11 MR. LACEY: I see.

12 I want a copy of that as well, Mark.

13 MR. FREEMAN: I'll give you a copy right now.
14 It's the only copy I've got with me; I'd like to get it
15 back.

16 MR. LACEY:

17 Q I guess in view of your testimony I
18 understand why you know very well the exact number of
19 congeners of dioxin. Why are you so up to date on the
20 congeners of furans?

21 A Well, I mean part of my job is to know the
22 environmental characteristics of materials such as
23 these, and part of my background reading -- if you read
24 something often enough, you are going to remember that
25 number. Every article on dioxin furan starts off with

1 the number of isomers of each of those particular
2 species.

3 Q Or congeners?

4 A Or congeners.

5 MR. FREEMAN: I'm going to have to retract my
6 offer. I made some notes on this last night. I'll be
7 glad to give you a clean copy. The direct questions by
8 Mr. Hobson went 30 pages.

9 MR. LACEY: There were some cross-examination
10 questions?

11 MR. FREEMAN: There were two, I think, and
12 then Herschel Hobson had a few more questions. The
13 entire deposition runs less than 39 pages. We'll be
14 glad to give you a copy.

15 MR. LACEY: Okay.

16 Q Anything else you reviewed besides your
17 deposition and whatever articles you looked at around
18 your desk?

19 A No.

20 Q Now, back to the point that we got off on,
21 there certainly can be some differences in
22 characteristics between any particular congener of PCBs.
23 Correct?

24 A Yes.

25 Q So different that some are solids and some

1 are liquids?

2 A What are we talking about?

3 Q PCBs. Different congeners of PCBs.

4 A No, generally they're all solids.

5 Q I see.

6 A I think maybe the monochlorobiphenyls are
7 liquids, but the individual polymers are all solids.

8 Q Substantially different characteristics,
9 isn't that correct, between different congeners?

10 A I don't know what you mean by substantial,
11 nor do I know which characteristics you're talking
12 about.

13 Q Well, there are a number of characteristics
14 that vary depending upon the congener. Isn't that
15 correct?

16 A There is variation in characteristics
17 depending on the congener, that's correct.

18 Q Is that also true for furans?

19 A Yes, it is.

20 Q Is that true for dioxins?

21 A Yes, it is.

22 Q And yet when you would do your test to try to
23 determine how well your material absorbed furans as a
24 part of your analytical process, you simply used one
25 specific congener out of 140 some-odd?

1 A I don't know that it was specifically one,
2 but one or a few. We certainly did not use all 135,
3 that's correct.

4 Q And the assumption was made that the
5 absorbative characteristics of the material being used
6 would work the same for all those congeners. Correct?

7 A That's correct.

8 Q And that is not an assumption which you've
9 tested out with 145 different isomers?

10 A 135. That's correct.

11 Q Okay.

12 And the same assumption was made with regard
13 to dioxin and the limited number of congeners there.
14 Correct?

15 A That's correct.

16 Q Again, it was not tested out?

17 A That's correct.

18 Q Okay. And if that assumption is incorrect,
19 then your calculation of the degree of concentration of
20 contamination is going to be low. Correct?

21 A No, it could be high. The one that we used
22 could be absorbed less than the ones that we didn't use.

23 Q If you absorbed less --

24 A Whichever way. I'd have to think through.
25 If you absorb less --

1 Q You can't absorb more than is there, can you?

2 A But you're talking about relative
3 absorbativity of the congeners. So if the congeners
4 there were absorbed better than the standard, then the
5 results would be high. If they were absorbed less
6 effectively than the standard, the final results would
7 be low.

8 Q I see. I'm sorry. I thought the absorbative
9 material absorbed it all. It didn't?

10 A You're the one that's telling me it didn't.

11 Q I was trying to find out. Did it absorb it
12 all?

13 A Of course not. You get 80 percent recovery,
14 70 percent recovery, something like that. You don't
15 recover it all and you don't necessarily know where it
16 went. There are various stages in this whole process
17 where you can get plus or minus type results.

18 Q I see.

19 A You're always looking at an average about a
20 mean, and absorbativity is one of the characteristics.

21 Q I see. So even with the particular congener
22 that was tested the absorbtive material was not 100
23 percent effective?

24 A That's correct.

25 Q Okay.

1 A That's the whole purpose of putting it in is
2 to measure how much of it you do recover.

3 Q I thought the purpose of putting it in was to
4 confirm that it would absorb it all.

5 A No, it's to determine how much you do
6 recover.

7 MR. LACEY: I see.

8 MR. FREEMAN: Then you measure how much you
9 don't recover at the end of it?

10 THE WITNESS: You measure how much you
11 recover, and you know how much you put in, so that gives
12 you your percentage of recovery. You compare it to what
13 you put in at the beginning of the experiment.

14 MR. LACEY:

15 Q Did you ever perform any tests with PCBs
16 produced by other companies?

17 A No.

18 Q Do you know which Monsanto facility the PCBs
19 that you measured were produced at?

20 A I certainly know that -- well, some of them I
21 am sure were produced at the Sauget plant.

22 Q That's the one in East St. Louis?

23 A That's correct.

24 Q And why do you know that?

25 A Well, as I recall, I can remember the lot

1 number of at least one or more of the samples started
2 with K, and that was our designation for that plant. I
3 can't recall whether all of them were K samples or not,
4 but --

5 Q I see. And what was the designation of
6 production from the Anniston plant?

7 A I don't even know the answer to that.

8 Q I see. Could the production from different
9 plants vary in the amount of contamination?

10 A I don't have any knowledge one way or the
11 other.

12 Q I see. You certainly can't rule that out?

13 A No. It's not impossible.

14 Q Did you ever perform any tests on PCB
15 materials produced by manufacturers other than Monsanto?

16 A Not to my knowledge, no.

17 Q I see. Do you have any information on the
18 relative degree of contamination of Monsanto's materials
19 versus those produced by other manufacturers? And I'm
20 speaking specifically now of furans and/or dioxins.

21 A Okay. There are literature references to
22 those relative levels.

23 Q What information do you have about that?

24 A First of all, the dioxins have not been
25 detected in anybody's PCBs. The dibenzofuran levels, in

1 foreign products -- the Japanese and German have been
2 looked at most -- are five to ten times higher. They
3 average five, ten, fifteen parts per million where
4 Monsanto's are consistently around two parts per
5 million.

6 Q Okay. Do you know what the level of
7 contamination was in PCBs produced in Monsanto's foreign
8 PCB plants?

9 A No, I do not.

10 Q Do you know when the materials that were
11 being tested from foreign manufacturers were produced?

12 A I don't have specific knowledge of that. I
13 don't know that the -- the literature says that, but I
14 don't recall.

15 Q So you don't know whether it was 1970-
16 produced material, 1975-produced material or anything
17 else?

18 A No, I don't really know.

19 Q Okay.

20 Now, as I read your opinion, Exhibit 2, it
21 relates to the contamination that would be in Monsanto-
22 produced PCBs when they leave Monsanto facilities. Is
23 that correct?

24 A Okay. Well, if you are referring to "I am
25 also familiar with the scientific literature relating to

1 analyses performed on PCBs produced both by Monsanto
2 Company and by other manufacturers," then I don't know
3 the history of those samples that have been reported in
4 the literature that were analyzed by other people other
5 than Monsanto.

6 Q Okay. So the analysis of samples of other
7 companies may be after use?

8 A Certainly some of that in the literature is
9 reported after use.

10 Q Now my question to you is: The analysis that
11 was done on Monsanto PCBs was prior to customer use?

12 A The analyses we did, that's true. The
13 analyses reported in the literature, I have no
14 knowledge.

15 Q You don't know one way or the other?

16 A That's correct.

17 Q Okay. Now, it is certainly conceivable, with
18 the recognition that you believe that PCBs in the
19 presence of heat and oxygen can produce furans.
20 Correct?

21 A Under certain conditions they've been shown
22 to produce furans, that's correct.

23 Q It is certainly possible that after use PCBs
24 produced by Monsanto may have a higher degree of furan
25 contamination than those measured by you at the plant?

1 A The literature says that is not true in
2 electrical uses.

3 Q My question to you, not trying to address any
4 particular use now, is whether, given the fact that in
5 the presence of heat and oxygen PCBs can create furans,
6 it is possible in use you may have a greater amount of
7 furan contamination than would be the case with the PCBs
8 leaving the Monsanto plant.

9 A My opinion is based on the literature, which
10 says that has not happened. Measurements have shown
11 that in use PCBs, referring to electrical equipment,
12 because that's where the measurements have been done,
13 the levels are not increased.

14 Q I see. Well, I guess maybe I need to come
15 back and get very clear. I'm not asking about
16 electrical use only. Do you understand I represent
17 plaintiffs who were exposed to PCBs other than in
18 electrical uses?

19 A Okay. I understand that. But my opinion
20 that I'm expressing to you is based not on personal
21 knowledge but my understanding of the literature, and
22 that is where that literature is from.

23 Q I guess what you're telling me is you have no
24 way to have an opinion about whether for uses in
25 hydraulic applications, where PCBs are exposed to heat

1 in the presence of atmosphere, additional furans may be
2 created than when the PCBs left Monsanto's plant.

3 A That's correct.

4 Q Knowing that in the presence of heat at the
5 300- or 600- or 700-degree level centigrade and oxygen
6 furans will be created, can you agree with me that if
7 that heat is present on PCB-containing fluids in the
8 open atmosphere it is likely that additional furans will
9 be created?

10 A I would say it's possible, I would not say
11 it's likely.

12 Q I see. And why do you say it's not likely?

13 A Well, I don't think the information is there,
14 and "likely" has a different implication than
15 "possible." I don't think there is much of a chance
16 that measurable amounts would be produced. That sounds
17 like a possibility more than a likelihood. Just my
18 interpretation of the words.

19 Q I see.

20 Now let me ask you about electrical uses.
21 What measurements are you familiar with where there have
22 been examinations of PCBs used as electrical fluid after
23 use?

24 A The one I have in mind is an article that
25 came out of Great Britain that looked at that specific

1 question.

2 Q And was that reviewing Monsanto PCB products?

3 A I don't know.

4 Q Was that reviewing electrical products
5 manufactured in the United States in accordance with
6 United States specifications?

7 A I don't know. I just don't remember the
8 details of which fluid it was. It was a transformer
9 fluid, and that's what I know.

10 Q Did that electrical use involve a situation
11 where there had been any type of fire or explosion?

12 A I think there had been an arcing situation.

13 Q Inside the transformer?

14 A Yes.

15 Q Where oxygen was present or absent?

16 A I don't think it specified.

17 Q Do you know enough about the way a
18 transformer is built to know whether or not there is
19 oxygen present inside, available?

20 A It's not intentionally in there, but they've
21 been known to have leaks that allow oxygen in. So I
22 don't know.

23 Q So you don't know whether or not oxygen was
24 available or not in the particular situations that were
25 measured?

1 A I don't recall, no.

2 Q I mean if a transformer is built correctly to
3 exclude oxygen and there's not a leak to allow oxygen to
4 get in, by definition you're not going to create any
5 compounds that need oxygen?

6 A That's correct.

7 Q So that's sort of a truism?

8 A That's correct.

9 Q And if that's what the measurements proved,
10 they proved what you could know intuitively without
11 measuring it at all, didn't they?

12 A To a certain extent. If you make the
13 assumption there was no leakage, et cetera, et cetera,
14 that's true.

15 Q Do you know whether all those things were
16 addressed in that study?

17 A I don't recall.

18 Q If in fact those studies demonstrate that in
19 situations where there are no leaks and the transformer
20 was properly sealed at the outset with no oxygen,
21 there's no additional furan created, that doesn't really
22 address the situation what may happen where there is
23 leakage allowing --

24 A Your question addresses whether in use fluids
25 had dibenzofurans. That was the question I was

1 addressing. I don't know the answer to your further
2 questions relating to that.

3 Q Now let's go back to the measurements that
4 were made at the Binghamton, New York, fire. Were you
5 able to, in your review of that literature, ascertain
6 whether it appeared that furans were present in a
7 greater concentration than would have resulted simply
8 from the furans initially present in the manufacturing
9 operation?

10 A I really don't recall the number specifically
11 enough to answer that at this point.

12 Q Well, what is your impression? Was it your
13 impression that additional furans were created in the
14 failure mode itself?

15 A They were created by the exposure of the --
16 my impression is that additional furans were created by
17 the exposure of the transformer fluid to the fire that
18 was burning.

19 Q Okay. So there would have been measurable,
20 in your opinion, after the fire, both the furans that
21 were present when the PCB product was manufactured plus
22 additional furans that were generated in the failure
23 situation?

24 A That would be my understanding of the
25 situation, yes.

1 Q And in part one of the reasons you would
2 understand that is because you also found other
3 chemicals present after the failure?

4 A That would be correct.

5 Q Specifically dioxin?

6 A That would be correct.

7 Q Okay. So that if Monsanto's PCBs are used in
8 such a way or in a situation where there can be a
9 failure in the presence of oxygen even of electrical
10 equipment, it is certainly possible that additional
11 furans will be formed. Correct?

12 A In a fire situation, that has been shown to
13 be true.

14 Q Okay.

15 A In other situations, I don't recall whether
16 oxygen was present or not. The experiments say they're
17 not formed under fire conditions, even under arcing.

18 Q But we don't know?

19 A That's correct.

20 Q And that would be an important thing to know
21 before making an analysis of whether --

22 A I would say that's true, yes.

23 Q Okay.

24 Let me ask you a little bit about your
25 publications. You published an article on

1 "Characterization of PCBs." Can you tell me what that
2 was about generally?

3 A Okay. That was coauthored with Jim Yarnell
4 Hicks. Basically that was an overview of the chemistry
5 of PCBs and their environmental behavior. It was a
6 general "Here's what PCBs are" type paper.

7 Q Not really any new research or anything?

8 A No.

9 Q And who was your coauthor?

10 A Jim was the one that was the lead author on
11 that.

12 Q He was at Monsanto?

13 A Yes. He was my supervisor at the time.

14 Q You did most of the work and he got the lead?

15 A No, he did some work.

16 Q Some work?

17 A We all contributed.

18 MR. FREEMAN: Remember you are under oath.

19 [Laughter]

20 MR. LACEY:

21 Q The next one I see here is "Tissue Residues
22 from Subacute Oral Feeding of PCB Dielectric Fluids."
23 Tell me about that.

24 A Okay. That was a study where rats were fed
25 fluids containing PCBs by a toxicological testing lab in

1 St. Louis. We analyzed the tissue levels of the rats,
2 the -- I guess it was muscle -- no, I think it was
3 fat -- fat tissue levels during the feeding period,
4 which I think was 30 days, and then during a 30-day
5 period when they were taken off the feed to watch the
6 levels decline in the tissues.

7 Q These were not long-term chronic feeding --

8 A No, shorter than chronic.

9 Q Thirty days?

10 A As I recall, it was a 30-day feeding and 60-
11 or 90-day clearance.

12 Q The publication date listed on this is 1967.

13 A What? If it is, it's a typo.

14 Q It says 1967. Maybe I'm misreading.

15 A It's a typo.

16 Q What should it be?

17 A I thought it was like '75. Yeah, I think
18 it's 1975. I'm sorry. That's a typo.

19 Q Okay.

20 A Entirely wrong.

21 MR. LACEY: Okay.

22 MR. FREEMAN: That's on the date of the
23 subacute feeding?

24 THE WITNESS: Let me be sure it's not
25 backwards. No, that's the date, and that's wrong.

1 MR. LACEY: Okay.

2 THE WITNESS: I'll get the correct date to
3 Mark and he can get it to you. It's 1975 or 1976. It's
4 probably '76. It's probably a transverse.

5 MR. LACEY: Okay.

6 Q The next article is "Determination of Trace
7 Amounts of Chlorodibenzo-p-dioxins and
8 Chlorodibenzofurans in Technical Grade
9 Pentachlorophenol," 1977.

10 A That's correct.

11 Q Tell me about that.

12 A That basically describes the technique that
13 was developed in our laboratories similar to the
14 technique for measuring dibenzofurans in PCBs, where you
15 have to get the dibenzodioxins and dibenzofurans away
16 from the pentachlorophenol so you can analyze
17 specifically. So it describes the techniques used to
18 clean up the sample, and then the measurement techniques
19 also.

20 Q Basically just describes methodology?

21 A Absolutely.

22 Q Next, "Activated Sludge Degradation of Adipic
23 Acid Esters"?

24 A Yes. That was basically part of the group
25 that I was in did biodegradation materials, and I would

1 be responsible then for the analyses of those samples
2 coming out of those biodegradation tests. Those are
3 kind of courtesy coauthored papers.

4 Q What does that mean?

5 A Most of the interpretation was done by other
6 people but I contributed by having done the method
7 analyses for the materials.

8 Q I see.

9 "Environmental Fate of Selected Phosphate
10 Esters." What's that all about?

11 A Same story. Looking at biodegradation. And
12 I think in that case there was actually some
13 environmental sampling done. I did the analysis on
14 those samples.

15 Q "An Environmental Assessment of Butyl
16 Benzyl" --

17 A Phthalate.

18 Q Okay.

19 A You asked me about phthalate esters this
20 morning.

21 Q Well, I can't spell it, I can say it.
22 Somebody else tells me what it is and I'm in good shape.
23 Tell me about that.

24 A Again, that was testing done in our
25 laboratories to evaluate biodegradation and accumulation

1 of butyl benzyl phthalate, and again I was responsible
2 for the analyses.

3 Q Most of these deal with your methodology more
4 than anything else?

5 A No question about it. Probably all of them.

6 Q "Application of Laboratory Freshwater Lake
7 Model in the study of LAS Biodegradation."

8 A Same story. I was doing analyses for those
9 studies.

10 Q What's LAS?

11 A Linear alkyl sulfonate.

12 Q "Environmental Concentrations of Butyl Benzyl
13 Phthalate."

14 A Same story. Probably the same information.

15 Q Just published again somewhere else?

16 A The last I heard it was still to be
17 published, but that's been several years. So I don't
18 know whether it's been published or not. The last time
19 I checked, it had not been published. It was a
20 conference, the proceedings were supposed to be
21 published. As far as I know, they've not been.

22 Q Then last, "Exposure Studies Relating to
23 Industrial Processes Containing Incidental PCB."

24 A Right.

25 Q What's that?

1 A That was an outgrowth of some work a group of
2 us did with the Chemical Manufacturers Association
3 looking at the incidental generation question, how to do
4 analyses for incidentally-generated PCBs. This was a
5 paper presented by a Dow person at an EPA PCB symposium
6 in 1983 and since published under the auspices of the
7 EPA. Again it's a method paper.

8 Q Says '82 here.

9 A I'm sure that's correct.

10 Q Is your only contribution to that just the
11 methodology for measurement again?

12 A Yes.

13 Q Okay.

14 A It's basically a methodology paper.

15 Q I guess I was going to ask you, you may or
16 may not know from your work at Monsanto, what levels of
17 PCBs in terms of parts per million are normally
18 generated in these incidental situations.

19 A The regulation requires I think it's two
20 parts per million per congener or per GC peak, which
21 could be congeners. So that's how the regulation reads.
22 So ours are less than that. In an analysis of PCBs in
23 those particular products.

24 Q And each peak may represent an isomer?

25 A Could represent one or more isomers or one or

1 more congeners.

2 Q So I could have two parts per million times
3 209?

4 A That's basically true, yes, if you've got a
5 technique that separates all 209 isomers or 209
6 congeners, which to my knowledge doesn't exist.

7 Q I see. How sensitive is your technique in
8 separating the different congeners into isomers, and how
9 many peaks can you separate them?

10 A My technique?

11 Q Yeah.

12 A I don't know that I have a technique.

13 Q Well, part of --

14 A The state of the art right now probably would
15 allow you to do something greater than 150 peaks if you
16 had all isomers present. I don't know the exact state
17 of the art now.

18 Q I see.

19 A But it's continuing to develop.

20 Q How many peaks did you find in doing your
21 measurements, for example, of the possible peaks on
22 furans? How many peaks did you identify?

23 A Oh, we didn't -- we weren't -- I mean we were
24 looking at -- we were using Pat Collin technology. We
25 knew we weren't separating all the peaks. We were

1 looking at like three or four peaks, which could have
2 been eight to twenty congeners. I have no way of
3 knowing. Because at that time the technology was not
4 there to do the high resolution work that's available
5 now.

6 Q So you were not able to identify any
7 particular congeners or isomers of furans?

8 A Absolutely not.

9 Q And the same thing would be true for any
10 analytical work you were doing in the mid-Seventies
11 looking for dioxins if you found anything?

12 A That is absolutely correct.

13 Q All right.

14 I notice on your CV, under the list of
15 Technical Expertise, you say "Environmental and health
16 aspects of industrial chemicals." I'm not quite sure
17 what you mean by the health aspects of industrial
18 chemicals as a matter of your expertise.

19 A I'm not sure I do either. Is that all it
20 says?

21 Q Right at the top, first listing.

22 A I guess basically what that means is that I
23 have a general understanding from literature of what the
24 general health aspects are and can relate that to other
25 people within Monsanto. In other words, I don't have

1 expertise or personal on-hand things, but I can
2 communicate issues related to health of a variety of
3 chemicals.

4 Q With regard to PCBs, does that mean you've
5 read papers on Yusho, Yucheng, things like that?

6 A Right.

7 Q But you don't consider yourself an expert in
8 those issues?

9 A No.

10 Q Not qualified to offer opinions about that to
11 anybody?

12 A I wouldn't think so.

13 Q Except company employees?

14 A I would say that's true.

15 Q What opinions have you offered to company
16 employees who have asked you about the potential health
17 effects of PCBs?

18 MR. FREEMAN: That's an awful broad question,
19 David.

20 MR. LACEY: I want to find out what he said.

21 Q Let's narrow it down. Have you ever been
22 asked as part of your job --

23 A My name is on the MSDS. I feel that PCBs,
24 high levels, can cause skin problems and may cause liver
25 problems, and I don't feel there's necessarily anything

1 in the literature which gives substantial support to any
2 other health effects.

3 Q Okay. That's your personal opinion?

4 A Yes.

5 Q Okay. Have you confirmed that opinion with
6 anybody in Monsanto who you think is more experienced in
7 that?

8 A I don't think our epidemiologist has a
9 severely different opinion on that.

10 Q Who is your epidemiologist?

11 A William Gaffey.

12 Q Have you talked with him about those issues?

13 A Well, I haven't sat down and said, "Let's
14 talk about these issues." But he has had inputs into
15 various positions we've discussed. And he's done a
16 review of the epidemiology which is published.

17 Q Have you ever had any questions raised by
18 Monsanto employees that have been directed to you with
19 regard to health effects and what your opinion was?

20 A Monsanto employees? I don't think so, no.

21 Q Have you had questions raised by employees in
22 other companies?

23 A Not by employees, no.

24 Q Have you had questions --

25 A I mean not that I know of. Somebody could

1 have called and I would have answered the questions.

2 Q What questions have you had raised?

3 A Well, I think basically people would call
4 after a spill and say: What are the health effects?

5 We would say basically that our feeling is
6 that the health effects are potential skin problems
7 after long-term heavy exposure, potential for liver
8 effects.

9 Q I see.

10 Did you actually get involved in handling
11 PCBs at all in the analytical work you did?

12 A Certainly I weighed out standards and things
13 like that, sure.

14 Q Did you protect yourself from physical
15 contact with it?

16 A I was working with small amounts. I don't
17 think I -- I don't recall taking any specific
18 protection, no.

19 Q Did you get any on you?

20 A Probably. Small amount.

21 Q You also list technical expertise in
22 polychlorinated biphenyl issues. How does that differ
23 from environmental and health aspects of industrial
24 chemicals?

25 A Obviously part of my responsibilities over a

1 year were more related to PCBs, so it's a more specific
2 thing since that's what my job responsibility was.

3 Q That's this period of from May of '85 to
4 September of '86?

5 A That's correct.

6 Q You've got a section listed "Application of
7 Good Laboratory Practices." What is that?

8 A Okay. That's how you do analyses so that you
9 know what your accuracy is and your precision is, and
10 how you build check samples into your procedures to be
11 sure that the results you're reporting out are
12 meaningful.

13 Q That's what you've --

14 A That it's as correct as possible. Quality
15 control.

16 Q Previously in the methodology you developed
17 there was an effort to apply good laboratory practices?

18 A That's correct.

19 Q Okay.

20 When did you first speak with Robert Hall?

21 MR. FREEMAN: In relationship to this case?

22 A In relationship to this case?

23 MR. LACEY:

24 Q Well, yeah. I didn't realize you were --

25 A Well, you've already been told I was deposed

1 in the Charles Wright case.

2 Q I haven't seen the transcript.

3 A He was lead attorney on that.

4 Q Oh, okay. Well, let me back up, then. Let's
5 go back to the Wright case. When did you first talk to
6 Mr. Hall in some case other than this case?

7 A Probably sometime last fall.

8 Q And did he contact you?

9 A I don't recall.

10 Q Were you asked to take some role in that
11 case?

12 A I was asked to talk to Mr. Hall about
13 generally what are PCB-type questions, yeah.

14 Q Was this before you were identified as a
15 witness in the case?

16 A I don't know how my witness in that case came
17 up. I don't know whether I was identified — I don't
18 know all the ins and outs of identification and stuff.
19 I certainly talked to him before I knew that I was going
20 to be deposed, yes.

21 Q Okay. You never rendered a written report in
22 that case, however, like the one you've written here?

23 A No.

24 Q Was Mr. Hall present when you were deposed in
25 that case?

1 A Yes.

2 Q When did you first speak with Mr. Hall about
3 this case?

4 A I'm not sure I have spoken to Mr. Hall about
5 this case.

6 Q Well --

7 A I was told by Mr. Bistline at Monsanto that I
8 was going to be designated as a witness and that I
9 should write a letter to Mr. Hall outlining my position.

10 Q I see.

11 A Which I did. I don't recall whether I have
12 spoken to him on this case particularly or not.

13 Q Well, the reason I asked that is the first
14 sentence in your letter says, "This letter constitutes
15 my report to you in the above-captioned matter."

16 A I was told by Mr. Bistline, who is Monsanto's
17 attorney, that I was going to be offered as a witness in
18 this case and that I should write a letter to Mr. Hall,
19 which is that result.

20 Q Okay. What were you told about the matters
21 on which you would be a witness?

22 A Well, we discussed what areas, you know, they
23 felt they needed my expertise in, and those are the
24 areas I've addressed. Basically the levels of
25 dibenzofuran contamination in PCBs and the question of

1 furan and dioxin furan formation in PCBs.

2 Q And those were the only areas in which you
3 were asked to assist Monsanto by testifying. Is that
4 correct?

5 A By testifying, yes.

6 Q Well, is there some other way you were
7 supposed to --

8 A Well, as I told you, previously I've talked
9 to Mr. Hall just to give general background into PCBs in
10 general.

11 Q But that's got nothing to do with this case?

12 A That's true.

13 Q I'm trying to find out about this case.

14 A In this case, that's the extent of my
15 contribution.

16 Q Okay.

17 What are the current detection limits for
18 furans?

19 A In what?

20 Q Well, how about PCBs?

21 A In PCBs? My guess would be that per congener
22 they're probably down in .1 to 1 part per billion per
23 congener now.

24 Q What are the current detection limits for
25 dioxin?

1 A They would be the same.

2 Q Do you know whether anybody has attempted to
3 duplicate the studies that you did in the mid-Seventies?

4 A Oh, there have been reports, you know,
5 periodically up till the present time of people looking
6 at furan and dibenzodioxin levels in PCBs, yes.

7 Q Has Monsanto itself undertaken using the new
8 methodology to ascertain the level of furan and/or
9 possibly dioxin contamination in its PCBs at the level
10 down to one part per billion.

11 A No, they have not. As far as I know.

12 Q Your laboratory does have the capability of
13 using these new techniques now, does it not?

14 A Well, by me you mean Monsanto. A Monsanto
15 laboratory has those capabilities, that's correct.

16 Q Okay. But no studies have been undertaken
17 since the ones you did in 1975 or '76?

18 A Not to my knowledge.

19 Q Okay. Were new studies undertaken, those
20 studies would have the ability to answer to a level of
21 measurement several hundred times lower than the one you
22 used, the concentrations of furans and/or possibly
23 dioxins, would they not?

24 A I'd have to think through the exact number.
25 It would certainly be lower by a factor of ten to a

1 hundred, maybe more. Because the separation techniques
2 are so much better now. I don't really know how that
3 would compare to my technique which lumped lots of
4 congeners in the same peaks.

5 Q Your technique -- I'm talking about the '75,
6 '76 technique, lumped what, 134 furan isomers into four
7 peaks?

8 A I have no idea how many isomers were there
9 or congeners were there. I really don't know how many
10 peaks we got either. I suspect we didn't have that
11 number of congeners, nor do I suspect we had that few
12 peaks. We probably had more peaks than that.

13 Q In any event, your techniques were able at
14 that point to measure down to several hundred parts per
15 million?

16 A No, several hundred parts per billion
17 probably, hundred parts per billion per congener
18 probably.

19 Q Several --

20 A Total a hundred to a thousand parts per
21 billion total dibenzofurans.

22 Q And now we're talking about techniques that
23 can measure down to one part per billion per congener?

24 A I would think so, yes.

25 Q And there is a significant factor difference

1 between those two?

2 A Ten to a hundred, a few hundred possibly.

3 Q Certainly several hundred is possible?

4 A I'd have to think through it more.

5 Q I see.

6 How long did it take to perform your studies?

7 A Well, that's hard to say. I mean it wasn't:

8 I'm going to do this and I'm not going to do anything

9 else and then I will be done. I would say to take a

10 PCB, go through the whole technique of analyzing,

11 clean-up, analysis, data calculation, et cetera would be

12 a period of two to three days per sample.

13 Q Okay. And that involves how many people in

14 that process?

15 A Well, it could all be done by one. Generally

16 when we were doing it there were probably two involved.

17 Q So we're talking maybe 24 man-hours,

18 something like that?

19 A Something like that, yeah, probably.

20 Q Did Monsanto ever undertake to determine the

21 furan contamination in the transformer fluids that it

22 blended which contained not only PCBs but also other

23 chemicals as scavengers and trichloro- or

24 tetrachlorobenzene?

25 A Not to my knowledge.

1 Q Are you able to offer an opinion about the
2 amount of furan contamination which would be present in
3 a transformer fluid that Monsanto sold which contains
4 scavengers and/or tetrachlorobenzene as well as PCBs?

5 A I wouldn't think it would be significantly
6 different. By significant I mean within a factor of two
7 or three different. I would think it would be about the
8 same.

9 Q Well, that's your estimate. I'm trying to
10 find out if you've got any basis for it. Do you have
11 any basis for it whatsoever other than just a guess?

12 A The basis would be, in the first place, if
13 you assume there are no dibenzofurans in
14 trichlorobenzene, which I don't know, then that would
15 dilute it and make it a factor of two lower. I do not
16 know the levels that would be present in native
17 trichlorobenzene.

18 Q So the answer is you don't know and you can't
19 give us any reasonable scientific estimate of the amount
20 of furan contamination that would be in a transformer
21 product sold by Monsanto that contained
22 trichlorobenzene?

23 A I don't know if I don't know, that's correct.

24 Q In fact, if I understand your testimony, you
25 think you are more likely, when you make

1 trichlorobenzene under heat, to create furans than you
2 would be from PCBs. Is that correct?

3 A Well, No. 1, I don't know that you create
4 trichlorobenzene from dibenzofurans under heat.

5 No 2, no, I wouldn't think it would be any
6 more likely.

7 Q Let me see if I can get these things tied
8 down, then. Am I correct in understanding it was your
9 opinion that part of the additional furans found after
10 fires with transformer fluids that contained both PCBs
11 and trichlorobenzenes resulted from the trichlorobenzene
12 transformation into furans?

13 A That is my opinion.

14 Q Okay. And that involves heat. Correct?

15 A Fire involves heat, that's correct.

16 Q Well, I mean I'm saying that process takes
17 place in the presence of heat, not without it.

18 A Well, we're talking about the process of what
19 they term incomplete combustion, which involves heat,
20 yes.

21 Q Okay. If you have the opinion that
22 trichlorobenzene sitting in a container in this room in
23 ordinary atmospheric temperature will form furans, let
24 me know.

25 A I do not have that opinion.

1 Q Okay. I didn't think you did. And again, so
2 we're clear, your opinion is that trichlorobenzenes,
3 where heat and oxygen are present, will create some
4 furans?

5 A If the conditions are correct. If the heat
6 and oxygen conditions are correct.

7 Q Yes.

8 A Let me, if I may, clarify exactly what my
9 position is based on the literature. My understanding
10 is that laboratory conditions under which PCBs have been
11 shown to create dibenzofurans have also shown that
12 chlorobenzenes create dibenzofurans.

13 Q Okay. And those conditions involve oxygen
14 and the concentrations found in the atmosphere?

15 A Approximately, yeah.

16 Q And heat of approximately 300 degrees
17 centigrade?

18 A In one particular study where very low levels
19 were formed, yes.

20 Q Or 600 centigrade?

21 A More typically and more understandably, 600,
22 650 degrees centigrade, yes.

23 Q Okay.

24 Now, my question really, then, based on that,
25 is whether you can appreciate the prospect that

1 trichlorobenzene, through its manufacturing process, if
2 heat is applied in that process to chlorinate the
3 benzene, may also create some furans in that process.

4 A If heat were applied in the process, it is
5 not impossible that dibenzofurans would be formed,
6 correct.

7 Q And in fact if heat were applied in the
8 process by which trichlorobenzene and PCBs were mixed to
9 form the transformer fluid and oxygens were present, you
10 might create --

11 A I think that's a mighty big if.

12 Q You think it's much more likely heat is
13 applied in the chlorbenzene?

14 A I would say that's a more likely situation.

15 Q And then you also have the opinion that in
16 the presence of heat and oxygen in the appropriate
17 amounts trichlorobenzene can also create dioxins?

18 A Laboratory studies have shown that given
19 appropriate conditions that transformation can occur at
20 low levels.

21 Q And you have not measured the transformer
22 fluids sold by Monsanto that were a combination of PCBs,
23 trichlorobenzene and scavengers to determine whether or
24 not you could measure dioxin contamination in that
25 fluid. Is that correct?

1 A To the best of my knowledge, I have not done
2 that measurement, correct.

3 Q So there may or may not be dioxins contained
4 in that transformer fluid that Monsanto sold?

5 A I can't say that that's impossible.

6 Q In fact, you hold the opinion that it's
7 almost impossible to create dioxin from PCBs. Correct?

8 A Correct.

9 Q But on the other side of the coin, you
10 certainly do not hold an opinion it's almost impossible
11 to create dioxin from trichlorobenzene?

12 A It's been shown to occur in the laboratory.

13 Q Therefore, if in the process by which the
14 trichlorobenzene is manufactured there are dioxin
15 contaminants that are then mixed with the PCBs to make
16 the transformer fluids, we may have a transformer fluid
17 contaminated with dioxin. Correct?

18 A If all your ifs accumulate to that point, I
19 would not say it's possible, correct.

20 Q And Monsanto has never, to your knowledge,
21 tested a single one of its trichlorobenzene-containing
22 transformer fluids to determine whether or not there's
23 any dioxin contamination. Correct?

24 A To my knowledge, Monsanto has not tested any
25 such transformer fluids, correct.

1 Q And Monsanto has never tested any
2 trichlorobenzene-containing transformer fluid to
3 determine whether or not the furan level of
4 contamination in the overall product is greater than the
5 contamination in the PCB component. Is that correct?

6 A I would say that's correct.

7 Q So you cannot offer any opinion today
8 concerning the overall furan contamination of
9 transformer fluid sold by Monsanto that contain
10 trichlorobenzene. Correct?

11 A That's correct.

12 Q And you cannot offer any opinion today
13 concerning the dioxin contamination, if any, in
14 trichlorobenzene-containing transformer fluid sold by
15 Monsanto?

16 A That's correct.

17 Q Okay. And in order to do that you would have
18 to go back to the laboratory and perform testing you've
19 not done to date?

20 A Either that or to be sure and check the
21 literature and see if other people have tested such
22 fluids.

23 Q I see.

24 Does the name Askarel mean anything to you?

25 A Yes.

1 Q What is Askarel?

2 A My understanding of Askarel is a generic term
3 for a flame-retardant dielectric fluid.

4 Q Okay. And that would or would not contain
5 trichlorobenzene or tetrachlorobenzene?

6 A It may or may not, depending on the
7 particular fluid. It's a generic term.

8 Q You mentioned earlier today the people who
9 can destroy chemicals by incineration.

10 A Uh-huh. PCBs.

11 Q Is another name for that Pyroplasmas?

12 A No.

13 Q Are you familiar with Westinghouse's
14 Pyroplasma Waste Destruction System?

15 A I've read blurbs in trade magazines about
16 their experimental system.

17 Q Have you seen any of the advertising
18 literature on their system?

19 A I don't think so.

20 MR. LACEY: Mark this, please.

21 [Exhibit 8 marked]

22 MR. LACEY:

23 Q Let me show you what has been marked as
24 Deposition Exhibit No. 8. I'll ask you to review that
25 just very briefly.

1 Have you had a chance to review the document?

2 A I've skimmed it, yes.

3 Q Does that describe a process for what we
4 previously talked about, incineration of PCBs, among
5 other things?

6 A I wouldn't -- that is not what is typically
7 described as incineration. That may be a fine point,
8 but an incinerator licensed by the EPA to destroy PCBs
9 is not this process. This is an experimental,
10 developmental process which thermally destroys PCBs, but
11 I wouldn't call it incineration in the sense it's
12 usually used.

13 Q What would you call it?

14 A Well, it's a high-energy plasma destruction
15 using a high-energy plasma rather than just high
16 temperature to destroy the materials that are put into
17 the system.

18 Q Do you think that that process would be
19 adequate for destruction of PCBs?

20 A If one is to believe their data. That's what
21 their data implies, that it destroys PCBs with up to six
22 nines efficiency.

23 Q 99.9999?

24 A That's correct.

25 Q What's the efficiency of destruction in

1 incineration?

2 A I think it's required by law to be six nines.

3 Q Okay. Is there any reason you wouldn't trust
4 their data? You indicated --

5 A No, I don't have any particular reason to
6 distrust their data, other than it's advertising data
7 and you don't know whether it's normal operations or all
8 the data they have or --

9 Q Is there anything about the information that
10 you find questionable? Something that makes you doubt
11 it?

12 A No.

13 Q The document indicates in its conclusion
14 section that they have successfully processed a number
15 of different chemicals for destruction. Would it appear
16 to you that all those chemicals could in fact be
17 processed by that type of unit?

18 A Well, I mean that's what they have. I don't
19 see any particular reason why they should not be
20 destroyed by that particular --

21 Q One of the chemicals it notes they have
22 successfully destroyed is Askarel. Is that correct?

23 A That's correct.

24 Q They use that trade name designation for PCB
25 dielectric fluids?

1 A It's not a trade name.

2 Q Well, generic name, then?

3 A Yes.

4 Q And they note that in defining what that is,
5 because that's not a direct chemical name but it's a
6 generic-type term, they denote what that is. Correct?

7 A Yes.

8 Q Do you agree with their definition?

9 A No, I do not.

10 Q I see. Their definition, let me just read
11 it --

12 A I would agree with their definition, up to
13 the parentheses, as Askarel. I think their
14 parenthetical expression is exactly a parenthetical
15 expression and not part of the definition of Askarel.

16 Q So you would agree that Askarel is a mixture
17 of PCBs and chlorobenzenes?

18 A Can be.

19 Q But you would disagree with the statement
20 "along with low levels of dioxins and furans"?

21 A Unless they had data to show that, I wouldn't
22 say that's a given, no.

23 Q So you don't think that Westinghouse is
24 accurate in that statement of what Askarel is?

25 A They certainly give no data to show that the

1 fluids that they purport to destroy have dioxins or
2 furans in it, no. That's correct, I don't agree with
3 it.

4 Q I've noted that in prior depositions in this
5 case several of the former Monsanto employees that I
6 have deposed have indicated they thought that people
7 like Westinghouse had more experience with PCBs and
8 dielectrics than Monsanto, and one should defer to them
9 with regard to their knowledge. I take it you don't
10 share that view on conferring with them as to whether
11 Askarel contains dioxins.

12 A I don't think that says that.

13 Q Why don't you read the definition of Askarel.

14 A "Askarel (a mixture of PCBs and
15 chlorobenzenes along with low levels of dioxins and
16 furans)."

17 Q You don't understand that to say that Askarel
18 has low levels of --

19 A I understand it to say that Askarel is a
20 mixture of PCBs and chlorobenzenes along with low levels
21 of dioxins and furans.

22 Q I guess I'm still trying to find out whether
23 you read their definition to say that the Askarel is a
24 fluid that has in it PCBs, chlorobenzenes, dioxins and
25 furans.

1 A No. I say that Askarel is a -- the PCBs in
2 the chlorobenzenes, and they make the statement that
3 Askarel had low levels of dioxins and furans.

4 Q Again, that's not unlike some other people at
5 Monsanto or former Monsanto employees suggested a
6 deference to the GES and Westinghouses of the world.
7 You wouldn't wouldn't defer to them?

8 A If you interpret that, and they say that's
9 their definition, I would not defer to them on that
10 definition of Askarel, no.

11 MR. LACEY: Thank you.

12 How many pages of that deposition are marked
13 on, Mark?

14 MR. FREEMAN: I don't know, David. We'll
15 give you a copy of it Friday.

16 MR. LACEY: But I'm deposing the guy today,
17 not Friday. I'm sure that point escaped you, but I am.

18 MR. FREEMAN: About half a dozen or so.

19 MR. LACEY: Can you yank those out and let me
20 look at the remainder of it?

21 MR. FREEMAN: No, I don't want to do that.

22 MR. LACEY: Well, I guess then I'll continue
23 the deposition until I'm provided with the literature
24 that I should have been provided with, along with a copy
25 of the deposition he reviewed in preparing for his

1 testimony.

2 MR. FREEMAN: If you've got questions to ask
3 the witness, David, ask him now. We're not going to
4 agree to reproduce him. The Wright deposition is a
5 public record, you knew about that before today.

6 MR. LACEY: Actually, I don't think it is on
7 file at the courthouse in federal court in Beaumont,
8 because it's not the practice to file depositions over
9 there.

10 MR. FREEMAN: They're obtainable from other
11 sources. You know that as well as I do.

12 MR. LACEY: That may or may not be. The fact
13 of the matter is I had no idea that man had reviewed
14 that deposition before giving his testimony. I think
15 I'm entitled to see the documents he reviewed in
16 preparing for his testimony. If you don't want to make
17 it available to me, all I'm saying is I cannot ask this
18 man questions about that deposition at this point.

19 Subject to recalling him so that I can
20 question him about both the documents he reviewed, the
21 file of two or three inches of paper that he reviewed in
22 forming his opinion, didn't bring with him today, along
23 with that deposition review, I've got no further
24 questions at this time.

25 MR. FREEMAN: We've agreed to produce the

1 documents he's reviewed, we've agreed to produce the
2 deposition for the Wright case. We've been sitting here
3 since 9:20 this morning, it's now about 3:20 in the
4 afternoon, we took a little over an hour break. So if
5 you want to redepose him, make that request at that
6 time, after you've had the opportunity to review the
7 documents.

8 I don't have any questions at this time.
9 We'll reserve ours till later.

10 MR. LACEY: I think you asked a couple along
11 the way, but we won't count those.

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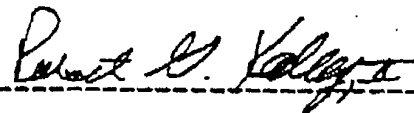
CORRECTIONS

Page	Line	Explanation
44	15-16	"apply for" should read "comply with"; "regulations" should be added at end of sentence.
44	19	"graded in" should read "greater than".
68	13	"PCBs" should read "TCBs".
77	3	"582" should read "572".
79	11	"chlorines" should read "chlorinated benzenes".
101	11	Subsequent to this deposition, I located a file in my records which did contain certain research reports containing information on PCDF levels in PCBs.
106	11	Data in the above mentioned file showed analyses of Aroclor 1254 done by me. The results were 10 ppm and 12 ppm total PCDFs. Other data, not generated by me, showed average levels of PCDFs in Aroclor 1254 to be 16 to 17 ppm.
150	24	"material" should be "tank car".
168	3 & 4	"Jim Yarnell Hicks" should read "Jim Mieux and Orville Hicks".
172	11	"A" should read "Linear Alkylbenzene Sulfonate".
174	24	"Pat Collin" should read "packed column".
183	18	Review of above mentioned file indicates 1982 analyses of Aroclor 1254 for total PCDFs averaging 12 ppm.
197	1	"in" should read "and".

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SIGNATURE OF WITNESS

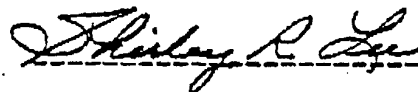
I, Robert G. Kaley II, solemnly swear or affirm, under the pains and penalties of perjury, that the foregoing 199 pages contain a true and correct transcript of the testimony given by me at the time and place stated, with the corrections, if any, and the reasons therefor noted on a separate sheet of paper and attached hereto, and that I am signing this before a Notary Public.



Robert G. Kaley II

THE STATE OF *Missouri*
COUNTY OF *ST. LOUIS*

Subscribed and sworn to before me, the undersigned authority, by the said Robert G. Kaley II on this the *12TH* day of *JUNE*, 1987.



Notary Public in and for

the State of *Missouri*
NOTARY PUBLIC STATE OF MISSOURI
ST. LOUIS CO.
MY COMMISSION EXP. JUNE 6, 1990
ISSUED FROM MISSOURI NOTARY ASSOC.

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1 THE STATE OF TEXAS]

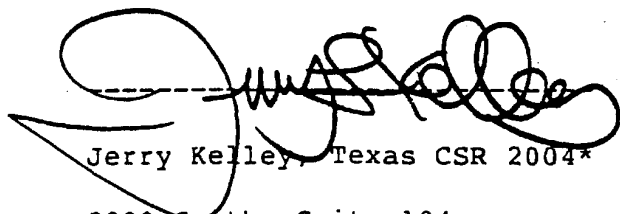
2 CERTIFICATE

3 I, Jerry Kelley, a Certified Shorthand
4 Reporter, hereby certify that the foregoing testimony
5 was given before me after the witness had been duly
6 sworn.

7 I further certify that the foregoing is a
8 true and correct copy of the transcript of the
9 proceedings.

10 I further certify that I am neither
11 attorney for, related to nor employed by any of the
12 parties or any attorney of record in this cause, nor do
13 I have a financial interest in the matter.

14 Witness my hand in Houston, Texas, on May
15 16, 1987.

16
17
18
19
20 
Jerry Kelley, Texas CSR 2004*

21 2900 Smith, Suite 104

22 Houston, Texas 77006

23 713/523-3767

24 *My Certificate Expires

25 December 31, 1988

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LAWYER'S NOTES

Page Line

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