

Continuation of Deposition of
E. SCOTT TUCKER, Ph.D taken on
the 24th day of June, 1992.

COPY

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DEPOSITIONS AND RECORDS - AT READING	
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TEL: 803 271-0610	

1 A. Yes.

2 Q. I was just trying to obtain the numbers .

3 MR. KASHANI: Enough for today?

4 Okay. Thank you, Doctor.

5 (THE DEPOSITION WAS ADJOURNED UNTIL THE

6 FOLLOWING DAY)

7 (CONTINUATION OF DEPOSITION ON 6/24/92)

8 BY MR. KASHANI:

9 Q. Good morning, Dr. Tucker.

10 A. Good morning, Saied.

11 Q. Do you remember that you're still under

12 oath?

13 A. Yes. But thank you for reminding me.

14 Q. Dr. Tucker, I'm going to show you a

15 document which, unfortunately, is not

16 Bates numbered, but have tagged the

17 interesting pages, but ---

18 A. Before we get started, I think we had

19 some unfinished business from yesterday

20 that I was supposed to check into. Do

21 you mind if I ---

22 Q. Oh, yes. Certainly.

23 A. --- answer with regard to that?

24 Q. Please. Please.

25 A. Okay. I checked, and my Ph.D. degree

1 from the University of Iowa was awarded
2 in February, 1968, which would mean that
3 I probably began working at Monsanto in
4 the fourth quarter of 1967. And I'm
5 sorry about the little lapse in memory,
6 but it has been --- oh, gosh --- I guess
7 two and a half decades or something like
8 that. And when I was deposed in --- in
9 the Outboard Marine Case I misspoke
10 myself. That is not correct in that
11 record. So, let this record reflect that
12 that's not correct, that it was a year
13 off.

14 Q. So, if you began work in the fourth
15 quarter of 1967, when did Dr. Keller give
16 you the assignment to look into the PCB
17 issue?

18 MR. ZIMMER: Asked and answered.

19 A. I believe that's already been asked and
20 answered.

21 Q. Well ---

22 A. Do you want to go back and review in the
23 record ---

24 Q. Well ---

25 A. --- or I can --- I can ---

1 Q. I'd like to get the years now, if we
2 could.

3 A. Well, I mean, my memory is about as clear
4 about that as it was about when I got my
5 degree, which is probably something I
6 would remember better than when I was
7 assigned this problem, which wasn't
8 particularly, you know, known to be
9 important at that time. It would --- I.
10 --- it's very doubtful that a brand new
11 graduate student out of a university
12 would receive an assignment like that
13 immediately upon arriving at Monsanto.
14 My guess would be sometime in '68.

15 Q. But, I guess with this as the starting
16 point, with the fourth quarter of 1967 as
17 the starting point, can we rely on
18 yesterday's testimony that you received
19 this assignment, I believe it was three
20 to six months after starting work?

21 MR. ZIMMER: I think that
22 mischaracterizes his testimony, but
23 if that's your recollection, Doctor
24 ---

25 A. I think we set up a window yesterday. My

1 ---

2 MR. ZIMMER: That's fine.

3 A. My --- let me --- let me --- I've thought
4 about this, because, you know, it bothers
5 us all as we get older that we don't
6 remember things, and then of course, we
7 have no base line, because I don't know
8 what you remember, you know, at your age.
9 So I don't know whether I'm losing it or
10 not. I doubt it.

11 Q. I assure you that I remember absolutely
12 nothing from 1967.

13 A. The situation was when I joined Monsanto,
14 I recall my first assignment. And my
15 first assignment was in the atomic
16 emission area to look at metal
17 spectroscopy. And we --- I remember
18 buying a Perkin Elmer model 303 atomic
19 absorption instrument, which was a state
20 of the art brand new kind of instrumental
21 technique at that time. And I remember
22 working on that. So I know that at least
23 the first three months, if not longer,
24 when I was with Monsanto, was just, you
25 know, getting settled in and being given

1 new kind of projects to, you know, get my
2 attitude good and get my feet on the
3 ground and so I'd understand the system.
4 I know from my own experience that most
5 people that we get, unless they are
6 overachievers --- even when they're
7 overachievers --- it's about six months
8 before they really settle down and they
9 really start to perform effectively from
10 my viewpoint as a --- as a senior level
11 management --- laboratory management
12 person nowadays. So the routine is that
13 the windowing is probably three to six
14 months or more before I got started on
15 the --- on the project, or before Keller
16 assigned it to me. And then there's, you
17 know, a time frame of putting things
18 together after that, purchasing
19 equipment. Equipment doesn't come out
20 like that. I mean first of all, you
21 know, you have to get a --- you know, a
22 approval for the dollars, and you have to
23 get a quote, and then you have to order
24 it, and they have to make it and then
25 they ship it and things of that sort.

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1 So, that's --- is that helping you?

2 Q. I believe so. I think what we were

3 trying to do yesterday was set a time

4 frame, starting from a beginning point,

5 and we've now, I guess, established a

6 beginning point ---

7 A. Uh-huh (affirmative).

8 Q. --- which is when you started work, which

9 would be the fourth quarter of 1967.

10 A. Sometime during the fourth quarter of

11 1967 and that --- and that jibes with the

12 fact that the degree at the University of

13 Iowa was awarded in February of 1968.

14 Q. All right. And then we discussed a

15 certain period after that. You were

16 given this assignment, then a certain

17 period ---

18 A. Correct.

19 Q. --- after that ---

20 A. Correct.

21 Q. --- certain other events happened.

22 A. Correct.

23 Q. All right. So, given this beginning

24 point, is there anything else you'd like

25 to clarify about the succeeding event ---

1 the timing of the succeeding event from
2 yesterday ---

3 A. I ---

4 Q. --- other than the beginning point?

5 MR. ZIMMER: I think that was the
6 only thing you asked him to double
7 check on, so ---

8 A. Yes, the clarification is for your
9 benefit.

10 Q. I understand.

11 A. And so, if you require more
12 clarification, I'd be happy to try it.

13 MR. ZIMMER: Let's let him ask the
14 question before you answer.

15 A. Okay.

16 Q. All right. So, given this beginning
17 point, do you remember when you first
18 started running standards through the
19 equipment --- meaning the gas
20 chromatograph with electron capture and
21 the gas chromatograph with the mass
22 spectrometer?

23 MR. ZIMMER: Asked and answered.

24 Q. Well, I mean, with all due respect, I
25 mean --- I understand that, you know,

1 it's a long time ago. But we have a
2 deposition that was taken ten years ago
3 with completely different dates than what
4 I've just heard.

5 MR. ZIMMER: Okay and what the
6 dates showed on that deposition ---

7 MR. KASHANI: Wait a minute. I'm
8 not directing my attentions to you,
9 and I'd appreciate if for once you
10 don't testify.

11 MR. ZIMMER: You know, I'm getting
12 so tired of hearing that worn-out
13 criticism of that I'm testifying.
14 If you ask a fair question, I won't
15 have anything to say. But this
16 prefacing of every one of your
17 questions as with, "Well, you told
18 me yesterday. Has that changed now"
19 ---

20 MR. KASHANI: Oh, no, no, no.

21 MR. ZIMMER: Just because the man
22 has figured out the exact date of
23 his degree.

24 MR. KASHANI: No, no. I'm entitled
25 to go forward --- I guess what I'm

1 responding to is your "asked and
2 answered" objection. I'm entitled to
3 go forward from an established date
4 to establish a time line from that
5 date now that it's been established.
6 It is not appropriate for you to say
7 that these questions have been asked
8 and answered when yesterday we
9 hadn't established a beginning
10 point. Now that we've established a
11 beginning point, I'd like to go
12 forward and establish the dates from
13 that beginning point. So I don't
14 think it's appropriate for you to
15 say "asked and answered."

16 MR. ZIMMER: All right. Are you
17 done?

18 MR. KASHANI: Yes.

19 MR. ZIMMER: Okay. It's very
20 appropriate for me to say, "asked
21 and answered," because merely
22 establishing a beginning point
23 doesn't change the answers that he
24 gave you yesterday to the precise
25 same questions. He wasn't able to

1 answer the question yesterday except
2 to give you broad time frames in
3 terms of the number of months after
4 he started.

5 MR. KASHANI: Well, maybe we can
6 ---

7 MR. ZIMMER: So what difference
8 does it make ---

9 MR. KASHANI: --- fill in ---

10 MR. ZIMMER: Let me finish. What
11 difference does it make whether he
12 started in 1967 or 1973? You think
13 the answer is going to be different
14 the second day.

15 MR. KASHANI: We're trying to
16 establish some dates and years ---

17 MR. ZIMMER: It's your time ---

18 MR. KASHANI: --- if possible.

19 MR. ZIMMER: You can spend it if
20 you want, but, I mean, he told you
21 the answer to at least two of the
22 questions that you have now
23 addressed to him this morning,
24 yesterday.

25 Q. Given this beginning point of starting

1 work in the fourth quarter of 1967, do
2 you remember the year that you first
3 began running the standards through the
4 ---

5 A. The year?

6 Q. --- mass spectrometer?

7 A. Probably 1968.

8 Q. Okay.

9 A. Now, wait. Wait a minute. You said mass
10 spectrometer, okay. And you've lumped a
11 couple of things together here.

12 Q. I understand.

13 A. Your earlier question that I was going to
14 ask you to separate. You need to
15 separate gas chromatography electron
16 capture and gas chromatography mass spec.

17 Q. Let's do that.

18 A. Gas chromatography electron capture was
19 the instrument that I ordered and that I
20 set up and that I operated initially.
21 Gas chromatography mass spectrometry was
22 an instrument that I believe was operated
23 in Martin Deitrich's group by Jim
24 Mieuier, that I used through Jim Mieuier,
25 in other words, had him do it, because he

1 was the mass spec expert and things of
2 that sort. And so answering your
3 question earlier, I'd like to amend your
4 question to reflect that it's GC electron
5 capture and not mass spec, because mass
6 spec, that's erroneous.

7 Q. Okay. So let me ---

8 A. I think that's important.

9 Q. No, I understand. I understand because I
10 understand certain equipment was obtained
11 later. So, when did you first begin
12 running standards through the gas
13 chromatograph electron capture equipment?

14 A. I guess it would be sometime in 1968.

15 Q. And do you remember when you first
16 started running samples from the
17 environment through the mass spectrometer
18 electron capture equipment?

19 A. Okay. The mass spectrometer will always
20 happen at a much later date ---

21 Q. I'm sorry.

22 A. --- than the electron capture, so ---

23 Q. I misspoke. I meant the gas
24 chromatograph electron capture ---

25 A. Okay.

1 Q. --- when you first began running samples
2 through ---

3 A. Not specifically. But it would have
4 occurred after the equipment had been
5 ordered, after the equipment had been
6 received, after the equipment had been
7 set up, after the standards had been
8 obtained, after we'd run the standards
9 through, after we'd developed the
10 preparative methods and things of that
11 sort. You don't just jump in and do the
12 environmental samples, because in order
13 to get the constituents that you're
14 interested in out of the environmental
15 samples, you have to go through and spike
16 similar matrices that are free from the
17 materials with knowns, go through it,
18 make sure you get the recovery, and in
19 this particular case with PCB's, it was
20 particularly complex, because there was
21 like 210 potential isomers, so you have
22 to make sure that you put the material in
23 the matrix, you run it through your
24 isolations procedures that gets it in a
25 form that you can feed it to the

1 instrument and then you have to look at
2 that relative to real standards to see if
3 any one of the 210 things have changed,
4 so it's --- it's a rather complex
5 situation. It's not like developing
6 methodology for a single constituent.
7 It's at least 210 times more complicated,
8 and in reality, it's probably some
9 factorial of 210. I don't know if you
10 know what factorials are, but 210
11 factorial is some number that we never
12 will understand.

13 Q. So ---

14 A. I'm trying to give you what I think you
15 want, and that's a feeling for how this
16 development occurred and the difficulty
17 and the amount of time required.

18 Q. All right. I think I have an
19 understanding ---

20 A. I'd like to be responsive to your
21 questions ---

22 Q. I understand. I think I have an
23 understanding of how this works. I mean,
24 it's not something that you just --- from
25 what I understand, and correct me if I'm

1 wrong --- it's not something that you
2 just, you know, pour something in a test
3 tube and then look at it and then you
4 have the answer. I understand that it
5 requires very precise methods and precise
6 work.

7 A. Well, that's correct. And the other
8 thing that ---

9 MR. ZIMMER: Let's let him ask you
10 a question.

11 THE WITNESS: Okay.

12 A. Let me qualify this. I'd like to qualify
13 this though. I'd like to qualify this.
14 Okay? Less than one percent of the
15 people in the United States have Ph.D.s,
16 and even a lesser amount than that are in
17 chemistry. Okay? That kind of
18 assignment went to an individual with
19 that kind of level of training and not
20 somebody else; okay? And so, that,
21 again, reflects the degree of complexity,
22 the degree of training and the degree of
23 experience that's required to execute
24 these techniques. At that point in time
25 electron capture and mass spec were

1 leading edge technologies that --- that
2 were just being developed and understood.
3 Okay. I'm sorry. I'll get off my
4 soapbox.

5 Q. No. I understand. And do you recall
6 what equipment it was that Jensen and
7 Widmark used?

8 A. Yes. They used --- the one piece of
9 equipment that I do remember was an LKB
10 mass spectrometer.

11 Q. Did they ---

12 A. The brand names of the other stuff they
13 used I don't have the faintest idea.

14 Q. Did they use gas chromatograph and the
15 mass spectrometer in conjunction?

16 A. Yes, they did. They were one of the
17 pioneers in terms of interfacing that.
18 And I think they worked very closely with
19 LKB, which was the instrument company
20 doing that. And there weren't that many
21 mass spec instrument companies around,
22 so, it required, again, a lot of
23 expertise, a lot of knowledge, and a lot
24 of dollars to do that kind of routine.

25 Q. And this is referring to the work Jensen

1 and Widmark did back in 1966?

2 A. '66. '67. I believe '67 was the first
3 documentation of their work that I saw.
4 Maybe '68, something like that. That was
5 the date on the information.

6 Q. So, Jensen and Widmark were using this
7 --- as you described it --- leading edge
8 technology before Monsanto?

9 A. Yes.

10 Q. So, if we can go back to the question of
11 --- I think we've left off at the point
12 that you started to run the standards
13 through the gas chromatograph and the
14 electron capture. Could I ask if you
15 remember approximately how long it was
16 after you began running the standards
17 through the gas chromatograph electron
18 capture before you could begin using
19 samples from the environment, or begin
20 testing samples from the environment?

21 A. Now, the question is ---

22 Q. Do you recall approximately how long it
23 was after the time that you began running
24 standards through the gas chromatograph
25 electron capture equipment to the time

1 when you began running samples from the
2 environment?

3 A. No, I don't.

4 Q. Was it on the order of six months, a
5 year?

6 MR. ZIMMER: Asked and answered.

7 A. Let me clarify the situation ---

8 MR. ZIMMER: No. Answer his
9 questions and let him do the work,
10 okay. That's the way we want a
11 deposition.

12 THE WITNESS: Can I --- I would
13 like to talk to you off the record.
14 I need to clarify something.

15 MR. ZIMMER: All right. Let's take
16 a recess.

17 (OFF RECORD)

18 Q. I'll just ask my previous question. Do
19 you recall approximately how long it was
20 between the time you first started
21 running standards through the gas
22 chromatograph electron capture equipment
23 and you first ran samples from the
24 environment?

25 A. No.

1 Q. I guess my next question was do you
2 recall approximately the order of time,
3 between six months and a year,
4 approximately how long it was?

5 A. I mean, we could play this arbitration
6 game in terms of, you know, any number
7 --- the number of how I feel and things,
8 but I don't remember, as I stated.

9 Q. Are there any documents that might
10 refresh your recollection as to when
11 these events occurred?

12 A. I'm sure there are.

13 Q. Do you know what those documents might
14 be?

15 A. They could be original electron capture
16 chromatogram traces from the instrument
17 and things of that sort.

18 Q. Could they be lab notebooks?

19 MR. ZIMMER: Calls for speculation.

20 A. I believe I stated earlier that I wasn't
21 in the habit of keeping a lab notebook
22 unless I was dealing with something that
23 was patentable, or, you know, something
24 of that sort, so I --- I answered the
25 question.

1 Q. Did anyone who was working on the
2 equipment keep a lab notebook? By
3 "equipment," I mean the gas chromatograph
4 and electron capture?

5 MR. ZIMMER: Same objection.

6 A. No.

7 Q. Let me refer back to your deposition in
8 the Outboard Marine Case. We'll be
9 introducing portions of this into the
10 record, not the whole thing, but
11 portions.

12 A. That's good. Good Lord, that's a thick
13 document!

14 Q. First of all, you said before that you
15 recalled this deposition?

16 A. I recall the event.

17 Q. Do you recall if the --- the caption of
18 the case is listed as United States
19 versus Outboard Marine Corporation and
20 Monsanto Company. Do you recall if
21 Monsanto was a defendant in that case?

22 A. Monsanto was a co-defendant.

23 Q. Do you recall the substance of the case?

24 A. I believe the substance of the case was
25 with regard to environmental

1 contamination with PCBs by Outboard
2 Marine in terms of the way they were
3 using it and things of that sort.

4 Q. Were these PCBs originally purchased from
5 Monsanto?

6 A. Yes.

7 Q. At this particular deposition, do you ---

8 A. Well, let me correct that. They could
9 --- they were probably originally
10 manufactured by Monsanto because Monsanto
11 was the sole U.S. manufacturer of these
12 materials, and I doubt they would go to
13 Europe or someplace else to get them. I
14 mean, there wouldn't be any cost
15 incentive. Whether or not Monsanto sold
16 them to a broker who, in turn, sold them
17 to Outboard Marine, I have no knowledge
18 of.

19 Q. Do you mean that Monsanto was the sole
20 U.S. manufacturer of PCBs?

21 A. Do I mean that?

22 Q. When you said sole manufacturer ---

23 A. That's what I thought I said, yes.

24 Q. --- of these things?

25 A. Yes. They were the sole U.S.

1 manufacturer of PCBs to my knowledge.

2 Q. Do you recall the specific deposition, I
3 guess it's listed as having taken place
4 on April 15, 1982?

5 A. I believe I mentioned --- I believe I
6 answered earlier that I recalled it.

7 Q. Were you represented by counsel ---

8 A. Yes.

9 Q. --- at that deposition? And were you
10 testifying under oath at that time?

11 A. Yes. And it states in here that I was
12 duly sworn in and things of that sort, so
13 --- page three.

14 MR. ZIMMER: No. He's aware of
15 that.

16 Q. Let's save some time here. While that's
17 being taken care of, let's turn to
18 something else. I'm going to hand you
19 the exhibit that I had originally.

20 MR. KASHANI: Mark this 334.

21 (Thereupon the Court Reporter
22 marked the pertinent document as
23 PLAINTIFF'S EXHIBIT NUMBER 334-A)

24 Q. I'll ask you to take a look at that.

25 A. (Witness complies with request).

1 Q. Dr. Tucker, you've had some time to look
2 at the Exhibit. Do you ---

3 MR. ZIMMER: Are you finished
4 looking at it?

5 THE WITNESS: If you ask about
6 areas that I haven't gotten to, I
7 can look at it again.

8 Q. Okay. This Exhibit seems to refer to a
9 presentation that was made to the
10 Interdepartmental Task Force on PCBs, May
11 15, 1972. Is this the presentation you
12 mentioned yesterday in the context of
13 discussions with the Corporate Management
14 Committee?

15 A. Yes. This is a presentation that I
16 mentioned yesterday that was given, I
17 believe, to either members or --- I know
18 it was certainly given to Howard Bergen
19 and those kind of folks prior to being
20 presented externally, which is a standard
21 procedure for companies --- for every
22 company I ever worked for.

23 Q. Do you recall giving the actual
24 presentation to, I guess it was a
25 government body?

1 A. Yes.

2 Q. Does the description of your portion of
3 the presentation begin on ---
4 unfortunately, the pages aren't numbered,
5 but there is a page that begins with
6 "Assessment of the Biological Persistence
7 of Polychlorinated Biphenyls by Dr. E.S.
8 Tucker".

9 A. Yes.

10 Q. Does this describe your portion of the
11 presentation?

12 A. Yes. The reason I remember that is that
13 it's a fairly high honor to present this
14 kind of information to the --- to a
15 interdisciplinary group that's appointed
16 through the President's Council on
17 Environmental Quality.

18 Q. I understand. Let me refer you to what I
19 believe is a slide or maybe a part of the
20 presentation.

21 MR. KASHANI: Let's go off the record
22 for a second.

23 (OFF RECORD)

24 Q. Let me refer you to the first page which
25 describes your presentation. It's the

1 page that at the top, again, reads
2 "Assessment of the Biological persistence
3 of PCBs". Refer you to the second to
4 last paragraph on that page, that begins
5 with, "Aroclor 1016 is a special case in
6 that while it contains about 40 percent
7 chlorine by weight ---
8 A. 41.
9 Q. 41 percent. I'm sorry. "--- chlorine by
10 weight, its penta, hexa, and heptachloro
11 biphenyl content has been significantly
12 reduced with respect to Aroclor 1242, a
13 product produced by direct chlorination,
14 containing 42 percent by weight
15 chlorine." Is this Aroclor 1016 the same
16 as MCS 1016?
17 A. Yes.
18 Q. What is Aroclor 1016?
19 A. Basically, as I recall, Aroclor 1016 or
20 MCS 1016 was a 42 percent chlorinated
21 product that was distilled.
22 Q. You mean, it was taking Aroclor 1242 and
23 distilling it?
24 A. It was taking 42 percent chlorinated
25 biphenyl and distilling it.

1 Q. How was that 42 percent chlorinated
2 biphenyl manufactured?

3 A. By --- in the standard process that ---
4 that Monsanto used.

5 Q. Was that the same manufacturing process
6 we discussed yesterday?

7 A. Yes.

8 Q. Was the 42 percent biphenyl manufactured
9 in the same way that Aroclor 1242 was
10 manufactured?

11 A. Yes. It's just that at the point that it
12 was 42 percent chlorinated, there are
13 some other steps that I think, I believe,
14 were taken to produce the actual product
15 that was called Aroclor 1242.

16 Q. I see. So it's ---

17 A. That's why I differentiate ---

18 Q. What were those final steps? Were those
19 the ---

20 A. The final steps were ---

21 Q. --- distillation process?

22 A. --- as I recall --- I'm an analytical
23 chemist, not a process chemist, and I
24 wasn't in charge of that particular
25 operation --- but, as I recall, there was

1 some treatments of the materials with
2 diatomaceous --- blowing it with air to
3 remove --- dry air to remove HCl and then
4 treatment of the material with
5 diatomaceous earths or some kind of
6 absorbent --- solid absorbent material
7 and then filtering to remove any residual
8 amounts of hydrochloric acid or chloride
9 materials that were deleterious to the
10 dielectric properties of the fluid.

11 Q. Did these steps change the PCB content or
12 PCB composition?

13 A. Not to my knowledge.

14 Q. So, the base, before the distillation
15 step in the production of MCS 1016, or
16 Aroclor 1016, was the beginning product
17 in terms of PCBs and terms of PCB
18 content, the same as Aroclor 1242?

19 A. Yes. Yeah. I think I understand your
20 questions.

21 Q. I guess what I'm saying is, that absent
22 this step that you mentioned, in order to
23 make Aroclor 1016, you would take Aroclor
24 1242 and distill it to produce Aroclor
25 1016?

1 A. No.

2 Q. Then what ---

3 A. That's the point I'm making. The point
4 I'm making is that you wouldn't go to
5 completely producing the final product,
6 Aroclor 1242 and then convert the final
7 product, Aroclor 1242 into what was
8 Aroclor --- what was eventually called
9 Aroclor 1016. You would do that step
10 prior ---

11 Q. It was intermittent --- Okay. But in
12 order to produce Aroclor 1016, do you
13 start with a product that has the same
14 PCB content and ratios as Aroclor 1242?

15 A. It was my understanding that they did.

16 Q. And then, at that point, you would remove
17 a certain number --- or remove a number
18 of the penta, hexa, and heptachloro
19 biphenyls from that product to get
20 Aroclor 1016?

21 MR. ZIMMER: At what point, when you
22 say, "at that point"?

23 Q. Well, you --- if we have to go through
24 the manufacturing process, as you stated,
25 you start with a product which has a PCB

1 content similar to --- the same as
2 Aroclor 1242 and then there are some
3 other steps which you discussed ---

4 A. Okay.

5 Q. --- and then, at some point in the
6 process, do you remove --- to manufacture
7 Aroclor 1016 --- do you remove the penta,
8 hexa, and heptachloro biphenyl, meaning
9 the PCBs with five, six or seven
10 chlorines on them, or do you remove some
11 portion of those PCBs?

12 A. Let me --- let me say this --- the
13 efficacy of the Aroclor products or PCB
14 products, relative to their safety and to
15 their dielectric properties and all that
16 kind of good stuff, was dependent upon
17 the chlorine ratios, so a product like
18 Aroclor 1242 had to contain 42 percent
19 chlorine and had to have the isomeric
20 distribution fairly closely that it had
21 to perform the way it did in dielectric,
22 you know, and fluid applications from
23 properties viewpoint, including the
24 safety aspect of it and that kind of good
25 stuff. So, the deal here is --- what I

1 think you're trying to say is that the
2 product was produced, and then it was
3 distilled and fractionated to the extent
4 that the higher chlorinated homologs were
5 removed, is that what we're getting at
6 here?

7 Q. Sure. I mean, what we're talking about
8 is you have a product that starts out
9 with the same --- in the manufacturing
10 process you have a product that starts
11 with the same PCB content and ratio as
12 Aroclor 1242, but then you take it
13 through a distillation process to remove
14 a portion of the PCBs with five or six or
15 seven chlorines?

16 A. Right. As I recall, Aroclor 1242 had ---
17 you know, it's kind of like a Gaussian
18 distribution. It's determined by the
19 reactivity. And I believe Aroclor 1242
20 had something on the order of about five
21 to eight percent of PCBs that would have
22 a chlorine number of five and above in
23 it.

24 Q. Five, six or seven chlorines?

25 A. Correct.

- 1 Q. More than five? Five or more?
- 2 A. Five or greater chlorines, up to maximum
3 theoretical possible, which was ten. And
4 I believe it was somewhere on the order
5 of five to eight percent, in that range.
- 6 Q. Is that percentage --- just a quick aside
7 --- is that percentage accurately
8 reflected in the chart I showed you the
9 other day?
- 10 A. You will have to show me the chart. I
11 don't recall it.
- 12 MR. ZIMMER: He's talking about the
13 handwritten chart here.
- 14 Q. That's Exhibit 332.
- 15 MR. ZIMMER: He didn't prepare it.
16 That calls for speculation. You're
17 asking him now to interpret this
18 chart, and he's not your expert.
- 19 A. You cannot tell from this chart.
- 20 Q. All right. Going back to MCS 1016 ---
- 21 A. Or I cannot tell from this chart. I
22 don't know what you can do. Excuse me.
23 I didn't mean to speak for you.
- 24 Q. Going back to MCS 1016, do you recall the
25 reason for removing the --- as you

1 described --- the five to ten percent of
2 PCBs from Aroclor 1242 that had five or
3 more chlorines ---

4 A. Yes.

5 Q. --- on the biphenyl? What was that
6 reason?

7 A. At this point in time --- and I believe
8 this document is dated May 15th, 1972 ---
9 we had accumulated enough scientific and
10 other types of information, both
11 externally and internally, with regard to
12 polychlorinated biphenyls and the way
13 they behaved in the environment to have a
14 good picture of what was going on
15 finally. What we had found, basically
16 --- this is strictly my opinion --- was
17 that the only problems associated with
18 PCBs were the long-term, from an
19 environmental viewpoint --- and it was a
20 potential situation --- was the long-term
21 persistence of the pentachloral isomers
22 and above --- five and above, based on,
23 you know, looking at environmental
24 samples that were way up the trophic
25 line, things of that sort. So it was

1 felt that with proper product stewardship
2 by the people who used it, once everybody
3 became aware of the situation --- and we
4 had a pretty good picture in 1972 ---
5 that a product that was devoid of the
6 small amount of penta and above isomers
7 could still be used in dielectric and
8 some very closed system type applications
9 where safety was a paramount
10 consideration and things of that sort,
11 which is really what Aroclors were used
12 for to begin with, because they were a
13 fairly expensive product. And if cheaper
14 substitutes were available, and there
15 were many, they would have been used, but
16 they just didn't have the flammability
17 properties of the Aroclor and the safety
18 record of the Aroclor. So the attempt
19 here, and what I'm trying to say is that
20 Aroclor 1016 was Aroclor 1242 earlier in
21 the game there, in the manufacturing
22 process. It was distilled to remove the
23 five to eight percent higher chlorinated
24 homologs and to produce a product that,
25 if it was used properly, wouldn't

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1 contribute --- continue to contribute to
2 the accumulation of the persistent
3 isomers in the environment. In other
4 words, it wouldn't overwhelm the
5 environment's ability to handle those
6 isomers which was a bit slow and very
7 hard to even observe.

8 Q. You mean the environment's ability to
9 handle the PCBs with five or more
10 chlorines was, as you say, a bit slow and
11 difficult to observe?

12 A. Correct.

13 Q. Was the distillation process to produce
14 MCS 1016, was that a difficult process or
15 expensive?

16 A. I'm not a process chemist, and I have no
17 knowledge of the dollars associated with
18 it or the difficulty at the level that
19 they did it with the existing equipment
20 and things of that sort, so I --- I don't
21 feel qualified to answer that question.

22 Q. And the answer you gave concerning the
23 reasons for producing MCS 1016, is that
24 Monsanto --- is that the conclusion that
25 --- as far as you know --- I'm asking

1 for your knowledge --- Monsanto ---
2 people at Monsanto reached prior to
3 producing MCS 1016?

4 MR. ZIMMER: Lacks foundation and
5 calls for speculation.

6 Q. I mean, you gave me the reasons for
7 producing MCS 1016.

8 A. I mean that was --- can we --- can we get
9 the questions down to where I don't
10 forget the front before we get to the
11 end? Please. Or ask two.

12 Q. You mentioned the reasons for producing
13 MCS 1016, and I'm wondering were those
14 reasons --- you mentioned those reasons
15 with reference to this document, which is
16 dated 1972. I'm wondering if those
17 reasons were in place when Monsanto first
18 started producing MCS 1016. I mean, were
19 you aware of those reasons for producing
20 the product?

21 A. Not ---

22 MR. ZIMMER: Same objections.

23 A. Okay. Let me state this. Not to the
24 degree that we were aware at this point
25 in time. This is an evolutionary

1 process. Back originally when PCBs were
2 first even reported being found in the
3 environment, nobody understood how they
4 got there or where they came from or any
5 of those kinds of routines. I mean it
6 --- the knowledge that we have today is
7 so much superior, based on our experience
8 and all the work that we've done,
9 relative to what happens in the
10 environment that back then, you know, we
11 were like two years old, okay, in our ---
12 in our understanding of that kind of
13 thing. So the whole thing was an
14 evolutionary process. And in 1972, we
15 had achieved what's called a state of
16 grace in terms of having enough
17 knowledge, both internally and externally
18 --- and it wasn't just Monsanto folks ---
19 that we felt we understood the mechanisms
20 that were going on in terms of the
21 environmental movements and PCBs and what
22 was happening. I don't know whether that
23 answers your question or not, but it
24 answers it from my viewpoint in terms of
25 the evolutionary process. So, whether or

1 not --- the question was we had --- when
2 we first started manufacturing MCS 16 ---
3 whether we had the same knowledge we had
4 in 1972, the answer to that would be
5 "no", because we continued to generate
6 knowledge until I left the company in
7 1978, in fact there are still people
8 today who are generating knowledge with
9 regards to this particular problem.

10 Q. Sure. I understand that. But --- let's
11 see if we can go at it another way. Do
12 you recall when it was that Monsanto
13 first manufactured MCS 1016?

14 A. No.

15 Q. I'll show you a document.

16 MR. KASHANI: Mark this Exhibit
17 335. I'm sorry.

18 (Thereupon the Court Reporter
19 marked the pertinent document as
20 PLAINTIFF'S EXHIBIT NUMBER 335-A)

21 Q. I'm not suggesting that you received this
22 or that you remember it, but ---

23 A. You're not what? I'm sorry.

24 Q. Your name is not listed here, so I'm not
25 suggesting that you were copied on this

1 document. But does this trigger any
2 recollection as to when Monsanto began
3 producing --- or experimenting with in
4 this case --- MCS 1016?

5 A. You're asking me to document the validity
6 of this document?

7 Q. No, I'm wondering if this document
8 triggers any recollection as to MCS 1016?

9 A. Not any specific knowledge on my part as
10 to dates or days or times or anything of
11 that sort, no.

12 Q. This material --- this document refers to
13 a material known as Aroclor 1242B. Is
14 that the same material as --- or the same
15 product, eventually as MCS 1016?

16 A. I don't recall working with any product
17 called 1242B.

18 Q. Did you ever have an occasion to test MCS
19 1016 in your biodegradation studies?

20 A. Yes.

21 Q. And what were the results?

22 A. The biodegradation studies, I believe,
23 without checking the record --- and there
24 is, you know, it's published all over the
25 place --- was that it degraded at or

1 about the same rate as Aroclor 1242, and
2 that the degradation rate was
3 proportional to the degree of
4 chlorination in the studies that were
5 performed.

6 (OFF RECORD)

7 (While off the record the Court
8 Reporter marked the pertinent
9 document as PLAINTIFF'S EXHIBIT
10 336-A).

11 Q. Dr. Tucker, do you recognize this
12 document?

13 A. Yes.

14 Q. Did you write it?

15 A. Yes.

16 Q. Up at the top it says "Special Study
17 71-2." Now, what does that mean?

18 A. As I believe we discussed earlier, the
19 first the special study, there were three
20 types of reports that we issued: special
21 studies, methods, and new techniques in
22 the analytical chemistry group. 71
23 refers to the year. The 2 refers to the
24 sequence --- the zero sequence of the
25 report.

- 1 Q. So this was part of a series of reports?
- 2 A. Correct.
- 3 Q. Referring to the title, it says, "MCS
4 1016 - An environmentally compatible
5 Aroclor." What did you mean by that,
6 "environmentally compatible"?
- 7 A. It meant that --- as I recall --- that
8 the material, if released --- if
9 controlled properly and used properly and
10 only released at very low levels --- that
11 there would be no environmental problems
12 as we saw them at that point.
- 13 Q. Referring again to the first page, this
14 is page TRAN 036753, under the section of
15 summary, the first sentence reads: "The
16 information present in this special study
17 report demonstrates that, from an
18 environmental viewpoint, MCS 1016 is at
19 least 10 times better than the current
20 product Aroclor 1242." Now, what did you
21 mean by that?
- 22 A. I believe I meant that the laboratory
23 information that we were able to produce
24 in studying the two materials
25 concurrently indicated that whatever we

1 felt at that point in time was --- had to
2 do with environmental compatibility ---
3 that MCS 1016 was, in our judgment, a
4 factor of ten better.

5 Q. Better than Aroclor 1242?

6 A. Correct.

7 Q. Meaning whatever environmental --- I'm
8 going to use the word "problem" --- was
9 associated with Aroclor 1242, MCS 1016
10 was ten times better, I guess. Ten times
11 less likely to produce that problem than
12 Aroclor 1242?

13 A. Perceived problems. And the problems are
14 still perceived today ---

15 Q. Oh, yes, I understand. We're talking
16 about what was believed at the time of
17 this report.

18 A. Okay. The observation was that --- that
19 after long periods of time in the
20 environment, if PCB fluids were released,
21 that we could still see some. Some
22 people perceived that as a problem back
23 then. I don't know that there --- and
24 this is twenty-five years later, so I
25 don't know that it's a problem. So I

1 don't know whether you want to call it a
2 "problem" or not. If you choose to call
3 it a "problem" I'd like to define it.
4 Q. Well, let's --- I think you're talking
5 about the situation of environmental
6 persistence, persisting in the
7 environment ---
8 A. Correct.
9 Q. --- in terms of PCBs persisting in the
10 environment.
11 A. Correct.
12 Q. Just let's call it a "situation" or
13 whatever you want.
14 A. Let's call it a "situation," because
15 persistence is not necessarily a problem.
16 Q. I understand.
17 A. The earth persists, so that's a nice
18 thing, you know. So, I --- I ---
19 Q. But, in terms of ----
20 A. I don't think I ---
21 Q. Well ----
22 A. Okay.
23 Q. When you say that MCS 1016 is at least
24 ten times better --- and "better" is your
25 word, not my word.

1 A. Right. But I don't see myself using
2 "problem" in here either.

3 Q. No. I understand. I understand. But
4 when you say MCS 1016 is at least ten
5 times better than the current product
6 Aroclor 1242, did you mean that MCS 1016
7 was ten times less likely or --- well,
8 let's say ten times better in terms of
9 not persisting in the environment?

10 A. What I meant was that through the
11 criteria that we were using in this
12 study--- and I'd have to read this study
13 and delineate the criteria --- that MCS
14 1016 was ten times better. It could mean
15 that it had ten times less of something.
16 It could mean that it degraded ten times
17 faster. It could mean a lot of things.
18 I'd have to read the report to give you
19 --- to reestablish the information and
20 interpret it for you.

21 Q. But from what it says --- so it was ten
22 times better from an environmental point
23 of view?

24 A. Yes. That's what it says.

25 MR. ZIMMER: "Viewpoint," I

1 think, is the word used.

2 A. Yeah. Environmental viewpoint. Okay.

3 Q. Let me refer you to the second page,
4 which is number TRAN 036754.

5 A. Yes, sir.

6 Q. And go back down to the paragraph above
7 where it says, "Conclusion." It says,
8 "Some simple arithmetic with the numbers
9 in Table II shows that approximately 75
10 percent of Aroclor 1254, approximately 10
11 percent of Aroclor 1242, and only
12 approximately 1 percent of MCS 1016 are
13 the refractory PCB isomers that are
14 responsible for the biological build up."
15 What does "refractory" mean?

16 A. "Refractory" means difficult.

17 Q. Difficult to degrade?

18 A. It could be difficult to degrade, yes.

19 Q. What did you ---

20 A. In this context, it probably is.

21 Q. This biological buildup, is that ---

22 A. It could be difficult to partition into
23 water from fat situation too. So it's
24 refractory to some process.

25 Q. What did you mean by "refractory" in this

1 sentence?

2 A. Okay. Let me read it. "Refractory"

3 meant --- I think I meant persistence ---

4 Q. Okay.

5 A. --- based on the observations that we've

6 made today.

7 Q. I understand. And this reference to

8 biological buildup in that sentence, by

9 that were you referring to the

10 accumulation of PCBs, for example, in the

11 fatty tissues of fish and so forth?

12 A. By that I meant that the higher

13 chlorinated PCBs, because of their

14 properties, were preferentially absorbed

15 and concentrated in lipophilic materials.

16 Yes.

17 Q. Is "lipophilic" referring to fatty

18 tissues?

19 A. Yes. That's correct.

20 Q. Fatty tissues of fish and other animals?

21 A. Fatty tissues are in any living organism.

22 Q. Sure. Let me refer you back to the

23 testimony that was given before the EPA,

24 that I believe we introduced as an

25 Exhibit yesterday.

1 A. This was before Judge Sweeney?

2 Q. Yes. Exhibit 317. And to refer you to
3 page 2862 of the transcript, which is
4 TRAN 028546.

5 A. Let me just ---

6 Q. If you look back at the bottom paragraph
7 where it says, "Answer", is that your
8 testimony? After where it says "A" about
9 line 17.

10 A. I would say it is.

11 MR. ZIMMER: I don't understand the
12 question, really. It says,
13 "Answer." This is a passage of his
14 testimony.

15 MR. KASHANI: It's Dr. Tucker's
16 testimony.

17 THE WITNESS: Yes.

18 MR. ZIMMER: I mean, do you want
19 him to review it and make sure ---

20 MR. KASHANI: No. No. I ---

21 MR. ZIMMER: --- in the context of
22 the question that it's correct?

23 MR. KASHANI: No. I just want to
24 make sure I have the right place in
25 the transcript and this is still Dr.

1 Tucker's testimony.

2 A. Yeah. I looked back, and then there
3 seems to be --- it seems to be continuous
4 from the point at which it shows that I
5 was sworn in.

6 Q. Okay. And the answer presented here, or
7 the answer here or the testimony you gave
8 here reads, quote: "The definition is
9 proposed because we sincerely believe
10 that the predominant problem with
11 polychlorinated biphenyls is the
12 persistence of some of the higher
13 chlorinated ones in the sense that if
14 they persist for exceedingly long periods
15 of time and can bioaccumulate, then there
16 is a potential possibility that they
17 could achieve, if they continue to be
18 released, that they could achieve a level
19 in higher organisms that could have a
20 toxic impact." Was this your testimony?

21 A. Yes, sir.

22 Q. When you said "bioaccumulate" do you mean
23 the same thing as the phrase "biological
24 buildup" in Exhibit 336?

25 A. Yes.

1 Q. And by the "higher chlorinated ones," do
2 you mean the PCBs with five or more
3 chlorines on them?

4 A. Yes.

5 Q. And is that the same as the "refractory
6 PCB isomers"?

7 A. Yes.

8 Q. Thank you.

9 A. Shall I return Exhibit 317 to the
10 recorder?

11 Q. Sure. Thank you. Yes. Doctor, I'm going
12 to refer you back to another Exhibit as
13 well as long as we're looking at older
14 Exhibits.

15 A. Since we're talking about how I feel
16 about things, and you brought that up in
17 that last testimony in front of the EPA
18 for the Toxic Substance Act routine ---

19 Q. There's no question pending.

20 MR. ZIMMER: Well, if he wants to
21 talk, he's entitled to. You don't
22 have the ability to cut him off, so
23 --- Doctor, if you feel you need to
24 add something to it, you may. I
25 would prefer that you wait for a

1 question, though.

2 A. Yeah. Okay.

3 Q. Turn back to Exhibit ---

4 MR. ZIMMER: Don't feel chagrined
5 about making comments that you feel
6 are necessary to augment your
7 testimony.

8 Q. Let's move on. We have very limited
9 time. We go on to Exhibit --- back to
10 327. Yesterday you mentioned that --- I
11 believe you mentioned that you had no
12 specific recollection of this Exhibit.
13 This is Exhibit 377. Do you have any
14 general recollection of this document?

15 A. Yeah. I have a general recollection of
16 the document. And --- yes.

17 Q. Do you remember what context you might
18 have prepared this document or prepared
19 this draft?

20 MR. ZIMMER: He didn't indicate
21 that he did prepare it.

22 A. General context.

23 Q. Well, what's the substance of your
24 general recollection?

25 A. Of this?

1 Q. Yes.

2 A. That it had to do with research that I
3 was working for on a Monsanto product
4 while I worked for Monsanto. And it
5 talks about a lot of things that --- some
6 of which we were directly involved with.

7 Q. I'm going to refer you to a sentence on
8 page three which is TRAN 023492.

9 A. Okay. Are you going to give me a copy of
10 it to look at?

11 Q. Okay. Sure. Since I don't have a copy,
12 could you please read that ---

13 A. Oh, here I'm sorry.

14 Q. Could you be kind enough to read that ---
15 that first full paragraph?

16 A. Which one? This one that starts
17 "Unfortunately"?

18 Q. Yes.

19 A. Okay. "Unfortunately the solution to the
20 problem will initially involve our
21 withdrawal of Aroclor 1254 and 1260 from
22 the market place. Followed by a
23 concerted effort to prove that Aroclor
24 1242 is biodegradable. If we can prove
25 that Aroclor 1242 is biodegradable then

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1 with sufficient care the manufacture and
2 use of this material can continue. The
3 clearance of Aroclor 1242 will in turn
4 clear materials such as 1221, 1232, etc.
5 and possibly even Aroclor 1248."

6 Q. Okay. Do you recall writing that?

7 A. I don't recall specifically writing that,
8 no.

9 Q. Do you have a general recollection of
10 writing something like that?

11 A. Yes.

12 Q. And do you have that general recollection
13 in the context of the time of this
14 document, which appears to be October or
15 December, 1969?

16 A. I'm sorry.

17 Q. October or November, 1969?

18 A. I can't argue with the date. I don't
19 recollect it specifically. I don't know
20 what I was doing in 1969 specifically ---
21 that specifically. I apologize for my
22 inability to do that, but I just don't.

23 Q. The second sentence what you read,
24 mentions, quote, "A concerted effort to
25 prove that Aroclor 1242 is

1 biodegradable." Do you recall that
2 effort taking place?

3 A. Yes.

4 Q. Then the next sentence reads, "If we can
5 prove that Aroclor 1242 is biodegradable,
6 then with sufficient care, the
7 manufacture and use of this material can
8 continue." Do you recall proving that
9 Aroclor 1242 was biodegradable?

10 A. Yes.

11 Q. How did you do that?

12 A. Through the semicontinuous activated
13 sludge studies, through the River
14 Die-away studies, through all the efforts
15 that we incurred.

16 Q. Are these ---

17 A. We ---

18 Q. Are these the studies that we looked at
19 yesterday?

20 A. Some of them, yes.

21 Q. You mentioned you couldn't recall any
22 other studies than --- other than what we
23 looked at. Do you now recall studies
24 other than what we looked at ---

25 A. No.

1 Q. --- in terms of those documents?

2 A. I --- I'm --- that's a very convoluted
3 question. Can you ask that in a more
4 direct fashion, please, so I can
5 understand what I'm answering?

6 Q. Yesterday, I showed you Exhibits ---

7 A. If I had a tail I'd feel like I was being
8 jerked around by that question, very
9 frankly, so since I'm attempting to be as
10 honest and as straightforward as
11 possible, I'd appreciate it if you could
12 clarify that question.

13 Q. Yesterday, I showed you Exhibits 328 and
14 329 --- and, I'm sorry, 330 --- and I
15 asked you if you remembered any
16 biodegradation studies other than the
17 studies that are reflected in these
18 Exhibits, and you said, "No, I don't
19 recall." Could you show me which of
20 these studies is a reference in these
21 documents, as you said, proved that ---
22 proved that Aroclor 1242 is
23 biodegradable?

24 MR. ZIMMER: If it is indeed in one
25 of these studies.

1 MR. KASHANI: But he said he
2 doesn't recall any other.

3 MR. ZIMMER: Right. Does he have
4 to recall all of them? Does he get
5 penalty points for not remembering
6 every single piece of paper that was
7 generated?

8 A. This is ridiculous. I published an
9 article in a peer group --- peer review,
10 journal that clearly indicated that
11 Aroclor 1242 was biodegradable.

12 Q. What was ---

13 A. The information was presented as part of
14 the presentation to the President's
15 Council on Environmental Quality
16 Interdisciplinary Group as being
17 degradable. Now you're asking me to look
18 back at a segmented time frame, 1969, I
19 believe, December to February of 1970, on
20 three reports, which may or may not be
21 complete renditions of what was going on
22 at that point in time, and you're asking
23 me to judge from that information whether
24 or not Aroclor 1242 is degradable. I
25 don't understand that.

JUDY COMP & ASSOCIATES

1 Q. You said that at some point you proved
2 that Aroclor 1242 was biodegradable.

3 A. That's correct.

4 Q. Do you recall the study or studies that
5 proved that Aroclor 1242 is
6 biodegradable?

7 A. Yes.

8 Q. Which studies were those?

9 A. They are published. The Semicontinuous.
10 Activated Sludge study showed that
11 Aroclor 1242 biodegraded at roughly about
12 20 percent of the material every
13 forty-eight hours.

14 Q. When was that study published?

15 A. I don't know. I'd have to look in the
16 record. But I can look. It would have
17 to be, probably in the 1970s.

18 Q. Would it be the --- after 1972?

19 A. Could be. I'd have to look.

20 Q. Do you remember when the work was
21 performed?

22 A. Not really.

23 Q. Specifically, prior to that date of
24 publication? A year prior, two years
25 prior.

- 1 A. I don't remember that specifically.
- 2 Q. Was the work performed before 1970?
- 3 A. I just said I don't remember that
- 4 specifically.
- 5 Q. And did the studies show that all of the
- 6 PCBs in Aroclor 1242 degraded or the
- 7 lower chlorinated PCBs?
- 8 A. What the study demonstrated was that to
- 9 one degree or another, the degradation
- 10 rate was proportional to the degree of
- 11 chlorination, so what we were able to
- 12 observe during the time frame of the
- 13 study, was that the lower chlorinated
- 14 materials degraded more rapidly than the
- 15 higher chlorinated materials. During the
- 16 time frame of the study, we were unable
- 17 to observe any significant degradation on
- 18 those things that we began to call
- 19 refractory isomers.
- 20 Q. And these refractory isomers are the PCBs
- 21 with five or more chlorines?
- 22 A. Correct.
- 23 Q. So, during the course of the study, you
- 24 saw that the PCBs in Aroclor 1242, which
- 25 had four or fewer chlorines were

- 1 degrading?
- 2 A. Correct.
- 3 Q. But that the PCBs in Aroclor 1242, the
- 4 refractory PCBs in Aroclor 1242 were not
- 5 degrading over the course of your study?
- 6 A. During the time frame observed, that's
- 7 correct.
- 8 Q. And were these the refractory isomers
- 9 that were reflected in Exhibit Three
- 10 Thirty-six as being about 10 percent of
- 11 Aroclor 1242?
- 12 A. Right. "Refractory" is a cute scientific
- 13 word for slow.
- 14 Q. So, your study that you were just
- 15 describing, the study that was published
- 16 in the mid-seventies that you described,
- 17 during the course of the work that led to
- 18 that study and led to that paper,
- 19 approximately 10 percent of the PCBs in
- 20 Aroclor 1242 were not observed to
- 21 degrade; is that correct?
- 22 A. I don't know that to be correct to that
- 23 level of detail.
- 24 Q. Well ---
- 25 A. I stated what I knew earlier in answers

1 to questions you just asked me.

2 Q. So, you saw that the refractory isomers
3 were not degrading during the course of
4 your study?

5 A. That's correct.

6 Q. And this is a study that you referred to
7 earlier as proving that Aroclor 1242 is
8 biodegradable?

9 A. Correct.

10 Q. Were there any studies that you can
11 recall at any time which showed a greater
12 degree of biodegradability or a greater
13 percentage of biodegradability than
14 reflected in this study?

15 A. This study showed a certain amount of
16 biodegradability.

17 MR. ZIMMER: Do you have the study
18 so that we can ---

19 MR. KASHANI: Unfortunately, we
20 don't.

21 MR. ZIMMER: Okay.

22 MR. KASHANI: It has not been
23 produced to us.

24 MR. ZIMMER: That's not correct ---

25 THE WITNESS: It's in the open

1 literature. I mean ---

2 MR. KASHANI: And also, it's
3 somewhat later than the time period
4 of this case.

5 Q. But in any case, do you recall any
6 studies that showed a greater degree of
7 biodegradability of Aroclor 1242 than
8 reflected in that study?

9 A. Do I recall any studies that show any
10 greater degradability than shown in the
11 published work?

12 Q. Yes.

13 A. Not specifically. Which doesn't preclude
14 that it didn't occur.

15 MR. KASHANI: Let's take a break.

16 (OFF RECORD)

17 Q. I'm going to refer you back to the
18 deposition from the Outboard Marine case.
19 Let me refer you to page 103 ---
20 beginning at page 103, and continuing to
21 page 105. And what I'd like to do is
22 introduce the cover page, page 3 and the
23 signature page, the certificate ---

24 A. Uh-huh (affirmative).

25 Q. --- along with those pages as ---

1 MR. KASHANI: Well, let's start
2 with introducing the cover page and
3 signature page and the notary's
4 signature as an Exhibit. Just call
5 this the Exhibit next in order.

6 (Thereupon the Court Reporter
7 marked the pertinent document as
8 PLAINTIFF'S EXHIBIT NUMBER 337-A)

9 Q. And then let's go to pages 103 to 105,
10 beginning on page 103, where it ---
11 there's a question down near the bottom
12 of the page that says, "Well, you had run
13 enough known samples to convince you that
14 you could find what you knew was there by
15 mid-1969, correct?" and going on to page
16 105, ending with your answer in the
17 middle of page 105, which reads, "Many of
18 them were, yes. We had a practice, as we
19 pulled up notebooks periodically, these
20 would go to the library, if I remember
21 correctly, for microfilming and things of
22 that sort, and then we would get them
23 back and retain them ourselves. But
24 everything was kept. It was a general
25 practice to retain everything." I'd like

1 for you to read over that testimony
2 starting with that indicated page on 103
3 and going to page 105.

4 A. (Witness complies with request).

5 MR. KASHANI: And we'll introduce
6 that portion as the next Exhibit.

7 (Thereupon the Court Reporter
8 marked the pertinent document as
9 PLAINTIFF'S EXHIBIT NUMBER 338-A)

10 Q. Do you recall ---

11 A. Can I have the first one that was
12 introduced as an Exhibit to make sure
13 we're talking about the same document?
14 It's just this several hundred page
15 document. (Witness peruses document).
16 Okay.

17 Q. Do you recall giving that testimony?

18 A. I recall giving the testimony.

19 Q. It's the testimony that I've indicated
20 beginning on the question on page 103
21 that I read and ending with your answer
22 on page 105, which I read. Was that
23 testimony true and accurate?

24 A. Yes.

25 Q. This Outboard Marine deposition was taken

1 about ten years ago. Do you know today
2 --- let me go back a second. Page 105 it
3 refers to lab notebooks. As you sit here
4 today, do you know where those lab
5 notebooks might be or if Monsanto kept
6 those?

7 A. I don't know where they might be, and I
8 don't know if Monsanto kept those.

9 Q. Thank you. I refer you to testimony
10 beginning on page 66 of the deposition,
11 and beginning with the point --- the
12 question which reads, "Did you do any
13 other type of sampling or analyses
14 besides water and sediment?" and going to
15 your answer on page 68 where the question
16 asked is, "Those were the first
17 environmental samples that you ran?",
18 question mark. And your answer is,
19 "Yes." I wonder if you could read that
20 portion, beginning with the question on
21 page 66 and going to your answer on page
22 68.

23 A. Do you want me to read that aloud?

24 Q. No. You don't have to read it aloud.

25 A. Just read it?

1 Q. Yes.

2 MR.. KASHANI: I want to mark this
3 as Exhibit next in line.

4 (OFF RECORD)

5 (While off the record the Court
6 Reporter marked the pertinent
7 document as PLAINTIFF'S EXHIBIT
8 NUMBER THREE 339-A.)

9 A. Okay. I've completed reading it.

10 Q. Again, with reference to the testimony
11 that I delineated from the question on
12 page 66 to the answer on page 68, do you
13 recall giving that testimony?

14 A. Not specifically.

15 Q. Was that testimony true and accurate?

16 A. I think, to the best of my recollection,
17 it was. I was under oath at the time
18 that it was taken.

19 Q. Do you recall the fish samples that are
20 mentioned in this testimony?

21 A. Nope.

22 Q. Page 67, there's an answer that refers to
23 --- the answer is down near the middle of
24 the page. There's a question first that
25 reads, "Why would you find higher levels

1 in fish?" And your answer was, "The
2 reason that eventually came out of it was
3 a little thing called bioaccumulation."
4 Is that bioaccumulation referring to the
5 biological buildup of PCBs in fatty
6 tissues?

7 A. It refers to the selective partitioning
8 of low levels of material from water into
9 an organism's lipid --- lipid materials..
10 And that's called, I think,
11 bioaccumulation. At least it's kind of
12 like my definition of it.

13 Q. In the context of this testimony, is that
14 referring to PCBs traveling and being
15 collected in the fatty tissues of fish?

16 A. Yes.

17 Q. Thank you. Dr. Tucker, do you remember a
18 project of getting samples from some of
19 Monsanto's customers, from their plants,
20 to analyze for PCB content?

21 A. Yes, sir.

22 Q. Do you remember who worked on that
23 project?

24 A. Not specifically.

25 Q. Do you remember when that project began?

1 A. No, sir.

2 Q. Do you remember the purpose of that
3 project?

4 A. I think there were --- not specifically
5 --- there were many purposes, probably.

6 Q. Do you remember generally any of those
7 purposes?

8 A. The only thing I recollect was that there
9 were --- there was an interest to see our
10 own customers' operations where they were
11 using the material to determine what was
12 there, and I seem to recall in one case
13 that there were some sedimentation ponds
14 that had fluids in the bottom of them,
15 and they wanted to reclaim and/or develop
16 ways for reclaiming and/or recovering
17 these materials and recycling them.

18 Q. Do you recall which customer that was
19 with the ponds?

20 A. Not specifically.

21 Q. Let me refer you to a portion of your
22 deposition starting on page 86 and going
23 to page 87.

24 MR. KASHANI: Mark this Exhibit.

25 (Thereupon the Court Reporter

1 marked the pertinent document as
2 PLAINTIFF'S EXHIBIT NUMBER 340-A).

3 Q. I refer you to page 86 beginning about
4 mid-way down the page where it says,
5 "Question: Was there a project set up
6 within Monsanto to provide you with
7 samples for analyses from customers?"
8 And your answer was, "Yes." And then
9 going to page 87, where your answer ---
10 or where the question is, "So you were
11 provided with the samples he took and you
12 analyzed those samples for PCBs as part
13 of your overall assignment to confirm
14 that PCBs were in the environment?" And
15 you answered, "Yes." I'd like you to
16 read that portion, please.

17 A. Okay. I've read it.

18 Q. Do you recall giving that testimony?

19 A. Not that --- not specifically I recall
20 giving the testimony.

21 Q. All right. Was the testimony I've
22 indicated from that portion on page 86 to
23 the portion on page 87 true and accurate?

24 A. I was under oath at the time I said these
25 things, so, I would assume that it was.

- 1 Q. Do you recall ---
- 2 A. To the best of my ability, it was
- 3 truthful and accurate.
- 4 Q. Does this refresh any recollection of who
- 5 might have been involved in the sampling
- 6 for you?
- 7 A. Yeah. Don Pogue. I recall Don Pogue
- 8 being involved in the project.
- 9 Q. Who was he?
- 10 A. Well, starting with the most simple, I
- 11 believe he was an employee --- Monsanto
- 12 employee. I believe he was in the
- 13 marketing and sales or technical customer
- 14 interfacing area, to the best of my
- 15 recollection.
- 16 Q. How did Don Pogue go about collecting
- 17 these samples, if you know?
- 18 MR. ZIMMER: Calls for speculation.
- 19 A. I don't know.
- 20 Q. Did you ever deal directly with any of
- 21 the customers in the context of these
- 22 samples, or obtaining these samples?
- 23 A. It wasn't --- that was not the way that
- 24 we did that, no.
- 25 Q. Well, how was it done?

1 A. In general, it was done through an
2 interface that dealt with the customer.

3 Q. What do you mean by "interface"?

4 A. Well, a project manager like Don Pogue
5 might be considered a project manager.
6 In this particular instance, as I recall,
7 it was his job to contact the customers
8 and --- and I don't know which customers
9 or how they selected them. I wasn't
10 involved in that. But to contact them
11 make arrangements to get the samples, get
12 them to the laboratory, get us to analyze
13 them. We'd analyze them and provide the
14 information back to them, and he, in
15 turn, would then provide it to the
16 customer. That's the way it worked.

17 Q. You mean you provided the information
18 back to Don Pogue or some equivalent ---

19 A. Whoever.

20 Q. --- Monsanto employee?

21 A. Correct.

22 Q. And the information would flow on from
23 there?

24 A. Correct. That's a typical project
25 manager type approach that's taken for

1 most things.

2 Q. Do you recall if the customers were told
3 that one of the purposes for taking the
4 samples was with an idea of reclamation
5 efforts?

6 A. I don't recall --- I have no knowledge
7 that customers were specifically told
8 that. I knew that that was part of it.

9 Q. Did you personally ever notify any
10 customers that they had PCBs in samples
11 collected from their facilities?

12 A. No.

13 MR. ZIMMER: Lacks foundation.

14 Why would he? He hasn't told you he
15 had any customer contact. I marvel
16 at the time we've spent on things
17 like that that are outside of the
18 Witness' area.

19 A. For the record, my job was not to contact
20 customers or interface with them.

21 MR. ZIMMER: He knows that. Just
22 answer the question.

23 Q. Do you recall a meeting with
24 representatives from NCR concerning their
25 use of PCBs that took place about 1970?

1 A. No, I don't.

2 Q. I refer you to the Exhibit next in order

3 ---

4 (Thereupon the Court Reporter
5 marked the pertinent document as
6 PLAINTIFF'S EXHIBIT NUMBER 341-A).

7 Q. This is Exhibit 341, and I ask you to
8 review that.

9 A. (Witness complies with request).

10 Q. It's a one page. I gave you two copies.

11 A. Oh. Okay. I've reviewed it.

12 Q. Do you have any general recollection of
13 this document?

14 A. No, sir.

15 Q. Does this trigger any recollection of a
16 meeting with representatives from NCR?

17 A. No, sir.

18 Q. What about the next Exhibit?

19 MR. KASHANI: Mark that 342,
20 please.

21 (Thereupon the Court Reporter
22 marked the pertinent document as
23 PLAINTIFF'S EXHIBIT NUMBER 342-A).

24 Q. Do you recall this document?

25 A. No, sir.

1 Q. Does this trigger any recollection of a
2 visit with NCR?
3 A. No, sir.
4 Q. Turning to the second page of this
5 document. This is at page TRAN 085271.
6 Near the top, under the heading,
7 "Objectives" Number 1. "Review the
8 current state of knowledge in areas of
9 toxicology, biodegradation and analysis
10 of --- I believe that's --- MIPB, HB-40,
11 and Aroclor 1242." Do you know what
12 "MIPB" means?
13 A. Yes.
14 Q. What is that?
15 A. What does it mean?
16 Q. Yes.
17 A. It means monoisopropyl biphenyl.
18 Q. Do you know --- was that a proposed
19 replacement product for NCR, to your
20 knowledge?
21 A. Yes.
22 Q. Why was it proposed as a replacement?
23 A. For NCR?
24 Q. Yes.
25 A. Because it did the same job that Aroclor

- 1 1242 did.
- 2 Q. Was NCR using Aroclor 1242 previously?
- 3 A. I believe that has been documented, yes.
- 4 Q. And what were they using it for?
- 5 A. As an encapsulation fluid for carbonless
- 6 carbon paper.
- 7 Q. Are these those triplicate forms and
- 8 quadruplicate forms?
- 9 A. They can be, yes.
- 10 Q. And what was HB-40?
- 11 A. I believe HB-40 stood for 40 percent
- 12 hydrogenated biphenyl.
- 13 Q. What does that mean, "hydrogenated"?
- 14 A. It means that biphenyl has been reacted
- 15 with hydrogen such that it's taken up 40
- 16 percent of the theoretical amount that it
- 17 could take up if it were completely
- 18 hydrogenated.
- 19 Q. Do either MIBP or HB-40 contain chlorine?
- 20 A. No.
- 21 Q. Are either of them PCBs?
- 22 A. No.
- 23 Q. Do you recall if NCR ever substituted
- 24 another product for Aroclor 1242 in its
- 25 application?

- 1 A. I believe they did, but I don't recall it
2 specifically.
- 3 Q. Do you remember if it was HB-40?
- 4 A. As I said, I don't recall it
5 specifically.
- 6 Q. Did you have any involvement in any
7 discussions at Monsanto pertaining to
8 NCR's use of Aroclor 1242 and the
9 possible substitution of another product
10 for Aroclor 1242?
- 11 A. Go through that question again, please?
- 12 Q. Do you recall any discussions you had
13 with individuals at Monsanto regarding
14 NCR's use of Aroclor 1242 or NCR's
15 substitution of another product for
16 Aroclor 1242?
- 17 A. No.
- 18 Q. Do you know why NCR substituted another
19 product for Aroclor 1242?
- 20 A. I do not know why NCR did.
- 21 Q. Do you recall a meeting that took place
22 in 1970 with representatives from General
23 Electric?
- 24 A. Vaguely.
- 25 Q. Let me show you the Exhibit.

1 (Thereupon the Court Reporter
2 marked the pertinent document as
3 PLAINTIFF'S EXHIBIT NUMBER 343-A).

4 A. If it's the one that I recall vaguely,
5 and I can explain to you why it was
6 vaguely.

7 Q. Was there more than one meeting with
8 General Electric?

9 A. I haven't the faintest. There could have
10 been. (Witness peruses document).

11 Q. I refer you to the Exhibit next in order,
12 Exhibit 343, and ask you to review that,
13 and then ask you if that refreshes your
14 recollection about meeting with General
15 Electric.

16 A. (Witness peruses document). Yes, this is
17 the meeting that I vaguely remember.

18 Q. This meeting took place in January of
19 1970?

20 A. Yes.

21 Q. Did representatives of General Electric
22 come to St. Louis to meet with Monsanto
23 representatives?

24 A. It indicates that they did.

25 Q. Do you recall the meeting was in St.

1 Louis?

2 A. No, I don't.

3 Q. Do you recall generally what was

4 discussed at the meeting?

5 A. Let me explain why I recall the meeting.

6 I recall Mr. Edward L. Raab from General

7 Electric, and I recall him slamming his

8 fist on the table and telling us that if

9 we quit manufacturing PCBs, they'd sue us.

10 Q. Do you know what General Electric used

11 PCBs for?

12 A. Yes.

13 Q. What did they use PCBs for?

14 A. They used them as a dielectric fluid.

15 Q. Is that in capacitors and transformers?

16 A. Yes.

17 Q. Do you recall --- I'm referring you to

18 the page two of this Exhibit at TRAN

19 023510 under the heading of C.

20 Biodegradeability of PCBs. The second

21 sentence mentions, "Drs. Richard, Keller

22 and Tucker discussed biodegradeability

23 studies by Monsanto at" --- is that

24 Ruabon?

25 A. Ruabon.

1 Q. Ruabon?

2 A. Ruabon.

3 Q. Ruabon. That's spelled R-u-a-b-o-n ---
4 "and elsewhere." Do you recall those
5 discussions?

6 A. Not specifically.

7 Q. Do you recall any discussions at this
8 meeting about the biodegradability of
9 Aroclor 1242?

10 A. Not specifically.

11 Q. Let me point out for the record that
12 there's a mark --- I think there's a mark
13 on your copy --- it may not have come
14 out. It's in pencil. It's very light
15 --- on page two. That mark is not part
16 of the Exhibit, and I will provide a
17 clean Exhibit for the court reporter.
18 There's some handwriting up on top of
19 page two. That is not part of the
20 Exhibit, and that will be removed. That
21 was ---

22 MR. ZIMMER: It's the copy that
23 he's been shown, so it's going to
24 stay in the Exhibit.

25 MR. KASHANI: Well, I can show you

1 an Exhibit without that, or one that
2 we ---

3 MR. ZIMMER: Well, you can do that,
4 but ---

5 MR. KASHANI: Why don't we use this
6 Exhibit?

7 MR. ZIMMER: --- this one is going
8 to stay in there as well because
9 it's the one that he referred to.

10 MR. KASHANI: Let's use that one.

11 MR. ZIMMER: No. This one's
12 staying in the record. You can add
13 another one if you want, but it's up
14 to you what you want to show him.
15 That one also has it.

16 MR. KASHANI: This one also has it
17 too, so ---

18 Q. Well, does that mark affect in any way
19 your understanding of this Exhibit or
20 your recollection of the meeting?

21 A. Not really.

22 Q. Does it mean anything to you?

23 A. No.

24 Q. Were there any meetings at Monsanto prior
25 to the General Electric meeting to

1 discuss what would be discussed at the
2 General Electric meeting?

3 A. I don't recall any.

4 Q. I'll show you Exhibit --- the next in
5 order. by the way, do you recognize this
6 Exhibit, xhibit Three 343?

7 A. No.

8 Q. Do you know if Exhibit 343 reflects what
9 took place at the General Electric
10 meeting?

11 A. I couldn't swear to it, no.

12 MR. KASHANI: I'm entering the next
13 Exhibit. That will be 344.

14 (Thereupon the Court Reporter
15 marked the pertinent document as
16 PLAINTIFF'S EXHIBIT NUMBER 344-A).

17 Q. Do you recognize this document?

18 A. No, sir.

19 Q. Do you recognize the handwriting?

20 A. No, sir.

21 Q. Does this document trigger or refresh any
22 recollection of a possible meeting prior
23 to the General Electric meeting to
24 discuss topics for the General Electric
25 meeting?

- 1 A. No, sir.
- 2 (Thereupon the Court Reporter
3 marked the pertinent document as
4 PLAINTIFF'S EXHIBIT NUMBER 345-A).
- 5 Q. I'll show you one last Exhibit.
- 6 A. Okay.
- 7 Q. It's Exhibit 345. Do you recognize this
8 document?
- 9 A. No, sir.
- 10 Q. Does this document trigger any further
11 recollection of what was discussed at the
12 General Electric meeting ---
- 13 A. No, sir.
- 14 Q. --- of January, 1970? Do you recall
15 which Aroclors General Electric used
16 predominantly?
- 17 A. No, sir. I don't.
- 18 Q. Was Aroclor 1242 used in capacitors ---
19 used in dielectric applications?
- 20 A. Was the question both or one or the
21 other?
- 22 Q. Let's start with dielectric applications.
- 23 A. Yes.
- 24 Q. Was it used in capacitors?
- 25 A. I believe so.

1 Q. Was it used in transformers?

2 A. Yes.

3 Q. Did Westinghouse use Aroclor 1242?

4 A. They used polychlorinated biphenyls. I
5 can't remember for sure, but it seems to
6 me that Westinghouse had its own trade
7 name and made up their own fluids.

8 Q. Was that Interteen?

9 A. That seems --- that would --- yeah.
10 Since you brought it up, that sounds like
11 what the name was, Interteen.

12 Q. And do you know what Aroclors or PCBs
13 went into Interteen?

14 A. I think it depended upon the application.
15 It depended upon whether the unit was
16 going to go in a very cold climate or a
17 very warm climate. The whole --- the
18 whole reason these are called dielectric
19 fluids was because they stayed fluid, and
20 the fluidicity of the material was of
21 particular importance. So, for example,
22 if they were going to use it in Alaska
23 where it was very cold, they would use a
24 lower chlorinated material --- to the
25 extent they could safely --- to keep it

1 fluid.

2 Q. I'm sorry --- a more chlorinated?

3 A. Lower chlorinated material to the extent
4 that they could, because the chlorine to
5 hydrogen ratio determined its safety from
6 an explosive, fire viewpoint.

7 Q. Okay.

8 A. So it depended ---

9 MR. KASHANI: Let's take a break..

10 (OFF RECORD)

11 Q. Dr. Tucker, we had ---

12 MR. KASHANI: --- and counsel, we had
13 inadvertently produced copies ---
14 the copy of Exhibit 343 that we
15 produced inadvertently had some
16 marks on the second page. That
17 production was inadvertent, and we
18 did not mean to waive any rights by
19 producing that. In fact, my copy,
20 unfortunately, did not contain those
21 marks which is why the production
22 occurred. That's why I was unaware
23 of it. I'd like to introduce
24 another Exhibit and mark it Exhibit
25 next in order ---

1 MR. ZIMMER: You can substitute it
2 if you like. I don't really care.

3 MR. KASHANI: Okay.

4 MR. ZIMMER: If you want, instead
5 of 343. That's fine.

6 MR. KASHANI: Okay. Let's
7 substitute this document instead of
8 Exhibit 343. This document is in
9 all respects identical to Exhibit
10 343 except --- I have a --- let me
11 go back. I have a document which is
12 in all respects identical to Exhibit
13 343 except it does not contain the
14 marks that were put on later. This
15 document I have in my hand is
16 identical to what Monsanto produced
17 to us, and I would like to
18 substitute this document for the
19 existing Exhibit 343, and this
20 document will become Exhibit 343.

21 MR. ZIMMER: That's fine. See, I'm
22 not such a bad guy.

23 Q. Dr. Tucker, I'm going to show you the
24 Exhibit next in order, Exhibit 345 ---
25 346, I'm sorry ---

1 (Thereupon the Court Reporter
2 marked the pertinent document as
3 PLAINTIFF'S EXHIBIT NUMBER 346-A) .

4 Q. --- and ask you if you recognize this
5 document?

6 A. No, sir.

7 Q. This is a document that's been provided
8 by Monsanto. It appears to be an
9 organizational chart, dated June 1, 1972.
10 I wonder if you recognize some of the
11 names and relationships on the chart?

12 A. Are you asking me if I recognize --- is
13 that a question yet?

14 Q. Yes. Do you recognize any of the names
15 ---

16 A. Yes.

17 Q. --- or relationships on the chart? Do
18 you recognize Mr. C.W. Roos, who is
19 listed at the top?

20 A. Yes, I do.

21 Q. Who is he?

22 A. He was the Director of Technology
23 Planning and Evaluation as it says here.

24 Q. Did he have anything to do with PCBs or
25 functional fluids? Start with PCBs.

1 A. Would you define anything to do with ---
2 Q. Would be involved in the manufacture or
3 testing or production.
4 A. No, sir.
5 Q. What was his job?
6 A. He was Director of Technology Planning
7 and Evaluation.
8 Q. What did that mean?
9 A. It meant that the following groups that
10 are shown there reported to him. He was
11 really --- let's see --- let me try to
12 remember. He had the --- the analytical
13 or applied sciences people reported to
14 him, which was a, you know, support ---
15 service support group. He had process
16 technology group, which, again, was a
17 service support group and that kind of
18 routine. It's a position much like mine
19 right now where I'm Director of
20 Analytical Programs for Clemson Technical
21 Center. I mean, I don't know what kind
22 of level of detailed explanation you want
23 in terms of what the job entails or
24 entailed.
25 Q. Do you know when he joined Monsanto?

1 A. No, sir.

2 Q. Was he with Monsanto in 1967?

3 A. I don't know.

4 Q. About 1968, 1969?

5 A. I don't know.

6 Q. If you go to the first column on the

7 left, you have listed T.M. Patrick.

8 A. Right.

9 Q. Do you remember him?

10 A. Yes. I remember Tracy Patrick.

11 Q. Who was he?

12 A. He was Bob Keller's boss.

13 Q. Did he have any involvement with PCBs?

14 MR. ZIMMER: I'm sorry. Which time

15 frame are we talking about? As of

16 the date of this ---

17 MR. KASHANI: During the time that

18 -- let's define the date as between

19 1968 and --- 1967 and 1972.

20 MR. ZIMMER: All right. Thank you.

21 A. I have problems with --- still have

22 problems with the involvement.

23 Obviously, he was my boss' boss, and I

24 worked on PCBs. So, if that's

25 involvement, then I would agree to your

- 1 stipulation he had involvement. But, I
2 mean, I don't understand the question.
3 If I answer "yes" is --- I really don't
4 understand the question. What do you
5 mean by "involvement"?
- 6 Q. Did you have any discussions with him
7 concerning your work with PCBs?
- 8 A. No.
- 9 Q. Did you ever report to him or send memos
10 to him, to your knowledge?
- 11 A. No.
- 12 Q. What about Mr. Marchand, O.J. Marchand,
13 the Facilities Supervisor? Do you know
14 him? Or did you know him?
- 15 A. Yes.
- 16 Q. What was his job?
- 17 A. Facilities Supervisor.
- 18 Q. Was he in charge of the lab?
- 19 A. Physical building, yes.
- 20 Q. Was he in charge of obtaining equipment?
- 21 A. No.
- 22 Q. Did he have any role in your obtaining
23 equipment for your PCB work?
- 24 A. He may have.
- 25 Q. Do you know what that role might have

1 been?

'2 A. It could have been as simple as opening
3 the door so that they could be delivered.
4 I mean, he was in charge of the physical
5 facilities, so you'd have to be more
6 specific in terms of what kind of a role
7 you're talking about.

8 Q. Did he have to authorize a requisition or
9 an expenditure ---

10 A. I don't know whether he was in the
11 authorization trail. I don't recall.

12 Q. Dr. Keller is --- explored that. And
13 then we have group leaders. What are
14 group leaders?

15 A. Group leaders are individuals that lead
16 groups of people that are given certain
17 types of assignments.

18 Q. You are listed here as a group leader; is
19 that correct?

20 A. Yes.

21 Q. When did you become a group leader?

22 A. I believe I commented earlier, about
23 three years after I joined the company,
24 but I don't recall exactly.

25 Q. That would have been about 1970?

- 1 A. Well, it --- well, let's see --- let's
2 see, I think we've established that I
3 joined the company sometime in the last
4 quarter of 1967, so three years from
5 that, it could --- it could be 1970.
- 6 Q. Did your group have a name?
- 7 A. Analytical chemistry group.
- 8 Q. Do you recall which people in that group
9 were involved in the PCB work you were
10 doing?
- 11 A. Probably most all of them.
- 12 Q. Do you know how many people were in the
13 group?
- 14 A. Not specifically, no.
- 15 Q. Do you recall any names?
- 16 A. I recalled some of those names for you
17 earlier.
- 18 Q. That was a Mr. --- Litsch ---- was that
19 ----
- 20 A. Litschgi.
- 21 Q. Litschgi?
- 22 A. Right.
- 23 Q. Do you know how to spell that?
- 24 A. L-i-t-s-c-h-g-i.
- 25 Q. And who else?

- 1 A. Bill Meaz.
- 2 Q. Mr. Mieuier?
- 3 A. Jim Mieuier was not in my group. He was
- 4 in M.W. Dietrich's group, which was the
- 5 spectroscopy group.
- 6 Q. Did the spectroscopy group have any
- 7 involvement with the PCB work?
- 8 A. Yes.
- 9 Q. And Mr. Dietrich was in charge --- Dr.
- 10 Dietrich or Mr. Dietrich?
- 11 A. Doctor.
- 12 Q. Was he in charge of that group?
- 13 A. Yes.
- 14 Q. Do you know who worked for him or under
- 15 him?
- 16 A. Jim Mieuier was one of them. Bernie
- 17 Katlowski, Ozzie Knast. Ozzie actually
- 18 worked for me some too, now, that I
- 19 recall. Gary Mappes --- those are names
- 20 that come --- that come to me in
- 21 recollection.
- 22 Q. Do you know if any of these gentlemen are
- 23 still at Monsanto?
- 24 A. Let's see. Not specifically.
- 25 Q. What about the gentlemen you mentioned

1 earlier that was working in your group,
2 if they are still at Monsanto?

3 A. Jerry Litschgi is still at Monsanto.
4 Bill Meaz was at Monsanto, but last I
5 heard, he had muscular dystrophy, and I
6 don't know whether he is still with them.
7 Another name that's just been sparked up
8 --- Bob Kaley worked for me too.

9 Q. How do you spell that?

10 A. K-a-l-e-y.

11 Q. What did Mr. Emery do? E.M. Emery, or if
12 it's Dr. Emery?

13 A. You know, I don't remember if it's Doctor
14 or not. I think it was. Ed Emery was
15 the group leader of the gas
16 chromatography group.

17 Q. Did he have involvement with the PCB
18 work?

19 A. Yes.

20 Q. What did he do with the PCBs?

21 A. His involvement with the PCBs, as I
22 recollect, was mainly from a product
23 viewpoint, in terms of composition, those
24 kinds of things.

25 Q. Did he analyze Aroclors for composition?

- 1 A. Yes.
- 2 Q. Was he the fellow who analyzed, or did he
3 do any analyses of Aroclors for PCB
4 composition in terms of number of isomers
5 and isomers in the ---
- 6 A. Ed was a group leader. It was doubtful
7 he did any analysis himself.
- 8 Q. Do you know if he supervised work that
9 involved determining the isomers of
10 Aroclors?
- 11 A. He may have.
- 12 Q. What about Mr. --- is that Fowler?
- 13 A. Lou Fowler.
- 14 Q. Lou Fowler? What was his role?
- 15 A. Lou Fowler was a group leader of what we
16 would call the process instrumentation
17 group.
- 18 Q. What is that?
- 19 A. When you have a process that's
20 manufacturing something, sometimes you
21 dedicate on-line instrumentation that
22 continuously monitors that process and
23 analyzes a stream for something. That's,
24 you know, a fairly simplified definition
25 of what a process --- in-line process

1 monitor is.

2 Q. Was Mr. Fowler or his group involved in
3 any way in monitoring the process for
4 production of Aroclors?

5 A. Not to my knowledge.

6 Q. Do you know if Dr. Dietrich or Dr. Emery
7 or Mr. Fowler or Dr. Fowler are still at
8 Monsanto?

9 A. I think Ed's retired --- Emery. Fowler,
10 I think, died, and Dietrich may or may
11 not be at Monsanto. But I don't know
12 specifically that any of them are.

13 Q. Do you know where they might be living?

14 A. No, sir.

15 Q. Who is --- is that Hinchey under Senior
16 Research Specialist?

17 A. Yes.

18 Q. Who is he?

19 A. He was Senior Research Specialist. He
20 was a statistician.

21 Q. Did he work with one of the groups listed
22 above?

23 A. He worked with all of them. He worked
24 for Keller.

25 Q. What did he do?

1 A. He was a statistician. He would develop
2 statistical models. He would look at
3 assemblies of information and analyze
4 them from a statistical viewpoint to talk
5 about how true, how accurate, how precise
6 --- you know, in general, to numerically
7 describe the properties of assemblies of
8 numbers. That's what a statistician
9 does.

10 Q. Did he have any involvement with the PCB
11 work?

12 A. Yes, he did.

13 Q. Did he determine confidence levels for
14 any of that work?

15 A. Yes, he did.

16 Q. And by that, I mean did he analyze your
17 data from the PCB work and determine how
18 confident you could be that that data was
19 accurate? That might not be a correct
20 ---

21 A. No.

22 Q. --- description. What did you understand
23 when I said "did he determine confidence
24 levels"?

25 A. Confidence levels, relative to the

1 question that you asked, seemed to
2 indicate to me how true numbers and
3 environmental samples were that we
4 measured and he did not do that.

5 Q. What did he do, then, with respect to the
6 PCB work?

7 A. He helped us make sense of the tissue
8 residue information that we obtained from
9 Industrial Bio-Test, and the avian,
10 mammalian, and aquatic exposures studies
11 that we conducted to try to ferret out
12 what was going on with PCBs in those
13 types of biological systems.

14 Q. You mean that he would help determine
15 whether you were actually detecting PCBs
16 in the tissues?

17 A. It could be loosely interpreted as that,
18 but that wasn't the focus.

19 Q. And what was the focus?

20 A. The focus was to create pharmacokinetic
21 models that described how PCB --- that
22 did a material balance in terms of PCBs
23 in, PCBs out and where within the system
24 with the box being the animal the PCBs
25 would go.

- 1 Q. So, he helped in the determination of how
2 much PCB remained in the animal?
- 3 A. Correct.
- 4 Q. Do you know where he is today?
- 5 A. No, sir.
- 6 Q. Is that John Hinchin?
- 7 A. I believe it's Jack.
- 8 Q. Hinchin?
- 9 A. Hinchin; right. As it's spelled there,
10 H-i-n-c-h-e-n.
- 11 Q. This left column has individuals and
12 titles listed in it in sort of order.
13 Does that order, to your knowledge,
14 accurately reflect the sort of pecking
15 order, or the order in which people
16 reported to other people?
- 17 A. No. I think it's --- well, it depends.
- 18 Q. I mean, for example, did Mr. Marchand
19 report to Mr. Patrick?
- 20 A. Yes.
- 21 Q. Did Dr. Keller report to Mr. Marchand?
- 22 A. No.
- 23 Q. He reported to Mr. Patrick?
- 24 A. Yes.
- 25 Q. And did the group leaders report to Dr.

1 Keller?

2 A. Yes.

3 Q. And Mr. Hinchon reported to the group

4 leaders ---

5 A. No.

6 Q. --- and to Dr. Keller?

7 A. No.

8 Q. Whom did Mr. Hinchon report to?

9 A. Dr. Keller.

10 Q. Turning to the second column we see

11 Manager Process Technology. Do you

12 recognize that name?

13 A. Yes, I do.

14 Q. Who is that gentleman?

15 A. Ollie DeGarmo.

16 Q. Did he have any involvement with Aroclors

17 or PCBs or their production?

18 A. I do not know.

19 Q. Underneath, we have J.F. Quinn. Do you

20 recognize that name?

21 A. Yes. Jack Quinn.

22 Q. Who is he?

23 A. Section Manager in the Process Technology

24 section.

25 Q. Was he involved in the production of

1 Aroclors?

2 A. He could have been. I do not know.

3 Q. What about D.R. Cova?

4 A. I believe it was Daryll Cova, yeah.

5 Q. Was he involved in the production of

6 Aroclors?

7 A. I do not know.

8 Q. And underneath, we have group leaders, do

9 you know any of Mr. Caldwell, Mr. Knapp,

10 or Mr. Lynch?

11 A. Yes.

12 Q. Which ones do you know?

13 A. Knapp's name, Bill. I believe W. stands

14 for William. And Lynch I kind of

15 remember. Caldwell, I don't remember.

16 Q. What did Mr. Knapp or Mr. Lynch do?

17 A. I don't know.

18 Q. Did they have any involvement with

19 Aroclors or PCBs?

20 A. I don't know.

21 Q. Looking to the third column, we see Mr.

22 Codt, C-o-d-t. Do you recognize that

23 name?

24 A. No, sir.

25 Q. Going to the last column, we see J.S.

JUDY COMP & ASSOCIATES

1 Metcalf. Do you recognize that name?

2 A. No, sir.

3 Q. And underneath him, we see J.C. Weber.

4 Do you recognize that name?

5 A. No, sir.

6 Q. Thank you. Mr. Tucker, do you recall any
7 trip mentioned --- talked yesterday about
8 trips to Europe to meet with Mr. Jensen
9 and Mr. Widmark. I have taken a
10 deposition of Norman Johnson in this
11 case, and Mr. Johnson testified that
12 after a return from a trip to speak with
13 or meet with Jensen or Widmark, or both,
14 Dr. Richard and Mr. Johnson attended a
15 meeting where there were discussions
16 about the work going on in Sweden, and
17 Mr. Johnson testified that that meeting
18 took place in 1968. Do you remember any
19 such meeting when Dr. Richard reported on
20 results of work taking place in Europe by
21 the Swedes?

22 MR. ZIMMER: Let me --- before
23 you answer, I'm not sure you've got
24 the dates right. But Keller
25 testified that the trip took place

1 in '69.

2 MR. KASHANI: His trip. I'm
3 referring to Dr. Richard's trip.

4 MR. ZIMMER: Okay.

5 MR. KASHANI: And Mr. Johnson's
6 testimony.

7 MR. ZIMMER: I was at Mr.
8 Johnson's, but I don't recall the
9 testimony, but if that's accurate,
10 answer if you know of that sort of
11 meeting.

12 A. No.

13 Q. Mr. Johnson testified that Dr. Richard,
14 as early as 1968, suggested or urged or
15 advised --- let's use "suggested." We
16 can check the testimony to see what Norm
17 Johnson's exact testimony was, but I'm
18 going to use the word "suggested." Mr.
19 Johnson testified that in 1968 Dr.
20 Richard suggested that Monsanto would
21 have to withdraw all Aroclors from the
22 market. Do you recall any such
23 suggestion made by Dr. Richard or anyone
24 else?

25 A. No.

1 Q. Are you familiar with a Dr. Risebrough?

2 A. Do you want to define "familiarity"?

3 Q. Have you ever met him?

4 A. I don't recall ever meeting him.

5 Q. Have you ever read his papers on PCBs?

6 A. I have read at least --- I recall reading
7 at least one unpublished paper, perhaps,
8 by Risebrough.

9 Q. Let me show you the Exhibit next in
10 order.

11 (Thereupon the Court Reporter
12 marked the pertinent document as
13 PLAINTIFF'S EXHIBIT NUMBER 347-A).

14 Q. It's Exhibit 347. Do you recognize
15 either the first page of this Exhibit or
16 the attachment?

17 A. No, sir.

18 Q. The first sentence reads, "Attached is a
19 Xerox copy of a technical paper which
20 Scott Tucker and I picked up in
21 Washington recently." And I imagine that
22 "I" refers to Elmer Wheeler. Do you
23 remember picking up a technical paper in
24 Washington with Dr. Wheeler?

25 A. No, sir.

- 1 Q. Do you remember ever seeing the technical
2 paper that's attached to Exhibit 347?
- 3 A. I don't specifically remember seeing it.
- 4 Q. Do you have any general recollection of
5 this paper?
- 6 A. I have a general recollection, yes.
- 7 Q. Is this a paper by Dr. Risebrough that
8 you were mentioning --- you mentioned
9 earlier?
- 10 A. I can't be sure. What I mentioned I
11 recalled was reading an unpublished paper
12 by Risebrough. This appears to be
13 published.
- 14 Q. Was the unpublished paper you read prior
15 to the date of this paper? The date on
16 this paper appears to be ---
- 17 (OFF RECORD)
- 18 Q. The date on the memo is October, 1968, so
19 presumably the paper is on or before
20 October, 1968.
- 21 A. I can't answer. I don't have a good
22 recollection, obviously.
- 23 Q. What do you remember about Dr.
24 Risebrough's findings?
- 25 A. I remember that Dr. Risebrough claimed to

1 have found polychlorinated biphenyls in a
2 variety of environmental samples
3 somewhere on the west coast, I believe
4 ---

5 Q. And do you ---

6 A. --- of the United States.

7 Q. And do you remember when you first heard
8 about those findings?

9 A. Not specifically.

10 Q. Was it prior to the date of this memo,
11 October, 1968?

12 A. I don't recall.

13 Q. Does this memo indicate that you knew
14 about or heard of at least some of Dr.
15 Risebrough's findings as of October,
16 1968?

17 MR. ZIMMER: Does this memo
18 indicate that?

19 MR. KASHANI: Well, the memo refers
20 to Dr. Tucker and Dr. Wheeler
21 picking up a paper that appears to
22 be Dr. Risebrough's paper in
23 Washington.

24 MR. ZIMMER: You're right. Well,
25 he's not going to answer that

1 argumentative question, though.
2 That's spurious. Because it may
3 indicate that to you. It may
4 indicate something else to someone
5 else. You haven't established a
6 foundation that he remembers this
7 memo, and you've already asked him
8 if he remembers picking up that
9 paper in Washington, and he said
10 "no."

11 MR. KASHANI: Well, he said he had
12 some recollection.

13 MR. ZIMMER: He said he had a
14 general recollection of the paper.

15 MR. KASHANI: I'm trying to
16 establish when --- approximately
17 when he may have seen this paper.

18 MR. ZIMMER: Right. And you don't
19 need to argue with him, based on
20 what you think this memo shows.

21 That's not a fair question.

22 Q. Does the memo trigger any recollection as
23 to when you might have read this paper?

24 A. The memo doesn't trigger any
25 recollection. Elmer has indicated that

1 we picked something up. I don't recall
'2 picking it up. I mean, Elmer could have
3 picked it up when I was there too, but,
4 you know --- as I said earlier, I don't
5 recall this.

6 Q. Elmer, that's Elmer Wheeler?

7 A. Correct. E.P. Wheeler. I believe E.
8 stands for Elmer.

9 Q. Did you have an opinion of Dr.
10 Risebrough's work at the time you first
11 heard about it?

12 A. Not at the time --- probably not at the
13 time I first heard about it. I probably
14 would have had to review it first.

15 Q. After reviewing it, did you formulate an
16 opinion as to its ---

17 A. I recall an opinion.

18 Q. What was your opinion?

19 A. My opinion was that the information was
20 interesting and plausible, but that it
21 wasn't definitive.

22 Q. Now this is the information that Dr.
23 Risebrough had found trace amounts of
24 PCBs in wildlife on the west coast?

25 A. Dr. Risebrough had found indications of

1 chlorinated hydrocarbons in environmental
2 type samples, I think primarily birds'
3 eggs and things of that sort on the west
4 coast. And I believe, subsequently, at
5 some point in time --- he was primarily
6 looking for pesticides, like DDT and
7 Dieldren, and Lindane, and Toxaphene, and
8 a myriad of other chlorinated hydrocarbon
9 pesticides that had been intentionally
10 sprayed around out there and also
11 manufactured out there, and I believe ---
12 my recollection as it is --- is that some
13 point in time, he became aware of the
14 Sjorn Jensen work and went back and
15 reviewed his information and seemed to
16 find a number of extra peaks that he
17 decided that he felt strongly enough that
18 these were all PCBs, and he published
19 that information. And it was based
20 strictly on electron capture gas
21 chromatography, which is not an absolute
22 identification technique in environmental
23 --- especially in environmental samples
24 for PCBs.

25 Q. By "peaks" do you mean the graph readouts

1 that come out from the gas chromatograph?

2 A. That's correct.

3 Q. Do you recall anyone at Monsanto
4 expressing an opinion as to Dr.
5 Risebrough's work?

6 MR. ZIMMER: When?

7 Q. Let's start with at any time and go back.

8 A. I've just indicated that I expressed an
9 opinion, and I was at Monsanto.

10 Q. Anyone else?

11 A. Not really. It would have been in my
12 bailiwick to comment on the technical
13 aspects or validity of Risebrough's work,
14 specifically the analytical chemistry
15 associated with it.

16 Q. Do you recall any discussions concerning
17 Dr. Risebrough's work?

18 A. No, sir.

19 Q. Do you recall if Dr. Risebrough also made
20 the assertion that PCBs could have an
21 effect on steroids in wildlife?

22 A. Yes.

23 Q. When did you first hear that?

24 A. I believe it was part of the papers or
25 draft papers that I saw where he had

1 used, I believe, it was PCBs to invoke
2 some microsomal enzyme response.

3 Q. Was that in live animals?

4 A. I don't recall. But, in general, any
5 chlorinated hydrocarbon will invoke
6 microsomal enzyme responses.

7 Q. And what's a "microsomal enzyme
8 response"?

9 A. I'm not sure. I'm not a biologist, but I
10 know it invokes it.

11 Q. Is that an effect on the steroids in the
12 animal?

13 A. Could be.

14 Q. Let me show you an Exhibit.

15 MR. KASHANI: Exhibit next in
16 order.

17 (Thereupon the Court Reporter
18 marked the pertinent document as
19 PLAINTIFF'S EXHIBIT NUMBER 348-A)

20 A. I've looked over the Exhibit given me.

21 Q. Do you have any recollection of Exhibit
22 348?

23 A. No, sir.

24 Q. Any general recollection?

25 A. I have some general recollection of some

1 of the opinions that I've been reminded
2 of that were stated in here, yes.

3 Q. Which opinions are those?

4 A. Well, as I said earlier, I believe I was
5 asked to review Risebrough's work, and my
6 opinion was that it was speculative and
7 not based on absolute confirmation.
8 That's not a criticism, incidentally.
9 Scientists are intentionally speculative.
10 I mean they are asked to do that kind of
11 routinely. The problem associated with
12 that speculation is when actions are
13 taken on it. But there were some concern
14 with some of the extrapolations and the
15 probability of them being true or not
16 true. And there was some feeling, I
17 think, that Risebrough had extrapolated
18 the information he had way beyond any
19 reasonable interpretation of it, and, you
20 know, it's kind of interesting,
21 twenty-five years later, we were right.

22 Q. What was unreasonable about Risebrough's
23 extrapolations?

24 A. Well, Risebrough took ---

25 Q. I'd like to ask about your conclusions

1 back at the time, meaning at the time you

2 ---

3 A. Okay.

4 Q. --- reviewed his work and not today.

5 A. Well --- okay.

6 Q. I mean, obviously, today there is more
7 information ---

8 A. Yes, and ---

9 Q. --- and back at the time ---

10 A. --- you know, it's comforting to
11 understand that the way we felt was based
12 on good logic. First of all, Risebrough
13 took information that was generated for
14 one purpose and revisited it and
15 interpreted it in light of other people's
16 findings in Sweden and categorically said
17 that there was a major pollution problem
18 with polychlorinated biphenyls on the
19 west coast of the United States. Whether
20 that was true or not, that was a pretty
21 large step based on the information that
22 he had, especially since the information
23 was based on analytical technique that
24 was known to be less than definitive when
25 dealing with weathered biological

1 samples. It was a conclusion that you
2 could draw, but it was not necessarily
3 responsible.

4 Q. You mentioned that Dr. Risebrough was
5 using the gas chromatograph with an
6 electron capture device?

7 A. Correct.

8 Q. Was that similar to the equipment you
9 were using?

10 A. Correct.

11 Q. Were there any other opinions that you
12 found unreasonable or any other opinion
13 --- I'm sorry. Let's go back. Any other
14 opinions ---

15 A. Yes.

16 Q. --- that you recall triggered by this
17 memo?

18 A. Did you ask me if there were any other of
19 Risebrough's opinions that were expressed
20 in his papers that I found unreasonable
21 ---

22 Q. Yes. At the time?

23 A. --- at that time? Yes.

24 Q. What were those?

25 A. That PCBs and chlorinated hydrocarbons,

1 in general, were responsible for eggshell
2 thinning in birds.

3 Q. Why did you think that was unreasonable?

4 A. I felt that that was unreasonable because
5 there just wasn't enough information at
6 that time to make that conclusion in a
7 definitive fashion.

8 Q. Was there enough information at that time
9 to conclude that DDT was responsible for
10 eggshell thinning in birds?

11 A. No, sir.

12 Q. Did that information later develop?

13 A. It had been speculated that that was
14 true, but I don't think it's ever been
15 shown that that was the cause of eggshell
16 thinning.

17 Q. So, it's your opinion that it has not
18 been established that DDT can cause
19 eggshell thinning in birds?

20 A. I think it's been established that DDT or
21 the commercial product DDT potentially
22 can in laboratory animals. I don't think
23 it's been shown definitively to do so at
24 part per billion levels in the
25 environment.

- 1 Q. I refer you to a portion on page ---
- 2 A. Let me say one more thing too. The
- 3 microsomal enzyme situation, which I have
- 4 classed myself --- classified myself as
- 5 not being an expert in, you can invoke
- 6 the same kind of responses they were
- 7 seeing with chlorinated hydrocarbons just
- 8 based on stress of the --- of the animal
- 9 and things of that sort. So, you know,
- 10 just from my viewpoint as a scientist at
- 11 that point in time, the information
- 12 wasn't overwhelming enough to --- to take
- 13 major action. It called for generation
- 14 of more information.
- 15 Q. You believe that the information was
- 16 similarly lacking with respect to DDT at
- 17 that time?
- 18 A. DDT was considerably different than PCBs.
- 19 Q. Turning to page two of Exhibit 348, I
- 20 refer you to the last full paragraph.
- 21 Can I ask you to read that?
- 22 A. The last full paragraph?
- 23 Q. Yes.
- 24 A. Starting with Risebrough?
- 25 Q. "Risebrough has taken known Aroclor

1 samples ---

2 A. "Risebrough has taken known Aroclor
3 samples and claims to have evidence of
4 enzyme and hormone change. Here there is
5 not question of identification. Either
6 his position is attacked and discounted,
7 or we will eventually have to withdraw
8 product from end uses which have exposure
9 problems. Since Risebrough's paper in
10 "Nature", December, 1968 has just been
11 published, it is timely, perhaps
12 imperative, that this paper and its
13 implications be discussed with certain
14 customers. This is a rough one because
15 it could mean loss of business on empty
16 and false claims by Risebrough."

17 Q. Do you recall discussions along those
18 lines at Monsanto at about the time of
19 this memo, 1968?

20 A. No, sir.

21 MR. ZIMMER: Lacks foundation.

22 Q. Do you recall if the implications of
23 Risebrough's paper were discussed with
24 any customers?

25 A. No, sir.

1 Q. Do you recall if Monsanto lost any
2 business because of Dr. Risebrough's
3 claims?

4 A. No, sir.

5 Q. "No," you don't recall or "no," they
6 didn't lose any business?

7 A. Both.

8 Q. Wait. I don't understand. You don't ---

9 A. Well, then only ask one question at a
10 time.

11 Q. Did Monsanto lose any business because of
12 Dr. Risebrough's claims?

13 A. Not to my knowledge.

14 MR. ZIMMER: Let's take a break.

15 (OFF RECORD)

16 Q. I wonder if we could go back on the
17 record and just finish up with Document
18 348. Let me refer you to page one of
19 this document which is number T 091772.

20 A. Excuse me?

21 Q. I'm referring to the Bates number down at
22 the bottom.

23 A. T 091772, okay.

24 (OFF RECORD)

25 Q. I refer you to the second to the last

1 full paragraph which reads, "Monsanto is
2 preparing to challenge certain aspects of
3 this problem, but we are not prepared to
4 defend against all of the accusations."
5 Do you know which accusations Monsanto
6 was not prepared to defend against?

7 MR. ZIMMER: Assumes facts not in
8 evidence. Lacks foundation and calls
9 for speculation. You can answer it.

10 A. No.

11 Q. Do you know which aspects of the problem
12 Monsanto was prepared to challenge?

13 MR. ZIMMER: Same objection.

14 A. Same answer. No.

15 Q. Going to the three numbers after --- in
16 the first paragraph, it says, "Risebrough
17 in a recent paper," and then it lists
18 three items, one, two, and three ---
19 they're numbered.

20 A. Okay. Up at the top. Yes.

21 Q. Again, taking you back to the date of
22 this memo which is March, 1969, at that
23 point, to your knowledge, was Monsanto
24 challenging Risebrough's apparent claim
25 that PCBs are a pollutant --- I'm

1 referring to number one --- are a
2 pollutant or widely spread by air and
3 water. Do you know if Monsanto was
4 preparing to challenge that accusation?

5 MR. ZIMMER: Calls for speculation.

6 A. No.

7 Q. Was Monsanto prepared to challenge the
8 accusation that PCBs were an
9 uncontrollable pollutant? Again, I'm
10 quoting from number one.

11 MR. ZIMMER: Okay. Your question
12 before was did he know. Now you're
13 saying was Monsanto. He is not
14 Monsanto. He can only tell you what
15 he knew so --- I know it's a
16 semantical ---

17 MR. KASHANI: I know. I mean, I'm
18 assuming when I ask "Do you know?"
19 and you answer "No" that you are
20 saying --- the answer means that you
21 do not know.

22 MR. ZIMMER: Okay.

23 THE WITNESS: That's what I assume
24 too.

25 MR. KASHANI: Okay.

1 MR. ZIMMER: I'm just making sure,
2 because the ---

3 MR. KASHANI: I can rephrase the
4 second question.

5 Q. Do you know if Monsanto was prepared to
6 challenge the apparent accusation that
7 PCBs were an uncontrollable pollutant?

8 A. Was prepared to ---

9 Q. Challenge, yes.

10 A. No.

11 Q. Was preparing to challenge.

12 A. What do you mean by "challenge," please?

13 Q. Refute it, dispute it through the
14 literature or through publications.

15 A. If "challenge" means that Monsanto would
16 initiate a more definitive analytical
17 program to get bona fide information to
18 either verify or deny speculations by
19 Risebrough, then I might say "yes" to
20 that. "Challenge" has a, you know, an
21 emotion associated with it that --- I
22 mean, you know, this isn't exactly a
23 boxing match or a fist fight.

24 Q. This memo is entitled Aroclor Wildlife
25 Accusations which has a certain

1 connotation to it, and I guess I'm using
2 "challenge" in the same context, whether
3 ---

4 A. Well ---

5 Q. --- Monsanto was prepared to simply
6 accept these accusations without response
7 or if Monsanto was preparing to respond
8 in some way.

9 MR. ZIMMER: Okay. That's a
10 different question.

11 A. The memo discusses Risebrough, and the
12 word "accusation," which is also an
13 emotional word, is what Risebrough was
14 doing. He was accusing. Monsanto didn't
15 necessarily believe that he had the facts
16 to speculate the way he was. And so I
17 believe that they were preparing to
18 defend themselves against those
19 accusations, and any defense against
20 those kinds of accusations involved
21 obtaining definitive information that was
22 beyond a shadow of a doubt reflective of
23 what the real situation was. So, if you
24 mean was Monsanto challenging him in that
25 way, I would agree, although I still

1 don't like the word "challenge" because I
2 don't think this was an --- needed to be
3 or was an adversarial situation from
4 Monsanto's viewpoint.

5 Q. Well, using your definition, was Monsanto
6 preparing to challenge the accusations
7 that are listed in number one on page one
8 of Exhibit 348?

9 A. What I said was that Monsanto was
10 preparing to investigate properly.

11 Q. I'm using your definition of "challenge"
12 ---

13 A. No.

14 Q. --- the one you used in your previous
15 ---

16 A. No, I was using your definition of
17 challenge, and, yes ---

18 Q. "Yes" to what?

19 A. Yes, Monsanto was preparing to obtain
20 definitive information to establish the
21 validity of Risebrough's speculations.

22 Q. Do you know if Monsanto ever obtained
23 that information?

24 A. No.

25 Q. What about the second item referring to

1 PCBs as a toxic substance with no
2 permissible allowable levels? Do you
3 know if Monsanto was preparing to
4 challenge that accusation?

5 A. Well, it goes on further than just that
6 portion ---

7 Q. Well, yes. I'm referring to the whole
8 thing.

9 A. Okay. Yes.

10 Q. Was Monsanto preparing to challenge that
11 accusation?

12 A. Yes.

13 Q. And were investigations performed to
14 challenge that accusation?

15 A. Yes.

16 Q. Do you know who was involved in those
17 investigations?

18 A. I believe you would have to talk with
19 Industrial Bio-Test.

20 Q. So Industrial Bio-Test did the work to
21 challenge these accusations?

22 A. I think so. I don't know.

23 Q. Do you know who at Monsanto was involved?

24 A. Not specifically. It probably would be
25 in Wheeler's bailiwick.

1 Q. Was Dr. Kelly involved?

2 A. Emmett Kelly was Wheeler's boss.

3 Q. Was Mr. Garrett involved? Jack Garrett?

4 A. I don't know. I doubt it.

5 Q. Do you know if any laboratory other than,

6 or any group other than Industrial

7 Bio-Test was involved in doing the

8 investigation to determine the validity

9 of the accusations set forth in number

10 two of Exhibit 348?

11 A. No.

12 Q. And, finally, was Monsanto prepared to

13 challenge the accusations set forth in

14 number three, which reads that apparently

15 PCBs are "a toxic substance endangering

16 man himself, implying that the peregrine

17 falcon is the leading indicator of things

18 to come"?

19 A. Was that question "preparing" or

20 "prepared"?

21 Q. Let's say "preparing."

22 A. Yes.

23 Q. Do you know if Monsanto did do

24 investigations to determine the validity

25 of this claim?

1 A. No.

2 Q. Okay. Who asked you to review Dr.
3 Risebrough's work?

4 A. I don't recall.

5 Q. Might it have been Dr. Keller?

6 A. Could have.

7 Q. All right. Thank you.

8 MR. KASHANI: Let's take a break.

9 (OFF RECORD)

10 Q. Dr. Tucker, I'm going to refer you back
11 to Exhibit 321 that was introduced
12 earlier and ask you if you have any
13 general recollection of this document?

14 A. That's different to what you usually ask.
15 You changed to general recognition ---
16 whether I have --- or do I recognize the
17 document? You said "general recognition"
18 this time?

19 Q. Yes.

20 MR. ZIMMER: Recollection.

21 A. General ---

22 Q. Recollection.

23 A. --- recollection. Yes, I do. This is an
24 earlier Exhibit.

25 Q. Other than when you saw it yesterday, do

1 you have any other recollection?

2 A. Not specifically.

3 Q. Any general recollection?

4 MR. ZIMMER: I'm also puzzled by
5 --- I mean, of seeing it before? Or
6 what's the --- or issues discussed
7 in it? I mean, that's the dilemma,
8 I think, that both the Doctor and I
9 are having.

10 MR. KASHANI: I've asked the same
11 question with respect to other
12 documents, and Dr. Tucker answered
13 "yes" or "no," and I'm asking the
14 same question.

15 MR. ZIMMER: Well, and he's
16 expressed some confusion about it,
17 so I think if there's a way you
18 could flesh that out for us ---

19 Q. Well, can you answer, Dr. Tucker?

20 A. Well you've expressed confusion. I mean,
21 I've asked this same question before.

22 MR. ZIMMER: You just did the same
23 thing. We can have it read back if
24 you need to. If you can answer, go
25 ahead, Doctor. I'm not trying to be

1 obstructive. I'm just trying to
2 figure out ---

3 A. I don't recall specifically this memo.
4 The topic in it is obviously something
5 that Monsanto was paying me to deal with
6 there. We all know that, so in general,
7 it's familiar.

8 Q. Let me refer you to the paragraph that's
9 numbered Five on the first page. That's
10 at TRAN 057161. Number Five reads, "The
11 advisability of determining" or it says,
12 it reads "determing" --- I assume it
13 means determining, although, of course,
14 we're not sure --- "the character and
15 possibility of isolating the "major
16 fraction" in each of the Aroclors to be
17 studied is to be explored." Does the
18 term "major fraction" in the context of
19 Aroclors mean anything to you?

20 MR. ZIMMER: Calls for speculation
21 and lacks foundation.

22 A. "Major fraction" would mean something to
23 me, yes.

24 Q. What does that mean?

25 A. Major part.

1 Q. Does that refer to the dominant isomer in
2 the context of what we were discussing
3 yesterday?

4 A. Yes. It would appear to do so. That's
5 how I would interpret it.

6 Q. Just to take an example, in the case of
7 Aroclor 1242, the dominant isomer would
8 be the biphenyl which has three chlorines
9 on it?

10 A. Correct.

11 Q. And that would be the major fraction of
12 Aroclor 1242?

13 A. It might be part of the major fraction.

14 Q. What would be the rest of the major
15 fraction?

16 A. Depends on what you defined as the
17 fraction, whether it was half of it,
18 whether it was a third of it, whether it
19 was a fourth of it, whether it was an
20 eighth of it? Depends on your definition
21 of the fraction.

22 Q. But major fraction does ---

23 A. 51 percent is a major fraction. If
24 there's four components in something, and
25 one of the components is twice as much as

1 in the others, then one-fourth of the
2 components is the major fraction. It
3 depends on the definition of the fraction
4 is what I'm attempting to relay to you.

5 Q. So, does major fraction embody the
6 concept that the compound in this case
7 --- not a compound --- the substance in
8 this case, Aroclor consists of more than
9 one different substance?

10 A. I think while it doesn't consist of more
11 than one substance, it consists of
12 multiple isomers and/or homologs, but
13 they're basically the same substance,
14 polychlorinated biphenyls.

15 Q. That's a new term. What do you mean by
16 "homolog"?

17 A. What I mean by "homolog" is, for example,
18 all of the isomers that have five
19 chlorines associated with them --- all of
20 the isomers that have four chlorines
21 associated with them. Those to me are
22 homologs.

23 Q. So, "homolog" is a sub-set of isomers ---
24 in the context of Aroclors?

25 A. Homolog is a group of isomers that have

1 the same chlorine number. That's what I
2 mean by it.

3 Q. Back to the question on major fraction.
4 I understand that we have to define, you
5 know, a percentage, but does major
6 fraction embody the concept that there
7 are different components to an Aroclor
8 and we can take a sub-set of those and
9 call it the major fraction?

10 A. I think --- yeah, that would be true. I
11 think "fraction" itself denotes --- when
12 its talking about anything --- that it's
13 a sub-set thereof.

14 Q. Do you know ---

15 A. Yes.

16 Q. Okay. Do you know if, at the time of
17 this memo, --- this is December, 1968 ---
18 Monsanto had the ability to isolate the
19 different homologs in Aroclors?

20 A. I know they did not. I know no one had
21 the ability to isolate the different
22 homologs.

23 Q. At the time of this memo in December,
24 1968, --- I'll withdraw that.

25 A. If I can shed some light on that, I'd be

1 happy to. Or I can stick to your
2 questions. It's your choice.

3 MR. ZIMMER: Why don't we stick to
4 his questions.

5 THE WITNESS: Okay.

6 Q. I refer you to another document.

7 MR. KASHANI: This can be marked
8 Exhibit Three Forty-nine.

9 (Thereupon the Court Reporter
10 marked the pertinent document as
11 PLAINTIFF'S EXHIBIT 349-A)

12 Q. Do you recognize this document?

13 A. No, sir.

14 Q. I refer you to page four, the paragraph
15 numbered four, section "C". This refers
16 to --- I'll read the quote. It says,
17 "Top-cut --- top, hyphen, cut ---
18 retained batches of A-5460," and then the
19 next sub-paragraph, sub-paragraph "D"
20 refers to, quote, "Carry out a plant
21 trial of 'top-cutting'." Does the term
22 "top-cut" mean anything to you?

23 A. No, sir.

24 Q. Does that have any application to PCBs?

25 A. Aroclor 5460 is not a PCB.

1 Q. I know.

2 A. Okay.

3 Q. I understand that.

4 A. So I don't ---

5 Q. I'm asking you if ---

6 A. Does this ---

7 Q. Not this, but ---

8 A. --- state that there's any application to

9 --- I don't understand the question,

10 please.

11 Q. Does the term "top-cutting" have any

12 application to PCBs?

13 A. Top-cutting could have application to

14 anything.

15 Q. What does "top-cutting" mean?

16 A. Taking --- I would --- I can only --- I

17 can only speculate.

18 MR. ZIMMER: Do you mean to him or

19 in this memo?

20 MR. KASHANI: Well, I mean he's

21 already testified he's not familiar

22 with the memo. I mean ---

23 MR. ZIMMER: Well, the term

24 actually ---

25 Q. Well, you said top-cutting could mean

1 different things, and ---

2 A. I know what the "top cut" means to me in
3 English.

4 Q. Does it mean anything to you in the
5 context of PCBs?

6 A. I could speculate on what it means.

7 Q. Okay and what is that?

8 MR. ZIMMER: He doesn't want you to
9 do that.

10 THE WITNESS: Okay.

11 Q. No, you can go ahead.

12 A. It would seem to me to take the top part.
13 I mean --- I mean, you know, you don't
14 have to be too intuitive to understand
15 that kind of part, but I don't know how
16 it would be applied.

17 Q. Do you mean taking the higher chlorinated
18 isomers out?

19 A. I don't know. I don't know what the top
20 of an Aroclor is. That's why it doesn't
21 make sense to me.

22 Q. Dr. Tucker, do you recall hearing about
23 an incident in Japan where some cooking
24 oil was contaminated with PCBs?

25 A. Yes.

1 Q. Referred to as the Yoshu incident?

2 A. Yes.

3 Q. How did you hear about that?

4 A. Through higher up folks in the company in

5 Monsanto.

6 Q. Was that Dr. Keller?

7 A. No. It was probably through --- it could

8 have been through Keller, but most likely

9 through Wheeler.

10 Q. And what were you told?

11 A. Just what you said yourself, that some

12 rice oil had been contaminated --- I

13 don't have the details of how it was ---

14 with a Aroclor similar product, a

15 polychlorinated biphenyl product, and I

16 believe they were called Kaneclors.

17 Q. And were you told anything else?

18 A. No, sir.

19 Q. Were you told that any people were

20 injured?

21 A. No, sir.

22 Q. Did you express any response to this

23 information?

24 A. Yeah. My response was "Why, so what?"

25 In other words, the people who imparted

1 the information to me obviously wanted me
2 to do something, and I asked them what
3 they wanted me to do.

4 Q. And what did they say?

5 A. I think the indications were that they
6 wanted us to take some of the
7 methodologies that we had and look at the
8 Kaneclor-type products and things of that
9 sort, and see what those Kaneclor PCB
10 products looked like relative to the
11 Monsanto products.

12 Q. And did you do that?

13 A. I recall either my group and/or Emery's
14 group doing some comparative work.

15 Q. And what were the results?

16 A. The results that they were different, but
17 the same.

18 Q. You mean the Kaneclor was different, but
19 the same than Aroclor?

20 A. They were polychlorinated biphenyls, but
21 they were --- definitely gave different
22 isomer distribution traces.

23 Q. They give different isomer traces. Does
24 that mean that they seem to indicate a
25 different mix of isomers than the

1 Aroclors that Monsanto manufactured?

2 A. There was a different mixture of isomers
3 between the two products, the Kaneclor
4 and the Aroclors.

5 Q. Could you detect any isomers --- which
6 isomers?

7 A. Could I detect ---

8 Q. Could you detect which isomers were in
9 the product that you examined from Japan?

10 A. The gas chromatography equipment that we
11 had available to us in the --- even
12 nowadays --- is not capable of doing
13 complete isomeric separations. And so,
14 what you end up with is a whole bunch of
15 peaks, some of which can have lower --- a
16 peak, for example, may have lower boiling
17 tetrachloral biphenyl-type isomers and
18 higher boiling trichloral biphenyl
19 isomers. So there's some overlap. But
20 the fingerprint that you get is
21 representative of the Aroclor or the
22 Kaneclor that you're dealing with. And
23 the higher the chlorination, the higher
24 the boiling point, so the whole
25 fingerprint moves one way or the other,

1 depending upon what degree of
2 chlorination there is. You see a number
3 of peaks and, depending upon whether you
4 are using capillary columns or packed
5 columns or whatever, you see more or less
6 peaks. And it's --- it can be, you know,
7 isomer distribution, homolog
8 distribution, component distribution, or
9 whatever distribution, but it's a
10 reproducible distribution of how the
11 column separates the constituents in that
12 product, and you end up with what's
13 called a fingerprint. And what I'm
14 saying is that we compared the
15 fingerprints of the Kaneclor products and
16 the Aroclor products, and there were
17 differences.

18 Q. Could you tell the homolog distribution
19 in the two products?

20 A. No. Not with --- no.

21 Q. Could you tell that there were different
22 homologs?

23 A. All we could tell was that there were
24 different boiling points, since the
25 separation that you obtain in a gas

1 chromatograph is primarily boiling point
2 and/or attraction, which can --- you
3 know, if --- I don't know how to say this
4 --- I guess I'll just say it. In a
5 biphenyl molecule you've got ten
6 positions in which you can put chlorine.
7 Okay? For example, in a monochloral,
8 there are three isomers, ortho, meta, and
9 para. Each one of those will have a
10 different boiling point. And they have a
11 different attraction for the liquid phase
12 that's present in gas chromatographic
13 columns that are used to separate those
14 two. So, depending on what the boiling
15 point of these are will determine how
16 they allude and also, the liquid phase
17 that's used in the column will determine
18 the order in which they are alluded.
19 When you start adding in 210 isomers in
20 different quantities, they can coallude.
21 A five could allude with a seven. A five
22 could allude with a three, so there's ---
23 it's kind of like an overlap all the way
24 across. So, we don't know for sure that
25 any particular peak that would come out

1 that was --- that was --- whether it was
2 totally a pentachloral homolog or whether
3 it was totally a pentachloral isomers or
4 which of them were. We just know that
5 it's a peak that appears at a certain
6 point, and that it's reproducible if you
7 don't change your conditions around too
8 much.

9 Q. What did you mean when you just said five
10 and seven and three.

11 A. Number of chlorines per biphenyl
12 molecule.

13 Q. So, by "five," you were referring to a
14 biphenyl with five chlorines on it?

15 A. Correct.

16 Q. And "seven" referring to a biphenyl with
17 seven chlorines on it?

18 A. Correct.

19 Q. Could you tell whether the samples of the
20 polychlorinated biphenyl product that you
21 analyzed from Japan contained biphenyls
22 with five chlorines on them or six
23 chlorines on them, or seven chlorines on
24 them?

25 A. By electron capture or by GC electron

1 capture?

2 Q. By any method available to you at that
3 time.

4 A. What was the date of the Yoshu incident?

5 Q. Well, we have a document that refers to
6 it that is --- let's see --- we have one
7 document that refers to it that appears
8 to be dated 1968. I have others.

9 MR. KASHANI: Let's enter this as
10 the next Exhibit and let me see if I
11 have other documents.

12 (Thereupon the Court Reporter
13 marked the pertinent document as

14 PLAINTIFF'S EXHIBIT NUMBER 350-A)

15 Q. This Exhibit has been marked Exhibit 350.
16 Do you recognize that Exhibit?

17 A. No, sir.

18 Q. Does that refresh your recollection as to
19 the date of the --- I use the term Yusho
20 (pronouncing you shaw). Does that refer
21 to the Japanese incident?

22 A. I think that's --- is that the correct
23 pronunciation or ---

24 Q. I don't know if the ---

25 A. That's --- I'm referring to the Japanese

1 incident, and I call it Yoshu
2 (pronouncing yo shoo).

3 Q. Yoshu. Does this document, Document 250
4 (sic) refresh any recollection about the
5 timing of that incident?

6 A. It doesn't pinpoint when the incident
7 occurred. It does --- it was apparently
8 produced, by the date in the upper
9 right-hand corner, in December of 1968
10 and it talks about it, so I assume that
11 it had to occur sometime prior to that,
12 but that's as close as it fixes it for
13 me.

14 Q. In any case, I'm referring --- in terms
15 of your ability to detect the different
16 homologs of polychlorinated biphenyls,
17 I'm referring to the analysis that you
18 took at about the time of the Yusho
19 incident so we can establish through
20 other means when that occurred. And then
21 my question remains as whether at that
22 time --- at the time that you were asked
23 to test the Kaneclor --- is that
24 K-a-n-e-c-l-o-r?

25 A. Either K-a-n-a or K-a-n-e ---

1 Q. "Kaneclor" meaning the PCB product from
2 Japan, whether at that time you were able
3 to detect the presence of PCB molecules
4 with five or six or seven chlorines on
5 them?

6 A. Yeah. I think, basically, that you
7 could, especially on the neat product
8 when you were dealing with materials that
9 were 100 percent PCBs.

10 Q. So, if you were ---

11 A. And, again, I will say very frankly that
12 it would --- you could --- it would be
13 very difficult to pinpoint every peak
14 that came off as being completely this or
15 completely that because again, there is
16 serious mixture in terms of that kind of
17 thing, but --- and also, you'd have to be
18 dealing with the neat product.

19 Q. I understand. If you were able, for
20 example, to draw a pure --- pure as it
21 comes --- sample of Aroclor 1242 right
22 off the production line at Monsanto and
23 analyze that --- and again, I'm talking
24 about roughly the time of the Yusho
25 incident --- Yoshu (pronouncing yo shoo)?

1 Yusho (pronouncing you show)? Yoshu
2 (pronouncing yo shoo) ---

3 A. Yes, sir.

4 MR. ZIMMER: We understand.

5 Q. --- incident, could you at that time
6 determine whether it contained PCBs with
7 five, six or seven, however many
8 chlorines? That would be a neat sample,
9 as you say.

10 A. Yeah. We could imply it by comparison
11 with Aroclors and with --- by comparison
12 with Aroclors using them as standards, we
13 could imply what was there.

14 Q. So the answer is "yes"?

15 A. Yes.

16 Q. Do you recall when Monsanto, or when you
17 in your lab, or, to your knowledge, other
18 labs at Monsanto first became able to
19 detect the presence of higher chlorinated
20 PCBs in the Aroclor products?

21 A. No.

22 Q. Was it sometime before the Yusho
23 incident?

24 A. Certainly.

25 Q. Do you remember approximately how long

1 before?

2 A. No, sir.

3 Q. Do you recall if your group was the first
4 to be able to run that analysis, in other
5 words, the first group to be able to pin
6 --- not pinpoint, but detect the presence
7 of --- or let us say --- well, I will
8 just withdraw that. That's fine. For
9 this work that was done, this work in
10 determining the PCBs or determining the
11 presence or detecting the presence of
12 PCBs with five, six and seven chlorines
13 on them, did you need the --- did you use
14 the gas chromatography electron capture
15 equipment or the gas chromatograph mass
16 spec equipment?

17 A. My group used primarily gas
18 chromatography electron capture
19 equipment, and that equipment was not
20 used to identify isomeric composition of
21 neat, pure Aroclors. In fact, if you
22 opened up a bottle of Aroclor near one of
23 those detectors, you would probably shut
24 it down for a week.

25 Q. So, what equipment did you use.

1 A. I didn't use any equipment to do it.

2 Q. Did your group --- what equipment did
3 your group use?

4 A. My group did not do that.

5 Q. Oh, I see. Do you know whose group did
6 that work?

7 A. Yes.

8 Q. Which group was that?

9 A. Martin Dietrich's group.

10 Q. Okay.

11 A. Or Ed Emery's. It would depend when and
12 that kind of routine.

13 Q. Okay. Thank you.

14 MR. KASHANI: Let's move to the
15 next exhibit. Plaintiff's Exhibit
16 351.

17 (Thereupon the Court Reporter
18 marked the pertinent document as
19 351-A).

20 Q. Do you recall this document?

21 A. Not specifically.

22 Q. Do you have any general recollection ---

23 A. Yes.

24 Q. --- of the topics discussed in this
25 document?

1 A. Yes.

2 Q. Do you remember writing this document?

3 A. Not specifically.

4 Q. Did you draw the map on the second page?

5 A. I know I didn't do that. I'm not that

6 artistically inclined, I guarantee you.

7 No.

8 Q. Who is Mr. H. Vodden? V-o-d-d-e-n?

9 A. If I remember correctly, Vodden is one of

10 the people associated with the Monsanto

11 U.K. operation in Newport.

12 Q. That's Newport in England?

13 A. Uh-huh (affirmative). United Kingdom.

14 Q. This memo appears to refer to testing

15 some mud samples from an estuary in the

16 Uskmouth --- U-s-k-m-o-u-t-h --- area in

17 United Kingdom. Do you remember

18 receiving those samples and running those

19 tests?

20 A. No, sir, I don't.

21 Q. This memo refers to ppb of Aroclor. Does

22 ppb mean parts per billion?

23 A. Yes, it does.

24 Q. And it says, in the third column it has

25 parts per billion Aroclor 1242 Found.

1 Was your lab able to test for the
2 presence of Aroclor 1242 under parts per
3 billion at the time of this memo, that's
4 October, 1969?

5 A. It would appear that that's true, yes.
6 Let me caution you on something here.
7 Many times materials that showed electron
8 capture activity when run through these
9 procedures were calculated as certain
10 Aroclors because the Aroclors were the
11 only things that were available as
12 standards.

13 Q. Okay.

14 A. The only time we could be fairly sure
15 from an electron capture chromatogram
16 that we were dealing with a bona fide
17 Aroclor --- in other words, a Monsanto
18 PCB product --- was if the complete
19 chromatogram matched in every way, shape,
20 and form with that of a standard
21 material. And in --- usually that was
22 always backed up by the fact that we
23 probably knew that the material was being
24 used and/or manufactured in the area that
25 the samples were obtained from. So, with

1 those kinds of information available to
2 us, we could decide whether we might be
3 dealing with an Aroclor 1242 or 1254, or
4 1260.

5 Q. In the case of this memo, was it the
6 determination made that you were dealing
7 with Aroclor 1242?

8 MR. ZIMMER: Lacks foundation.

9 A. The memo indicates and states that the
10 electron capture fingerprints were
11 identical with that of our Aroclor 1242
12 standard. In that particular instance,
13 and the fact that I would assume that, as
14 I said earlier, they may have been using
15 the material around that area, that it
16 might --- it was --- it had a high
17 probability of being Aroclor 1242 or that
18 being the source of what was being found.

19 MR. ZIMMER: Doctor, don't assume,
20 if you would, please.

21 THE WITNESS: Okay. Sorry.

22 MR. ZIMMER: He wants to know what
23 your recollection is. He can read
24 the memo ---

25 A. Okay, I --- I don't recollect this, as I

- 1 stated earlier, specifically.
- 2 Q. Do you know what the first column, the
3 first "PS Out Number N69/" --- do you
4 know what that means?
- 5 A. It's a sample designator of one sort or
6 the other, but I specifically don't
7 remember it or know what it means.
- 8 Q. Does that refer to method of logging or
9 record keeping of samples at Monsanto's
10 lab?
- 11 A. No.
- 12 Q. I refer you to the next document.
- 13 A. (Witness peruses document).
- 14 (Thereupon the Court Reporter
15 marked the pertinent document as
16 PLAINTIFF'S EXHIBIT NUMBER 352-A).
- 17 A. Okay.
- 18 Q. Do you recognize this document?
- 19 A. No, sir.
- 20 Q. Is this document in the format of other
21 memos that you wrote about the time of
22 this document, about 1969, at Monsanto?
- 23 A. Yes, sir.
- 24 Q. Is this the format we were discussing
25 yesterday, where you would dictate or

1 handwrite out a memo and the secretary
2 would write and it would come back and
3 make corrections and then it would go
4 back?

5 A. I believe so.

6 Q. Do you recall any of the topics that are
7 mentioned in this memo?

8 A. Yes, sir.

9 Q. Which topics do you remember?

10 A. I recall Wisconsin Alumni Research
11 Foundation Institute. And I recall
12 making a trip to review an audit at the
13 Institute. I don't recall exactly when I
14 did it or, you know, making that --- but
15 I do recall making that trip. And I also
16 recall a gentleman named Francis Coon.

17 Q. Is that the name listed here, F. Coon in
18 the first sentence?

19 A. Yes, sir. And Birdsall I remember too,
20 because those were the two people I
21 talked to when I visited.

22 Q. What was the purpose of your visit?

23 A. Wisconsin Alumni Research Foundation
24 Institute had put together the
25 wherewithal to begin sampling a sampling

1 of Lake Michigan to determine what kind
2 of constituents were --- could be found
3 in samples of water, flora, fauna,
4 sediments, and things of that sort. And,
5 to the best of my recollection, I think
6 they were looking for industrial sponsors
7 to help pay for this scientific endeavor
8 --- investigation. And in return for
9 participating and helping to --- to cover
10 the costs of doing this kind of --- this
11 thing, the information would be shared
12 openly and freely with all of the
13 sponsors as well as being published.
14 Wisconsin Research Alumni Foundation was
15 a university-type thing, so that's what
16 it was about.

17 Q. Was the Wisconsin Alumni Research
18 Foundation interested in looking for the
19 presence of PCBs in the Michigan --- Lake
20 Michigan water?

21 A. Not specifically.

22 Q. Were they interested in looking for PCBs
23 among other substances?

24 A. Yes.

25 Q. Did they have the equipment necessary to

1 detect the presence of PCBs?

2 A. Yes.

3 Q. And what equipment was that?

4 A. They had electron capture gas
5 chromatographs which were fairly common
6 and used for pesticides. It was not
7 fairly common that they were being used
8 for PCB analysis or had been validated,
9 verified, or confirmed for that. If I
10 remember correctly, WARF had been working
11 on validating the EC/GCs for use to
12 measure chlorinated hydrocarbons as well
13 as PCBs and to include PCBs.

14 Q. All right. "EC/GC" meaning electron
15 capture gas chromatograph?

16 A. Right. Or GC/EC. I use them both ways.
17 Sorry. I'll try to stick to one or the
18 other.

19 Q. Referring to the last paragraph on page
20 two. That sentence reads, "In view of
21 this, our current Penascola (sic) ---
22 P-e-n-s-a-c-o-l-a --- problem and other
23 published information, I would suggest
24 that we step up our efforts at finding
25 immediate replacement formulations for

1 Pydraul AC and Pydraul 625." Is this one
2 of the topics that you recall from this
3 memo?

4 A. No, sir.

5 Q. Does the term Penascola problem mean
6 anything to you?

7 A. The term "Pensacola" ---

8 Q. Pensacola, I'm sorry.

9 A. --- means something to me. It's a city
10 in Florida and we have a plant there, and
11 the Pensacola problem, as it's put here,
12 I seem to recollect --- I don't remember
13 clearly enough to --- to recollect.

14 Q. Does the term "Escambia Bay" trigger any
15 recollection?

16 A. Yes, that does. That means ---

17 Q. Is that by Pensacola?

18 A. Yes.

19 Q. Was this Pensacola problem, is that when
20 there was a discharge of Aroclors or PCBs
21 from a Monsanto plant which poisoned some
22 sea life? Is that what happened?

23 MR. ZIMMER: It assumes facts not
24 in evidence.

25 A. No.

1 Q. What happened?

2 A. Well, you've thrown some things in there
3 like poisoned sea life and things of that
4 sort that I think are speculative and
5 conjecture and inflammatory and untrue.

6 Q. Then what did?

7 A. As I recall, to the best of my ability,
8 it seems to me that there was a unit ---
9 I know we didn't ever manufacture PCBs in
10 Pensacola, and I think there was a unit
11 that may have been using a PCB-containing
12 fluid that had leaked and that had ---
13 the material had, apparently leaked into
14 something that went into Escambia Bay.
15 And I recall --- and I'll tell you what
16 I recall right now, especially since you
17 mentioned Escambia Bay --- I'm not even
18 sure I'm pronouncing that correctly ---
19 is that we were concerned that the
20 material had gotten into the bay and that
21 it perhaps might have, you know,
22 contaminated some of the bottom feeding
23 organisms in that bay. And I remember
24 receiving shrimp where somebody had hired
25 a shrimp boat to go collect shrimp by the

1 plant. And the reason I remember it is
2 because the shrimper that was asked to do
3 that was very indignant and very
4 embarrassed to do so, because nobody
5 shrimped there because there weren't any
6 shrimp there, and it wasn't a place where
7 shrimp were, and he felt his peers would
8 laugh at him.

9 Q. Did he find any shrimp?

10 A. We --- I think we found about a half a
11 pound of shrimp after an extensive
12 dredging of the area and things of that
13 sort, and they were shipped to us, and I
14 believe we analyzed them.

15 Q. Do you recall the results of that
16 analysis?

17 A. No, sir, I do not.

18 Q. Was the unit that leaked an air
19 compressor unit?

20 MR. ZIMMER: It assumes facts not in
21 evidence.

22 A. I don't recall.

23 Q. Is Pydraul AC used in air compressors?

24 A. I don't recall specifically.

25 Q. What about Pydraul 625?

1 A. I don't recall.

2 Q. Are Pydraul AC and Pydraul 625
3 PCB-containing compounds ---
4 PCB-containing substances? I'm sorry

5 A. I believe that they're PCB-containing
6 fluids. I don't know how much or which
7 or any of that kind of thing.

8 Q. I refer you to the second sentence of
9 that paragraph that reads, "I also feel
10 that Aroclor 1242 should not be used in
11 replacement formulations." Do you recall
12 writing that?

13 A. No, sir, I do not.

14 Q. Do you recall communicating that to
15 anyone?

16 A. No, sir, I don't.

17 Q. What about the second half of the first
18 sentence, going back a step, where it
19 says, "I would suggest that we step up
20 our efforts at finding immediate
21 replacement formulations for Pydraul AC
22 and Pydraul 625." Do you remember
23 discussing or communicating that with
24 anyone?

25 A. No, sir.

- 1 Q. Going to the third sentence, it reads,
2 "If this were done, I firmly believe that
3 in a short period of time analysts would
4 soon be reporting Aroclor 1242 as a
5 significant water pollutant thus
6 seriously endangering a market which so
7 far has not been questioned." Do you
8 remember communicating that or discussing
9 that with anyone?
- 10 A. No, sir, I don't.
- 11 Q. Does this memo trigger any recollection
12 of discussing any of these topics?
- 13 A. Are you referencing the last paragraph of
14 the Exhibit? It does not trigger any
15 specific recollection of discussing these
16 topics with anybody.
- 17 Q. Any general recollection?
- 18 A. Not --- well, these kinds of things were
19 discussed, but I don't recollect
20 discussing these things specifically. I
21 don't recollect discussing Pydraul AC,
22 625. I do not recollect this.
- 23 Q. What kind of things? Do you mean things
24 like replacement formulations for
25 PCB-containing products?

- 1 A. Yes.
- 2 Q. What do you remember about your
3 discussions on that topic?
- 4 A. In a lot of applications where the safety
5 And some of the other items that were
6 inherent to PCB weren't needed, but that
7 PCBs were used because they had good
8 physical properties and things of that
9 sort, because of the outside chance that
10 there may have been some problems, the
11 other types of materials were being
12 looked at to substitute for those
13 formulations, especially when we were
14 dealing with formulations that were
15 uncontrolled in any way, shape or form,
16 and I believe we touched on one earlier,
17 the NCR situation.
- 18 Q. By "substitute," do you mean substituting
19 a non-PCB-containing product for a
20 PCB-containing product?
- 21 A. That's correct.
- 22 Q. Do you remember having those discussions
23 about the time or about the date that's
24 listed on this memo on September, 1969?
- 25 A. No, sir.

1 Q. I want to turn back to Exhibit Three
2 Fifty-one just very briefly. The first
3 column on the first page had that
4 reference of PS Out Number N69/. You
5 mentioned that that's not a log number
6 --- that's not a number that you would
7 have kept at the Monsanto labs?

8 A. I believe I stated that it's not a ---
9 not a number that I recognized as a
10 Monsanto number, or that I recognized.

11 Q. Did Monsanto use a numbering system for
12 its samples that was different from this?

13 A. Not specifically. This --- to clarify
14 this --- this may have been the numbers
15 that were put on the labels by the people
16 who sent the samples. I mean, it's just
17 merely identification that means
18 something to somebody. And that
19 hopefully is unique to the sample. But I
20 do not recognize this, as I said earlier,
21 as a Monsanto number. I mean, like MCS I
22 would recognize as Monsanto Corporation
23 Sample. Or OS is Outside Sample, or
24 things like this. PS Out Number --- No.
25 I assume number --- N69 slash means

1 nothing to me.

2 Q. Did you ---

3 A. It doesn't trigger anything Monsantoish

4 to me.

5 Q. Did your group in your lab have a system

6 for keeping track of samples?

7 A. Yes.

8 Q. Could you describe that system?

9 A. To the best of my recollection, the

10 system was instituted when a large number

11 of samples began to come in from

12 customers and from all kinds of different

13 locations. And the samples when received

14 were logged into a log book by the

15 technician who received them.

16 Q. Who was that technician?

17 A. It could have been any number of the

18 people that I've mentioned previously,

19 Jerry Litschgi, Bill Meaz. There was

20 another gentleman by the name Ben

21 Lichtenburg, or something like that. I

22 can't remember. His name was "Nick" ---

23 was his nickname he went by.

24 Q. And these were people who worked in your

25 group?

1 A. Yes.

2 Q. Do you know what happened to that log
3 book?

4 A. No, sir.

5 Q. Was it kept at the lab in St. Louis?

6 A. Yes, sir.

7 Q. Do you remember what it looked like?

8 A. No, sir.

9 Q. Dr. Tucker, have you ever heard of the
10 Texas Eastern Transmission Company or
11 Texas Eastern Corporation?

12 A. Yes.

13 Q. How did you hear of them?

14 A. Not too long ago I read about them in C
15 and E News.

16 Q. Did you ever hear about Texas Eastern
17 while you were working at Monsanto?

18 A. Not to my recollection.

19 Q. Did you have any contact with any
20 individual from Texas Eastern?

21 A. Not to my recollection.

22 Q. Do you remember discussing Texas Eastern?

23 A. No, sir.

24 Q. What about Transwestern Pipeline
25 Company?

- 1 A. No, sir.
- 2 Q. Have you ever heard the term
- 3 "Transwestern" outside the context of
- 4 this lawsuit?
- 5 A. No, sir.
- 6 Q. Are you familiar with a product called
- 7 MCS 153 or Turbinol 153?
- 8 A. No, sir.
- 9 Q. Are you familiar with a product called OS
- 10 81 or OS 91?
- 11 A. No.
- 12 Q. Were you aware while you worked at
- 13 Monsanto that Monsanto was selling
- 14 PCB-containing lubricants for gas
- 15 turbines and natural gas compressors?
- 16 A. Not specifically.
- 17 Q. Did you have any general knowledge of
- 18 that?
- 19 A. No. I wouldn't say I did. I had no need
- 20 to know, no reason to know, no reason to
- 21 care in my function with Monsanto.
- 22 Q. Were you ever called upon to test samples
- 23 from Texas Eastern's equipment or plants
- 24 or Transwestern's equipment or plants?
- 25 A. The group that I ran may have. We tested

1 samples from a large number of customers.

2 I don't recollect it specifically.

3 Q. Do you remember ever getting a sample
4 from Texas Eastern or Transwestern?

5 A. No, sir.

6 Q. If you did receive such a sample, would
7 it be reflected in the log book?

8 MR. ZIMMER: Calls for speculation.

9 A. If the log book was being used at that
10 time, I assume it would have been
11 standard operating procedure to put it
12 in. There were any number of ways in
13 which sample receipt and things of that
14 sort were documented. Sometimes we used
15 to get a work request for analysis from
16 the people submitting and things of that
17 sort, and that would be used as the
18 documentation. If there was a log book
19 and we were logging those samples into it
20 it would be in that log book.

21 Q. Other than the log book, what were some
22 other ways that you kept records of
23 samples?

24 A. There were work requests that were
25 submitted by people that were in the

1 groups that we provided analytical
2 support to. Usually they were triplicate
3 copy things or something like that, and I
4 can't remember if they were NCR
5 carbonless carbon paper or not. Very
6 frankly, I don't think they were. But we
7 would get a copy of it, and they would
8 keep a copy of it, and we would keep
9 those as records sometimes. We also
10 might attach those to the report and file
11 it with the report that was provided back
12 to the customer whoever our client
13 happened to be, the customer being used
14 as internal. We didn't provide that
15 information externally.

16 Q. Meaning another division or department of
17 Monsanto?

18 A. Uh-huh (affirmative).

19 Q. Did you ever get unsolicited samples from
20 customers or other outside companies
21 other than Monsanto asking for analyses?

22 A. The samples I would get would have to
23 come through somebody prior to reaching
24 us. They would not come directly to us
25 unless they were prearranged agreements.

1 Q. Meaning it would have to go through
2 someone else at Monsanto?

3 A. Right.

4 Q. Did those work requests have a specific
5 form that you could recognize if you saw
6 it?

7 A. Yes.

8 Q. Were copies of those stored at the lab?

9 A. I believe so.

10 Q. Do you know what happened to them?

11 A. No, sir, I do not.

12 MR. KASHANI: Let's take a break.

13 (OFF RECORD)

14 MR. KASHANI: I'll introduce two
15 more documents. Let's introduce
16 them both together.

17 (Thereupon the Court Reporter
18 marked the pertinent document as
19 PLAINTIFF'S EXHIBITS NUMBERS 353A
20 AND 354-A).

21 Q. Dr. Tucker, I'm showing you Exhibit 353
22 and 354, and ask you if you recognize
23 either of these Exhibits?

24 A. Give me a chance to review ---

25 Q. Sure.

1 A. --- please.

2 Q. Of course. Take as long as you want.

3 A. Okay. (The witness peruses the

4 documents).

5 Q. Do you recognize either of these

6 documents?

7 A. Not specifically.

8 Q. Do you have any general recollection of

9 the subject matter?

10 A. I generally recognize the Monthly Summary

11 memo and generally recognize the subject

12 matter in the other memo.

13 Q. The Monthly Summary memo is Exhibit 354,

14 and the other memo is Exhibit 353.

15 A. Yes, sir.

16 Q. Monthly summary, is that something you

17 prepared every month?

18 A. Yes, sir.

19 Q. And what was the purpose of the Monthly

20 Summaries?

21 A. To document and update Keller where we

22 were at. To justify our existence.

23 Q. Was Exhibit Three Fifty-four one of those

24 Monthly Summaries?

25 A. It appears to be so, yes.

1 Q. And did all of your Monthly Summaries
2 follow the same general format?

3 A. As best I can recollect, yes.

4 Q. Were these summaries something you did in
5 the ordinary course of your business ---
6 ordinary course of your work at Monsanto?

7 A. Yes.

8 Q. And can we assume that it was important
9 to your work there that the summaries be
10 as accurate as possible? As accurate as
11 you could make them?

12 A. Yes.

13 Q. Going back to Exhibit 353, this refers
14 to "Aroclors having been applied to soil
15 and test plots at the University of
16 Florida on the 28th of June, 1939." I'm
17 referring to the first sentence in
18 Exhibit 353. What was that all about?

19 A. I don't recall what it was all about.
20 This occurred six months before I was
21 born.

22 Q. Oh, I don't mean the application of the
23 soils, but ---

24 A. I'm sorry, but I don't recall what it was
25 about.

1 Q. Do you remember receiving samples from
2 test plots that had been exposed to
3 Aroclors in 1939?

4 A. I believe we did, yes.

5 Q. And after simple preparation did you
6 analyze those samples?

7 A. I do not recall it specifically, but I
8 believe we probably did.

9 Q. Do you remember the results?

10 A. Not specifically, no, sir.

11 Q. Do you remember if you detected any PCBs
12 in those soils?

13 A. Not specifically.

14 Q. Do you have any general recollection?

15 A. If they put them in there, we probably
16 detected them.

17 Q. By "put them in there," do you mean if
18 --- by putting them in there you mean
19 applying --- when whoever it was applied
20 Aroclors to the soil plots in 1939?

21 A. Uh-huh (affirmative).

22 Q. And by "We probably saw them," do you
23 mean that after you analyzed these soil
24 plots after --- I guess we're talking
25 about thirty years --- you still detected

1 the presence of PCBs in those soil plots?

2 A. It is possible. And the reason I say
3 that is, although I don't have details,
4 from the memo it states that they were
5 using this as termite deterrents or
6 something of that sort. So I would
7 imagine that they were applied at some
8 very gross high level, and having that
9 much Aroclor in there would make it, you
10 know, such a sterile environment that it
11 would be just like putting it in a jar.

12 Q. And the Aroclors was essentially
13 unaffected after thirty years?

14 MR. ZIMMER: Lacks foundation.

15 Calls for speculation.

16 A. I don't recall specifically.

17 Q. Do you recall generally detecting any
18 Aroclor in these samples?

19 A. Not in these specific samples. I'd have
20 to see some documentation, some report or
21 something of that sort to --- to
22 specifically recall this. I don't
23 specifically recall the details of these
24 samples. We analyzed a lot.

25 Q. I'm going to refer you to Exhibit 354, in

1 the last paragraph on page one. It's
2 TRAN 058742. It reads, "Forty-five
3 Aroclor treated soil samples from a
4 Florida test plot have been provided by
5 the Agricultural Division. The Aroclor
6 was placed in these plots in 1938." Is
7 that referring to the same plots as
8 Exhibit 353?

9 A. I don't know for sure. If I had to
10 guess, I would. I don't know. The dates
11 are different. One says '39 in the memos
12 that I have and one says '38. As I
13 stated, we analyzed a lot of samples over
14 the eleven years or so that I was at
15 Monsanto.

16 Q. Going back to Exhibit 353, this refers to
17 plots which were laced or exposed to
18 Aroclors approximately thirty years
19 before the date of the memo and they were
20 sent for analysis. Do you remember
21 analyzing any plots of this type, soil
22 samples that were exposed to Aroclor
23 many, many years before the analysis?

24 A. I do not remember specifically analyzing
25 these samples, as I've stated earlier.

1 Q. Do you have any general recollection of
2 these samples?

3 A. Yes. I have a general recollection of
4 samples from a poison test plot for
5 termites in Florida.

6 Q. And, do you recall the results of those
7 analyses?

8 A. No, sir, I do not.

9 Q. Do you recall if you detected any PCBs at
10 all?

11 A. I just stated I do not recall.

12 Q. Would you have been surprised if you had
13 found no PCBs in those plots?

14 A. In which plots? The ones in Florida?

15 Q. The reference in Exhibit 353.

16 A. Looking at the memo --- what I need to
17 know the levels that they were laced
18 with; okay. And if I knew the levels,
19 and they were inordinately high, which I
20 suspicion they are, I would have been
21 surprised if we did not detect the PCBs
22 in there. In one of the four situations
23 mentioned here, the 5442, I would have
24 been surprised if we detected PCBs in
25 that since it's a terphenyl.

1 Q. Meaning if they had put Aroclor 5442
2 there wouldn't be PCBs because it is not
3 a polychlorinated biphenyl?

4 A. That's correct.

5 Q. But, turning to the second paragraph of
6 Exhibit 353, it says, Aroclors 1242,
7 1248, and 1254 were mixed in test soil
8 (one cubic foot per plot) at two rates of
9 application and in replicate spots."
10 Would you have been surprised to detect
11 Aroclors 1242, 1248, or 1254 in these
12 plots?

13 MR. ZIMMER: Lacks foundation.

14 Incomplete --- hypothetical, if you
15 will.

16 A. I would neither have been surprised nor
17 unsurprised. I don't --- I don't --- I'm
18 not sure why I would get emotional over
19 the situation or be startled by it.

20 Q. Do you recall writing up any report of
21 the analyses of these test plots?

22 A. No, sir, I do not.

23 Q. Do you recall publishing any papers that
24 refer to these plots?

25 A. No, sir, I do not.

1 Q. Earlier I pointed out a memo with your
2 name on it which referred to proving that
3 Aroclor 1242 was biodegradable. If you
4 had found that these test plots did not
5 contain any Aroclor 1242 after thirty
6 years, would that have contributed
7 towards the goal of proving that Aroclor
8 1242 was biodegradable?

9 A. "Yes" and "no."

10 Q. How so?

11 A. First of all, if the Aroclors were
12 introduced into this soil, and if it was
13 a sandy Florida soil or whatever it was,
14 which is pretty sterile to begin with,
15 and they were introduced at, say, a 25
16 percent incorporation level by weight or
17 something of that sort, and I didn't find
18 them there, I would have been very
19 surprised if we analyzed them, okay,
20 because under those kinds of conditions,
21 I would not expect, from what I knew
22 about those materials at that point in
23 time, that they would go away completely,
24 and that you wouldn't see portions of it.
25 So, it really would depend upon the

1 overall total picture as to whether or
2 not that type of information would
3 support or deny the biodegradability of a
4 material. There are a number of
5 variables that determine whether a
6 material biodegrades or not. If you take
7 and put Aroclor 1242 in a five gallon can
8 and put it in a warehouse for 150 years,
9 I will guarantee you when you come back
10 and look in that warehouse if it's still
11 there, and the can's still there, and you
12 look inside, you probably will find what
13 you put in there.

14 Q. You mean the Aroclor 1242?

15 A. That's correct. And I would not use that
16 as evidence that the material wasn't
17 biodegradable, because that's totally out
18 of context, totally out of perspective of
19 how the biological systems work. If, on
20 the other hand, they had spiked these
21 soils which were not just pure sand or
22 something of that sort, but soils that
23 had significant biological activity,
24 organics available and things of that
25 sort, and spike them at very low levels,

1 when I came back and I analyzed those
2 soils, I'd be willing to speculate ---
3 not beyond a shadow of a doubt --- that
4 this along --- if they weren't there when
5 I analyzed them and especially if they
6 were just, you know, very altered or very
7 different --- I would be willing to
8 speculate and combine that information
9 with a variety of other information from
10 different sources and talk about the
11 relative biodegradability of them. It's
12 not a yes/no and on/off situation.

13 Q. You mentioned a paper that you had
14 written in the seventies which reflected
15 that Aroclor 1242 was biodegradable to
16 some extent. Did you use the results of
17 these soil tests in that paper?

18 A. No, sir.

19 MR. ZIMMER: That mischaracterizes
20 his testimony about the paper too.

21 A. Well, regardless of the
22 mischaracterization or whatever ---

23 Q. Do you know the paper I'm referring to?

24 A. I know the paper I published, yes, and
25 that information from the soil test plots

1 was not used in there since it wasn't ---
2 didn't have anything to do with it. I'm
3 not even sure the data was available at
4 the time the paper was published, but
5 even if it had been it had no bearing on
6 it. I wasn't a controlled test.

7 (OFF RECORD)

8 MR. KASHANI: Next Exhibit.

9 (Thereupon the Court Reporter
10 marked the pertinent document as
11 PLAINTIFF'S EXHIBIT NUMBER 355-A).

12 (OFF RECORD)

13 Q. I'll hand you another Exhibit. I'm
14 handing you what has been marked as
15 Exhibit 355, and ask you to review that.

16 A. Okay.

17 Q. Do you recognize this document?

18 A. No, sir.

19 Q. This document refers to a meeting which
20 took place on June 30, 1970. On the face
21 of the document, it refers to such a
22 meeting. Do you recall any such meeting?

23 A. No, sir.

24 Q. It says that those present at the meeting
25 were R. Munch, R. Keller, E.S. Tucker,

1 V.W. Saeger, and E.M. Emery. Does that
2 trigger any recollection of the meeting?

3 A. No, sir.

4 MR. KASHANI: Let's go off the
5 record for a second.

6 (OFF RECORD)

7 Q. Dr. Tucker, I asked you earlier about
8 when it was that Monsanto first proposed
9 or when it was that it was first
10 discussed or you first heard about the
11 possibility of producing MCS 1016. Does
12 this memo trigger any recollection about
13 when that replacement product was first
14 proposed?

15 A. No, sir. As a matter of fact, in
16 reviewing the memo, I didn't see any
17 mention of it.

18 Q. Does Aroclor 1242B mean anything to you?

19 A. I believe I stated earlier when asked
20 that question that it did not.

21 Q. What about Aroclors 1230B?

22 A. No, sir.

23 Q. Now, going back to the first page, the
24 document --- this is TRAN 038874 --- on
25 about the --- mid-paragraph --- you have

1 a paragraph that begins with the words
2 "Presently Known" underlined. And then it
3 reads, "Presently known: The composition
4 of both standard Aroclor and the
5 replacement products by isomers and/or
6 chlorine level." Do you know what that's
7 referring to?

8 MR. ZIMMER: Calls for speculation
9 and lacks foundation.

10 Q. Is that a correct statement as of July 7,
11 1970?

12 A. No, sir.

13 Q. What's incorrect about it?

14 MR. ZIMMER: What does the
15 statement say, for starters,
16 Counsel? He's never seen this
17 before and it wasn't written by him.

18 MR. KASHANI: He's just said it's
19 incorrect, and I've asked him what
20 --- we've moved on. I mean, I've
21 asked him what's ---

22 MR. ZIMMER: Well, I haven't moved
23 on.

24 MR. KASHANI: --- incorrect on
25 that.

1 MR. ZIMMER: I'm still puzzled
2 about what the question is. You're
3 asking him to interpret something
4 somebody else wrote.

5 MR. KASHANI: You're not answering
6 the questions. Dr. Tucker said that
7 this was incorrect.

8 MR. ZIMMER: Well, something about
9 the way he reads it is incorrect,
10 but we don't know what was in the
11 mind of the author. That's the
12 problem. He can tell you what he
13 thinks is incorrect about it.

14 That's fine.

15 Q. What's incorrect about it?

16 A. At this date in 1970, and even to this
17 date today, we do not know, by complete
18 definition, all the isomers and/or
19 chlorine levels that are present in any
20 and all of the Aroclor products ---
21 products as they were manufactured then.
22 So, I find this to be incorrect, and I
23 find it to be a statement made by an
24 individual who didn't understand what
25 we're talking about here today.

1 Q. Who is that individual?

2 A. Ed Emery.

3 Q. He's the fellow who signed this memo?

4 A. It's the person who this memo is from.

5 Q. You said you didn't recognize the memo.

6 How do you know that this memo is from

7 Mr. Emery and that ---

8 A. Because up at the top it says, "From:

9 Name and Location: E.M. Emery", so I'm

10 assuming that if the memo is an accurate

11 memo --- and that's conjecture --- that

12 it's from who it says it's from, who is

13 Ed Emery. And Ed Emery --- I know Ed

14 Emery and I know his knowledge of the

15 situation, and I don't think that he knew

16 what he was saying here.

17 Q. When we encounter memos of this type that

18 say "From" and a name, can we assume that

19 the memo is accurate, as you are doing

20 now, that the memo came from the name

21 listed after the "From"?

22 MR. ZIMMER: Do not answer that.

23 We are not going to make any

24 assumptions.

25 MR. KASHANI: I'm not entitled to

1 make the same assumption Dr. Tucker
2 is making? Dr. Tucker is assuming
3 this memo is from Mr. Emery because

4 ---

5 MR. ZIMMER: Dr. Tucker is going

6 ---

7 MR. KASHANI: --- it says ---

8 MR. ZIMMER: --- beyond what he has
9 to do in responding to your
10 questions, and he is assisting you
11 in trying to figure out something
12 that I'm about to cut off, because
13 his job is to sit here and answer
14 your questions and not guess,
15 speculate, or assume.

16 MR. KASHANI: Dr. Tucker said that
17 this memo is from Mr. Emery, based
18 on the fact that Mr. Emery is listed
19 after the "From" line on this memo.

20 MR. ZIMMER: Right.

21 MR. KASHANI: And I'm entitled to
22 explore ---

23 MR. ZIMMER: And he's not going to
24 do any other assuming ---

25 MR. KASHANI: I'm entitled to

1 explore why --- the basis of that.

2 MR. ZIMMER: He said he assumes
3 that because his name is there, that
4 he must have written the memo if it
5 was actually written and if it went
6 out as it shows. You can interpret
7 the memo just as well as Dr. Tucker
8 can in terms of whether it ever was
9 sent or not. That's as far as we're
10 going to go.

11 Q. This memo is similar to other memos of
12 this type that we've seen today. On
13 memos of that type where it writes the
14 "From" line from that person, does that
15 indicate that person wrote the memo?

16 MR. ZIMMER: Lacks foundation.
17 Calls for speculation.

18 Q. Was someone running around Monsanto
19 putting other people's names on memos?

20 A. I wouldn't know that.

21 MR. ZIMMER: I'll be happy to tell
22 you probably not. But why are we
23 wasting time with this?

24 MR. KASHANI: Because we are
25 encountering difficulty

1 authenticating documents, and we're
2 seeking any way that we can
3 establish who wrote documents and
4 when they were written.

5 MR. ZIMMER: Well, you can't
6 establish who wrote this document
7 through somebody that didn't write
8 it and doesn't remember seeing it
9 before. As soon as you find that
10 out, you should move on.

11 A. Let me categorically state that I could
12 not validate that this document was
13 written --- ever written, or by who it's
14 written, or that any people on this
15 distribution list really received it ---

16 MR. ZIMMER: He knows that.

17 A. --- and that includes me who is on there,
18 and I've already stated that I don't
19 recognize this document specifically. I
20 don't understand what the issue is here.
21 If you're trying to get me to say
22 something that I don't want to say, or
23 that I can't say, or that's not true, I
24 have a problem with that. So, what is
25 the issue here?

1 MR. ZIMMER: Let's just let him ask
2 his questions.

3 Q. You stated that Mr. Emery was not
4 entirely correct when he made the
5 statement on this memo, and I'm just
6 asking how you know that Mr. Emery said
7 that, or what causes you to say that Mr.
8 Emery said that?

9 MR. ZIMMER: He gave you his
10 interpretation of a particular
11 sentence in a memo, which I probably
12 shouldn't have let him go that far
13 to do since he disclaimed any prior
14 knowledge of it or who wrote it. But
15 we're talking in circles here now,
16 because he's not going to do any
17 more assuming for you. Now, if you
18 have a question about a subject
19 matter in the memo, if you can
20 refresh his recollection about it or
21 something, that's fine.

22 Q. Was your basis for saying Dr. Emery wrote
23 this was the fact that Dr. Emery, or E.M.
24 Emery is listed on the front line of this
25 memo?

- 1 A. That was my only basis.
- 2 Q. Referring again to this phrase. I
3 understand your testimony that even today
4 we do not know 100 percent, completely,
5 the complete isomerization --- the
6 complete composition of every Aroclor.
- 7 A. Correct.
- 8 Q. But as of the time of this memo, July,
9 1970, did you know the approximate
10 composition of the Aroclors?
- 11 A. Yes.
- 12 Q. Did you know that each Aroclor contained
13 a mixture of homologs and isomers?
- 14 A. Yes.
- 15 Q. Did you know that each Aroclor contained
16 biphenyls with different numbers of
17 chlorines?
- 18 A. That's what homologs and isomers are.
- 19 Q. Your answer is "yes"?
- 20 A. Yes.
- 21 Q. Did you know at that time that, for
22 example, Aroclor 1242 contained biphenyls
23 with different numbers of chlorines?
- 24 A. Yes.
- 25 Q. Let's move on.

1 MR. KASHANI: Exhibit next in
2 order.

3 (Thereupon the Court Reporter
4 marked the pertinent document as
5 PLAINTIFF'S EXHIBIT NUMBER 356-A)

6 A. Okay.

7 Q. Do you recognize this Exhibit 356?

8 A. Not specifically.

9 Q. Is that your signature at the bottom?

10 A. It appears to be.

11 Q. Do you have any general recollection of
12 the topic matter of the Exhibit?

13 A. Yes.

14 Q. It's second sentence of the first
15 paragraph refers to, "Also included are
16 samples of two blends of distillation
17 cuts from Aroclor 1142." What is Aroclor
18 1142?

19 A. I don't recall.

20 Q. I want to refer you back to an earlier
21 Exhibit, 326, and refer you to page ---
22 well, it's numbered page on, what is page
23 TRAN 006987, and ask you to read that
24 first paragraph.

25 A. (Witness complies with request). Okay.

1 Q. Does that refresh your recollection as to
2 what was Aroclor 1142?

3 A. No, sir.

4 Q. What is a distillation cut from Aroclor
5 1142? Referring back to Exhibit 356.

6 A. "Distillation" usually refers to a
7 process whereby a material is heated up
8 and components that are present in that
9 material, if it's a multi-component
10 mixture, vaporize. If those materials
11 are collected for a period of time and
12 represent a portion of what was
13 originally being distilled, then what you
14 have is a fraction or a cut ---
15 distillation cut.

16 Q. Do you mean, in the context of Aroclors,
17 that through distillation, certain
18 components of the Aroclor could be
19 removed?

20 A. Correct. And I mean that in terms of
21 gasoline and petroleum and everything
22 that the engineering concept of
23 distillation is employed for, including
24 water.

25 Q. To refer to the rest of the sentence ---

1 the full sentence --- and this is the
2 second sentence, first paragraph of
3 Exhibit 356, it reads, "Also included are
4 samples of two blends of distillation
5 cuts from Aroclor 1142, prepared by R.
6 Munch, to see if elimination of the
7 higher chlorinated isomers would make a
8 product which would be more
9 biodegradable." Do you know what that's
10 referring to?

11 A. Based on the document that you just had
12 me review ---

13 Q. Refer ---

14 A. I ---

15 Q. Referring back to Exhibit 326?

16 A. I believe that's the thick one --- the
17 one that deals with the product
18 specifications and how they make it and
19 that kind of stuff?

20 Q. Yes. How they make Aroclor.

21 A. That's the first time that I understood
22 that 11 meant crude biphenyl. I've
23 always understood that 12, in the 1242 or
24 1221, meant the finished product, but I
25 never knew that the 11 did. So, based on

1 that, and this information, I would say
2 that Ralph Munch either did or had crude
3 Aroclor 1242, which would be 1142
4 fractionated through distillation, and
5 collected those cuts and made them
6 available.

7 Q. And did he remove the higher chlorinated
8 isomers from the crude Aroclor 1242?

9 MR. ZIMMER: Calls for speculation.
10 Lacks foundation.

11 A. It implies it in the memo that I'm
12 reading.

13 MR. ZIMMER: See, that's the
14 dilemma.

15 THE WITNESS: Yeah, I ---

16 MR. ZIMMER: He's asking you what
17 your memory is.

18 A. Okay. My memory does not contain that
19 information, but it implies it in the
20 memo that you've asked me to read.

21 Q. Referring to --- recall yesterday we
22 discussed MCS 1016 and the process by
23 which MCS 1016 ---

24 A. Yes.

25 Q. --- is produced? Does that also, at one

1 point, involve crude Aroclor 1242?

2 A. It could, but I don't know that. For
3 example, I don't know what 10 stands for.
4 Do you know what 10 stands for from any
5 review of the documents? I'd be curious
6 because I don't.

7 Q. Do you know what MCS 1016 stands for?

8 A. Yes, I know what --- I know what MCS 1016
9 is.

10 Q. Right.

11 A. But I don't know what the 10 is, for
12 example, like the 11 --- the 12 I do
13 know.

14 Q. Do you remember running any --- this memo
15 refers to samples of two blends of
16 distillation cuts from 1142. Do you
17 remember running any tests on those
18 samples?

19 A. No, sir.

20 Q. Do you remember if, at the time of the
21 date listed on this memo --- this is
22 Exhibit 356, you had the ability --- and
23 by "you," I mean the laboratories at
24 Monsanto --- I'm asking for your
25 knowledge and what you knew. Did the

1 laboratories at Monsanto have the ability
2 to remove the PCBs with more chlorine on
3 them from a batch of Aroclor?

4 A. Yes. They probably had the capability.

5 Q. Through this distillation process that
6 you discussed?

7 A. (Witness nods head in the affirmative).
8 Yes.

9 Q. Going down to the third paragraph of
10 Exhibit 356, it reads, "Do your
11 micro-organisms, once adapted to
12 biphenyl, require further feeding on
13 biphenyl to continue degrading the
14 chlorinated biphenyls." Do you know what
15 the "your" is referring to?

16 A. I believe it's referring to organisms
17 that the Ruabon people were using to
18 study degradeability.

19 Q. Was Mr. Lidgett --- L-i-d-g-e-t-t --- in
20 Ruabon?

21 A. Yes, sir.

22 Q. And was he doing work on biodegradation
23 of PCBs?

24 A. I don't know if he was specifically doing
25 it or if he was supervising it. He was

- 1 associated with it.
- 2 Q. And do you remember the subject matter of
3 that question which is in the third
4 paragraph of Three, Fifty-six relating to
5 the micro-organisms?
- 6 A. Yes.
- 7 Q. And what do you remember about that?
- 8 A. I remember that it had to do with the
9 concept of co-metabolism which I
10 mentioned earlier.
- 11 Q. Do you remember getting an answer to this
12 question?
- 13 A. No, sir, I do not.
- 14 Q. Just to refresh my memory, is this
15 referring to having some biphenyl in the
16 mix to, let's say, facilitate the
17 biodegradation of the Aroclor?
- 18 A. Yes. In two ways.
- 19 Q. What are those ways?
- 20 A. One way, in that the biphenyl molecule
21 without any chlorines on it is easier for
22 less resistance and less unusual for
23 bacteria to encounter. So, when the
24 bacteria encounter that they develop the
25 appropriate enzyme systems to use that as

1 both a carbon source and as an energy
2 source. If that material is continuously
3 provided to them and it's their only
4 source of energy, or it's a significant
5 source of energy and/or building blocks,
6 in terms of the feed they're receiving,
7 they'll continue to develop the enzymes
8 that are required to metabolize those
9 things. If it's withdrawn they may not.
10 Q. Meaning if the biphenyl is withdrawn?
11 A. Correct. So, if you were to take those
12 organisms and adapt them on biphenyl so
13 that they could oxidize biphenyl and then
14 begin feeding them chlorinated biphenyls
15 they would probably metabolize the
16 chlorinated biphenyls, but they may quit
17 if they are not continued to be --- if
18 they are not continually provided with
19 the easier carbon and energy source
20 biphenyl. And if that happens, then of
21 course, they wouldn't degrade those. So,
22 the other thing is is that the bug
23 population needs an energy source that
24 can keep up with it so it can stay viable
25 and not only use the energy source that

1 it's getting to stay viable but also to
2 co-metabolize other things, and that's
3 what that's meant by.

4 Q. Is a biphenyl molecule a PCB molecule
5 without any chlorine on it?

6 A. You could describe it that way, yes.

7 Q. And --- I don't want to mischaracterize
8 what you said, so I'm trying to put it in
9 layman's terms. You understand my
10 problem?

11 A. Yeah. That's fine.

12 Q. Is it correct to say with your
13 description that by supplying some
14 biphenyl initially the micro-organisms
15 --- the bacteria --- become used to
16 eating, as it were, the biphenyl and this
17 enables them more readily to digest and
18 degrade the PCB?

19 A. Yes. It allows us in the laboratory to
20 speed the process up so that we can
21 observe the degradation in the time that
22 we have to monitor it. The same thing
23 would probably occur in the environment,
24 but it would take long periods of time.
25 By introducing the biphenyl and

1 shortening --- short-circuiting the step
2 and making it go faster, we can observe
3 it on a real time basis. That's what
4 that's all about.

5 Q. How long is a "long period of time"?

6 A. Relative to in the laboratory or relative
7 ---

8 Q. Yes.

9 A. Well, depends on how much money you've
10 got and how much time. I mean, you know,
11 a month --- spending a month in studying
12 a particular isomer and the
13 biodegradability of it is a long time if
14 you've got 210 of them.

15 Q. I guess my question is how --- by what
16 factor, or how much is the process of
17 biodegradation of PCB speeded up by
18 introducing biphenyl into the mix?

19 A. It's not necessarily that it speeds up
20 the process, but it causes its inception
21 to occur earlier.

22 Q. How much earlier?

23 A. It depends.

24 Q. On what?

25 A. It depends on the bugs, and it depends on

1 the temperature, and it depends on the
2 day of the week and where the bugs were
3 gotten, and it just depends on so many
4 variables that it's not predictable. But
5 it is known that it will and can speed
6 things up and that it will and can cause
7 co-metabolism.

8 Q. So, the experiments you did in the
9 laboratory were more favorable towards
10 biodegradation than the natural
11 environment?

12 A. No.

13 Q. Is biphenyl available in the natural
14 environment?

15 A. Probably could be, yes.

16 Q. Is it available in the quantities that
17 you used in the lab and the
18 concentrations that you used in your lab
19 tests?

20 A. The biodegradation studies that were done
21 --- that were published --- were not
22 studies in which the biphenyl content of
23 the constituents were supplemented to
24 cause co-metabolism.

25 Q. We'll get back to those studies ---

1 A. I mean, that seems to imply that --- I
2 think you --- to me at least, you're
3 leaving on the table an accusation that
4 the biodegradation that we observed and
5 published was stimulated through
6 synthetic conditions, i.e. the additions
7 of biphenyls which was not the case.

8 Q. But --- I know that there were other
9 experiments without the biphenyl.

10 A. Okay.

11 Q. I understand that. But the experiments
12 with the biphenyl --- you just described
13 those as synthetic conditions. Is that
14 an accurate term?

15 A. They were synthetic conditions that the
16 biologists in Ruabon were using to
17 initiate the degradation of things.

18 Q. By "synthetic" you mean it was not --- a
19 condition that was not present in nature?

20 A. No. I mean that it was a condition that
21 was put together in the laboratory. I
22 don't know that it couldn't be present in
23 nature too. So, I mean, there's a ---

24 Q. What ---

25 A. --- difference there.

1 Q. Sure. I understand. What concentration
2 of biphenyl was typically used in the
3 experiments in which biphenyl was used to
4 trigger biodegradation?

5 A. I don't recall.

6 Q. Was it higher than what would commonly be
7 found in nature?

8 A. I would doubt it, but I don't recall.

9 Q. Is biphenyl a manufactured compound? Is
10 it something that Monsanto made, for
11 example?

12 A. Yes.

13 Q. Is it something that Monsanto synthesized
14 in the lab or extracted from nature
15 somehow?

16 A. Monsanto synthesized it in an operating
17 unit, a chemical plant.

18 Q. Is it something that I could go out and
19 harvest in nature in commercial
20 quantities, meaning biphenyl?

21 A. The kicker there is commercial
22 quantities. What do you mean by
23 "commercial quantities"?

24 Q. The quantities that Monsanto was selling
25 of biphenyl.

1 A. No. That's why they manufactured it
2 synthetically. That's why a number of
3 naturally occurring constituents are
4 manufactured synthetically.

5 Q. I'm trying to get a feel for how common
6 biphenyl is in nature. Is it ---

7 A. I think it's relatively common.

8 Q. Is it as common as salt, for example?

9 A. No.

10 Q. As common as PCBs?

11 A. It might be. You know, that's an
12 interesting question. It might be.
13 Let's put it to you this way. Biphenyl
14 is two benzene rings.

15 Q. Yes.

16 A. How common is benzene in the natural
17 environment?

18 Q. I don't know.

19 A. Very common. And so, what I'm saying is
20 the probability of those two rings
21 combining, you know, in the petroleum
22 reservoirs under the ground at high
23 temperatures and pressures and things of
24 that sort is probably fairly high, and
25 so, certainly, I would say there might be

1 part per million levels of biphenyl that
2 naturally occur in the environment from
3 that process. And so, from that
4 conclusion --- if that were true. This
5 is speculation --- since PCBs are at part
6 per billion levels and that kind of thing
7 in the environment, then they might be
8 equatable.

9 Q. Are those the concentrations you used in
10 the tests with biphenyl?

11 A. For --- we never --- the tests in the
12 United States, to my knowledge, we never
13 fed biphenyl in conjunction with the PCBs
14 to bring about this co-metabolism because
15 we got the materials to degrade with our
16 bugs without doing that.

17 Q. Do you know what concentrations were used
18 in Ruabon ---

19 A. No, sir.

20 Q. --- concentrations of biphenyl?

21 A. I do not.

22 MR. ZIMMER: Ruabon.

23 Q. Ruabon. Yes, it is Ruabon.

24 (OFF RECORD)

25 MR. KASHANI: Let's go to the next

1 Exhibit.

2 (Thereupon the Court Reporter
3 marked the pertinent document as
4 PLAINTIFF'S EXHIBIT NUMBER 357-A).

5 Q. Exhibit 357.

6 A. (Witness peruses document). Okay.

7 Q. Do you recognize this document?

8 A. Not specifically.

9 Q. Do you have any general recollection of
10 it?

11 A. Yes.

12 Q. Who was Mr. Baxter --- R. Baxter?

13 A. You know, as I recall, I think the
14 gentleman in that last memo --- what was
15 his name? Liggett? Lidgett?

16 Q. Lidgett.

17 A. Lidgett reported to Baxter.

18 Q. Baxter was in charge of --- I suppose
19 among other things --- biodegradation
20 studies ---

21 A. He could have been, yes.

22 Q. There's some handwriting up at the ---
23 under the --- I guess under the word
24 "Lidgett" on this document. Do you
25 recognize that handwriting?

- 1 A. No, sir.
- 2 Q. Do you recognize the signature?
- 3 A. Down at the bottom of the memo, is that
- 4 what you're talking about?
- 5 Q. Yes.
- 6 A. No, sir.
- 7 Q. The fourth paragraph of this document
- 8 states --- well, let's go to the third
- 9 paragraph that reads, "The samples sent
- 10 by Scott Tucker have now arrived and we
- 11 shall be including these
- 12 bromochlorobiphenyls in our subsequent
- 13 experiments." Do you remember those
- 14 samples?
- 15 A. Not specifically.
- 16 Q. What's a "bromochlorobiphenyl"?
- 17 A. Chemically, what that name means is is
- 18 that it's a biphenyl molecule that has
- 19 chlorine and bromine attached to it.
- 20 Bromine is just a higher atomic weight
- 21 halogen, just as, like iodine and
- 22 fluorine and astatine --- astatine or
- 23 whatever it is --- I always forget that
- 24 one.
- 25 Q. Why did you send --- was this a synthesized

- 1 molecule, bromochlorobiphenyl?
- 2 A. It probably was, yes.
- 3 Q. Do you remember when it was --- when
- 4 Monsanto first synthesized it?
- 5 A. No, sir.
- 6 Q. Was there any particular reason to
- 7 synthesize bromochlorobiphenyl?
- 8 A. Yes.
- 9 Q. What was that reason?
- 10 A. I believe that people were interested in
- 11 seeing what would happen if you
- 12 substituted bromine for chlorine on
- 13 biphenyl.
- 14 Q. In that context, were people at Monsanto,
- 15 to your knowledge, interested in seeing
- 16 if the resulting molecule --- I guess the
- 17 resulting compound which had bromine as
- 18 well as chlorine on the biphenyl --- was
- 19 more biodegradable than chlorine alone?
- 20 A. They were interested in seeing how
- 21 biodegradable it was, yes.
- 22 Q. Do you remember if any tests were run to
- 23 determine how biodegradable the substance
- 24 was?
- 25 A. Not specifically.

1 Q. Do you remember generally any tests?

2 A. In general, I think there probably were
3 some tests that were run.

4 Q. Do you remember the results?

5 A. No, sir.

6 Q. So, was this an attempt to see if a
7 substance that was, I guess, similar to
8 PCB might be more biodegradable than PCB?

9 MR. ZIMMER: Well, he hasn't said.
10 that it was indeed done. He's
11 postulated for you why it might be
12 done.

13 MR. KASHANI: He said he has general
14 recollection that this was
15 synthesized and that tests were run.
16 I'm asking if he were aware that
17 there was any consideration on
18 Monsanto's part that substitution of
19 bromine for chlorine and producing a
20 molecule that contains bromine as
21 well as chlorine, sort of a PCB with
22 bromine, might be more biodegradable
23 than PCBs alone.

24 A. I think that's what they were trying to
25 find out.

- 1 Q. Did they succeed?
- 2 A. I don't know.
- 3 MR. KASHANI: This next Exhibit,
4 Number 358 ---
5 (Thereupon the Court Reporter
6 marked the pertinent document as
7 PLAINTIFF'S EXHIBIT NUMBER 358-A).
- 8 A. (Witness peruses document).
- 9 Q. Do you recognize this document?
- 10 A. Not this document specifically.
- 11 Q. Do you remember the experiment that seems
12 to be described in the document?
- 13 A. Yes, I do.
- 14 Q. Could you describe that experiment,
15 please?
- 16 A. There was some interest as to what might
17 happen to the polychlorinated biphenyls
18 used as encapsulation fluids in
19 carbonless carbon paper when the material
20 was burned openly.
- 21 Q. Carbonless carbon paper was a product
22 produced by NCR?
- 23 A. Among others.
- 24 Q. And what was the result of the
25 experiment?

1 A. The experiment was a very preliminary
2 semi-quantitative initial experiment to
3 just see if the Aroclors were volatilized
4 or destroyed or anything of the sort in
5 --- by burning in this manner.
6 Unfortunately, I noticed in here that
7 they used the word --- that the word
8 "incineration" is used, and this wouldn't
9 be considered incineration as we now
10 think about "incineration" today. I
11 think that's important to note.

12 Q. "Incineration" today referring to a much
13 higher temperature?

14 A. Oh, yeah, and very controlled conditions.
15 The experiment just consisted of taking
16 --- creating an apparatus that you could
17 suck the smoke and particulates, et
18 cetera, off or a piece of paper that had
19 been set afire and pull that through
20 traps that were filled with hexane, in
21 which polychlorinated biphenyls were very
22 soluble, and so what you would end up
23 doing would be capturing the --- any
24 volatilized or vaporized or whatever PCBs
25 from the --- and other organics for that

1 matter too --- from the paper in the
2 trap. And then the idea was to look in
3 the traps and see how much was there,
4 very roughly semi-quantitatively. And
5 then also look at the residual that was
6 left on the paper and just get a feeling
7 for what --- what happened when you did
8 this.

9 Q. So, briefly, the experiment consisted of
10 burning some carbonless carbon paper from
11 NCR and seeing if by burning any ---
12 among other things --- Aroclors were
13 released into the air?

14 A. Correct.

15 Q. Did the carbonless carbon paper contain
16 Aroclor 1242?

17 A. I don't recall specifically. That would
18 be --- that would probably be correct.

19 Q. Do you say that because of figure 2,
20 which is at TRAN 007551?

21 A. Correct.

22 Q. You used Aroclor 1242 as a standard ---

23 A. Correct.

24 Q. --- to see if you could detect the same
25 Aroclor 1242 coming off from the carbon

1 paper?

2 A. Correct.

3 Q. Do you remember doing any other
4 experiments along these lines?

5 A. No, sir.

6 Q. Do you know if the results of this
7 experiment were reported to NCR?

8 A. No, sir.

9 MR. KASHANI: Let's take a break.

10 (OFF RECORD)

11 MR. KASHANI: Exhibit 359.

12 (Thereupon the Court Reporter
13 marked the pertinent document as
14 PLAINTIFF'S EXHIBIT NUMBER 359-A).

15 Q. I could ask you my question --- the
16 reason I'm bringing the Exhibit is I'm
17 wondering if you don't recall about the
18 Exhibit maybe it might trigger a
19 recollection.

20 A. Is that a question?

21 MR. ZIMMER: Not yet.

22 THE WITNESS: Okay.

23 Q. The question is do you recall discussing
24 or mentioning that --- to anyone at
25 Monsanto --- that the process that Jensen

1 and Widmark used to analyze PCBs in the
2 environment might have been destroying
3 Aroclor 1242?

4 A. I don't recall it specifically.

5 Q. Do you have any general recollection of
6 that issue?

7 A. No. I have no general recollection of
8 that issue.

9 Q. Let me refer you to page two of this
10 Exhibit, Exhibit 359. It's almost the
11 last paragraph. It begins with "Scott
12 Tucker." It says, "Scott Tucker reported
13 that Aroclor 1242 could be destroyed by
14 HNO_3 --- and three is a subscript ---
15 slash H subscript 2 SO_4 --- and the 4 is
16 a subscript --- treatment." What's HNO_3 ?

17 A. Nitric acid.

18 Q. And what's H_3SO_4 ?

19 A. Sulfuric acid.

20 Q. And can these compounds destroy Aroclor
21 1242?

22 A. Nitric acid can. But that --- no. "Yes"
23 and "no." There really has to be a "yes"
24 and "no" in this, and it depends on the
25 conditions just like so many things in

1 life do. And I can elaborate on the
2 chemical reaction of nitric acid and/or
3 sulfuric acid with chlorinated biphenyls.

4 Q. Let's see if we can restrict it a bit.
5 Were Jensen or Widmark using nitric acid
6 or sulfuric acid in their preparation of
7 samples for testing?

8 MR. ZIMMER: Calls for speculation.

9 Q. Based on their papers?

10 A. I don't recall. I'd have to review the
11 papers again.

12 Q. Can nitric acid destroy Aroclors other
13 than 1242?

14 A. I would have to ask you what you meant by
15 "destroy."

16 Q. Break down some of the PCBs such that
17 they would no longer be recognizable by
18 your detection equipment as PCBs?

19 A. Yes.

20 Q. Could nitric acid break down the lower
21 chlorinated PCBs?

22 A. I'd have to ask you what you mean by
23 "break down."

24 Q. Break down the PCBs such that they are no
25 longer recognizable as PCBs in your

1 detection equipment.

2 A. Yes.

3 Q. And, with that definition, can nitric
4 acid break down the higher chlorinated
5 PCBs?

6 A. It's possible.

7 Q. Under what conditions?

8 A. Multiple conditions, usually high
9 concentrations of nitric acid, certain
10 periods of time --- the longer the better
11 --- higher temperatures --- the higher
12 the better. As I said, high
13 concentrations, the higher the better.
14 "Higher" in any of these cases means that
15 the reaction or the reagent, nitric acid
16 is more vigorous in its activity or
17 reaction with other organic molecules,
18 and so it depends on temperature, time,
19 and concentration.

20 Q. I refer you back to Exhibit 319 which we
21 earlier discussed, but which appears to
22 refer to Jensen and Widmark's methods or
23 some of their methods.

24 A. Correct. Is there something specific you
25 want me to look at, or would you like me

1 to read it?

2 Q. No. Does that refresh your recollection
3 as to whether Jensen and Widmark were
4 using nitric acid or sulfuric acid in the
5 preparation of samples?

6 A. If you give me a chance to read this I
7 will tell you. I don't see it on the
8 first page so I'm going to have to read
9 that if you would like me to accomplish
10 that objective.

11 Q. Sure.

12 A. Okay. Good.

13 (OFF RECORD)

14 A. Okay.

15 Q. Were they using sulfuric acid or nitric
16 acid?

17 A. It appears in the second page, under ---
18 MR. ZIMMER: Doctor, before you ---
19 the question was, does that refresh
20 your recollection as to whether they
21 were doing it. He doesn't want you
22 to just read the document to him.
23 So, since you were starting to do
24 that ---

25 A. Yes, it says they were. It does not say

1 how frequently or whether it's done to
2 every sample or when. And it seems to
3 imply that it's a confirmational
4 technique.

5 Q. What's a confirmational technique?

6 A. "Confirmational technique" means if
7 there's a question or a doubt, you might
8 institute a second test that would help
9 that if it passed that test, would give
10 you two tests that indicated something
11 that might --- whether it was a PCB. If
12 there was still some doubt, you might try
13 a third confirmational test.

14 Q. Okay.

15 A. And if you were really in doubt and you
16 had a mass spectrometer available to you
17 with a gas chromatograph hooked up to it,
18 you'd do it the right way and you'd use
19 the absolute identification technique ---
20 mass spectrometry.

21 Q. So the paper states --- the Exhibit
22 states that Jensen and Widmark were using
23 nitric acid and sulfuric acid as part of
24 a further test to detect the presence of
25 PCBs in their samples?

1 MR. ZIMMER: The document speaks
2 for itself. Do you want him to just
3 ---

4 MR. KASHANI: I haven't had a
5 chance to read the document. I mean
6 ---

7 A. Yes.

8 MR. ZIMMER: Well, you showed it to
9 him.

10 MR. KASHANI: I haven't had a
11 chance to read that particular
12 portion.

13 MR. ZIMMER: Well, I don't care
14 about that. Would that be ---

15 MR. KASHANI: The question's been
16 answered. We're going to move on.

17 A. Okay. That's what the document
18 indicates.

19 Q. Now, having read that, does that refresh
20 any recollection about the reference to
21 nitric acid and sulfuric acid in Exhibit
22 359 --- on page two, 359?

23 A. Yes.

24 Q. And what was your recollection now that
25 it has been refreshed?

1 A. The recollection is that we wanted to
2 assure ourselves that this type of
3 treatment --- not assure ourselves --- we
4 wanted to know whether this type of
5 treatment in any way, shape, or form
6 could affect what you saw in samples that
7 were treated this way.

8 Q. You mean you wanted to assure yourselves
9 --- and this is relating back to
10 approximately the time of the memo in
11 1969?

12 A. Could be.

13 Q. By "the memo," I mean Exhibit 359.

14 A. Yeah. May 13th, 1969 is the date on the
15 memo that I've been provided.

16 Q. What I mean --- do you mean by assure
17 yourself that you wanted to assure
18 yourselves that Jensen and Widmark were
19 not destroying part of this PCB that they
20 were trying to sample by use of the
21 nitric acid and sulfuric acid?

22 A. Correct.

23 Q. And is it the case that nitric acid and
24 sulfuric acid will more readily degrade
25 PCBs with fewer chlorines on them?

1 "Degrade" may not be the right word.
2 Would more readily destroy PCBs with
3 fewer chlorines on them? By "destroy" I
4 mean make them undetectable by the
5 equipment?

6 A. Not necessarily.

7 Q. Is there a pattern to what --- under the
8 same conditions, are some PCBs more
9 likely to be degraded than others by
10 nitric acid and sulfuric acid?

11 A. Yes.

12 Q. Which PCBs are those in general?

13 A. It depends upon the reaction that occurs.
14 If the polychlorinated biphenyl is
15 nitrated --- in other words, a nitrate
16 group is introduced into the structure or
17 if it's sulfated, in other words an SO_3
18 group was introduced into the structure
19 ---

20 Q. I don't mean to interrupt, but are those
21 the things that can occur if the PCB is
22 exposed to nitric acid or sulfuric acid?

23 A. That's one of the reactions that can
24 occur, or two of the reactions that can
25 occur if they are exposed to mixtures of

1 the two especially. Those things become
2 polar and so high boiling that you would
3 no longer see them via gas
4 chromatography, and in addition to that,
5 it makes them more water-soluble, so they
6 wouldn't be extracted by the solvents
7 that are used to extract them --- the
8 polychlorinated biphenyls. Alternately,
9 you can have oxidation of the ring
10 structure where it opens it up and you're
11 no longer dealing with a biphenyl, but
12 you might be dealing with a phenyl
13 aliphatic compound or something of that
14 sort. And again, that would not give you
15 a reading as a PCB. Alternately, another
16 reaction could occur in which the
17 chlorine on a molecule was replaced with
18 a nitronium or sulfuric ion. In that
19 case, that would be more --- there would
20 be a higher probability of that occurring
21 where there were more chlorines on a
22 molecule than less. As I recall, the
23 dominant reaction of chemistry here is
24 nitration and/or sulfonation of open
25 carbons, and that kind of routine. So

JUDY COMP & ASSOCIATES

1 this would appear, at least at some
2 conditions, to affect the lower
3 chlorinated materials first.

4 Q. Meaning that the lower chlorinated PCBs
5 --- the PCBs with fewer chlorines are
6 more subject to the reaction that will
7 render the molecule more difficult to
8 detect?

9 A. They could be, depending upon the
10 conditions used. As I mentioned earlier,
11 there's things called time --- exposure
12 time --- temperature, and concentration
13 or reagents.

14 Q. I understand. But those conditions
15 being equal, the PCB molecules with fewer
16 chlorines are more subject to these
17 reactions with the nitric acid and
18 sulfuric acid?

19 A. I don't know that. And that's not
20 necessarily true.

21 Q. Well, what was that --- you mentioned a
22 concern expressed here was that --- it
23 was a concern expressed here that Jensen
24 and Widmark were not detecting all of the
25 PCBs that were actually present in the

1 sample?

2 A. Correct.

3 Q. So that there actually might be more PCBs
4 in the sample than Jensen and Widmark are
5 finding?

6 A. Correct.

7 Q. And were the PCBs that were not being
8 detected falling into any particular
9 type? Were they more likely to be
10 Aroclor 1242?

11 A. I don't recall.

12 Q. Were they more likely to be PCBs with
13 fewer chlorines on them?

14 A. I really don't recall those details of
15 the chemistries, and I would have to
16 review the data or do some experiments to
17 prove that, or we'd have to talk to an
18 organic chemist.

19 Q. There's a reference on Exhibit 359 to
20 Aroclor 1242 that's on the second page.
21 This is it.

22 A. It just so happens that the TRANS number
23 is 359 here. Sorry.

24 Q. No problem. In Exhibit 359 there's a
25 reference to Aroclor 1242. The full

1 sentence reads, as I read before, "Scott
2 Tucker reported that Aroclor 1242 could
3 be destroyed by HNO₃/H₂SO₄ treatment."
4 Does that refresh your recollection as to
5 whether there was consideration that
6 maybe Jensen and Widmark weren't
7 detecting all of the lower chlorinated
8 PCBs in their samples?

9 A. No. It wasn't done for that purpose. If
10 they used it as a means of confirming
11 things, and we were trying to repeat and
12 validate what they were doing, then we
13 would do that. And we would use that
14 treatment on Aroclor 1242. And then we
15 would report our observations. And it's
16 apparent from this that the observation
17 was that some of the Aroclor had
18 disappeared and could no longer be seen
19 by electron capture. Now, what that
20 means from there in terms of what Jensen
21 and Widmark did or whether they played
22 golf on Saturday or something of that
23 sort, I haven't the faintest damn idea.
24 So it can't be extrapolated that way.

25 Q. By some of the Aroclor disappearing, you

1 mean they weren't measuring all of the
2 Aroclor that was, in fact, present in the
3 sample?

4 A. No. I mean that the pattern that we saw
5 after treatment under the conditions that
6 we used, which aren't delineated here,
7 was changed. And you could no longer see
8 exactly the same thing you saw when you
9 compared an untreated sample with a
10 treated sample via electron capture gas
11 chromatography.

12 Q. You mean treated by the nitric acid or
13 ---

14 A. Correct.

15 Q. --- sulfuric acid?

16 A. Correct.

17 Q. Do you recall what the difference was in
18 the ---

19 A. Not specifically. No, I don't. I will
20 tell you very frankly as a chemist,
21 though, that when someone runs a reaction
22 at zero degrees centigrade, as indicated
23 in the Jensen and Widmark article, that
24 they are very concerned about keeping
25 that reaction to a minimum, because

1 that's what lowering the temperature
2 does. If they were to run it at a higher
3 temperature, then they themselves are
4 probably anticipating that it would have
5 an effect that they didn't want; okay?

6 Q. When you mention ---

7 A. As a chemist I would draw that conclusion
8 from this information.

9 Q. By this information --- and you
10 referenced the zero degrees --- you were
11 referring to Exhibit 319, I believe,
12 which on its face appears to be ---

13 A. Yes.

14 Q. --- the description of Jensen and
15 Widmark's work?

16 A. Yes.

17 Q. In other words, by running the reaction
18 at zero degrees shows a more careful
19 laboratory technique?

20 MR. ZIMMER: Careful than what?

21 Q. Than running at, say, at room
22 temperature?

23 A. No. It inhibits the reaction.

24 Q. Does running the reaction at zero degrees
25 make it more likely to detect the

1 presence of PCBs --- I mean --- I'll take
2 that back. Does running the reaction at
3 zero degrees make it more precise?

4 A. No.

5 (OFF RECORD)

6 Q. Did you ever analyze any of the chemical
7 properties of MCS 1016?

8 (OFF RECORD)

9

10 A. No.

11 Q. Do you know if those properties were
12 similar to those of Aroclor 1242?

13 A. All polychlorinated biphenyls have
14 similar chemical properties, so my answer
15 to that question --- state that question
16 again, please.

17 Q. Do you know if the properties of MCS
18 1016 were similar to those of Aroclor
19 1242?

20 A. Yes.

21 Q. Did they have --- were they both liquids
22 at room temperature?

23 A. Yes.

24 Q. Did they have similar dielectric
25 properties?

- 1 A. Yes.
- 2 Q. Did they have similar vapor points?
- 3 A. Yes.
- 4 Q. By "similar," I mean within five degrees
- 5 centigrade?
- 6 A. I don't know that specifically. I'd have
- 7 to look it up.
- 8 Q. Did they have similar viscosity?
- 9 A. Yes.
- 10 Q. Did they have similar fire resistant
- 11 properties?
- 12 A. Yes.
- 13 Q. Were they similar in terms of stability
- 14 ---
- 15 A. Yes.
- 16 Q. --- chemical stability? Were they both
- 17 approximately equally resistant to
- 18 breakdown in the environment? I take
- 19 that back. The image I'm thinking of is
- 20 --- you mentioned before that the drum of
- 21 Aroclor 1242 will last for 150 years in
- 22 the drum. Is the same true of MCS 1016?
- 23 A. Both of those materials are chemically
- 24 stabile.
- 25 Q. I'm going to show you a document marked

1 as Exhibit ---

2 MR. KASHANI: --- what's next?

3 (Thereupon the Court Reporter
4 marked the pertinent document as
5 PLAINTIFF'S EXHIBIT NUMBER 360-A)

6 Q. Exhibit 360. By the way, did you ever
7 meet Bill Papageorge?

8 A. Yes.

9 Q. William Papageorge? Do you remember
10 having any discussions with him on the
11 biodegradability of Aroclors?

12 A. Not specifically.

13 Q. Do you remember generally any such
14 discussions?

15 A. Yes.

16 Q. Do you remember when those occurred?

17 A. No, sir.

18 Q. Would you have a continuous discussion
19 with him, frequent discussions, or ---

20 A. Whenever he requested discussions we
21 would have them. And they would have
22 occurred during my employment with
23 Monsanto.

24 Q. Were they on the order of once a month,
25 once a week? The reason I asked that, if

1 you talked to him every day, I'm
2 obviously not going to ask you what you
3 said in every conversation. But if you
4 talked to him once a year, then we might
5 be able to pinpoint that time.

6 A. It was more frequently than once a year
7 and not as frequently as daily, and
8 there's no question about that. It was
9 intermediate frequency in terms of how
10 often Bill and I got together. Did you
11 want me to read this first before I do
12 anything or not?

13 Q. The only thing I'm going to refer to in
14 this Exhibit going back to Exhibit 360,
15 is on page for --- that's numbered page
16 TRAN 036314, under the heading "MCS 1016.
17 Going to the last sentence it reads,
18 "Since all the electrical properties of
19 MCS are indistinguishable from those of
20 Aroclor 1242 and there are only minor
21 differences in other properties, comma,
22 this fluid should be a direct substitute
23 for Aroclor 1242 in the capacitor
24 industry with no capacitor design change
25 or processing changes needed." Let me

1 refer to just the first part of that
2 sentence which is, "Since all the
3 electrical properties of MCS are
4 indistinguishable from those of Aroclor
5 1242 and there are only minor differences
6 in other properties ---". If we assume
7 that MCS here is referring to MCS 1016,
8 is that a correct statement, to your
9 knowledge?

10 A. If we assume that MCS is referring to MCS
11 1016, yes.

12 Q. Thank you. What does the term
13 "chlorinated polyphenyl" mean? Polyphenyl
14 --- p-o-l-y-p-h-e-n-y-l.

15 A. What it would mean to me is --- is it's
16 obviously not correct IUPAC terminology
17 and things of that sort. I mean, it's a
18 heavy duty subverted chemical term, I
19 would say, you know. Slang. It's
20 chemical slang ---

21 Q. Chemical slang, okay.

22 A. --- would be the best way I could
23 describe that. And ---

24 Q. You mean it's not a proper reference for
25 anything?

1 A. It's not a precise way to communicate any
2 information from a chemical viewpoint.

3 Q. Okay.

4 A. It's slang. And so you've got to be
5 probably part of the hood wherever that
6 came from to understand what it meant.
7 What it would mean to me, if you asked
8 me, and you are asking me, is it would
9 mean to me benzene or phentyl --- phenyl
10 groups that were connected that had
11 chlorines on --- associated with them.
12 Poly ---

13 Q. Polyphenyl --- p-h ---

14 A. Polyphenyl. "Polyphenyl" would mean more
15 than one --- p-h-e-n-y-l --- group, okay.
16 And for them to be in an assemblage or a
17 molecule, they would have to be bonded
18 --- chemically bonded together, so it
19 could be a biphenyl, it could be a
20 terphenyl, could be a quatriphenyl, could
21 be a pentaphenyl, a hexaphenyl, hepta and
22 so on, and --- chlorinated it says?

23 Q. Chlorinated.

24 A. "Chlorinated" means that they've had
25 chlorine reacted with them so that they

1 have chlorine bonded to it

2 Q. So, it could mean a lot of different
3 substances?

4 A. You bet.

5 Q. There's really no way to tell?

6 A. Ad infinitum.

7 Q. So, without more information, there's no
8 way to tell what it's referring to?

9 A. Correct. Specifically.

10 MR. ZIMMER: Perhaps the Exhibit
11 that you have in mind.

12 MR. KASHANI: I don't have any
13 Exhibit.

14 A. Well, it's like chlorinated hydrocarbons.
15 There are entities which will be
16 considered chlorinated hydrocarbons that
17 haven't even been thought of or ever
18 produced.

19 Q. So, is "chlorinated hydrocarbon" the same
20 sort of terminology in that it could mean
21 a lot of different things, and it's
22 impossible to tell what it means?

23 A. Without further specification, yes.

24 Q. So does the same go for chlorinated
25 aromatic hydrocarbon?

1 A. Chlorinated aromatic --- yes.

2 Q. So "chlorinated aromatic hydrocarbon" is
3 another term which can mean a lot of
4 different things, and there's no way to
5 tell what it means without more
6 information?

7 A. Well, no, you can ---

8 MR. ZIMMER: It calls for
9 speculation as to the "no way to
10 tell" part.

11 MR. KASHANI: Well, can you tell
12 without more information what
13 substance I'm referring to when I
14 use the term "chlorinated aromatic
15 hydrocarbon"?

16 MR. ZIMMER: In which context, just
17 mentioning it out loud?

18 MR. KASHANI: I'm saying it right
19 now, yes.

20 MR. ZIMMER: Okay, as opposed to in
21 a letter, for example, or on a
22 label?

23 MR. KASHANI: You're creating a
24 context here. I'm just asking for a
25 definition.

1 MR. ZIMMER: I am just asking if
2 there is a context. As long as you
3 tell me, it's just when you say the
4 term out loud, that's what I want to
5 know.

6 A. Okay. "Chlorinated aromatic
7 hydrocarbons" means something to me.

8 Q. What do they mean?

9 A. It's like "aliphatic hydrocarbons" would
10 have a meaning to me, or "aromatic
11 hydrocarbons" would have a meaning to me.
12 And what it means is is a class of
13 compounds, chlorinated aromatic
14 hydrocarbons. "Chlorinated" would mean
15 that there would be chlorine, and that
16 the chlorine had been reacted with it
17 because it was chlorinated, okay. So I
18 would know that there was chlorine
19 associated with what I'm talking about
20 here, and that it's a reacted --- it's a
21 bonded chlorine, not chlorine gas that's
22 sitting inside this bottle or something
23 like that. "Aromatic" refers to the fact
24 that it's an unsaturated carbon ring
25 structure. And it could be as few as

1 three carbons because that's all that's
2 required to make a ring is three carbons.
3 That's the minimum. And it could be as
4 many as --- well, I've seen publications
5 where there were literally hundreds of
6 carbons on that form a ring structure ---
7 decihedral whatever, okay. So the
8 aromatic portion of it, that's what that
9 would refer to me. What's the other
10 part?

11 Q. Hydrocarbon.

12 A. "Hydrocarbon" would mean hydrogen and
13 carbon okay. So that would tell me that
14 we're dealing with a class of compounds
15 that have those properties that I just
16 talked about. They also have other
17 things associated with them, but I need
18 to know in what context you are using
19 that terminology to discern that.

20 Q. Could chlorinated aromatic hydrocarbon
21 refer to DDT?

22 A. Yes.

23 Q. Could it refer to DDE?

24 A. Yes.

25 Q. You mentioned that it could refer to

1 compounds with three carbons in a ring?

2 A. Correct.

3 Q. How many carbons are in a ring in PCBs?

4 A. Twelve. Well, there's ---

5 Q. There's ---

6 A. --- six in two rings, but there's twelve

7 in the biphenyl structure. But there's

8 two rings, so there's six in each ring.

9 Q. What about the term "chlorobiphenyl"

10 A. P-h-e-n-y-l?

11 Q. Yes, y-l.

12 A. Okay. "Chlorobiphenyl" means chlorinated

13 biphenyls to me, or, you know ---

14 Q. So that refers to ---

15 A. Chlo --- chlorobiphenyl?

16 Q. Chlorobiphenyl. One word.

17 A. No "S"?

18 Q. No "S" and one word.

19 A. Well, "chlorobiphenyl" would mean to me

20 just monochlorobiphenyl.

21 Q. Meaning a PCB with one chlorine atom?

22 A. Correct. If you said "chlorobiphenyls",

23 multiple, then you might have some ---

24 then that could be and has been at some

25 point in time used by certain people ---

1 some people to talk about the whole ball
2 of wax.

3 Q. Is "chlorobiphenyl" a common term used to
4 refer to PCBs?

5 A. I don't use it commonly, and I've talked
6 a lot about PCBs over the years, so I
7 wouldn't say it's common.

8 Q. You mentioned earlier IUPAC?

9 A. Uh-huh (affirmative).

10 Q. Is that I-U-P-A-C?

11 A. It could be. I always forget. It's the
12 International Congress of such and such
13 and all that kind of stuff. It's an
14 organization that's in charge of
15 nomenclature for chemistry and makes
16 recommendations in terms of what's the
17 appropriate nomenclature.

18 Q. Does IUPAC make recommendations as to
19 what is the appropriate name to use to
20 refer to compounds?

21 A. Yes.

22 Q. And when you say that "chlorinated
23 polyphenyl" is not an IUPAC term do you
24 mean that is not a term that IUPAC has
25 recommended to use?

1 A. It's not the official terminology that's
2 recommended. It's just like if your name
3 is David and I call you "Davey," "Davey
4 is not official, "David" is, but you can
5 still be called "Davey." Do you see what
6 I'm saying?

7 Q. But --- okay. "Polychlorinated" ---

8 A. Whatever that last term you said ---

9 Q. Poly ---

10 A. --- is like a nickname.

11 Q. But it's not a precise name.

12 A. That's correct.

13 MR. KASHANI: Let's take a break.

14 (OFF RECORD)

15 (While off record the Court
16 Reporter marked the pertinent
17 document as PLAINTIFF'S EXHIBIT
18 NUMBER 361-A)

19 Q. Let me show you another Exhibit. It's
20 Exhibit 261.

21 A. (Witness peruses document). Okay.

22 Q. Dr. Tucker, do you recognize the format
23 of Exhibit 361?

24 A. No, sir.

25 Q. Is that a carbon copy of the format used

1 in Exhibit 360?

2 MR. ZIMMER: Calls for speculation.

3 A. It's certainly not a carbon copy ---

4 Q. Well, it's not ---

5 A. --- of the format used in 360 or the page
6 there. I don't know. I don't recognize
7 this format because it's obviously
8 incomplete or if it's not incomplete,
9 then the people who do use it are
10 well-schooled in what it means.

11 Q. I see. This is a form we received from
12 Monsanto.

13 A. Okay.

14 Q. I'm not trying to hide anything from you.

15 MR. ZIMMER: No, I --- it just
16 looks like the whole --- well ---

17 Q. This is a document we received from them.

18 MR. ZIMMER: Fine. Answer.

19 Q. Do you recognize the document?

20 A. Not specifically, no.

21 Q. Do you remember in general the topics
22 that are discussed in the memo?

23 A. Yes.

24 Q. And I should clarify, we're referring to
25 Exhibit 361, not 360.

1 A. Okay.

2 Q. Looking at the first paragraph, it says,
3 "I would like to set a target date of
4 Monday, February 8, to have a written
5 document which could help answer G.E.'s
6 questions on MCS 1016, it's degradation
7 rate; and why MCS 1016 is a better fluid
8 in the environment than Aroclor 1242 and
9 Aroclor 1254." Do you recall that
10 request?

11 A. Not specifically.

12 Q. Do you recall generally preparing a
13 document for the use of General Electric
14 or any other customer on MCS 1016?

15 A. Not specifically for General Electric or
16 for the use of any other customer. I've
17 prepared documents like that, though.

18 Q. Documents explaining --- and I'm going to
19 quote from the memo, "why MCS 1016 is a
20 better fluid in the environment than
21 Aroclor 1242"?

22 A. Yes.

23 Q. Do you recall providing such a document
24 to General Electric?

25 A. No.

1 Q. Do you recall if any such documents that
2 you prepared on MCS 1016 were provided to
3 General Electric?
4 A. No.
5 Q. Do you recall if they were provided to
6 any other customers?
7 A. No.
8 Q. Do you recall if General Electric ever
9 purchased any MCS 1016?
10 A. No.
11 Q. Do you recall if Monsanto offered to sell
12 MCS 1016 to General Electric or any other
13 customer?
14 A. No.
15 Q. Do you recall if Monsanto ever started
16 producing MCS 1016 in commercial
17 quantities?
18 A. Nope.
19 Q. Let me refer you back to Exhibit 366.
20 It's a document we discussed earlier that
21 refers to, among other things, MCS 1016.
22 Is this one of the documents that appears
23 to be --- is this the same category of
24 documents that is being discussed in
25 Exhibit 361?

1 MR. ZIMMER: Calls for speculation.

2 A. I don't understand the question.

3 Q. You said you had a general recollection
4 of preparing documents concerning MCS
5 1016 and specifically, as I quoted, why
6 MCS 1016 is a better fluid in the
7 environment than Aroclor 1242. Is
8 Exhibit 330 --- is that 336?

9 A. Uh-huh (affirmative). Yes.

10 Q. Is Exhibit 336 one of that category of
11 documents?

12 A. Yes. I understand the question.
13 Excellent.

14 MR. ZIMMER: That was a different
15 one than the first one.

16 A. It doesn't make any difference. I
17 actually understood that, and I'm not
18 being facetious. It was comfortable.

19 Q. So, the answer to my question is "yes"?

20 A. Yes.

21 Q. Do you remember if you prepared Exhibit
22 336 in response to Exhibit 361?

23 A. No.

24 Q. Do you remember if Exhibit 336 or any
25 information in it was ever provided to

- 1 any of Monsanto's customers?
- 2 A. No.
- 3 Q. Okay. Dr. Tucker, how long were you
- 4 employed by Monsanto?
- 5 A. I believe my tenure at Monsanto was
- 6 either 1967 or 1968 through 1978, so, ten
- 7 or eleven years.
- 8 Q. And you earlier mentioned that at some
- 9 point, about three years after you
- 10 started work you became a group leader?
- 11 Was that the term you used?
- 12 A. Yes.
- 13 Q. And how long were you a group leader?
- 14 A. I don't recall exactly without reviewing
- 15 my records. I have records that I can
- 16 review. Not with me, but I have records.
- 17 I don't recall.
- 18 Q. Do you recall your next position after
- 19 being a group leader?
- 20 A. I think it was Senior Research Specialist
- 21 or something like that.
- 22 Q. Do you recall approximately when you
- 23 achieved that position?
- 24 A. No, sir.
- 25 Q. And did you have a position beyond that

1 one?

2 A. Not that I recall at this point, no.

3 Q. And when did you leave Monsanto?

4 A. I think I left Monsanto in --- it must
5 have been 1978 or 1977.

6 Q. Since you have left Monsanto, have you
7 ever done any consulting work? We
8 discussed yesterday in the context of
9 lawsuits, but have you done any
10 consulting work involving PCBs or
11 contamination with PCBs since you left
12 Monsanto?

13 A. No.

14 Q. Have you discussed this deposition or
15 this case with anyone other than your
16 counsel prior to this deposition?

17 A. No.

18 Q. Are you being compensated in any way for
19 your time spent either preparing or
20 giving this deposition?

21 A. No.

22 Q. Okay.

23 MR. KASHANI: Thank you very much.
24 Thank you for your time, Doctor.

25 (OFF RECORD)

1 MR. KASHANI: The parties have
2 stipulated that the Court Reporter
3 will prepare a copy of the
4 transcript, the original transcript,
5 and will send the original to Dr.
6 Tucker or his counsel, depending on
7 what they specify. After you mail
8 the transcript, Dr. Tucker will have
9 thirty days to review it and make
10 any corrections and get those
11 corrections back to the Court
12 Reporter. And also Dr. Tucker will
13 have thirty days to sign the
14 deposition transcript. But if Dr.
15 Tucker does not make any corrections
16 or does not sign the transcript,
17 then the uncorrected and/or unsigned
18 transcript can be used for all
19 purposes the same as a signed and/or
20 corrected transcript. So
21 stipulated, Counsel?

22 MR. ZIMMER: Well said.

23 MR. KASHANI: Thank you.

24 (DEPOSITION CONCLUDED)

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SIGNATURE PAGE (SIGNATURE NOT WAIVED)

DEPOSITION OF E. SCOTT TUCKER, Ph.D

E. Scott Tucker, Ph.D

Sworn to and subscribed to before me this _____
day of _____, 1992.

Notary Public for South Carolina

My Commission Expires:

(SEAL)

1 STATE OF SOUTH CAROLINA)

2) CERTIFICATE

3 COUNTY OF GREENVILLE)

4 I, BETH BYCE, a Notary Public, duly
 5 commissioned and qualified in and for the
 6 State of South Carolina, do hereby certify,
 7 that the deposition of E. Scott Tucker, Ph.D,
 8 called by the Plaintiff, was taken before me
 9 at 2:00 p.m. on June 23rd, 1992, and at 9:10
 10 a.m. on June 24th, 1992; that said Witness was
 11 duly sworn; that his deposition testimony was
 12 transcribed under my direction, and that this
 13 deposition is a true record of said testimony;
 14 I further certify that I am not of kin or
 15 counsel to the parties in this case, am not in
 16 the regular employ of counsel for any of said
 17 parties, nor am I interested in the results of
 18 this case.

19 IN WITNESS WHEREOF, I have hereunto set my
 20 hand and affixed my official seal this ----
 21 day of -----, 1992.

22 -----

23 Notary Public for South Carolina

24 My commission Expires: 10-28-01

25

JUDY COMP & ASSOCIATES