IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA
EASTERN DIVISION

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WALTER OWENS, et al.,	:	
	:	Case No.
	:	CV-96-P-0440-E
Plaintiffs,	:	
v.	:	
MONSANTO COMPANY,	:	
Defendant.	:	

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Videotaped Deposition of
E. SCOTT TUCKER, III, PH.D.
VOLUME I
(Taken by Plaintiffs)
Charlotte, North Carolina
Tuesday, August 1, 2000

Reported by: Sydney C. Silva
Registered Professional Reporter
Notary Public

APPEARANCES:

For the Plaintiffs:

JAMES L. "LARRY" WRIGHT, ESQUIRE
Mithoff & Jacks, Attorneys at Law
111 Congress, Suite 1010
Austin, Texas 78701
Telephone: (512) 478-4422
Fax: (523) 478-5015

and

ROBERT E. SHIELDS, ESQUIRE
Doffermyre Shields Canfield
Knowles & Devine
1355 Peachtree Street, Suite 1600
Atlanta, Georgia 30309
Telephone: (404) 881-8900
Fax: (404) 881-3007

For the Defendant:

D. MARSH PRAUSE, ESQUIRE
Smith, Helms, Mulliss & Moore, LLP
300 North Greene Street, Suite 1400
Greensboro, North Carolina 27420
Telephone: (910) 378-5380
Fax: (910) 379-9558

Deposition of E. SCOTT TUCKER, III, PH.D., taken by the Plaintiffs at Smith Helms Mullis & Moore, LLP, 30th Floor, Interstate/Johnson Lane Building, 201 North Tryon, Charlotte, North Carolina, on the 1st day of August, 2000, 10:29 a.m., before Sydney C. Silva, Registered Professional Reporter and Notary Public.

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(Exhibits 1-3, 5 and 6 attached.)

P R O C E E D I N G S

(Deposition Exhibit No. 1 marked for identification.)

THE VIDEOGRAPHER: Today's date is August 1st, 2000. This is the tape number 1 of the video deposition of Dr. E. Scott Tucker, III, in the matter of Walter Owens et al versus Monsanto Company in the United States District Court for the Northern District of Alabama, Eastern Division, Case No. CV-96-P-0440-E.

This deposition is being held at the offices of Smith Helms Mulliss and Moore, 201 North Tryon Street, Charlotte, North Carolina. We're on the record at 10:29.

Will counsel introduce themselves, please.

MR. WRIGHT: Larry Wright for the Plaintiffs.

MR. SHIELDS: Robert Shields for the Plaintiffs.

MR. PRAUSE: Marsh Prause on behalf of the Monsanto Company.

THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

(Witness sworn.)

MR. WRIGHT: Before the deposition starts, let's set out the ground rules that we talked about before the deposition.

And, Mr. Prause, my understanding of our agreement and understanding for this deposition is is that all objections are reserved except for form of the question and responsiveness of the answer. And you indicated that you would like for the doctor to have the opportunity to review and sign the deposition and that's fine. I think we have plenty of time.

What's the normal routine in North Carolina, 30 days?

THE REPORTER: Two weeks to deliver the order to the attorney, and then the attorney will transmit to their client, and then their client has 30 days.

MR. WRIGHT: Okay. That sounds fine to me.

MR. PRAUSE: And what she just represented is an accurate depiction or representation of our understanding.

MR. WRIGHT: Okay.

MR. WRIGHT: Now I have marked as Exhibit 1 notice for the deposition. I don't really think we need to talk about that any more other than to note for the record that you have produced a stack of documents that were reviewed by the doctor prior to the deposition in response to some agreements by counsel and the notice of the deposition.

MR. PRAUSE: That's accurate, yes.

MR. WRIGHT: The second exhibit is going to be what has been provided to us in this case as Dr. Tucker's report.

(Deposition Exhibit No. 2 marked for identification.)

MR. WRIGHT: I would like for Dr. Tucker to look at that, please, and make sure, first of all, that that is his report.

Whereupon, E. SCOTT TUCKER, III, PH.D., having been duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. WRIGHT:

Q. I believe attached to the report is a CV. And I would like to talk about them separately if we can. I would like for you to look at the report first and then I'm going to ask you some questions about the VC.

A. (Witness peruses document.) I have completed looking at it.

Q. I'm sorry?

A. I say I have completed looking at it as requested.

Q. Okay. Is that your most current expert report in this case?

A. Yes.

Q. Is that the only expert report that you have prepared for this case?

A. Yes.

Q. Okay. Now you have given testimony, I know, in two other case that is are related to the Anniston situation. And I believe the official names of those are the Dyer case, does that sound familiar.

A. Yes.

Q. And the, do you remember the name of the other case?

A. Not off the top of my head, I'm sorry.

MR. PRAUSE: I would be glad to give it to you if you would like.

MR. WRIGHT: I think I have got it right

here, let me just make sure. Because I want to know that I have got all his depositions. Do you have it off the top of your head?

MR. PRAUSE: Yeah, it's the Abernathy case.

MR. WRIGHT: Okay.

BY MR. WRIGHT:

Q. So the Abernathy case, the Dyer case. Were you deposed in the Mars Hill case?

A. I don't believe I was.

MR. PRAUSE: I think that's correct, I think he was not. And I can confirm that for you if it becomes important.

MR. WRIGHT: I would like that to be confirmed.

MR. PRAUSE: Sure.

MR. WRIGHT: Because I want to make sure that I have all of the depositions that Dr. Tucker has given, period, relating to PCBs; but specifically I want to start that list with all of the depositions that he has given relating to the Anniston situation.

MR. PRAUSE: All right. I can have that confirmed for you that he was not deposed in Mars Hill later today.

MR. WRIGHT: Okay.

BY MR. WRIGHT:

Q. But so to the best of your recollection you have given two previous depositions in the Anniston cases, and those are the two we just mentioned?

A. Yes, sir.

Q. Now I received late yesterday two other depositions that you have given in PCB-related cases. And one of those is the United States versus Outboard Marine and Monsanto, and it says it was taken in April of '82. Do you recall that deposition?

A. Yes, I do.

Q. Taken in Connecticut, it looks like?

A. I believe it was taken in Stamford, Connecticut, if I recall it correctly.

Q. Then another deposition that I got late yesterday afternoon is the Transwestern Pipeline Company vs. Monsanto case. And this says that that deposition was taken in Greenville, South Carolina, in June of '92.

Do you recall that deposition?

A. Yes, I do.

Q. Okay. Have you given any other

PCB-related depositions other than the ones we have talked about?

A. Yes.

Q. Okay. Tell me which ones.

A. I was afraid you would ask that question. You're going to challenge my memory here. But there are documents available certainly much more accurate than my memory tends to be sometimes.

MR. WRIGHT: Well, the problem is they are not available to me.

MR. PRAUSE: Well, actually, we supplied you with also the deposition transcript for his deposition in Nevada Power. And it's a thin one, so I think maybe it might be in that box and you may have missed it.

MR. WRIGHT: Okay.

MR. PRAUSE: If it is not in there, I apologize. But I personally had that box prepared to be brought over to your hotel yesterday afternoon.

MR. WRIGHT: So you think it's in there.

MR. PRAUSE: I do.

MR. WRIGHT: Okay.

BY MR. WRIGHT:

Q. Besides Nevada Power, any others?
A. I believe there's a deposition for the Pennsylvania Attorney General's office in a DOT-related case in a building in Harrisburg. Let me think, there's one more -- but not, no, that's not PCBs. The Harrisburg one is PCBs.
Q. When would that have been taken?
A. It had to be within the last four years would be my guess.
Q. Where was it taken?
A. The deposition -- well, it wasn't a deposition, it was an expert report.
You're asking specifically about depositions? That's what I'm saying, my memory is?
Q. Right now I'm asking about depositions, which is the procedure we're going through here.
A. That's fine. I'm sorry I got confused, I apologize for that.
Q. Okay. So you think that's all the depositions now?
A. It sounds as if that's a fairly complete list, yes.
Q. Okay. Now you mentioned the Harrisburg case, which is a PCB case, that you gave a report

in?

A. I provided an expert report on a PCB situation there, yes.

Q. Okay. Was that report any longer than the page-and-a-half report we have in this case?

A. The report itself, no. Some of the referenced documents made it longer but the report itself was about the same scope as this.

Q. And was that for Monsanto?

A. No.

Q. Okay, who?

A. That was for the Pennsylvania Attorney General's office.

Q. Okay. So you were retained by the Pennsylvania Attorney General's office?

A. Correct, relative to PCB contamination of a building.

Q. Is Monsanto a Defendant in that case?

A. Yes.

Q. Do you have a copy of that report?

A. Do I have a copy of it with me?

Q. No, no, no, not with you --

A. Okay.

Q. -- but I mean in your office or your home or somewhere?

A. Yes, copies are available.

Q. Okay. To your knowledge, does Monsanto have a copy of that report?

A. Not to my knowledge.

Q. Okay. The report was provided to the Pennsylvania Attorney General's office pursuant to litigation against Monsanto?

A. Ultimately, yes.

Q. Okay. Was the report given before the litigation began?

A. The report was actually given early on when they asked me some questions and asked me to provide expert opinions on PCBs that were being found in the building, things of that sort. I provided that report. I didn't provide that report specifically for any litigation or anything of that sort; I provided it as informational to the Attorney General's office.

Q. I got you. And then later on litigation occurred?

A. Yes.

Q. And you don't know whether that report was provided to Monsanto or not in the litigation?

A. I do not have knowledge of that fact.

Q. And you were not deposed in that case?

A. That's correct.
Q. Generally, what did the report say?
A. It dealt with the analytical chemistry of PCBs and the identification of certain ones which I have expertise in.
Q. I assume you confirmed the presence of PCBs in samples that you reviewed?
A. I reviewed the data that I was provided and I provided them a statement relative to the efficacy of the information and to whether or not it was gathered in an appropriate manner and possibly some scientific conclusions that could be determined from some of the things that were seen.
It's typical expert opinions in an area that you are an expert in.
Q. I understand. What other cases have you given expert opinions in PCB-related matters? Now actually that's a bad question because it's overly broad.
Have you testified either at trial or in deposition in other PCB-related cases other than the Monsanto cases that we have talked about?
A. I don't believe I have.
Q. Have you given expert reports in litigation relating to PCBs in cases other than

the ones that we have already talked about?

A. I do not believe that expert reports that were provided had to do with PCBs. I think you've covered them all.

Q. Okay. You have consulted in other litigation, in other kinds of litigation?

A. Yes, I have.

Q. As an expert witness?

A. Yes, I have.

Q. You have given depositions in other kinds of litigation as an expert witness?

A. Yes, I have.

Q. Have you ever testified in trial in other kinds of litigation as an expert witness?

A. Yes, I have.

Q. How many times in trial?

A. I believe I have gone -- I have been in trial twice. And by that, where I actually appeared on the stand myself, not where a deposition was given.

Q. About how many depositions have you given?

A. Since?

Q. Ever.

A. Okay. I would guess on the order of

eight or nine, something like that, total.

Q. Just briefly, the other cases that do not relate to PCBs, what did they, what did your, the substance of your testimony relate to?

A. Again, it was related to reviewing analytical data that was generated by labs, analyzing the environmental samples, ensuring the client that the laboratory in question generated the information properly and that it met all the Environmental Protection Agency guidelines, and that the information that was produced was defensible and reflective of what it was intended to be.

Q. All right. Have you reviewed -- this is taking this a little bit out of order -- but have you reviewed Monsanto's testing information relating to Anniston that has been done in the last three or four years?

A. Okay. Have I done that in the last three or four years? Or has the information been accumulated in the last three or four years?

Q. Let me explain.

A. I'm not trying to be difficult. I just don't understand the question.

Q. Let me explain because I want to make sure I understand what you have done so far. And I can probably do it in a better chronological manner but this is the way I'm going to do it.

You know, of course, from your involvement in this and the other Anniston cases that there has been a lot of testing and sampling and analytical reporting done relating to PCBs in the Anniston area in the last three or four years, correct?

A. I don't have direct knowledge of all of the information that has been generated but it would not surprise me that a lot of sampling and analysis had been done in the area.

Q. Yeah. Well, that's what I'm trying to get at?

A. That's correct. So I'm sure, the answer to the question --

Q. Are you aware --

A. -- so I'm sure there is a lot.

Q. So you are aware that it has been done? That's the first question.

A. Am I aware of all of the sampling and analysis that has been done in the Anniston area relative to PCBs, is that your question?

Q. No.

A. Okay. I'm sorry.
Q. That's all right.
A. I want to answer your question but I want to answer it properly.
Q. No we'll take our time. That's all right.
The question is, are you aware that a significant amount of sampling and analysis of that sampling has been done in the last few years relating to PCBs in the Anniston area around and downstream from the Monsanto Anniston plant?
A. Yes.
Q. Have you reviewed any of that testing and sampling data for Monsanto?
A. I have reviewed some information that was generated by a laboratory, but I don't think it was specific to this particular deposition or the case.
Q. Well, it was related to the Anniston situation, correct?
A. I'm trying to remember. I'm sure it was.
When I review information, I'm not so much concerned about where it comes from or where the samples come from and things of that sort.

I'm more concerned about the process by which the materials, once they are received by the laboratory, is handled: Chain of custodies. Whether or not they use appropriate techniques. When they look at the information whether or not they are interpreting it properly and things of that sort. So my focus is not on who, what and where as far as the sampling is concerned; my focus is on the data package itself.

So my recollection is that it probably had to do with the Anniston area and that kind of thing but I don't specifically remember where, what or when.

Q. Okay. Do you remember who the lab -- what the laboratory was?

A. I believe the name of the laboratory was Bonner.

Q. All right. So you reviewed Dr. Bonner's results, you believe?

A. Yes, I reviewed some of Dr. Bonner's results.

Q. Right.

A. I'm sure I didn't review every PCB analysis he has done.

Q. Did you have criticisms of Dr. Bonner's analysis?

A. I wouldn't call them criticisms, I'd call them opinions.

Q. Well, what opinions did you have relating to Dr. Bonner's analysis that you recall?

A. The opinions were that there, the way that the people did the analysis was overall acceptable but there were excursions and there were some indications of lack of experience in terms of interpretation of the data and things of that sort.

Q. Was that reduced to a written report?

A. It, I think it was, yes.

Q. Other than Dr. Bonner's materials, have you been asked by Monsanto to review any other sampling or testing data from Anniston in the past few years?

A. I think the Bonner data is primarily what I have been asked to review.

Q. You have not reviewed any of the data generated by the EPA?

A. I review a lot of data generated by the EPA.

Q. Relating to Anniston?

A. No, I'm not trying to -- I, I can only answer the question the way you ask it. And I do review a lot of information generated by the EPA in my regular job.

Q. Yeah.

Hang on?

A. In terms of Anniston, no, I don't think so.

Q. Okay. For right now all of my questions relate to Monsanto and PCBs downstream from the Monsanto Anniston facility.

A. Okay?

Q. Okay?

A. So specifically we will be discussing things that have to do with one, with Monsanto; two, with Anniston, and, three, downstream and PCBs.

Q. Well, I say "downstream," in the vicinity of the Monsanto Anniston plant.

MR. PRAUSE: Well, you're not limiting it to the aquatic media?

MR. WRIGHT: No.

MR. PRAUSE: Okay.

BY MR. WRIGHT:

Q. And no, that isn't for the rest of our time. That's just for this series of questions.

I just want to know what you have done on behalf of Monsanto or in relation to Monsanto in the Anniston situation in the last few years.

A. Okay, I'll --

Q. We'll go back in history in a little while.

A. Okay. I believe so far that that information has been given to you in an accurate manner.

Q. Which is --

A. I said that --

Q. No, let me just --

THE REPORTER: One at a time, please, gentlemen.

Q. Let me just make sure that we're clear. You mentioned that you have reviewed Dr. Bonner's, some, maybe all of Dr. Bonner's material, and given some opinions relating to that, correct?

A. Correct.

Q. My next question is, have you reviewed any other testing or sampling results relating to Monsanto and Anniston and PCBs? And that would include some of the testing that I know has occurred. There has been testing and sampling by the EPA; there has been testing and sampling I believe by ADEM, Alabama Department of Environmental Management; there has been testing and sampling by Monsanto's own consultants, including among them Garrity and Miller, I believe, Goldman and Associates --

MR. PRAUSE: Objection to the form. Sorry.

Q. -- and certain outfits like that.

Have you reviewed any other material relating to Monsanto and Anniston and PCBs?

MR. PRAUSE: Object to the form of the question.

A. Yes.

Q. In the last few years?

MR. PRAUSE: Object to the form of the question.

MR. WRIGHT: Okay. This time I'm going to ask for an explanation. Did I leave somebody out or put somebody in that shouldn't be in?

A. I'm glad you asked the last few years. The answer to that question is no.

MR. PRAUSE: I think you, well, you mentioned Goldman and Associates; I think it's Golder.

MR. WRIGHT: Golder.

THE WITNESS: Right.

MR. PRAUSE: And, and I, it was a very long question, I wasn't sure if it was a compound question or what.

MR. WRIGHT: All right.

BY MR. WRIGHT:

Q. With the correction and recognizing that it was a long question, the short answer is no, you haven't looked at any of that stuff?

A. That is correct. The short answer is no. I said no.

Q. All right. Do you anticipate looking at any of that material?

A. You mean have I been asked?

Q. Yes.

A. To look at any of that material?

Q. Yes.

A. At this point in time?

Q. Yes.

A. No.

Q. Have you discussed with Monsanto reviewing any of the other testing and analysis other than Dr. Bonner's?

A. No.

Q. So that hadn't come up in any of your discussions with Monsanto?

A. I believe I said no to your question.

Q. Now is it fair to say then that the only documents that you reviewed in preparation for your deposition testimony today are the documents that were provided to us this morning?

A. Yes, that's fair to say.

Q. When did you review those documents?

A. I reviewed the documents yesterday in this room, as a matter of fact, with Mr. Prause.

Q. When did you all start and end your review?

A. I think must have been started around 9:00, I would imagine. Was it later than that? What time did I get here?

I guess the actual real review started after lunch when we came back and we started going through the stack of documents that have been provided you.

Q. All right. So you met without looking at the documents before lunch; and then after lunch, you went through the documents themselves?

A. Yes, sir.

Q. What time did you finish up?

A. That I remember, it was 7:00.
Q. In the evening?
A. Yes.
Q. Now obviously this is not the first time that you have met with Mr. Prause, correct?
A. Yes.
Q. How many other times have you met with Mr. Prause?
A. I think, I think it has been twice, possibly three times, before.
Q. Okay. I know you met with him at one of the depositions?
A. Correct.
Q. I know you met with him before that deposition, correct?
A. Right. As I said, I believe that it is three. That's my recollection at this point.
Q. Okay. Well, what I'm trying to pin down is when and where they were. So one of them was yesterday, you met with him yesterday?
A. Let me ask a question, if I may?
Q. Sure.
A. You are inquiring, you're asking relative to this case? Or are you asking in general?

Q. I'm asking ever in your life.

A. Okay. And I --

Q. Are you his Godfather, or I'm just wondering --

MR. PRAUSE: I wish.

Q. -- how many times you met with him relating to anything.

A. Right. The reason I'm asking is because you have been making things very specific and then converting back to very general.

Q. Right. And I'm going to do that.

A. And I want to do an honest accurate job answering your questions, so that's why I'm asking. So if you asking me how many times in my life have I met with Mr. Prause, I'm going to go back to around three times.

Q. Okay. And just for your, for your benefit, sometimes I'm going to ask general questions and sometimes I'm going to ask real specific questions. And sometimes I'm going to let you know whether I'm being general and specific and sometimes I'm not.

So if you have a question, just continue to do as you are doing and ask me to clarify my question and I'll be delighted to do that.

Because, obviously, I want to make sure that by the end of this deposition that you have only answered questions that you understand; and it is not to any of our benefit for you to answer questions that you don't understand.

A. I appreciate that and it is comforting that you will allow me to clarify it when I don't understand it.

Q. Okay. So you met with him yesterday; you met with him the day of the other deposition that he presented you at?

A. I believe that was the one in Greenville; is that correct?

Q. Yes. You met with him before that in preparation for that deposition?

A. I don't know that it was specific for -- do you mean the day before the deposition and the day of the deposition? Are those counted as two meetings or one meeting?

Q. That's counted as two meetings.

A. Yes. That's correct.

Q. Okay. Have there ever, have there been any other meetings between you and Mr. Prause?

A. I believe I met Mr. Prause one time at another law firm but I, I wouldn't swear to that.

Q. What do you mean, "at another law firm"? I'm not sure. When he was working in another law firm, or?

A. When he was at another law firm in, at another law firm in Birmingham, Alabama.

Q. Okay.

A. Not that he worked there --

Q. I understand.

A. -- he was just there.

Q. That's where the meeting took place?

A. Yes, that's correct.

Q. At another law firm's office in Birmingham, Alabama?

A. That's correct.

Q. Do you remember about when that meeting was?

A. As I stated, I'm not sure we met there for sure. I just -- it just -- My recollection seems to indicate that we may have.

Q. Okay. You met with some lawyers relating to the Anniston situation in the Birmingham office?

A. Yes.

Q. And Mr. Prause may have been there and may not have been there?

A. Yes, and I don't recall if he was or not for sure.

Q. About when was that meeting?

A. Last year sometime.

Q. Who do you remember was present at that meetings?

A. Mr. Cox. And there were other names but that's good enough.

Q. Adam Peck?

A. Yeah, Adam Peck was there, too.

Q. Harlan Prater?

A. Harlan I may have met in the hallway but I don't think he was directly involved. But he may have been. Gordon Lightfoot.

Q. Everybody does that. It's Warren Lightfoot.

A. Warren? Okay. I'm glad that you know where it is coming from.

Q. It's unanimous, everybody has done that. Mike Kelly?

A. Yes.

Q. David Moore?

A. Not in, under these circumstances. I do know David Moore and I have met with him in the past.

Q. Was that meeting in Birmingham before or in preparation for one of the other depositions?
A. Yes.
Q. And how long did that meeting last?
A. I believe it was a couple of days.
Q. All right. Were you the only expert present at that meeting?
A. At the specific meeting that I was at, I was the one that they were talking to, yes.
Q. And was the meeting immediately before your deposition or was it some extended period before your deposition?
A. We met the day before the deposition.
Q. All right. Now I want to go back chronologically and kind of start at the beginning. And if you will hand me your CV?
A. Sure.
Q. We're not going to go over all this material that has been gone over many times before. But you began your undergraduate career at the University of Michigan, correct?
A. That's correct.
Q. You graduated from Michigan State University with a Bachelor of Science degree?
A. Correct.

Q. And then you went to the University of Iowa for your Ph.D.?

A. Correct.

Q. And you graduated from the University of Iowa with a Ph.D. in February of 1968?

A. That's correct, February 3, 1968.

Q. Do you recall when you started at Monsanto?

A. Yes.

Q. What date did you start at Monsanto?

A. I don't recall the specific date. The year was 1967. Probably the first quarter or something like that.

Q. You think you started towards the beginning of '67?

A. That's my recollection, yes.

Q. Did you start in the St. Louis office?

A. They have multiple offices in the St. Louis area. I started at the Queeny Plant on South Second Street.

Q. What was your first job with Monsanto?

A. My first job with Monsanto was as a senior research chemist for the Organic Division.

Q. And what were your duties?

A. My duties were to provide chemistry

support in the form of analytical chemistry specifically for the Organics Division.

Q. And What did that mean on a day-to-day basis, what kind of analytical support did you provide?

A. It meant on a day-to-day basis that I analyzed samples of materials of interest to Monsanto for various constituents so they would know what they were made of, or how much was there, or how much was still there, and that kind of thing.

Q. Okay. Right now I'm staying at the beginning, okay? The '67 time frame.

A. Uh-huh.

Q. How did you analyze those materials?

A. Okay. My first assignment at Monsanto when I came there was to look into an area called atomic absorption spectroscopy. What they were interested in was a very new technique at that time that had just come out; and they were interested in acquiring the instrumentation and the equipment and the expertise and the experience to have that analytical technique available to them to analyze their products and their, and to monitor things in their processes.

And so they asked me to look into it and see what was the state-of-the-art; determine the appropriate instrumentation that we might be interested in buying; estimate the costs, the timing, and the amount of effort to get the instrumentation installed; and of course what kind of facility would be needed to put the instrument in.

And 5Then once that was done, what it would do for us, and to evaluate it and become familiar with it.

Q. So that was your specific job?

A. That's correct, that was my specific assignment.

Q. That's what you were brought in to do and that was -- I just want to know if that was what you were, when you hired on they said, "Dr. Tucker," well, you weren't a doctor then, but, "Mr. Tucker, here's what we want you to do. We want you to get us up to speed on this new technology."

A. When they brought me in they wanted me to function as an analytical chemist providing analytical chemistry support for their division. The project that was of most interest to them at the time happened to be atomic absorption spectroscopy, which is method for measuring metal content of things.

They could have assigned me to a lot of things but that's what they did when I got there.

Q. Right. That's what I'm trying to figure out is that was the first major assignment that you got was to get us up to speed on that particular technology?

A. Yes.

Q. Did your role or your, the main thrust of your job ever change?

A. On what I worked on specifically --

Q. Yes.

A. -- or as an analytical chemist? Because I have been an analytical chemist for 33 years.

Q. No. We talked about your initial main job was to get up to speed on this atomic absorption spectroscopy?

A. Yes, sir.

Q. Okay. Did you do that?

A. Yes, I do.

Q. How did you go about doing that?

A. As I was indicating in my earlier answer, I looked into the literature, I saw what people were doing, I saw what state-of-the-art was, I saw what the experts who had already worked in the area extensively recommended. And rather than reinventing the wheel, I took advantage of that kind of information, which is what I was supposed to do.

Based on the information, I made decisions with regard to what I thought we should acquire to be able to have that expertise available to us on site. And then I made those recommendations formally to my boss, who, in turn, shared them with other people.

Then after they were properly reviewed, we came back and made any adjustments that were necessary and then we went ahead and ordered the equipment and began the actual establishment of the technique at the site.

Q. Was your boss at that time Mr. Keller?

A. Dr. Keller, yes.

Q. Dr. Keller. All right. When was that job basically accomplished?

A. My guess would be that job was accomplished some time in 1967. It wasn't a long routine. The other thing is is that you don't work on widgets today and nothing else.

Q. I understand.

A. I mean, you work on widgets and widgets two and three and --

Q. I understand.

A. Yeah.

Q. But what I, my understanding of your earlier testimony was this was the first big job you got from Monsanto, the first big assignment?

A. Well, I'm not sure "big" characterizes properly. It was the first technical assignment I was given by the company. And what I did as a Ph.D. was establish the technique. And then once I had established it and it worked properly and I could say it was producing the information it was supposed to, then I trained technicians in the ability to do it and then turned it over to them. And then in the future I simply monitored what they did.

Q. All right.

A. That was my job.

MR. WRIGHT: Okay.

MR. PRAUSE: We have been going for about an hour, can we take a quick break?

MR. WRIGHT: Yes.

THE VIDEOGRAPHER: We're off the record

at 11:06.

(Recess taken.)

THE VIDEOGRAPHER: We're on the record at 11:14.

BY MR. WRIGHT:

Q. All right. When we left I think we had finished your first what I thought was a major assignment but you didn't like me calling it a big job. But I mean, isn't it fair to say that that was your first major assignment for Monsanto?

A. It is fair to say it is simply as it was my first assignment.

Q. Okay.

A. That would be a way to say it, too.

Q. Okay. Well, let's say it that way, then. What was your second assignment?

A. The second assignment had a little bit broader scope in the sense that I became involved with all of the wet chemistry techniques that were utilized by the division. And ultimately that led to me becoming the group leader or the supervisor of the wet chemistry group.

Q. Now I would like for you to explain the terms a little bit for me a little bit for me if you would. First of all, the first assignment that we discussed, the atomic absorption spectroscopy, did not relate to PCBs?

A. That's correct, that would not be a technique that you would use to measure PCBs. You would use that technique to measure metal ions.

Q. Fine. Okay. The next assignment that you described, you used the term "wet chemistry." What do you mean by that?

A. "Wet chemistry" is generally a, a simplistic analytical chemistry that involves titrations and gravimetric precipitations and not so much instrumentation. It's not a spectroscopy type technique or things of that sort. It involves things like titration of aqueous solutions for cyanides --

THE REPORTER: Slow down, please.

THE WITNESS: I'm sorry. I'd be very happy to do that for you; I apologize, I do that a lot when I leave my phone number.

MR. WRIGHT: "titrations of aqueous solutions..."

A. Generally speaking, the sample is either aqueous and you're looking for a constituent in the water sample, or you take a solid matrix and you dissolve it up so that it is in an aqueous sample and you look for a constituent in there.

You might be looking for to determine the pH or the hydrogen ion concentration of it. You might be looking for the cyanide concentration. You might be looking for total suspended solids. You might be looking for soluable salts. You might be looking for chloride. You might be looking for, you might be looking for any of those kinds of things.

Simplistic chemistry that involves more of the older historical type of analytical techniques, that's generally what is referred to as wet chemistry.

Q. Okay. And your specific role in that regard was to do that?

A. My specific role was to supervise technicians and also help them develop techniques and make sure they were doing them right and teaching them in a group that provided that kind of support, that analytical support, for the Organic Division chemists and process engineers.

Q. And PCBs were part of the Organic Division at that time?

A. PCBs are an organic chemical and they were part of the Organic Division, yes.

Q. Did your role in supervising the wet chemistry or facilitating helping the wet chemistry setup have any direct relation to PCBs?
A. No. None.
Q. Okay. About how long did that job take?
A. As I had mentioned, jobs worked concurrent --
Q. I know, they overlapped.
A. -- and all of this really occurred in the latter part of '67 and the earlier part of 1968.
By the way, I'm just looking at my resume here; and as I said earlier, the date that I actually received my Ph.D. was February 3, 1968. What that would mean is that I really joined Monsanto in about the fourth quarter of 1967.
And what had happened was the typist had missed the deadline to get the thesis in; and so I had to, I went ahead and left and I came back for the thesis defense and things of that sort at the next available graduation, which was February 3.
Q. Okay. That's what I had assumed?
A. Yeah.
Q. But I'm glad you clarified on when you started at Monsanto because that --

A. Well, what I had said earlier was compressing things to the point to where it was like, "When did I get all these things done," and that kind of thing.

Q. Yeah, I was wondering about that.

Okay. So you believe that it is more accurate to say you started at Monsanto in the latter part of 1967?

A. Yes, sir.

Q. Okay. And so the, the completion of your first assignment with regard to the atomic absorption spectroscopy would have been in early '68?

A. Yes. And the completion for responsibility goes in phases. The initial set up, the initial evaluation set up and establishment of the technique would have been something that I was involved directly.

The next phase would have been to transfer that and to teach it to other people. And then the third phase of that would be to have continuing responsibility as a technical expert for those people and to monitor them to make sure they were doing it correctly so that the data was all right.

And if something that they weren't capable of understanding happened to the instrument or to the technique, I would be required to solve that.

Q. Let me just ask, is that, again speaking to the atomic absorption spectroscopy, is that something that you had worked with in your graduate education at the University of Iowa?

A. It was something that I was aware of and that I had been exposed to, but it wasn't anything specific to my thesis work or my research work.

Q. Okay. By the way, what was your thesis?

A. My thesis was the, let's see, it was the mono 2-aza aryl hydrazones, and the analytical -- I'm sorry.

Q. All right, take your time.

A. The thesis was, "The Analytical Chemistry of Mono 2-aza Aryl Hydrazones."

Q. And how did you analyze that stuff?

A. The thesis research really involved more than analysis. It involved synthesis and design of organic molecules that were specific to being able to chelate with metal ions and to produce chelates that were colored and whose color was proportional to the amount of material present when they reacted.

And so what was involved was that I had to go to the original literature -- first of all, I had to come up with an idea where I might like to do my research in. Then I went to the original literature and cruised around to see what had been done. Then based on that, I decided that there might be some other things that hadn't been done yet that could be done.

And at that point I prepared a proposal that could be the basis for a Ph.D. research; and I put that together with appropriate literature references and things of that sort, then cleared it with my major professor. And then once he agreed that I should go forward, then I went forward with it.

In the area that you do original research in, it's called original because it hadn't been done before; otherwise, obviously, it wouldn't be original. And you really start at ground zero.

The ligands and the molecular structures that I was interested in were really figments of people's imagination and hadn't been put together specifically to do the job I wanted to do, and so

I had to learn how to get the starting materials and put those together and actually make the molecules that I had designed on paper.

And then Once I had done that, then I took those molecules and see how they interacted with various transitional metal ions. And then I took, when I found the proper structure that had the right characteristics for these interactions, then I began to develop those and exploit those for analytical chemistry and develop what was called colorimetric procedures for measuring things in aqueous environments.

So what you do is if, for example, you had cobalt in solution and you wanted to know how much cobalt was there, you could add this ligand to the solution and it would react with the cobalt; it would turn the solution red; and then you would read the optical density or the color, the density of the color, and that could be related to the concentration of the cobalt.

So what I did was I developed the foundation for and the extension of an original technique for doing analytical chemistry, measuring constituents in samples.

Q. That would have still been considered wet chemistry?

A. Pretty much, yes.

Q. Did that have anything at all to do with PCBs or the analysis of PCBs?

A. No.

Q. Now going back to your early days at Monsanto, when is your best recollection of the first phase of your first job finishing up?

A. The first phase of the job would probably be the beginning of '68 would be my guess. Because by the time you ordered the equipment, got it in place and that kind of thing and did that. So I would guess the first part of '68.

Q. All right. And then your second assignment, assisting the wet chemistry folks, when did that finish up?

A. It probably was initiated concurrent or shortly after the atomic absorption assignment. We worked on more than one thing. And it would probably have continued in parallel with that and probably expanded as I showed the ability to direct other people and to tell them what to do and work with them and get the job done.

The transition that occurred was the

actual people that I had trained in some of these techniques and that kind of stuff, when I began working with PCBs later down the road, probably went with me because they were familiar with working with me and I moved them right along into the new techniques that were being developed for measuring PCBs in samples.

Q. Okay. Well, we'll talk about that in a minute then. I would like right now to get a picture of Monsanto's, what did you call yourself, the Analytical Department?

A. We were called the Applied Sciences, if I remember.

Q. All right. What did the organization of the Applied Sciences look like. First of all, you were at the Queeny plant?

A. Yeah.

Q. Is that correct?

A. Yes, that's correct.

Q. Okay. And this is Applied Sciences for the Organic Chemical Division?

A. Correct, the Applied Sciences is a support group for the organic chemistry -- Organic Division chemists and engineers.

Q. All right. Give me, if you can, an

organizational picture of the Applied Sciences department.

A. Okay. Dr. Keller was the head of the Applied Sciences. Then -- and he was, I would say, nominally a manager.

Under Dr. Keller were a number of group leaders. And it would be divided somewhat according to discipline, and some analytical chemistry discipline and somewhat according to who had extra resources and that kind of thing.

But there was a spectroscopy group, which had to do with atomic absorption spectroscopy. Had to do with other infrared spectroscopy. Emission spectroscopy.

I also did, now that you've got me talking about it, I also did a lot of emissions spectroscopy for measuring metals, which is a different technique than atomic absorption, but an instrument that they already had that they needed somebody who knew how to operate it.

Then there would be -- they had a gas chromatography group that did nothing but gas chromatography analysis based on that particular technique. Then they had a physical chemistry group. And then I believe they also had a process chemistry group. All of these were analytical.

For example, the process chemistry group developed analytical techniques for monitoring processes. The spectroscopy group developed techniques for monitoring anything that could be monitored by a spectroscopic technique. The gas chromatography group monitored anything that could be, was amenable to, gas chromatography.

Is that enough?

Q. Yes.

A. All right.

Q. Who was working in the gas chromatography group when you --

A. Gosh, what was his name?

Q. -- when you started?

A. Ed, Dr. Ed Emery was the group leader of the gas chromatography group.

Q. How many gas chromatographs did they have when you started?

A. My guess is more than one and less than maybe 15?

Q. More than one but less than 15?

A. In our operation. They could have had as many -- they certainly had one, I can establish that without a problem. Whether or not they had seven, 11, 14 or 16, I don't know. But they could have had as many as, say, somewhere, they might have had 20 at the maximum at that group.

I'm trying to think. I think it was less than that at that time.

Q. Well, 5How big are these machines?

A. About this big; a box about this size (indicating). Let's see, let me relate that, three by three by three.

Q. Three feet by 3 feet?

A. By 3 feet would be maximum dimensions.

Q. Well how big was the gas chromatography section? I mean, were they in the warehouse or a were they in an office?

A. I don't understand your question. Because I can multiply 20 times three cubic feet and not come up with a warehouse.

Q. Well, this room, for example, appears to me to be about, what, 18 by 15, maybe?

A. I could have four chromatographs down this side of the table, four chromatographs down this side of the table, four chromatographs on that wall and four chromatographs on that wall.

Q. So four lines of chromatographs in a room this size?

A. Right. And if I were designing a laboratory that is probably the way I would kind of set it up. So you could have as many in this room, without making it too difficult for people to work, on probably as many as 16 chromatographs in this room.

Q. Was the gas chromatograph section as big as this room?

A. And then some. The Queeny, the building on South Second Street associated with the Queeny Plant, was an eight-story building that had been -- that was used for research and development and those kind of things. And we had I think one, close to one full floor of that building just for what we did.

Q. The only reason I'm asking you all this is there's a big difference in my mind between one and 15; and, and I know it has been a long time ago but --

A. Okay, let me clarify that for you.

Q. Yeah.

A. What I meant by that. I was trying to answer your question.

Q. Okay.

A. On a probability basis, whether or not we had 15 or 16 chromatographs there's a probably a 50/50 chance that I might be right or I might be wrong. Okay? But on one, I was damned sure we had one.

Q. Okay.

A. And my guess -- and the other thing is that we had instruments that we lent out to various operations and might be shipped to other parts of the company that were designed specifically by those folks to monitor processes.

Q. Okay.

A. So we had other instruments out in the field, too. And then we had instruments that were not necessarily used because they were so specific they had been used for a project in the past but not in the future.

So my guess is, is they could have had at least 20 chromatographs there. And that they -- I am trying to remember how many people they had in that group at that time. I think there were probably on the order of four or five people in the group, and so that's a reasonable number of instruments for them.

Q. All right. And then the spectroscopy department, who was in charge of that?

A. Dr. Martin Dietrich was in charge of that.

Q. And then did you work under him in your initial assignment?

A. Yes.

Q. Would you, is spectroscopy something that that you could or would use to analyze PCBs?

A. Yes.

Q. Did, when you started, did they use spectroscopy to analyze PCBs?

A. No.

Q. So the spectroscopy group when you started did not use that technology to analyze PCBs?

A. Correct. Yes.

Q. Did they analyze PCBs using the gas chromatography when you started?

A. Yes.

Q. What kind of analysis did they do using the gas chromatography?

A. It would be an analysis that would be referred to as production quality control.

Q. Okay. What does that mean?

A. It means that you take materials that are at or near 100% PCBs in this particular instance which you have chosen and you analyze them to see what percentage they are PCBs, is it 99, 98, 97? And you might even go to the extent of fingerprinting them to see that they look the same from a gas chromatographic viewpoint -- which is just simply a way of looking at something -- that they look the same from lot to lot to lot. And so you would be analyzing samples that were taken from production.

Q. Okay. So these would be basically Aroclor, pure Aroclor samples that they would be running through to make sure that they met production quality control standards?

A. That's correct. The only addition I would add to what you said is I would really call it "neat" rather than "pure."

Q. All right.

A. Because Aroclors are mixtures to begin with.

Q. That's right. And I have seen in your writing that you draw that important distinction quite a bit.

When you say "neat," you mean what?

A. Completely PCBs.

Q. All right.

A. That's the one extreme. Now it can be, you know, 50% or something like that, but it's pretty well neat.

Q. And when you use the term "pure," you would use that only in reference to one of the PCB isomers?

A. That would be the purest way to use it.

Q. All right. Okay.

A. If you forgive the pun.

Q. Okay. Now there was no -- well, when did you first get drawn into the PCB analysis area?

A. I think that occurred probably mid '68.

Q. And what do you recall about that assignment?

A. Well, I don't, I wouldn't really call it an assignment at that time.

Q. Okay. I guess what --

A. I would call it really more of a discussion of what people were saying or thought they might be saying and things of that sort.

Q. Okay. Well, 5That's basically I'm just trying to get started.

What's the first thing you remember about the discussions relating to PCBs that got you involved in the PCB analysis situation?

A. Apparently there had been discussions by Bob Keller, Dr. Keller, with other people within the functional fluids group or whatever; I had no privy to those, didn't even know about them.

But at the point in time I became involved, I was aware of the fact we had received a telex, which was a fast way of communicating back in that, in that century. And in that telex we had been notified by our operations in Britain -- in Ruabon, I think specifically, although I'm not sure -- that there were some reports by some scientists in Sweden that they were finding polychlorinated biphenols in the environment.

And that's the first appraisal I remember of the discussions and the initiation of discussions on that particular topic.

Q. And that would have been in a conversation between you and Dr. Keller, you believe?

A. Yes.

Q. And that would have been in mid '68 --

A. That's my --

Q. -- to the best of your recollection?

A. -- that's my recollection, yes.

Q. Okay. Do you remember whether it was the beginning of mid '68 or the, towards the -- what's the best month in '68 that you can?

A. Well, mid '68 means like --

Q. June?

A. -- maybe June, right. Whether or not it's the beginning or the end or maybe even over into July, I don't know. But it certainly wasn't in the beginning of '68. It was, as I said, mid, around mid '68.

Q. All right. And what Dr. Keller told you is, is that they had received -- by "they," I mean Monsanto -- had received a telex from a group in?

A. From who?

Q. From Monsanto in Britain?

A. Correct.

Q. That somebody in Sweden had found what?

A. The report was --

Q. Yes.

A. -- is that a research group in Sweden had found polychlorinated biphenols in a place where it was surprising.

Q. What else do you remember about that initial conversation?

A. I think the general consensus was at that point in time that the people that were reviewing this and looking at it were curious as to what it meant, and nobody was really sure what it meant at that point in time. It was just an observation that we had been appraised of and we were being asked, "Does this mean anything to you guys?"

Q. Had, had Dr. Keller done any work on it at that point or was he asking you to begin the work?

A. Dr. Keller was a manager and as such he didn't work at the bench. So he may have done what he did as work on it.

Q. Which is assign it to you?

A. Reading, reading about it, determining who was the best individual present in the people he had available to him to do it for whatever reason. Who might be the best, most up-to-date person who could make sense out of something of this sort? That kind of thing. So that was his work.

And I'm sure that at that point in time he was being asked, "Well, you're an analytical chemist, what does it mean to find polychlorinated biphenols," I believe it was in eagle feathers, to be real truthful with you, from a museum, if I remember now.

And, you know, it was like, "Well, I don't know but I guess we can kind of figure it out. We need more information."

Q. Okay. And at that time he asked you to try to gather more information?

A. From a technical viewpoint, I believe that was kind of the beginning of the investigation of the issues and what was going on and what was associated with it to establish, "Gee, what does this mean?"

Q. Okay. Were you basically in charge of finding out what it meant from that point or at that point?

A. Certainly not. I was part of a team.

Q. Who was in charge?

A. I don't -- I would -- my guess at this point in time would be that it was probably the directors of the functional fluid, the director of the functional fluid product line.

Q. Who was that?

A. At that time, that was Dr. Bill Richard. And he reported to I believe Howard Bergen.

Q. All right. Your initial meeting and conversation was only with Dr. Keller, or was it with more than --

A. That's my recollection.

Q. Okay.

A. And I was simply being asked, "Does this mean anything to you?" I mean, "What do you think of this?"

Q. What did you do after that?

A. I said, "I don't know what I think of it."

But it's like any investigation; when you are asked a question and you don't have an answer, you begin to look for the answer. And I was asked to look for the answer from an analytical viewpoint.

Q. Were you given the telex?

A. I could have been given a copy of it; I doubt if I had the original. And I don't, I don't really recall. It wouldn't matter. I mean, I would be appraised of what it meant one way or the other.

Q. You don't recall whether you saw the --

A. No, I saw the original.

Q. I'm sorry?

A. I saw, I saw a copy of the original. Now whether or not it was given to me, I don't know.

Q. At that time you are saying at this very first meeting you believe you saw the original?

A. I believe he may have had that in his possession but I don't, I don't know at that very first meeting.

But what I said was I saw a copy of it. Now exactly when, I don't know that. That's a different question.

Q. All right. Well --

A. If you want to ask that, ask it and I'll answer it.

Q. Okay. Let me ask that. Do you remember when you saw the telex?

A. Some time probably shortly after that but I don't remember specifically.

Q. Did you see any other information relating to that subject matter, i.e., the discovery of this substance in Sweden?

A. Subsequently I saw information; but it was not immediately forthcoming because there had been no publications, this was all word-of-mouth.

As I recall it, it was a, something that was said in passing at a technical meeting in Sweden or some European country at which one of our people was attending, perhaps in the audience. And that caught their ear as to, "Hum, that's interesting, what's that doing there?"

And then the question was asked, you know, about polychlorinated biphenols -- which, of course, as you know, I think, is not the proper way to refer to PCBs.

Q. Yeah. Just so the court reporter, whenever you say "bi feen ol" you're talking about O-L and when we say "bi feen uls" we're talking about at Y-L?

A. I make an attempt to be demonstrative --

Q. Yes?

A. -- in my pronunciation so that she can differentiate or the court reporter can differentiate. It is a subtle difference --

Q. Yes, I understand that.

A. -- but it's a big deal.

Q. It's important to you scientists?

A. No, important to everybody because the molecular structure is a totally different material.

Q. All right. And I just want to be clear on what your understanding at the time you got your assignment was, is that, "There had been this comment that's all we know, it's this substance biphenol is what everybody is talking about and can you guys figure out what's going on?"

A. Okay. And I don't think it was what everybody was talking about. I think it was one report --

Q. All right.

A. -- at a technical meeting by a technical person that was heard by one of our representatives at the meeting who in turn began to ask, "Gee, anybody know anything about this?"

And I wasn't given an assignment at that time. I was asked if I had any knowledge of that particular compound and why it would be present in eagle feathers or something of that sort?

Q. Okay.

A. And to be real truthful, I didn't have any idea whatsoever.

Q. Now --

A. And in fact, as you pointed out kind of, the technical term being used to describe the molecule was incorrect.

Q. But that was the term that was given to you?

A. That's correct.

Q. In your meeting?

A. That's correct. So I thought we were dealing with polychlorinated biphenols, which is a different constituent than biphenyls. So I didn't even know the answer to that question.

Q. And that's all the information that you were given at the beginning of your hunt basically?

A. Yes, sir.

Q. Okay. Then what did you do?

A. I believe shortly after -- well I want about --

Q. Let me ask, let me ask. You indicate you were not given an assignment --

A. That's right.

Q. -- at that point?

A. No. I was going to say I went about my regular functions --

Q. Okay.

A. -- at that point time.

Q. That's just the first time you heard about this --

A. That's right.

Q. -- PCB situation?

A. That's the first time I heard about the polychlorinated biphenols situation.

Q. All right. When is the next time you heard about either polychlorinated biphenols or polychlorinated biphenyls?

A. I don't recall exactly. Certainly after that occurrence. Probably not very long after that it was clarified they did not mean phenols, P-H-E-N-O-L-S, they meant biphenyls, which of course was more significant to us because it was something we manufactured.

Q. About how, about how long after that initial meeting did you all get that information?

A. I, I can't, I don't have a good recollection of that.

Q. Okay. Is it on the order of weeks? Is it on the order of months?

A. Yes.

Q. Weeks or months?

A. Yes.

Q. Okay.

A. My suspicion is is that that type of information came back fairly quickly. But you asked me if I recollect specifically and, I'm sorry, I do not.

Q. Okay. So a few weeks or months later, whenever --

A. I, Let me clarify that.

Q. Yeah.

A. You just jumped over to months, and I would say a few weeks.

Q. Okay. So a few --

A. Let's deal with it in a reasonable perspective.

Q. So a few weeks later, was it in the fall of '68?

A. We're talking about, no, it was, it was, that kind of thing was probably clarified fairly quickly. Whether or not the information was passed along to me fairly quickly, you know, I wasn't assigned to anything at this point. I was simply asked a question.

Q. I understand. And I'm just trying to find out when you heard that it was biphenyls instead of biphenols?

A. Probably shortly after that. Whether or not I was asked to do anything about that one way or the other except to clarify my understanding of what the question was, probably not.

I guess you need -- from my viewpoint, you need to understand the perspective. The perspective was that something had been found or recorded as found at very minute levels in eagle feathers from eagles in a museum by an analytical chemist who was doing pesticide analysis in samples.

And it was like, "Okay, what's the significance of that?"

The significance was that it was a marble out of place. And whether it had -- how it got there, through contamination by the guy in the laboratory, through inappropriate interpretation of his data, through any of those kinds of things? None of these things were answered yet.

He hadn't published the information; he had only spoken about it. It hadn't been peer reviewed; it hadn't been disseminated; nobody understood how he did it. The only thing we understood was that they had detected this molecule which is similar to the ones we manufactured in eagle feathers -- eagle feather. And that was all.

So at that point in time my guess is is that Keller and the folks in Europe said, "Hey, we need details. Are you sure its phenols?"

Q. I'm trying to pin down so that we can walk through this in an orderly fashion when each of these steps occurred from your perspective. Okay?

A. Okay.

Q. And my understanding is, is that that information that you just gave me is the information that was given to you in the first conversation; you didn't have an assignment yet; this was just a discussion. Is that fair?

A. Yeah. If I can use an example, it's like determining when you got pregnant. Until you are pregnant for a while and have determined you are really pregnant, only then can you figure out when conception occurred.

Q. Okay.

A. So that's the kind of question you're asking. So if I'm appearing evasive, I'm not doing it intentionally --

Q. I understand. I'm just trying to get your best recollection; and your best recollection when you got that information is in the summer of 1968?

A. Mid 1968.

Q. Mid 1968? Okay.

A. That's correct, that's absolutely correct.

Q. And then after, some period of time after that; we don't know how long, although you say it was relatively shortly. So your best estimate would be weeks instead of months, I assume now?

MR. PRAUSE: Objection to the form of the question.

A. Okay, my understanding of the question --

Q. What's your best estimate, what's your best estimate as to how long it was until you heard again about biphenols or biphenyls in Sweden?

MR. PRAUSE: Object to the form of the question.

A. I have to allow enough time -- and I'm thinking aloud to myself -- for the people to pass the question back to Europe; for the people in Europe to assess the questions and try to provide the answer; to provide the answer back.

And you know how a telex is, it is not like an e-mail or a phone call or anything of the sort. My assumption is, is that the response came back in days. Now whether or not at that point in time the powers that be thought that it was significant enough to come to me, a bench chemist, to get my input on that information, they may have discussed it among themselves for a while.

But I certainly was apprised in a reasonable time frame. That's why I objected a little bit to you saying months.

Q. Okay.

A. Because that really is demonstratively long.

Q. Okay. And could --

A. A couple weeks probably.

Q. All right. Your best recollection or best estimate is that it was a couple of weeks?

MR. PRAUSE: Object to the form of the question.

A. In that time range.

Q. All right.

A. That would be, yes, that's acceptable. That's an acceptable --

Q. All right.

A. -- resolution based on my best recollection.

Q. When you got that information, did you get any additional information or was it only the clarification that we're talking about biphenyls and not biphenols?

A. I think the initial clarification was simply that. I think ultimately, since the gentleman had mentioned that he had analyzed something and determined it to be there, the ultimate question was, "Gee, how did you analyze it?"

Q. Okay.

A. And, "What did you really find? Will you share those results? Are you going to publish them soon?"

Q. Okay. I'm trying to walk through this in order.

A. I understand that.

Q. So I just want to clarify. This may be -- you may have answered the question but I want to clarify.

In this second conversation now when the specific chemical is clarified, were you given any additional information and is that when you were given your assignment?

A. I think at that point in time I might have been appraised of the fact that the original designation was incorrect. And furthermore, I might have been asked, "Well, do you know anything about measuring pesticides and what kind of ways they do that and that kind of thing?"

And since I wasn't a pesticide chemist and things of that sort, I probably would have said no. And at that point in time, I probably would have thought, "Well, hum, I don't know that. Maybe I ought to find something out about it."

So I might have gone to the library and started looking at the way those people did their analysis, start to figure out what's going on so I could begin to answer my superiors' questions, which seemed to be important to them.

Q. All right. Is it your best recollection that you were not specifically asked to do that, that you just did that kind of as an eager young Ph.D.?

A. I think that's, that's part of the answer. I think that's half of the answer. The other half is, is that I'm an analytical chemist; my job is to analyze things for things. My job is to understand the techniques and tools that are used by analytical chemists to do this.

Soren Jensen was an analytical chemist, he was analyzing something for something. Doing the same thing I was doing. So it was legitimate that they would come to me and ask me what I knew about it.

Q. Okay. But what I'm asking you -- and I understand that and I appreciate that information. What I'm trying to find out is, at some point you got an assignment --

A. Correct.

Q. -- to do some work. And I'm trying to figure out when you got that assignment. Was it in this second conversation that we have just talked about, or was it after you had done some homework on your own that you later got an official assignment to follow it up?

A. The question is "an official assignment."

Q. I'm sorry?

A. The question is "an official assignment." I'm responsible for answers in my area of expertise. And if I'm there to answer questions relative to analytical chemistry, if somebody asks me a question I can't answer, that's an assignment.

Q. Okay. What were you asked?

A. Actually, I don't know what you mean by "assignment." I think it would help me if you clarify what you mean by "assignment."

Q. Okay. Here's what I, let me tell you what I understand and you tell me if it is accurate. This may answer the whole question.

What I understand is, is that in this second conversation the specific chemical was clarified and you were asked, "Do you know anything about analyzing pesticides and so forth?"

And you said, "No, I don't really know anything about that."

I didn't hear you say, "Dr. Tucker, go find out about this." And I'm just asking, were you told to go find out about it at that point, or were you just asked questions that you didn't have the answer to and --

A. I would believe about at or about that time they began to say, "Well, you know, look into that and see how they do it."

Q. All right.

A. And so 5If that's your definition of the assignment, which is my understanding of it now, then I would say at or about that time or shortly thereafter it was evident that they had told me to go look into this and see how we do it so we can understand what's going on.

Q. Okay. But you don't have a specific recollection of getting an official assignment by -- from Dr. Keller saying, "I want you, Dr. Tucker, to go investigate and find out what's going on here"?

A. Okay. We were all assigned to answering that question. We were all trying to figure it out.

If you are saying he said to me, "Gee, I want you to go find out how pesticide chemists analyze samples for PCBs," no, he didn't, he didn't ask me that question at that point in time.

These guys weren't analyzing samples for PCBs, they were analyzing them for pesticides. And so I was asked to become familiar about that time with the techniques they employed.

Q. Okay. And is that as close as you can get to what you were asked to do?

A. Yes.

Q. Okay. What did you begin to do?

A. I 5Reviewed the literature to see what kind of techniques that were employed by these folks. And determined next whether or not we had any experience within the company, within my scope of the company, with these kinds of techniques so I could ask somebody how they worked --

Q. Okay.

A. -- things of that sort.

Q. Were you provided any literature or were you tasked with going and gathering the literature?

A. As far as the techniques used by the folks, it was more I was tasked to go look it up. I mean, it's, there was a lot of publications out there by people who were measuring pesticides in, in environmental samples.

Q. What did you find?

A. Well, I found out that they used, for these organic molecules, they used gas chromatography and that the primary detective that they employed for this kind of thing was an electron capture detector, referred to as an electron capture detector.

Q. Did Monsanto have one of those?

A. It just so happened that in the organic chromatography section of the Applied Sciences they did have a detector on the shelf.

Q. Okay. Had it been employed yet?

A. Not really. They had bought the detector to begin evaluation of it -- not, certainly, for this particular subject, but because the electron capture detector was a new kind of way of detecting things. It was extremely sensitive and fairly specific, and it was a new kind of detector for chromatography systems.

And so 5Part of our charge was to keep abreast of new technologies and to acquire those and to see how they could help the company do its job better. And so they had acquired one.

When I asked around and I talked to Ed Emery and the folks they had, "Gee, we've got one of those. We've got an electronic capture detector."

"And have you used it for anything?"

"Well, not really."

Q. Then what did you do?

A. Specifically, I don't remember exactly what I did. But I know what I -- what would be seem logical to me, and I have developed hundreds of methods.

I went about figure out how to get the wherewithal to do what they were doing.

Q. By "they," are you talking about the other people who were reporting finding this chemical?

A. The only person that we had had report PCBs at that time was Widmark; and that was an unconfirmed observation, verbal, as a matter of fact --

Q. All right.

A. -- that got garbled in the telex. But there were a lot of people around analyzing environmental samples for DDT and for chlorinated pesticides and they were using gas chromatography and they were using electronic capture detectors. And so that's what I began to become familiar with.

There's more than just having the gas chromatograph and the detector. I mean, the material's out there in something; and you've got to isolate the material, clean it up, present it in the proper form to get it through the instrument, through the instrument and then to the detector.

And you need to understand how an electronic capture detector works and how a gas chromatograph works. And that's when I began the process.

It was just like with the atomic absorption. It was a new technology for them; and I basically was at that point in time starting to do the same thing I did with the atomic absorption with the gas chromatograph and the electron capture detector.

Q. All right. And about, does that take us into the fall of '68 now?

A. It is getting, yes.

Q. All right. And when did you first start working with the electron capture and the gas chromatograph together?

A. I would say probably the end of third, beginning of fourth quarter, 1968. Something in that range.

Q. All right. Now do you recall the first samples that you tried to analyze yourself?

A. Yes.

Q. Okay. Tell me about that?

A. Okay. I think we require an understanding between you and I as to what a sample is.

Q. Yes.

A. And so it's probably better if you tell me what you think a sample is and then I answer the question relative to that.

Q. Well, in relation to what you had heard about these other guys were doing -- which is, finding PCBs in an eagle feather from a museum, which is all you knew -- my understanding is that's all you knew that had been done, did you go get an eagle feather and in a fall of '68 and try to sample it?

A. No.

Q. Okay. What's the first thing that you tried to sample?

A. Those would be --

Q. I'm sorry, to analyze, let's say.

A. Yeah. The first, when are you developing a technique, you don't work with unknowns because you don't know what the answer is. So what you want to do is you want to develop a technique that gives you a proper answer.

So the only way you can determine a technique that gives you a proper answer is if you have known materials that give you known responses; they're called standards. So the first thing you work with once you get the system set up, and it's a complex system, is standards. You make sure that the system that you are working with gives you the right answers with the standards. And when it gives you the right answers with the standard, then you figure, "Well, you know, at least the system is working properly."

So if I deliver the standard, the constituent in question, of a known amount to the instrument in a proper manner and it goes through the chromatograph and then goes through the detector and the detector detects it and tells me if I put in 10, I got 10 out -- or nine, depending upon the recovery -- then I can say, "Well, you know, it's working."

Q. Okay. So did you start off -- I'm just trying to figure out what you started off sampling. Did you put a few drops of Aroclor in some water and shake it up and run that through your?

A. No.

Q. Okay. Well, why don't you tell me what you did? Then I won't try to --

A. I will. You have asked the question and I will answer the question best of my ability.

The first thing we did after we set up

the instrument and made sure that it was functioning properly is we took the manufacturer's standards solutions -- which weren't PCBs, they were pesticides.

We took the manufacturer's standard solutions and we ran those through the instrument and made sure that it gave us the appropriate chromatogram, which is, you know, a trace of how it goes through the column in the instrument and separated out and then goes through the detector. It tells you its retention time.

It also gives you a peak that has a nice shape associated with it. If it's a nice shape, then it means it is getting through the instrument without being degraded. If the peak is up on this side or up on that side, then something is happening and the thing is not working right.

You also may have a known response that you expect in terms of the detector. And so you look at the response you get versus what the manufacturer says it should be; if they agree, you say, "Okay, now at least I can do what the manufacturer did. His instrument meets his specifications." That would be the first thing that's done.

Now the pesticides or the compounds that were provided were undoubtedly an hexane, which is a solvent very amenable to gas chromatography. And that's where it starts.

And so if you want to refer to that as a sample, I would refer to it as a standard, that would be probably the first thing that was done, to check the specifications of the instrument to meet the manufacturer's specifications, and that's what I did.

Q. Okay. About how long did that take, do you think?

A. Well, with the -- first of all, the actual instrument that we used, the FM402 biomedical chromatograph, had to be order. That, if you rush them, it can be four weeks; but more than likely it is usually quoted six to eight weeks to get the instrument in.

During that time, you order the gasses that you need and make sure you setup's there and everything. And then you get the instrument in and set it up and that kind of thing. So it could be anywhere from four to eight weeks before you are even prepared to but that first sample through and make sure the instrument is operating properly.

Q. Okay. So after you got the machine set up and you're starting to run these samples, I'm wondering how long that process took?

A. Okay. I thought that's what we were talking about. And we said that we ordered the -- oh, you mean once I had the instrument in house?

Q. Yeah. Once you had the instrument in house, I'm just asking how long a period --

A. Probably a couple weeks.

Q. Okay. Then what did you do?

A. Well, once I had established that the instrument worked according to the manufacturer's specifications, then I decided that we needed to develop the wherewithal of taking a sample, like eagle feathers, and treating it in such a manner that we isolated what we were after and carried it through the cleanup steps and then got it to the right concentration and things of that sort and in the right solvent medium and then injected it into the instrument.

So we then had to develop the sample preparation techniques. Okay. The simplest matrix to deal with that these folks were dealing with was water. And so water is undoubtedly where we started.

Q. All right.

A. And so I had to figure out a way to put a known amount of a PCB into water; run the water through a proposed sample preparation scheme; and then run what I got at the end there, which would be just like the standard only it wasn't a standard this time, through the instrument and have it tell me that I had recovered everything that I had put into the water.

That's fairly complicated. Sound simple but you have to -- well, you don't have to understand, but it's helpful if you do -- that PCBs aren't soluble in water --

THE REPORTER: I'm sorry, "PCBs" what?

MR. WRIGHT: Aren't soluable in water.

A. Are not real soluable in water. It's not like taking weighing out a portion of table salt and throwing it in water and dissolving it up in a known amount of water, and then you have got a standard solution.

You have a known amount of water that you measured and you hae a known amount of soluable chloride in there, which is salt. And you've got a standard.

So you can take a aliquot of that and weigh the solids and you're probably going to come up with 100% of the sodium chloride on a weight basis.

With the PCB routine, you had to take and introduce the PCB into the water; and you had to worry about it plating out, it liking the vessel -- the walls of the vessel that you had the water in -- better than it liked the water because its hydrophobic. And you had to make sure there was -- those were equilibrated. And then you had to be sure that you take a representative sample out in a manner that you're, again, the walls that you take the sample out with, the pipette, the glass pipette, doesn't pull the PCBs out and make them disappear.

And so you have to work your way through all these kind of things.

And eventually, it's a reiterative process; it's a step-by-step process; you can't jump, you can't go from 1 to 25, you have got to go 1, 2, 3, 4, 5, 6. Because about the time you skip a step, the number 12 kills it and so then you have to back up and start over again.

So you go through this process and you

establish that the sample preparation technique works and that you are able to, one, prepare a solution that has with a known quantity of PCBs in it. Two, you are able to carry it through your sample preparation, your extraction, your cleanup, whatever you did. And, three, you get it into a format that you can deliver it to the instrument such that you can take your response on the other end and calculate what's back here.

And if it agrees with what you put in, you are happy. And then you can say, "Well, okay, you know, nice, clean, distilled water that I have spiked with PCBs, I can analyze that."

Now with PCBs the situation becomes more complicated because there's 209 isomers. Okay? So it's not just a matter of having sodium chloride, which is a single thing, and isolating that; it's a matter of making sure that whatever you do between when you put it in the water and you take it through the instrument doesn't change the ratio of those isomers of the 209 components in that particular PCB. Because if it does, then it don't look like your standard.

Q. And so you were involved in working all of that out in the fall of 1968?

A. Correct.

MR. PRAUSE: Before we transition to the next phase, I would like to request a short break.

MR. WRIGHT: Let me, let me ask about three or four questions.

MR. PRAUSE: Sure. I just wanted to give you a heads up.

MR. WRIGHT: Because I think I am about to a transition point.

MR. PRAUSE: Okay.

BY MR. WRIGHT:

Q. During this period, did you visit any of the laboratories that were doing pesticide analysis to see how they were doing it?

A. I'm sure I did.

Q. Well, which ones did you visit?

A. I don't recall specifically. But there was no -- whether I did during that specific time, I'm not really sure. I visited a lot of laboratories that did pesticide analysis.

Q. Eventually?

A. That's correct.

Q. Okay. But I'm asking: Before you started running samples through your machine, did you visit any laboratories? And if so, which laboratories did you visit?

A. All right. I would have to say that I probably did not during the specific period of time that you are referring to.

Q. All right.

A. I do know that Keller and some folks visited laboratories.

Q. Do you know which laboratories Dr. Keller visited?

A. Yeah, they went to Europe and visited Soren Jensen and Gunther Widmark in Sweden.

Q. Do you know when they --

A. I don't know exactly when. But I do remember that I had to get shots to go there and then I didn't get to go.

Q. Why didn't you go?

A. Well, they already had enough people going to get the information they needed and they wanted me back developing methods and establishing them in our laboratory. So it was a priority about who does what.

Q. Did they come back and give you any instruction?

A. Yes. They came back and gave me

information.

Q. What information did they give you?

A. They brought back prepublication copies of things and stuff like that. I don't remember specifically what it was; but they brought back all the information that they could get, both verbally and written, with regard to what was going on over there.

Q. Well, did they bring back information relating to the way that, that Dr. Jensen and Dr. Widmark had prepared their samples?

A. My recollection is, is that at some point, whether it was this specific point or not, we did obtain an unpublished prepublication copy of what they had done and how they had done it.

Q. And I'm just asking, was it before you started inventing your process?

A. No.

Q. Okay. Now do you know if Dr. Keller actually visited the laboratory or simply spoke with Drs. Widmark and Jensen?

A. I don't know if they specifically visited the laboratory. My assumption is if he went and talked to them he went over there and talked to them at the laboratory because that's where they were. But I don't know that they did.

Q. You don't know that?

A. No, I don't know that.

Q. What was the first laboratory that you visited doing this type of analysis other than your own?

A. I think the first laboratory I visited was probably in Crevecouer, it was in our Agricultural Division.

Q. I'm sorry?

A. I think the first laboratory, one of the first laboratories, that I would have gone to would be out at our Crevecouer location in St. Louis that -- at the Crevecouer location -- that the agricultural folks familiar with agricultural type samples and things of that sort. And I talked with those people. I don't recall directly.

But you're asking what lab that might have some knowledge of those kinds of things did I go to during that period of time? And I would have used my internal resources first --

Q. Well, what I --

A. -- because they were the most readily available to me.

Q. Okay. Okay. I'm afraid that's not responsive to the question I asked.

The question that I'm asking is, is what lab that was doing this electron capture gas chromatography analysis did you go to? What was the first lab other than your own that was doing that kind of analysis that you went to?

A. I can give you a list of laboratories that I know I have been to. Whether or not I can tell you the very first one at this point in time, we're talking -- I would like to understand that we're talking about 1968 and that this is 2000.

Q. Well, I don't know when it was, whether it was '68 or '69?

A. It could have been '69, too. But do you agree we're talking about '68 or '69?

Q. The very first time that you went to a lab other than your own that was doing gas chromatograph electron capture. And I understand that it was a long time ago.

A. I understand the question; and I was attempting to tell you that I can tell you the laboratories I had visited. I cannot specifically tell you the first one because I cannot recollect it because it is just a long time ago.

Q. Okay. And I'm just asking --
A. I think I have answered the question.
Q. Okay. You cannot recall the first laboratory other than your own that was doing that kind of analysis that you went to?
A. That's correct.
Q. And you can't recall when it was?
A. That's correct. You mean in terms of the specific day or month or year?
Q. Yes.
A. I think I can get the year probably.
Q. What's your best estimate of the year?
A. Probably in '69 would be my guess --
Q. All right.
A. -- would be when it happened.
Q. And can you tell me approximately how many other labs that were doing that kind of analysis you visited in, say, 1969?
A. No, not specifically.
Q. Last question, then we'll take our break.

Tell me the labs that you recall that you visited, beginning in 1969, that were doing the same type of analysis that we have been talking about, the gas chromatography electron capture.

A. The reason I'm smiling is, is that that is a very general, open-ended question. I have been in the business 33 years and I have visited thousands of laboratories.

Q. The only reason I ask --

A. They all do that kind of work, electron capture work.

Q. The only reason I asked you that question is because you told me that's the question you could answer --

A. That's right.

Q. -- that's the labs you went to --

A. I can tell you the labs that I have visited.

Q. Okay. Tell me, let me, let me close the end of the question as best I can. Even if you don't remember the first lab you visited, can you tell me some of the first labs --

A. Sure.

Q. -- that you visited?

A. I can tell you the labs that I visited during that period of time or close to it. There was WARF, Wisconsin Alumni Research Foundation, I visited Dr. Francis Coon and the folks there.

There was a lab down in Paxtaunt; there was a lab in Escambia; there was a lab in Duluth, Minnesota. There were -- I think, and I had correspondence with a number of places. But there were a lot of them.

But I don't, and that's strange, but I don't really recall the very first one I went to. I'm sure a review of the record could establish that, but I don't recall it. But those are some of the labs that I visited; and those were the kind of labs that were primary interested in doing that kind of work in those days. They were primarily government labs and university-associated laboratories.

MR. WRIGHT: Okay. Thank you. We can take a break now.

THE VIDEOGRAPHER: Off the record at 12:19.

(Lunch recess taken 12:19 p.m. to 1:18 p.m.)

THE VIDEOGRAPHER: This is tape two of the deposition of Dr. E. Scott Tucker, III. We're on the record at 1:10 -- excuse me, 1:18.

BY MR. WRIGHT:

Q. Okay. Dr. Tucker, I think when we left off was early 1969 and you were in the process of working out the analytical method for analyzing PCBs using that new equipment. And what was that called again, the equipment?

A. Oh, you're asking me? I thought you were --

Q. Yes.

A. -- asking the reporter. I'm sorry.

Q. That's okay.

A. Forgive me for daydreaming. The equipment, the new piece of instrumentation that we ordered because the other one that we had wasn't suitable for environmental work was an F&M Model 402 biomedical gas chromatograph.

Q. Do you know how long that equipment had been on the market?

A. The, are you talking about electron capture detectors, are you talking about gas chromatographs, or are you talking about that particular model?

Q. Well, let's start with that particular model.

A. Not very long.

Q. Okay. How about gas chromatographs?

A. Gas chromatography as in one form or the other, certainly to a much less sophisticated extent than it exists today even, has been around a long time.

Q. I guess some quantification. For example, was it used in the '50s?

A. It was originally called gas vapor chromatography. G, G -- I can't remember what it was. But it's like anything. You know, there is a Model T and then there's a Lexus Q45. They are both cars and cars have been around for a long time but there is a big difference between the Lexus and the Model T.

So gas chromatography had been around for a long period of time for uses; and it is a concept was available, but certainly it went through an evolutionary process like everything else.

Q. Had electron capture technology been around for a while?

A. Not as long as gas chromatography, I don't think. Now you had the fundamental concept of electron capture has been around since the world was invented; but the concept as we're using it here in terms of analytical chemistry --

Q. The equipment is what I'm asking you about.

A. And not the phenomenon?

Q. Right.

A. Okay. Now you're talking about electron capture detectors specifically for gas chromatography?

Q. Yes.

A. Have they be around a long time? Is that your question?

Q. Yes.

A. Define "long" for me, please.

Q. Rather than do that, why don't you just tell me when they came out?

A. Let's say that they were in existence when I was at Monsanto, obviously; I ordered one.

Q. How long before you ordered one had they been in existence?

A. And used for analysis of environmental samples?

Q. Yes.

A. Probably, gosh, not much more than, let's see, that was 19-, we're talking 1968, correct? So that would be, that's not too much, not too much earlier than that. Several years maybe.

Q. Let me ask you, this is one of the documents that I was provided this morning that you reviewed. We'll mark it as Exhibit No. 3.

(Deposition Exhibit No. 3 marked for identification.)

Q. Can you tell me what that is?

A. (Witness peruses document.)

Q. It appears to be an excerpt from a report of some sort?

A. Did you want me to tell you what I thought it was?

Q. Yes.

A. Okay, let me look at it and see if I can decide based on what you have shown me here what it is.

It looks like Pages 15 and 16 taken from a periodic report that was produced by the Functional Fluids Group in terms of projects they were working on, and specifically electrical fluids.

Q. Okay. What was the Functional Fluids Group?

A. The Functional Fluids Group was a group of engineers and chemists that made and formulated functional fluids for use in, in industry.

Q. Was it a subdivision of the Organic Division?

A. Yes.

Q. And so the Functional Fluids Division was the division that was responsible for Aroclors?

A. Yes.

Q. Do you recall who was the head of the Functional Fluids Division at that time?

A. You mean the Director of Research or his boss?

Q. Well, tell me both.

A. I think Howard S. Bergen was higher up; and then I think Bill Richard, Dr. Bill Richard, reported to Howard. And Richard was the Director of Research and Development for the Functional Fluids Group. And I think Bergen was like a Business Director or Vice President or something like that.

Q. Okay. And did they, did the Functional Fluids Group -- and I assume all groups at Monsanto -- prepare periodic reports?

A. Yes.

Q. And those reports were prepared for the management, I assume?

A. Yes.

Q. Would that have been the kind of report that would have gone to the Executive Committee?

A. You have to define what "Executive Committee" means for me.

This would be a report that would be certainly written by the folks who were being paid from the job numbers associated with functional fluids and budgeted and that kind of thing. And this report would probably go to Bill Richard and Bill Richard would be responsible for the whole thing. And then it would probably go to Howard Bergen.

A higher level than that, I don't know about the distribution; and in fact, there's no distribution evident on this.

Q. Well, the problem is it is a partial --

A. That's correct, as I stated earlier.

Q. -- excerpt.

A. So my answer to your question -- and please rephrase your question again and I'll answer it directly.

Q. Well, my question is a little bit of a general question.

A. I meant the question that you asked. I didn't -- could?

Q. The question, what I'm trying to find out is, is who those, who reports like that went to? Okay?

A. And I have given you all the knowledge that I have relative to that subject.

Q. Okay. As far as you know, a report from the Functional Fluids Division like that would have gone to Mr. Richard; and it may have gone higher, but you don't know?

A. That's correct.

Q. Okay. You heard me use the term "Executive Committee." Is that the first time you ever heard that term used in relation to Monsanto?

A. It may not be, no. It may not be. But the Executive Committee means the Executive Committee and --

Q. My understanding of the way Monsanto was organized at the time, and please correct me if I'm wrong, is that Monsanto had a committee that met approximately weekly that was called different things at different times. Sometimes it was called the CDC committee; I can't remember what those initials stand for. Sometimes the CAC. But it was a committee made up of upper level management that was responsible for making the important decisions for the entire company.

Did you ever hear of a committee like that during your time at Monsanto?

A. Well, Monsanto had 56,000 employees worldwide and I'm certain they had a number of committees that called themselves executive committees. Does that particular term that you brought forward to me mean something specific to me outside of the words themselves? No.

Q. Okay. You are not aware of a committee that met in St. Louis on approximately a weekly basis that was responsible for the upper level management decisions of the company?

A. You know, I think it's proper to keep in context that I was a senior research analytical chemist working at a bench level in the company. That I was a technical person. And that while I'm sure these things may or may not have existed based on what you are telling me and knowledge that I had directly or indirectly, it wasn't my focus.

Whether they met weekly, or whether they were made up of this, or whether they are made up of that, or whether they did this or they did that, that wasn't my venue.

Q. Dr. Tucker, I'm not asking you that right now. All I'm asking you is, is are you generally familiar that during your time at Monsanto there was a high-level management committee that went by different names during different periods of time but was made up of high-level managers that met on approximately a weekly basis?

MR. PRAUSE: Object to the form of the question.

Q. You can answer the question, sir.

A. The question from my viewpoint is so general and not clear enough that I couldn't answer it if I wanted to.

Q. All right.

A. And I'm happy to try to answer questions that I understand and that are focused enough to have an answer to.

Q. Okay. Did you ever hear a gentleman named Monte Throhdal?

A. Yes.

Q. What was Mr. Throhdal's position?

A. I don't know his exact title.

Q. What was his general title?

A. Well, he seemed to be everybody's boss, sort of. I don't, I don't know Monte Throhdal.

Q. Well, Mr. Throhdal gave a deposition in a case and he described a committee that he was on from I believe 1966 to when he retired in maybe '84. And he said, quote, "There's always been an Executive Committee of the Board. And an Executive Committee of the board was simply doing the Board's work at the time the Board was not at session. It was called variously different things. There was -- it was the Corporate Development Committee; it was sometimes called the Corporate Administrative Committee; it was sometimes called the Corporate Management Committee."

And my question to you, sir, is simply, is today the first time that you have ever heard any of those terms in relation to the concept of a upper level committee of managers and executives at Monsanto?

A. No, it is not the first time I have heard what you have gone through.

Q. All right. Were reports like the report you have in your hand forwarded to this committee -- whether we're calling it the Executive Committee or the Corporate Development Committee or the Corporate Management Committee or the Corporate Administrative Committee --

MR. PRAUSE: Object to the form of the question.

A. I would have to answer that I do not know. I'm sure Mr. Throhdal could answer that question for you --

Q. All right.

A. -- because he was on the committee, I was not.

Q. Okay.

A. So to be very frank with you, I tried to explain to you earlier that I was a senior research chemist at the bench level at Monsanto. At that time, I had joined Monsanto, what did we say, in 1967, latter part? And I doubt if I had been around long enough to got to that high a level in a company that large.

So are you asking me if I have direct knowledge that this report was passed on to a committee that you refer to as the Executive Committee? I do not have that knowledge and I would have to answer, I don't know.

Q. Okay. That wasn't my question, but I appreciate your answer.

A. Well, then I am obviously having problems understanding --

Q. Yes.

A. -- your question.

Q. We are. My question was, generally do you have knowledge of such a committee? We have now establish that yes, you have knowledge that there was such a committee at Monsanto during the time you were there, correct?

A. That is correct.

Q. All right. My second question is: Were reports like the one that you have there in your hand, reports of divisions of the company, passed to the Executive Committee? That's the question.

MR. PRAUSE: Object to the form of the question.

A. That question has been asked and answered and I'll answer it again.

I don't have any direct knowledge of the subject that you are talking about. I do not know, did I ever witness or see any indications that these reports were passed forward to them.

I don't doubt that what you are telling

me may be true. But on the other hand, you're asking if I have direct knowledge and can testify to to the fact that it was done, and I can't.

Q. Well, with all due respect, sir, I'm not asking you whether you saw the report get handed to a member of the Executive Committee. I'm just asking you, during the years that you were at Monsanto, were you made aware that reports like the one you have in your hand were forwarded to the Executive Committee?

A. No.

Q. I mean --

A. No.

Q. -- Dr. Keller ever tell you, "Look, guys, we need to write this up, we need to send it to the Executive Committee, they're going to be considering this next week"?

MR. PRAUSE: Object to the form of the question.

Q. Anything, or anything like that?

A. Absolutely not. He would say, "This report is for Bill Richard." And what Bill Richard did with it outside of discussing it with us is what Bill Richard did with it. So absolutely not.

Q. Did you ever at your time at Monsanto ever make a presentation to the Executive Committee?

A. I think at some point in time I was asked to make a presentation that would fit the description of the Executive Committee that you have been telling me about.

Q. Okay. Do you remember when that was?

A. No. I'm sure it's documented but I don't remember specifically.

Q. It related to PCBs, obviously?

A. I would assume that it did, yes.

Q. Did you only make one such presentation to the Executive Committee?

A. That would be, that would be my guess, yeah.

Q. Is it your testimony, Dr. Tucker, that it wasn't a memorable experience to someone in your position to make a presentation to the Board of the corporation?

A. It is my testimony that the period of time that we are talking about is 32 or 33 years ago and I have been around long enough to have many memorable occasions in my career. And while I'm sure that that was a memorable occasion, I'm also quite sure it was part of my job and that I was asked to do it and at the level I was at in Monsanto I probably wasn't asked very frequently to do it. And that I probably wouldn't even know who that committee was or what their objective was.

I would probably just simply know that I had to go and discuss what I was doing because somebody like Bill Richard had asked me to because they didn't speak the technical language well enough and they wanted to show that they wanted to present something where I was at or something.

Q.   So it's your --

A.   So I don't doubt it.

Q.   So it is your testimony when you gave your presentation to the Executive Committee you didn't know you were giving your presentation to the Executive Committee?

A.   I don't recall it as being, as their saying to me, "Okay, you're giving a presentation to the Executive Committee," or something of that sort.

You yourself called it several different things, so. But that's fine.

Q.   Well I'm asking you any of those

things --

A. And I'm answering your questions --

Q. Yeah.

A. -- and I think I have done that, so we can continue.

Q. Do you have a recollection of giving a presentation on PCBs?

Well, you have already indicated that you have a recollection that you probably gave such a presentation at some point to a committee like the committee that I described?

A. I recall being asked to give -- at one time being asked to give a report on the status of what I was doing to rather high level people in Monsanto. But to be real truthful with you, I'm a senior research scientist and a chemist and, you know, that's fine, that was good for those folks and that's what they did. I did what I did.

Q. And you don't remember when that was?

A. Not specifically, no.

Q. Do you remember what the presentation that you gave was about?

A. I think we have already established that it was probably about PCBs.

Q. Do you remember it in any more detail?

A. Again, I'm going to, I'm going to try to make this clear and I'll continue to say it again and again. And that is, is that we're talking about a subject that was 32 years ago; and you're asking me very specific dates and times and things of that sort, and I'm trying to recollect those to the best of my ability and I think I'm doing that.

But I'll tell you very frankly, in 32 years ago, I don't know what I did almost on any specific date specifically. And that's the way it is.

Q. Okay. Let me object, nonresponsive.

My question is simply, do you recall anything more about your presentation to the Executive Committee than the general subject matters of PCBs?

A. No.

Q. Do you remember anything more about when this presentation was other than it was some time during your tenure at Monsanto?

A. No.

Q. Now could I have Exhibit No. 3 again for a moment?

A. Certainly.

Q. There's a project described in Exhibit

No. 3; and just for the record, what is that project?

A. The pages given me it is stated on Page 15 at the top, "Project." And then it says, "Electrical Fluids - Part V - Air and Water Pollution Control."

Q. And there's a date on that excerpt, is there not?

A. There is a, in the upper right-hand corner there's something that says "FLU," which I assume means fluids, "-030 Part V." And then in parentheses there's "(7/68)," which I would assume is July of 1968.

Q. Okay. Look at the next page.

A. That's Page 16?

Q. Yes.

A. Okay.

Q. And is there a date down at the bottom?

A. Yes. It says July 18, 1968.

Q. Okay. And it, this project, air and water pollution control, the first objective indicates, "Follow developments in analytical chemistry leading to more sensitive and specific methods for identifying Aroclors in our environment.

"2. Keep in touch with laboratories doing research on environmental contamination by Aroclors including university, FDA, USDA, Fish and Wildlife Service.

"3. Study present methods for disposal of Aroclors and if necessary develop safer ones.

"4. Assess possible toxic effects on humans."

Did I read the objectives correctly?

A. Yes, you did.

Q. Okay. And then for the justification -- I'm going to paraphrase -- it indicates that, well, the first sentence, "During studies of the fate of chlorinated organics insecticides, biochemists have isolated unknown chlorinated hydrocarbons which they have tentatively identified as chlorinated biphenyls. These have been shown to be present in some fish, birds and wild animals in certain areas at concentrations of the parts per million range."

And then it talks about public health authorities being interested and that Monsanto may need to cooperate in developing disposal procedures and so forth in order to avoid restrictive legislation. Correct?

A. Is your paraphrasing correct?

Q. Yes.

A. It's, it's, yeah, it's fine. I mean, your paraphrasing is probably as long as the statement.

Q. Okay. Well then, so that we have a nice clear record, let me ask you, Dr. Tucker, to read the justification section that follows the objectives section that we just discussed.

A. Okay. Be happy to do that.

"Justification: During studies of the fate of chlorinated organic insecticides biochemists have isolated unknown chlorinated hydrocarbons which have been tentatively identified as chlorinated biphenyls. These have been shown to be present in some fish, birds and wild animals from certain areas at concentrations in the part per million range. Public health authorities have therefore felt that it was necessary to determine whether or not environmental contamination by chlorinated biphenyls is a hazard to human life or health. It is vital that we cooperate in these studies so that we can be sure that the results are valid and know that we can assess the impact of the findings of the on the Aroclor business. We may need to cooperate with -- we may need to cooperate in developing disposal procedures which will not result in harmful contamination in order to avoid restrictive legislation."

Q. Then would you read the status section?

A. "Status: At present, we are collecting all available information on this problem. The medical department is following the toxicity -- toxicology and will start a test program at Calandra Labs to determine biological effects of trace Aroclor. The research will evaluate the validity of published analytical identification. Samples of Aroclor, and in some cases of pure chlorinated biphenyl isomers are being made available to government and university laboratories working on this problem for use as calibration standards."

Q. And then the next section is entitled "Plans." Correct?

A. Yes.

Q. And there are some initials next to the responsibilities?

A. Uh-huh.

Q. Correct?

A. Yes.
Q. The first item is what, sir?
A. And I assume you're talking to the first item under "Job"?
Q. Right.
A. And it is, "Assess validity of analytical methods used by workers in this field."
Q. And who is tasked to do that?
A. The persons tasked with that responsibility are Dr. Robert Keller and Dr. Scott Tucker.
Q. Your initials ST, standing for Scott Tucker, correct?
A. That's correct.
Q. And then a target date of March 1969?
A. That's correct.
Q. Is the handwriting on this page yours?
A. It looks to be my handwriting, yes.
Q. Can you --
A. My copy is not very clear, but I would say based on the clarity that I have here that it probably is my handwriting.
Q. My copy is not very clear, either.
My question is, there's some handwritten modifications to the first job. It says "Assess

validity of," and it says, "analytical methods" in the typewritten text. Can you tell what is handwritten?

A. No, I can't. Can you? And I'm not being, that's not challenge, I can't read it.

Q. I can read the last two words, I can't read the first. It says "other workers" and I can't read what the first word is.

A. I can recognize that it could be "of the workers" or "other workers," either one.

Q. Okay.

A. And I'm honestly not sure what that -- well, I'm not sure what that first word is either.

Q. Okay. And that appears to have gotten the handwritten 2 and a circle next to it, correct?

A. Uh-huh.

Q. And then the one right below it says, "Collect information on all work being done by others in this field." And that got a handwritten circle and a 1 next to it, correct?

A. Yes.

Q. And you're one of the three people tasked with that, correct?

A. Yes.

Q. The others being WRR, which is Mr. Richard?

A. That would refer to Dr. Richard, yes, that's correct, Bill Richard.

Q. EW, Elmer Wheeler?

A. Right.

Q. He's in the medical department?

A. That's correct.

Q. And yourself, Scott Tucker?

A. Correct.

Q. I assume that it was your job to get the information being done by other analytical chemists?

A. Correct.

Q. And it was Elmer Wheeler's job to get the information relating to, of a medical nature?

A. Yes.

Q. And Mr. Richard's job to basically oversee both of those tasks?

A. And gather information from the people he knew in the business, too. I mean, we all had, were tasked with the same thing at different levels and in different areas.

Q. What information do you recall Mr. Richard ever gathering?

A. In terms of functional fluids?

Q. Yes.

A. Certainly he would know -- and I don't know that he knew, but my guess is, is that he knew who they were being sold to and what kind of work those people were doing on the fluids and things of that sort so...

And I know that, for example, Bill Richard went to Europe and talked with Widmark and Jensen. He had a Ph.D. in chemistry, he wasn't not technical.

Q. And that's the meeting we already talked about and the information that you got back from that meeting we already talked about it?

A. That's correct, we talked about that earlier.

Q. Now I'm going to skip the third task, since you're not, "Determine present disposal methods for Aroclors," you're not tasked with that.

The fourth job is, "Toxicology Review with government agencies, research institutes and then start outside test program." And you are one of the people tasked with that, correct?

A. That's correct.

Q. And then you have numbered, "Review with government agencies, research institutes," you have numbered that 3, correct?

A. Uh-huh.

Q. And then "Start outside test program," you have numbered that 4, correct?

A. That's correct.

Q. And then you hand-wrote in number 5, which says, "Source." Do you recall what you were referring to when you did that?

A. When I did what?

Q. When you wrote "Source" as job number 5.

A. Yeah, I think there was, at that point in time, there was significant questions as to what was the source of the PCBs that had been seen by the few people who had seen them.

Q. Okay. And so that was one of the jobs that you were assigned?

A. It was one of the jobs that I was assigned to contribute to. It wasn't specifically assigned to me, as you have pointed out.

Q. Well you were the only analytical chemist involved in this project, correct?

A. That's correct. And that means that I would be charged with responsibility for the analytical chemists associated with each of these items.

Q. And what that means specifically with job number 1, you were the only person that was in charge of -- well, you and your boss, Dr. Keller, who we have talked about his contributions -- were assigned with assessing the validity of the analytical methods used by the workers in the field, correct?

A. That's correct. By the way, Dr. Keller did have a Ph.D. in analytical chemistry.

Q. I understand. You have given me the information that he gave you, though, correct?

A. Uh-huh.

Q. Can you answer out loud?

A. Yes. If we are referring to an earlier question?

Q. Yes, I'm referring to the discussion this morning.

A. Okay.

Q. I asked you to give me all of the information that he gave you about this project. Do you recall that?

A. To the point that we pursued it, yes.

Q. Yes.

A. And to the point where you had asked me if what he had told me about the polychlorinated biphenyls and the text and things of that sort and his visit to Europe.

Q. Right We've gone through the spring of '69, I thought?

A. Sure. I thought I got the feeling we were talking about something else for some reason.

Q. No. You told me everything that he gave to you through the spring of 69, correct? If not, I would like to know what else he told you.

A. I believe I have relayed to you in answers to your earlier questions the answers to those questions.

Q. Okay. That's what I thought.

A. If you are going somewhere we haven't been, you know, just let me know and I'll try to answer your question.

Q. No. I'm asking you to tell me what other information Dr. Keller passed on to you about this project other than the information that we have already talked about?

MR. PRAUSE: When?

Q. Through the spring of 1969.

A. Yeah. That's fine.

Yes, I have related that to you.

Q. Now with respect to job number, the second job the page, which you have marked as job number 1, "Collect information on all work being done by others in this field," we have talked about your job was to collect all of the analytical chemistry being done by all of the other analytical chemists in the field, correct?

A. Yes.

Q. And you were the only person who had that duty other than perhaps Mr. Richard through his contacts in the business?

A. And his contacts in Europe an his contacts with government people and things of that sort.

My prime responsibility was to be a focus for the collection and evaluation of that information. If any of these other members that had responsibilities associated with it obtained information of that sort, they passed it to me.

Q. Okay. And my question right now specifically is, is did Mr. Richard through the spring of 1969 pass any information to you about analytical chemistry?

A. He could have.

Q. Do you remember any?
A. Not specifically.
Q. Do you remember any generally?
A. If -- all I can say relative to that question, yes, I remember generally.
Q. Okay. What do you remember generally that he passed to you?
A. That Bill was tasked with the fact that if he received any prepublications or any information relative to analytical chemistry that he should pass it on to me to be evaluated. So my assumption is whatever he received under that period of time he passed on to me. What it is specifically, I do not recollect.
Q. Well, and my question is: Do you recollect that he passed anything on to you?
A. Oh, yeah.
Q. You just don't recall what it was or what it related?
A. Very specific, yes. I do -- now wait a minute.

You asked me if I recall specifically what it was. The answer to that question has been answered no.

What it related to is what we're

discussing. It related to analytical chemistry and any information he obtained from whatever source, and he would pass that on to me to be evaluated. So that's what it related to.

Q. Then you have no better recollection than that --

MR. PRAUSE: Object to the form.

Q. -- about anything Mr. Richard passed on to you through the spring of 1969?

MR. PRAUSE: Argumentative.

A. Yes.

Q. I'm not arguing with you, I'm just trying to ask you --

A. I didn't say you are arguing with me.

Q. I understand.

A. I'm on the record here and I did not say that.

Q. I understand?

A. Yes, I believe is the answer to your question.

Q. And just so that the record is clear, you don't have any better recollection of anything that Mr. Richard passed on to you through the spring of 1969 other than what we just talked about?

A. Yes.

Q. And then the other tasks that you were involved in that -- the one that you have numbered 3, "Review with government agencies and research institutes," you were the only analytical chemist who had any responsibility for that?

A. No, I, I believe that if we are talking about the fourth item in the job list that Dr. Keller's name or his initials, at least, are there, indicating he had responsibilities associated with that. And he was an analytical chemist --

Q. Okay. Well --

A. -- as we discovered earlier.

Q. -- I understand that. But I thought, other than what we have talked about already with regard to Dr. Keller, you were the person at Monsanto who was in charge and who did what you have numbered as item number 3, i.e., "Review with government agencies, research institutes relating," and I'm adding now, relating to analytical chemistry issues.

A. Dr. Keller had contacts with government agencies, he had contacts with other laboratories. He had contacts with other researchers. He was an analytical chemist; he knew other analytical chemists.

So it stands to reason that he also had contacts with those people; and that he would be concerned about the same things that I was; and that he would receive information of that sort; and when he did, he would pass it on to me.

Q. Let me object, nonresponsive.

I understand that, that you're assuming that he passed on information on to you? My question to you is --

A. No, I'm not assuming that he passed information on to me. I recollect that information was passed on. That's the way it worked. What specifically, I don't recollect.

Q. What information did Dr. Keller pass on to you relating to any review with government agencies or research institutes relating to analytical chemistry?

A. I'm sure we established earlier that he passed on information from Dr. Widmark --

Q. Right. So --

A. -- so that's an example.

THE REPORTER: Gentlemen, on at a time, please.

Q. Other than what we already talked about, you don't recall any other information from Dr. Keller relating to this job number 3?

A. Not specifically.

Q. Okay.

A. What about generally?

Q. Other than what we have already talked about?

A. If, in general, if Dr. Keller obtained information relative to analytical techniques that were being used or information from any of his contacts, he would pass it on to me. In that context, I assume we have already talked about that; so that's what you're talking about I already talked about?

Q. Let me object, nonresponsive.

A. Okay.

Q. You have indicated that you don't have any specific recollection of any information that Dr. Keller passed on to you?

A. No more specific than the fact that it had to do with the subject that we're talking about.

Q. Do you have any general recollection of any information that he passed on to you relating to any reviews with government agencies or research institutes?

A. In general, he was tasked to share that information with me. What it is specifically, I don't recollect.

Q. Then item number 4, "Start outside test program." What did that relate to?

A. My recollection at this point is that referred to the industrial biotests exposure of animals for toxicology purposes.

Q. And you were involved in the analytical chemistry of that project?

A. Yes.

Q. Correct? Was anybody else or were you in charge of the analytical chemistry part of that industrial biotest program?

A. Yes.

Q. And then 5, "Determining the source of the PCBs," were you the one that was primarily in charge of that task?

A. Within my area of responsibility, yes.

Q. Now and as far as you are aware, this is, this July 18, 1968, is the first time this project was initiated?

A. No.

Q. I'm sorry?

A. You asked me if I had direct knowledge that this document indicates that this was when this project was started? I have no direct knowledge of what this document says.

Q. I'm saying -- let me object, not responsive.

I'm saying as far as you know, as far as Dr. Tucker knows, this is when the project was initiated, July 18, 1968?

A. The project in question is what we read earlier --

Q. Air and water pollution --

A. -- Electrical Fluids - Part IV - Air and Water Pollution Control.

Q. Yes.

A. No.

Q. Are you aware that it was continuing before that --

A. I am --

Q. -- or that it was existing before that?

A. You asked me if I had any specific recollection that it couldn't have had, there couldn't have been a report like this before.

Q. No, that's not --

A. I haven't the faintest idea.

Q. No, sir. Let me object, nonresponsive. That's not my question.

A. I don't understand your question.

Q. My question is: To the best of your knowledge, this is the first time that you were made aware of this project, Electrical Fluids - Part VI - Air and Water Pollution Control?

MR. PRAUSE: Object to the form of the question.

A. That's a compound question and we need to break it down into parts so I can answer the parts or not.

Q. No, the question is real simple. It is: To the best of your knowledge, this is the first time that you became aware of this project? I've rephrased it to make it a little bit easier, I think.

A. No.

Q. Okay. When had you become aware of the project before July 18, 1968?

A. The initial information was at or about that time. But aspects and portions of this -- for example, what are polychlorinated biphenols and what are they doing in the environment and does that measurement measure that thing and that sort -- those questions were asked at or about this time and they could have been asked before. So you're asking me to categorically say based on my knowledge I know that they were not asked before that.

And I think we discussed that aspects associated with these things were asked before that. So that's why I'm having difficulty giving you the answer you apparently want.

Q. Let me object, nonresponsive.

You were not aware of this project existing before about the time that the document indicates. Is that fair?

A. Yes.

Q. All right. And after this period of time -- after this time, July of 1968, you, is when you began work on this, the jobs that we have discussed, correct?

A. Yes.

Q. And we have already discussed to some extent what you did, particularly in relation to beginning to develop an analytical method for evaluating PCBs. Have we already discussed everything you did regarding collecting information on all the work being done by others in the field?

A. Yes. To both of those questions.

Q. Okay. Have we discussed everything you did with regard to reviewing with government agencies and research institutes?

A. Yes.

Q. I don't believe we have discussed what you did with regard to starting an outside test program. So would you tell me what you did with regard to the job that you numbered as number 4, "Start outside test program."

A. Yes. As we had covered earlier, I think, there had been statements with regard to evaluating in more detail toxicology information associated with PCBs. The information up to that point in time was certainly everything everybody wanted; but with the advent of them potentially being places where people were surprised, they decided they wanted to learn more about the information.

In general, toxicological studies do not involve tissue residue analysis or any effort to establish actual feed concentrations or to do any sort of a material balance in the biological systems that are being exposed to the food that's intentionally contaminated with what is being tested at known concentrations.

In this particular instance, since the materials were thought to be found as residues in biological samples, eagle feathers, it was felt that the toxicological program should include provisions for the collection of tissues and fluids and organs and things of that sort from the animals that were exposed to the Aroclors for toxicity purposes.

In order to make sure that these studies had the appropriate number of animals and that could generate enough material for us to analyze and those kinds of logistics, I was included to provide what I would need or the group I was working with would need to do the analysis and to determine the distribution of these materials in the biological systems; and in some essences, essence the fate of the materials -- what happened to them as they went through the biological system.

I hope that answered your question.

Q. It did. When did you begin that?

A. My guess would be on or about July '68.

Q. Do you recall when the industrial biotest program was begun?

A. Not specifically.

Q. When did you determine that -- well, how did you assess the validity of the analytical methods used by workers in the field?

A. Well, first of all, the analytical methods being used by workers in the field were not designed for PCBs, they were designed for pesticides. It was just an ancillary event that made a mutant begin to think or discover that some of the peaks that they were seeing could be due to something else besides what they were specifically looking for.

And the way they did that was they took a portion of an extract and used a technique to qualitatively identify the molecular structure of the component -- not necessarily how much was there or where it came from or any of that kind of thing -- but, "Gee, what was this peak that doesn't fit any of the pesticides or things we're looking for?"

And in doing that, they identified the molecule as being a higher chlorinated, specifically higher chlorinated group of PCBs.

So the methods that were in the literature were not specifically designed for PCBs and it wasn't known whether they worked in a quantitative fashion. It wasn't known that they weren't subject to a multitude of interferences. It wasn't known that they could be used to actually quantitate the measurement or decide which PCBs were present, or any of those kinds of things.

So in order to establish the validity of those procedures and in some instances modify them so they would work for the analysis of PCBs if they happened to be present and determine that, we had to look at what they were doing; we had to see how they did it; and we had to take PCBs through that methodology and where necessary modify it so that it worked.

Q. When did you determine that you agreed that it was in fact PCBs that were being found? Or did you ever doubt it? Let me ask that question first.

A. Oh, certainly. Absolutely. It was, it was, I think everybody doubted it. Nobody understood any of the transfer mechanisms or any of that kind of stuff. It just wasn't the state-of-the-art at that time. Everybody had the same questions as to where could they potentially be coming from?

And as it turns out, they could and did come from multiple sources.

Q. So you are saying that in the late summer of 1968 everybody doubted that it was in fact PCBs that were being found?

A. Well late 1968, I think we're talking about one verbal response from a scientist in Sweden who found PCBs in eagle feathers.

Q. That was your understanding of what --

A. No, it was my knowledge.

Q. -- the state of the, the state of the knowledge as of late 1968?

A. Late 1968? That was close, yes.

Q. And so having only that report available to you, you doubted that what he had found was in fact PCBs?

A. It wasn't my job to doubt, it was my job to confirm. And so I kind of object to being characterized as doubting. So I would like to clarify that and say my job was to confirm that they hadn't made a mistake; that, indeed, their scientific interpretation of the theoretical information and the new information they had was correct in my opinion as an expert in the area. And so that's what I did.

Q. And when did you confirm that?

A. When did I confirm that Soren Jensen's work was correct?

Q. No. Well, okay, let's start with that question. When did you first confirm that Dr. Jensen's work was correct?

A. The confirmation of Dr. Jensen's work was confirmed at the stage of the game where evaluation of the technique showed they could do what they do.

We had no reason to doubt his integrity and that he wouldn't do what he -- do it correctly and things of that sort. So I don't think there was necessarily for a period of time a question that these were actually biphenyls; I mean, that was settled early on. The source of those materials was indeed a question. And whether or not they were being accurately measured was indeed a question.

And since GC mass spec was the only way of absolutely -- since GC mass spec was the only way of absolutely identifying PCBs and since these were the only people that did it and with just a few samples, a handful of samples, I mean, all the other things that were bandied around as potentially being PCBs were just that, they were conjecture. They weren't reality yet.

Now your question to me is when did I determine that PCBs were real?

Q. No. No, that's not the question.

When did you form the opinion that Dr. Jensen's work was valid to the extent that he had found PCBs in the materials that he said that he had found them in?

A. About the time that I had completed establishing the methodology in our laboratory and was satisfied that it worked and was actually beginning to analyze environmental samples of our own was when I began to really understand that what he had done was correct.

Q. And when was that?

A. Well, I think that would have to be in '69.

Q. Do you know when in '69?

A. I'm trying to remember. It would have to be early in '69. It would be when we first --

This isn't a, a black-or-white question

or a yes-or-no question. This is an understanding of what has been done in the assimilation of the information so that a pattern creates and then you can set the pattern.

And we had to verify in our own laboratory that what he was doing was correct and that we got the same kind of results. Not the same exact results; we never exchanged samples with him.

My guess is in 1969, first quarter, second quarter, in that range.

Q. Why didn't you exchange samples with him?

A. First of all, we weren't -- they were the first people in the world to connect a mass spectrometer to a GC and they did it in conjunction with LKV, which was a European manufacturer of mass specs. And it was a one-of-a-kind instrument that had just been hooked together and done once; it was a major breakthrough.

The gas chromatograph and the mass spectrometer operate at different ends of the spectrum. A gas chromatograph operates under pressure; a mass spec operates under a vacuum.

The wherewithal for connecting the two had to be developed so you could run the sample through the chromatograph and into the mass spec. So there were a lot of technical breakthroughs required to do that; and, frankly, they were the only people capable of it. That's why they did it first.

Q. And that's why you didn't share samples with them?

A. I could share samples with them. Why would I -- I mean, we did actually provide standards and things of that sort of thing through in Britain with the folks over there. But there wouldn't be any sense in exchanging samples, we hadn't established the techniques in our laboratory at that point in time.

Q. I thought you said you didn't provide samples to Dr. Jensen and Dr. Widmark?

A. We did not provide samples; we provided standards. It turned out that Monsanto provided everybody in the world standards for PCBs because we made the materials and we were the sole U.S. manufacturer of them.

MR. PRAUSE: When you get to a good point I'd like to break. We've gone for an hour. If this isn't it, and you want to go for another five minutes or so, that's fine.

MR. WRIGHT: Yeah, I would like to finish up this point.

MR. PRAUSE: Sure.

MR. WRIGHT: We can take a break if you would like.

MR. PRAUSE: If it's good for you.

MR. WRIGHT: It's all right.

MR. PRAUSE: Okay, thanks.

THE VIDEOGRAPHER: We're off the record at 2:18.

(Recess taken.)

THE VIDEOGRAPHER: We're on the record at 2:38 -- I'm sorry, 2:30.

MR. WRIGHT: I tell you what we can do, though, is rather than all of us getting a copy of this, we'll just have, that will be the original and stay with the original deposition. And then we can just get a list of the numbers from you, from Ms. Court Reporter, rather than you making three or four sets of all of these documents.

Do you understand what I'm talking about?

THE REPORTER: Yes, sir, exhibit number

what?

MR. PRAUSE: Okay. So this stack of documents with the exception of the one you have been talking about will be Exhibit 4?

MR. WRIGHT: Exactly. Yes.

MR. PRAUSE: So with the exception of MONS 037992 through 037993, the remainder of the documents that Dr. Tucker reviewed will be designated as Exhibit EST4.

MR. WRIGHT: Yes. So let's make sure that we get it on the record.

(Deposition Exhibit No. 4 marked for identification.)

BY MR. WRIGHT:

Q. Dr. Tucker, we have talked about Exhibit No. 3, which is a document out of the stack of documents that you reviewed before your deposition today and brought -- and the attorney that is representing Monsanto brought to the deposition today, correct?

A. Yes.

Q. Okay. Exhibit No. 4 is the remainder of the documents that you reviewed in preparation for the deposition and which were provided to you by the attorney from Monsanto, correct?

A. Yes.

MR. WRIGHT: And we have agreed, Mr. Prause, that, rather than each of us getting a copy of this entire stack of documents, that what the court reporter can do is compile a list of Bates numbers and append that to the deposition as Exhibit No. 4?

MR. PRAUSE: Yes.

MR. WRIGHT: And whoever maintains the original will just maintain the original stack of documents as Exhibit No. 4.

MR. PRAUSE: That's acceptable.

MR. WRIGHT: Okay.

MR. PRAUSE: I guess we should also clarify, these represent the documents that Dr. Tucker has specifically reviewed in preparation for this deposition. He is also relying, though, of course, as an expert and factual witness on his background, his academic work.

I just don't mean to represent to you that everything he is saying is based on this stack of documents; but those are all of the documents that he specifically reviewed in preparation for this deposition.

MR. WRIGHT: I understand that.

MR. PRAUSE: Okay.

MR. WRIGHT: That is what I had understood.

MR. PRAUSE: Right. Great.

BY MR. WRIGHT:

Q. And by the way, these documents were provided to you by the attorney for Monsanto for your review, correct?

A. Yes.

Q. Okay. Are there any documents in this stack that you specifically requested Monsanto provide you?

A. No.

Q. Now a question that I asked you earlier related to how you read chromatograms. In other words, what that means. And I believe in this stack is the method that you worked out, your analytical method, correct?

A. There are a number of analytical methods that were worked out in there and a number of special studies and a number of other things.

MR. PRAUSE: This may be the one you have in mind.

A. Can you review the earlier question that you are referring to relative to the chromatograms, or was that off the record?

Q. Well, it was kind of at the end of our morning session where I told you that I was going to ask you to explain how you read a chromatogram.

A. But that was off the record?

Q. Okay.

A. That was not a question that you asked me --

Q. I'm not arguing with you.

A. I'm not arguing with you, either. I'm just trying to establish where we were at in terms of was that a question that was asked earlier while we were on the record? If it was, I don't recall it. If it was the one that was asked as we broke after we went off the record, then I recall it. That's why I --

Q. It was the one that was asked as we broke.

A. I just want to understand the question.

Q. Yeah, it was the one that was asked as we broke. And what I'm trying to find is the first official analytical method that you...

All right. Let me hand you what's

marked as MONS number 079347 and ask you what that document is.

A. Do you want the last number, too?

Q. The ending number, yes, go ahead and give us the ending number.

A. The ending number on this document is MONS 079383. The document I have been handed is "Analytical Chemistry Method 71-35." It is a consolidated revision of earlier analytical chemistry method 69-13 and 70-1, according to the statement on the cover. And it's entitled, "Analysis of Environmental Materials for Polychlorinated Biphenyls."

Q. Is that something that you wrote?

A. Yes.

Q. Or prepared?

A. Yes.

Q. Okay. When was that prepared?

A. Well, the clues that I have on the front page are 71-35. So this particular document would be the 35th document, 35th analytical chemistry method in 1971. It is a consolidated revision of analytical chemistry methods 69-13 and 70-1, which would in turn indicate that it was in some way derived from method, analytical chemistry method

13 in 1969 and analytical chemistry method number 1 in 1970. And from the best of my recollection that's what I recall the way the numbering system went at that time.

Q. Okay.

A. I don't -- I can look but I don't see any other specific dates on this document or this copy of the document.

Q. Okay. Well, what I would like to focus on is if you could walk us through the way your method worked.

A. Okay. It's the way the method worked. And in essence, this is the kind of document that would be handed to an individual who wanted to know, "How did we do the analysis?" And in turn, might, indeed, want to know how they should do the analysis.

And actually contains enough information that they should be able to read this, provided they are educated in this skill, and be able to reproduce it and set it up in their own laboratory and do exactly what we did and get the same results.

It is one of the ways that analytical chemists communicate with each other in terms of how to do things; they are called standard operating procedures today. At this point in time it was before we had EPA and things of that sort and we didn't have standard operating procedures; but it would be today called a standard operating procedure, and it would be a standard method.

So it starts out with the title that we have already talked about. Then it goes into the scope of what the method is is intended, kind of like a background. And then it discusses the principles upon which the method is based.

And then it discusses an item called reagents, which are the chemicals basically and solutions prepared from chemicals, which are what reagents are, that will be required to perform what is in this particular standard operating procedure.

The next section discusses a thing called apparatus. And in the apparatus section are the physical vessels and analytical type tools, just like if you were a mechanic, that would be required to manipulate the sample in question that you are analyzing and the standards and the quality control samples and things of that sort through the procedure and obtain the final results from the instrument.

The last -- the next section talks about procedures and it has sampling. And then it talks about the matrix, which in this particular instance is water, and the extraction of the water samples.

In other words, how do you treat the water sample to get out of it what you want and to get it out in such a fashion that it can be presented to the next step or to the actual instrument and determine what's in it in the way you have decided to do that?

It talks about the extraction of water samples; it talks about sediment and soil, the extraction of the sediment and soil samples. The first step obviously at this point is that you need to take a sample itself and get the material that you're interested in out of it quantitative or as quantitative as you can without altering it in any way, shape or form and get it into a form that then can be taken to the next step in the procedure.

It talks about whole animal, poultry, fish, individual tissues. And by that it means muscle, liver, fat, kidney, heart, spleen, lungs, et cetera. It talks about extraction of these tissue samples. And then it talks about milk and it talks about, in the case after milk, it talks about sample cleanup procedures.

Some samples, depending upon what the bulk of the matrix is made up of, require special treatment to ensure that the materials in question are isolated in their entirety and also to eliminate any interferences and leave those behind. And we use sample cleanup methods to do that.

And the sample cleanup methods called out in this particular procedure are designated as DMF/hexane partition; and that's dimethylformamide, which is a, a means solvent, hexane partition, and a chemical treatment. Chemical treatment involving things like --

THE REPORTER: I'm sorry, "involving things like..."?

A. I am sorry, I completely forgot about your, about going too fast for you and I apologize. Wouldn't you like to be a student in a class I was lecturing to?

Saponification with alcoholic potassium hydroxide and extraction with sulfuric acid. And those are types of cleanup procedures.

Another type of cleanup procedure that is used to remove --

Q. Why don't we kind of shot cut through the cleanup procedures and go straight to assuming you have a clean sample ready to go, what do you do?

MR. PRAUSE: Do you mean concentrated already, too? Or just clean?

Q. Yeah. After you, after you clean up the sample then you have to concentrate it?

A. Very timely. The next thing was liquid/solid chromatographic cleanup, which is the last cleanup procedure. And then there are evaporative concentration procedures which are used because the solvents, you know, end up with an unspecified large volume of an organic solvent with the materials of importance in it.

And those have to be evaporated down to a known volume that you want, so that it concentrates the sample so that you have enough of the material to analyze for it and you have to do it without losing it, that's the step that -- the last step before you are ready to run it through the electron capture gas chromatograph and determine whether or not these steps will work for you.

Q. Okay.

A. Sometimes these steps need to be repeated if it is a particularly difficult matrix and that kind of thing.

At this point in the methodology it describes the electron capture gas chromatograph instrument being used. That's the important thing for other people; if you don't know what kind of instrument they're using, then it's hard sometimes to reproduce what they're doing, at least at the state-of-the-art in the 1960s. Today that is not the case necessarily.

The instrument used in this particular instance was a Hewlett-Packard 5750; that's a designation of the company that manufactures it. It was termed a research chromatograph and/or a 402 high efficiency gas chromatograph. And I believe you have heard the 402 terminology earlier.

Q. Yes, you mentioned that.

A. All right. The next specifies the detection system used with the chromatograph. And in this particular instance and in all the instances in our work we used high temperature nickel 63 electron capture cells.

Next it specifies the column that was used in the instrument, a glass, spiral; and it also specifies the packing in the column and the liquid phased on the packing that's used to effect the separation of the materials that are injected into it.

Next it describes the column temperature conditions which are used, which is another important parameter that is used to define how a chromatography is done. Next it specifies the temperature range that the detector is held at; and there are important reasons for that, too.

It also specifies the injection port temperature. It also specifies the pulse rate that is used with the, with the electron capture detector.

It also specifies the flow rate for the carrier gas; and the carrier gas is what effectively carries what you want to separate through the instrument column and into the detector.

And then because the electron capture detectors have unusual properties, there is a requirement for a purge gas, which is an argon methane gas mixture.

And that basically is what is required to define the electron capture gas chromatographic system that is used to make final measurement on the samples that we prepared.

The next section describes quantitation. And in a sense, as we have alluded to earlier, PCBs are not a single entity and are a very complex mixtures with varying ratios of each of the isomers, of which there are 209.

Quantitation requires special consideration and special definition so that others who are doing what you are doing can reproduce what you are doing. And each analytical chemist at this point of the game tried to use a system that would best exactly tell what you is there or try to quantitate correctly the amount of PCBs present in the sample.

This is further -- the difficulty here is further complicated by the fact that samples, the PCBs in real world samples can be altered biologically or selectively through absorption processes, through UV degradation, through a variety of processes, and it changes the PCB distribution. In other words, by that I mean type and kind.

Once that is changed, then of course the commercial product which has -- is manufactured to have a specific isomer distribution of type and kind no longer is a perfect standard. And so you get into what's the best way to estimate the level of PCBs in the sample.

Q. What did you determine was the best way to estimate?

A. At this point in time, which was in 1971, the recommended quantitation procedure, which was the best where we were at that time -- and the reason we documented it so well was so that we knew that it might change and there might be better ways that would come along.

But we also knew that people needed to know exactly how we were doing it so they could verify our results and take what we were doing and do it with other things.

And basically it says, "Quantitative determinations employing the electron capture detector are non-stoichiometric measurements made by compare peak heights or areas for known concentrations with those for unknown compositions. Four variations of the peak height or area quantitation procedures have been employed."

And it lists four cases: There's the case where the electron capture gas chromatogram of the PCB unknown is unchanged with respect to the standard PCB with no evidence of interferences.

Q. How do you tell that?

A. The detector -- Okay. The way the gas chromatograph works, and I need to tell you this, so bear with me so that you will understand how do you tell that? My answer to your question, "How do you tell that?"

In a plug flow basis you deliver a known volume of solvent with PCBs in it and maybe other things from a sample -- because nothing is perfect in terms of cleanup procedures -- into the instrument, into the injection port.

The injection port is heated at a much hotter temperature than the column which is attached to the injection port. When the solvent and the PCBs go into the injection port, they're flash vaporized. They are immediately converted from a liquid form into a vapor form and they go directly on the packing in the column.

The column is a glass column that just is a spiral, sometimes, or a U; and it goes from the injector port to the detector. The column is sealed; and the way you get the sample in is by sticking a fine needle through a septum, which is a rubber or a synthetic-type rubber device that's self-sealing.

So when you put the syringe through, inject the sample in, it flash vaporizes and you pull the syringe back out and the septa seals. So the sample is swept by the carrier gas which flows through the column in through the packing.

As the carrier gas -- and the column is kept at a temperature, a specified temperature, that's a little less than the injection temperature sometimes but also less than the detector temperature.

Because if the detector temperature is less than the highest column, temperature then the material can coalesce in the detector is a liquid and ruin the detector and the, and the determination.

So the material goes through the column. And as it goes through the solid absorbent that's coated with a known liquid that's not volatile, the PCBs and other molecules present in the vapor phase partition back and forth; in other words, they go into the liquid phase and they come out of the liquid phase; they go into the liquid phase and they come out of the liquid phase.

Depending upon how well, how compatible the liquid phase is with the organic molecule in question, it will either be held back or allowed to go through more quickly.

If the liquid phase likes the molecule, it holds it back; it holds on to it because they like to be associated with each other. If the liquid phase does not like the molecule, then molecule shoots right through; and that's what causes the separation.

Each individual PCB has its own specific molecular characteristics, as does any other organic material that's in that sample that can be volatized and run through a chromatograph.

The boiling point is reflective of this. If it's a low boiling material, it shoots through the instrument unless it's held up for some other reason. If it's high boiling material, it takes much longer to go through the instrument.

If it's a very polar material and you have a very polar support, then it takes a long time for it to go through because they like each other. If it's not very polar and the support's very polar and it goes through, it goes through more quickly because they don't like -- opposites don't necessarily attract as much.

Well, I'm not sure I said that correctly, but I think you get the drift of what I'm saying.

So what comes out is you put the PCAB in as a, as a group. And the instrument does -- it separates them into components. Doesn't do a perfect job, but it separates them to the best of its ability. Different columns have different resolutions in terms of being ability to separate these components and different types of columns, support-coded open tubular columns, capillary columns --

Q. Sorry, say the one that you --

A. SCOT columns, SCOT, support-coded open tubular columns, do a better job, have a higher resolution than packed columns. But you've got to only put so much sample in them.

And then capillary columns, which are

the ones that are used today, even have higher resulution. So where you might put in 209 components for the PCB and separate it into 12 peaks for the packed column, 12 groups, with a capillary column you might separate it into 100 peaks.

Q. How many do you get with the SCOT?

A. The SCOT columns?

Q. Yes.

A. The SCOT columns were a precursor to the capillary columns, so they were the first attempt at producing capillary columns. And you get hundreds of peaks or 50 peaks or 25 peaks. You get more than you do with the packed column --

Q. What were you --

A. -- a higher resolution.

Q. -- what were you using in the?

A. Packed columns.

Q. '71 method? Okay.

A. Packed columns. So lowest resolution columns were what were available at that time.

Q. When were the SCOT columns introduced?

A. At some point after we had developed this methodology we had some new support-coated open tubular columns that were being evaluated for other purposes. They were really intended for -- these columns were intended of QC analysis of neat materials where there isn't any sensitivity problems or things of that sort. And you put it in there and you'd get a very good fingerprint and it separates, maybe if you had 209 components, it might give you 53 groups; whereas the packed column would only give you 12.

They were a precursor to the capillary columns which we have today, which do a much finer job. You might get 125 -- you might separate them to 125 groups. None of them separate them completely.

The point is, is that it separates them into groups. The point is it separates them into groups and that those groups come out the other end and they are detected by the detector. And so what you end up with as a function of time on the X axis is the detector response going up and down as these separated components come out, okay?

If you put in Aroclor 1242, and this is hypothetical, you would end up, say, let us say that you would end up with 11 peaks; and they would be in a certain intensity ratio such that the major components would be here and then it would come back down. That's call a gas chromatograph -- gas chromatogram. That's the output of the instrument.

Q. That's just a plain ordinary gas chromatograph?

A. All the outputs from any GC is called a gas chromatograph.

Q. Okay.

A. It doesn't matter whether it is electron capture, flame ionization, microcolorimetric.

Q. Okay. So, well, go ahead and finish and then I have a question I need to ask you.

A. The unique thing that you have is that every time you injected a Aroclor 1242 standard, if you're running your system correctly and you're staying within the ranges of your system so that everything is linear and things of that sort, you end up with the same pattern every time with the peaks in the same ratio.

The first peak might be less than the second peak, which is greater than the third peak but which is less than the fourth peak, and it is in the same ratio. So you get a fingerprint that's characteristic of that Aroclor.

It is also characteristic of the system

that you are running it through. If you use a different column, if you change the system temperatures, if you change the carrier flow rate, change the attenuation on the detector, then the fingerprint changes.

Q. But if you run Aroclor 1242 through once the machine has been calibrated, and then you run a second sample of Aroclor 1242 through, the peaks should match?

A. Yes.

Q. Okay.

A. Under situations where there are no interferences present, where there have been no physical and/or chemical and/or biological alteration of the isomers present in that material.

So yes. It is like everything in the world: If you have an unchanged Aroclor and you put it in once and you put it in again, you should see the same thing. This is what it's all about.

Q. Right. That's right.

A. That's how you know deductively --

Q. Okay.

A. -- that you're dealing with an Aroclor.

There's another aspect to it, too. The

reason you use an electron capture detector is because it is a specific kind of system and only a certain class of molecules are sensitively detected by an electronic capture detector. The molecule needs to have the propensity to be a high, have a high capture rate for electrons; that's why it is called electron capture.

A nickel 63 electron capture detector is basically a nickel -- a tube with radioactive nickel in it; and nickel 63 is a radioactive isotope of nickel. It produces a beta particle continuously as it decays in that source. And a beta particle is basically an electron.

Q. Are we talking about what you used now?

A. As a detector. Yes, sir.

Q. Okay.

A. Yes, sir. And the nickel source has a long half life so it is always constant in terms of the amount of electrons that are coming out.

You have collector electrode above that. The collector electrode collects the electrons and measures them and gives you a certain output signal. And as long as nothing is attenuating the electron beam, as long as nothing is capturing the electrons as you pass it through, then you always get the same signal; you get a nice flat baseline.

Now when you pass a molecule through that doesn't have, that's not electron capture active, the baseline continues to be straight because none of the electrons are captured by that molecule and they don't cause it to be changed.

When you pass a compound that has, that's highly electron capture active, such as PCBs, chlorinated naphthalene, DDT, lindane, toxaphene, et cetera, et cetera, through it, those molecules capture electrons well and they attenuate the beam.

So what you really see is you see the current fall because it is changing the standing current. And then, of course, as the molecule passes through, it goes back up again. Okay.

Well, people don't like to see a negative things, so we flip it over and we give you a peak like this, even though it is an attenuation versus an accentuation of the beam. So that's what gives you your chromatograph.

So the detector is critical in the sense that it doesn't detect a lot of things. It detects a lot of things but it doesn't detect everything. It's not a universal detector. So it gives you some selectivity; so some things you don't have to worry about causing interferences.

And that's how the whole system works. So if I run 1242 through the system correctly -- a standard, for example, not through all the sample preparation portion but I run it through and I get a nice --

THE REPORTER: I'm sorry, "through the system..."

THE WITNESS: Through the system.

THE REPORTER: "not..."

MR. WRIGHT: Not a sample.

THE WITNESS: Not, it's a standard.

A. And I get a nice fingerprint that, say, gives me 12 peaks that looks like it is supposed to.

Then I take another one and I run that through again, I should get the same exact thing. Not only do the peaks agree with each other on a retention time basis -- in other words, the time at which they elude from the instrument and see the detector, but they also agree in the intensity in terms of how much is there.

So the two standards need to agree with each other.

Q. Okay. Let me ask you this, now. Before the electron capture devices were paired with the gas chromatograph, you still, if you just had a plain old gas chromatograph, the principle would be the same: You would put Aroclor 1242 in, for example, and you would get peaks --

A. No.

Q. -- that --

A. You have to have a detector. And that's why I took the time to explain that the electron capture detector added a uniqueness to the system.

The first detection systems for chromatographs were really what were called thermal conductivity detectors. They are just a heated wire inside this instrument and it has a current passing through it that heats it. When you passed a molecule over it in that little cavity, it would cool the wire, depending upon how much of it was there and what it was. And you would measure that signal.

Now, obviously, almost anything that went across that wire cooled the wire to some degree or another so that thermal conductivity detector was universal. If you had petroleum hydrocarbons, if you had benzene, if you had ethyl alcohol, anything you put in there gave you a signal.

Q. So when you said Monsanto had 15 or so gas chromatographs, that's what you were describing?

A. Correct. None of the gas chromatographs that Monsanto had at that time were intended for environmental analysis. They were all intended for product quality control. And to be real truthful with you, the first electron capture instrument that I -- the detector and the instrument that I used that I had at Monsanto there was so highly contaminated because it had neat materials put into it that the only thing I could do was get familiar with the equipment and how it worked and things of that sort.

It never was able to achieve the sensitivity needed to measure PCBs in the environmental samples. And the reason was is, is that at some point in that instrument's career it had probably seen 100% Aroclors. And so the electron capture detector is a million times more sensitive than the detectors they were using; so even if there was just a millionth of the material that they put in there hanging around in that instrument somewhere, each time you protubated it, you would get a signal with that very, very sensitive detector.

So that's why we had to go to the biomedical chromatograph detection system, which this next one we talked about.

Q. Okay.

A. Now if that original system had never seen neat materials, we could have used it. But it is just a whole different world.

Q. Okay. I guess what I'm trying to determine is: Before the pairing of the electron capture with the gas chromatograph, what level of detection could you achieve? For example, could you achieve 100 parts per million?

A. Yep. 100 parts per million is 100th of a percent, and that would be down toward the lower limit on those particular instruments, right.

But everything else under the sun caused a response, too. And everything else under the sun is at -- is present usually at a million times the concentration you find PCBs in the environment. PCBs are at the part per billion, part per trillion level.

Q. Yeah. But right now I'm not talking

about that.

A. I know. But I'm going -- I'm trying to make sure that I'm not taking you a place that I shouldn't because I don't give you enough information.

The TC detector could never be used to monitor environmental PCBs, period.

Q. What is the TC detector?

A. Thermal conductivity. That's kind of like the first GC detector.

Q. That's the ones you are saying that Monsanto had when you showed up?

A. That's the ones that Monsanto and a lots of other people had when I first showed up and they have them today.

Q. Okay.

A. They still have them today.

Q. Okay.

A. It's a universal detection system.

Q. But it could detect PCBs to a 100 part per million level?

A. Pure, unadulterated, not contaminated with, standards, yes.

Q. Why couldn't it detect fresh Aroclor 1242?

A. It could by itself at down to about 100th of a percent or 100 parts per million.

Q. 100 parts per million?

A. Yes.

Q. All right. Same with Aroclor 1254?

A. Yes.

Q. 1260, 1268?

A. Right.

Q. All of those?

A. And I'd like to -- 100th of a part per, 100th of a percent was the limit. It wasn't an optimal working range; it's like down at the bottom. Okay? A 10th of a percent would be a lot better.

Because, again, you're dealing with 209 components. And if you separate them, each component becomes less of the percentage, so you're not really dealing with the whole.

Q. Okay. Now is it your testimony that the only machine that could go below 100 parts per million was this new machine that you acquired for Monsanto?

A. Yeah, that's basically it from a layman viewpoint, yes.

Q. There was no other technology between the chromatograph that you mentioned and the medical electron capture machine?

A. Okay. I need to clarify something here. In my life, the words "any" and "all" don't exist.

Q. Well --

A. And if you say "all," that precludes any exception whatsoever. And I can't live with that because that's not the real world. And when you say "any," you do the same thing.

Q. What I'm asking you, doctor, --

A. So I'm stumbling on your questions --

Q. Okay.

A. -- because you're asking me to give you 100% answers which don't exist.

Q. Let me rephrase it.

If you had not had electron capture technology in 196-, late 1968 when you started working in this area, if you had not had that machine, is there another method that you could have used to measure PCBs below 100 parts per million?

A. Not in environmental samples and not definitively, no.

May I reverse the situation and have you understand that the people that began to detect these things began to detect these things because they were using electron capture -- gas chromatographs with electron capture detectors.

Q. Well, they weren't looking for PCBs?

A. That's correct. But they saw them anyway.

Q. That's right.

A. And other people were using the other kinds of detectors that you're talking about for a long time ago, I wonder why didn't they discover the PCBs?

Q. And what I'm asking -- let me object, not responsive.

What I'm asking you, sir, is a completely different question. The question that I'm asking you as a scientist and as an expert witness for Monsanto is, is it your testimony that in 1968 there was no technology available to detect PCBs below the 100 part per million level other than electron capture technology?

A. No.

Q. Okay. What other technologies existed in 1968 and 1969 to detect PCBs below 100 parts per million?

A. Well, you could use infrared

spectroscopy. You could use ultraviolet and/or visible spectroscopy. You could successfully tweak and adjust conditions such with great difficulty that other systems that weren't so sensitive could possibly see it.

Q. Okay. What other systems?

A. Well, you could take the sample and concentrate it 100-fold times so that you were delivering more, more absolute material to the instrument and you would see something.

Would you know what it is? No.

Could you say it was a PCB? Not unless you put it in there and knew you put it in there.

Q. So your testimony is that if you were looking for PCBs there is no other method available to detect PCBs?

A. You're asking me if I was looking for it and then you're asking me if there's no other method available?

Q. Yeah, let me -- hang on --

A. You're asking me if I were looking for PCBs, what technique would I use? And I will tell you the technique I would use would be gas chromatography either coupled with an electron capture detector or a mass spectrometer. That's what I would tell you.

Now the next question was?

Q. Yes. I understand your answer to that question because that's what you did use and eventually got very good at it.

A. It's not, it's not what I -- what I just used, it's what the entire worldwide international community including everyone in the United States used eventually.

Q. Yes, I understand that. My question is much simpler than that. My question is: Before that technology came along, if you wanted to determine the existence of PCBs in a sample at a level less than 100 parts per million, could you have used existing technology and done so, to the best of your knowledge?

MR. PRAUSE: Do you mean an environmental sample as opposed to?

MR. WRIGHT: Yeah. By "environmental," I'm talking about either dirt or water or fat.

MR. PRAUSE: Okay.

MR. WRIGHT: I assume that's what you mean by "environmental."

MR. PRAUSE: "Sample" can be also what

Scott calls a neat Aroclor, which, and there's a difference.

MR. WRIGHT: Yeah. I don't want to get into an argument.

MR. PRAUSE: I want to make sure his answers are clear.

MR. WRIGHT: Yeah Let me rephrase the question. Don't answer, let me ask a question, okay?

THE WITNESS: Okay. That will be the last time you say that, right? (Laughter)

BY MR. WRIGHT:

Q. The question is very simply, doctor: Are you aware of any technology that was available before this electron capture technology came on the scene that could have identified PCBs in, say, a sample of water at levels below 100 million -- I mean 100 parts per million?

A. No.

Q. Are you aware of any technology that could have identified or detected PCBs in lipids at a level below 100 parts per million?

A. No.

Q. Are you aware of any technology that could have detected PCBs in air at levels below

100 parts per million?

A. Yes.

Q. Okay. Describe that technology for me, sir.

A. The reason I answered no to the initial questions and yes to the last question is there is a difference between "detect" and "identify." There are many ways to detect things; there are few ways to identify them.

So the initial three questions you asked me if I could detect and identify, identify and detect. I could detect probably but not identify. The last question, for whatever reason, you chose to alter it and asked me if I could detect but you didn't ask me if I could identify it as a PCB; and so the answer to the last question was yes.

I'm not being a smarty person. I'm trying to say that this is not as simplistic a routine as we would like to reduce sometimes. So the answers to those questions are no, no -- and I believe there were only three of them -- yes.

Q. Okay. Now let me ask you a fourth question. Without the use of this electron capture technology that you began using in 1968/'69, was there a way for a scientist such as yourself to detect the presence of PCBs at levels below 100 parts per million in water?

A. Sometimes, but not identify.

Q. So if you were a scientist, you -- and you were looking for PCBs, you could have detected their presence but you couldn't have determined exactly what isomers they were? Is that what you are saying?

A. No.

Q. If you were a scientist and you were looking for the presence of PCBs in a sample of water, for example, could you have determined the presence of PCBs at levels at less than 100 parts per million?

A. No.

Q. Are we having a semantic problem between my use of the word "determine" and your use of the word "detected"? Because I don't understand how that question and answer is any different than what we went through a few minutes ago.

A. And what I'm trying to do is what you are asking me to do, and that is answer your question. And so I am answering the question.

Q. All right.

A. Is the question appropriate? Well, from a scientific viewpoint -- I'm sure it is appropriate from your viewpoint and I don't have any opinion on that one way or the other.

Q. If it's --

A. But you are asking me if I could detect PCBs. And the answer to that question is I don't know whether it is PCBs or not. I could detect something but it could be, it could be gasoline. It could be mineral oil. Because those detection systems would see mineral oils just as easily as they would see PCBs and they would look the same and you wouldn't be able to tell.

So I would be able to detect it but I wouldn't be able to tell you what it is.

Electronic capture has the unique property of only being absorbed molecules that capture electrons, of which PCB is a member. Mineral oil is not. So you can mix PCBs with mineral oil and you can put them in an electron capture instrument and it will ignore the mineral oil and it will see the PCBs.

You take that same mixture and put it in the systems that were available -- flame ionization, thermal conductivity -- and you run them through, it will see them both and you can't tell what's there. You have no, you haven't a clue whether it is a PCB unless you made the solution up.

Q. Okay. So just to clarify, then, your testimony is you could not have quantified PCBs in air, for example, before 1969 or '68?

A. Correct.

Q. Okay. You're aware of no technology that could have quantified PCBs in water or in fat or in soil or in any other, or air, or any other environmental media below the level of 100 parts per million?

A. Correct.

Q. And so if Monsanto or anyone else had asked you, "Dr. Tucker, can you tell me how much PCB is in the air in this room," you could not have done so in 1968?

A. Correct.

Q. And you're not aware of any scientist in the world that could have done so?

A. Correct.

Q. And the method that you developed you believe was the first method that could accurately do something like that?

A. Well, first of all, for the record, I didn't develop the technique. There were a lot of people that developed the technique.

What I did was I use an existing methodology and applied it specifically to PCBs and showed that it be could be applied with PCBs with the same results that were obtained with other chlorinated hydrocarbons or pesticides, so be it.

So I didn't invent anything. I took existing technologies and put them together in a fashion and choose to them and optimize them for what they were intended to study chlorinated hydrocarbons.

So, you know, there's not any invention or anything of the sort here. Does that?

Q. Yes. All I'm trying to clarify is, in your scientific opinion before that method was developed by whoever it was developed by there was no other way to quantify PCBs in environmental media?

A. That's correct.

Q. Okay. Now let's mark this as Exhibit No. 5.

(Deposition Exhibit No. 5 marked for identification.)

Q. I'm going to hand you a document --

A. Are we done with?

Q. Not yet, just sit it off to the side, if you would.

A. Okay. That's fine, I'm happy to do that. Actually, I'll make sure we do.

Q. Exhibit No. 5 is marked DSW 147758, and it is through 147781. And it is entitled, "Report No. 2970, Final Report on Aroclor in Gases." And it is by the Research Department, Phosphate Division.

MR. PRAUSE: Do you have another copy of that.

MR. WRIGHT: No.

MR. PRAUSE: Since it is not a document I showed Dr. Tucker?

MR. WRIGHT: I don't have another copy of that. I'm asking him to look at it.

MR. PRAUSE: I would like to be able to look at it, too.

MR. WRIGHT: Why don't you and he look at it together?

THE WITNESS: We can do that.

MR. PRAUSE: Okay.

THE WITNESS: All right.

BY MR. WRIGHT:

Q. Have you ever seen that report before?

A. I don't recall seeing it before.

Q. Basically it was a report done by --

A. I would like to look at it and read it if you're asking me to do something, unless you would like to explain it to me first.

Q. I'll explain it to you and then you can tell me whether I'm right or not. Basically --

MR. PRAUSE: I'll object to you making statements on the record. If you are going to present a question to the witness, that's fine; but you testifying is not what we're here for today.

Q. Okay the question is: Is that report a report that was prepared by someone who worked in a similar position to you in the year 19 --

MR. PRAUSE: 53.

Q. -- 53?

A. I don't know.

Q. Can you check and see?

A. Now you want me to check to see whether the gentleman writing this report was a Ph.D. analytical chemist, is that what you want me to check? Or would you like me to read this report and see what it says.

THE VIDEOGRAPHER: Excuse me, Dr. Tucker, you lost your mike there.

THE WITNESS: Oh, I'm sorry. It happened when I moved over next to Marsh. You got me on a short leash here. Am I coming in clear now?

THE VIDEOGRAPHER: Yes, thank you.

THE WITNESS: I was afraid of that. I was kind of keeping an eye on it.

BY MR. WRIGHT:

Q. I read the title of the report; and you and I together can read some additional information about it, and then I'll see if you can answer my question. The report is entitled, as I stated, "Final Report on Aroclor in Gases," correct?

A. You're asking me if this is what the title says?

Q. Yes.

A. Not what the report is?

Q. Yes.

A. Okay. The title states as you read it.

Q. Okay. And it states that it was for the "Research Department, Phosphate Division, Anniston, Alabama," correct?

A. Correct.

Q. Work started May 8, 1953, correct?

A. Correct.

Q. Work completed October 16, 1953?

A. Correct.

Q. Correct? Report submitted March 15, 1954?

A. Correct.

Q. And it was prepared by H.B. Richards, Jr., correct?

A. Correct.

Q. Did you know Mr. Richards?

A. And there is also A.M. Ellenburg?

Q. Yeah. Chemists, underneath that, chemists?

A. No.

Q. A.M. Ellenburg --

A. Not to my knowledge.

Q. -- and H.B Richards, Jr.

A. And the question is did I know --

Q. Did you know either of those gentlemen?

A. No.

Q. Okay.

A. I didn't even know they were gentlemen.

They could be females, for all I know.

Q. All right. It says, "18 copies of this report were distributed as follows." One to the file in the St. Louis library. You're familiar with the St. Louis library, correct?

A. Out at Crevecouer, that is correct.

Q. Okay. In fact, that's one of the places where you went to try to assist you in preparing your methodology, correct?

A. Yes, I did.

Q. Copy went to A.M. Ellenburg. Copy went to H. K. Mason. Copy went to the Research Library, Anniston. Copy went to England.

Copy went to P. G. Benignus, you knew him, didn't you?

A. Paul Benignus, yes, I did.

Q. Copy went to Emmett Kelly. You knew him, didn't you?

A. Yes, I did.

Q. Copy went to H.L. Hubbard. Did you know H.L. Hubbard?

A. Name sounds familiar but I don't think so.

Q. Okay. Did you know anybody else on the list of recipients?

A. Nope.

Q. Okay. The report is marked as confidential, correct?

A. Yes.

Q. Shows a contents page, correct?

A. Yes.

Q. There's an introduction. And it said, "Dow Chemical Company is interested in using Aroclor as a plasticizer in manufacturer of their Saran, (vinyl-) --

A. Vinylidine.

A. Vinylidine plastics?

A. Correct.

Q. "(vinylidine chloride) plastics, but is hesitant for fear that the Aroclor vapor might produce toxic affects upon the personnel in their plant.

"At the request of the sales department this work was undertaken to determine the Aroclor vapor concentration in the Anniston plant under usual working conditions."

Is Aroclor vapor concentration attempting to determine the amount of Aroclor in a sample of air?

A. Yes.

THE VIDEOGRAPHER: Counselor, I'm about to run out of tape, if we could change the tape real quick.

MR. WRIGHT: Okay.

THE VIDEOGRAPHER: Off the record at 3:29 to change tape.

(Recess taken.)

THE VIDEOGRAPHER: On the record at 3:33.

A. I have reviewed the document and --

Q. Well, wait, let me ask you a question.

A. Okay, fine, thank you.

Q. All right. Doctor, we took a break and you have had the opportunity to review Exhibit No. 5; is that correct?

A. Yes, sir, it is.

Q. And let me ask you some questions about it.

In this document, these scientists did quantify the amount of Aroclor in several samples of air, correct?

A. No. Incorrect.

Q. On Page 4, Table I, it's entitled, "Aroclor 1242 Vapor Concentration in the Plant." Correct?

A. That's what it is entitled.
Q. And they give a test number, which in this, looking at the top one is 10. Position number 5; presumably, that's a position in the plant but I guess we don't know that unless we read the entire report.
From your review, can you confirm that that's what they are talking about?
A. I, it could be. No, I can't, and I don't think the sampling position is relevant to our discussion.
Q. All right. They give a concentration of chlorine?
A. May I ask you a question?
Q. Right now, I'm just going over the results.
A. Sure.
Q. And then I'm going to ask you questions about the results.
A. All right.
Q. They give "Concentration, Chlorine" and they state that as .14, correct?
A. Yes, sir.
Q. And then they give MG/CU.M. You as a scientist know that that means milligram per cubic

meter, correct?

A. That's correct.

Q. Of Aroclor, correct? And they give an amount at .33, correct?

A. Yes, sir.

Q. Okay. So they are saying that in that sample there is .33 milligrams per cubic meter of Aroclor 1242 in that sample of air?

A. No, sir, that's not what they are saying.

Q. Okay. What are they, what do you believe they are saying?

A. May I have the document, please?

Q. Yes.

A. Thank you. What they are saying is that they are using a technique that takes everything in the air through a heated furnace which decomposes everything to hydrochloric acid if there happens to be a chlorine carbon bond present.

The hydrochloric acid is then captured and the chloride ion derived from that combustion technique is then reported, and that's what they are saying "Concentration, Chlorine" is.

They then take the chlorine -- which

could be from any source, any molecule that contains a carbon chlorine bond -- and they for the purposes of this study, since they are only concerned about maximum numbers that could be Aroclors and they are working in an environment where they know Aroclors is the predominant thing used, they convert that into a value that is representative of perhaps the amount of Aroclor that could be present.

And if -- and this is why I don't, I try not to be a lawyer. If you read the study later on and if you honestly look at what, how they specify what they are measuring, it clearly states that they are not measuring PCBs and that any number of other materials could contribute to it, and that they are not identifying these as PCBs.

And I think it's a little unfair from my viewpoint to extract portions of a 20-page document and not go to the qualifications that the scientists themselves put on the information.

And they state very clearly in the discussion that the comparative determinations of total chlorine in the air -- well, first they say.

"The conditions of the tests and the limitations of apparatus are not such that absolute determinations of chlorinated hydrocarbons are not -- that absolute determinations of chlorinated hydrocarbons are not possible. Comparative determinations of total chlorine in the air during any specific tests can be made. The chlorine detected by this apparatus can be attributed to three sources:

"1. Chlorinated hydrocarbons in the air, Aroclors, or any other chlorinated hydrocarbon.

"2. Chlorine in the air as free chlorine or as HCL.

"3. Chlorine ion present in the absorption solution and the wash water."

So they clearly state to a person knowledgeable in the subject that the method is not specific and is only reflective and only can be used under certain circumstances with certain qualifications.

This method would never be adopted to analyze an unknown sample at the levels we're talking about for polychlorinated biphenyls.

Q. Let me object, nonresponsive.

Doctor, you will agree that the intent of this research was to quantify the amount of

Aroclor in the air in the Anniston plant, correct?
A. Yes.
Q. And that's what the scientists were attempting to do, correct?
A. Yes.
Q. And they reported results quantifying the amount of Aroclor in the air with a discussion of their methodology and the parameters that they were using, correct?
A. Yes.
Q. And they reported total chlorine, correct?
A. Correct.
Q. And then they used an assumption to say that the chlorine in the Aroclor plant was Aroclor, correct?
A. No.
Q. If we turn to Page 11, the conclusions, item one says, "No absolute determinations of Aroclor vapor concentrations can be made by the method used, due to presence of unknown quantities of chlorine and hydrochloric acid in the air." Correct?
A. I can't see the document from where you have it, I'm not reading it. So it could possibly

be correct, I have no reason to doubt it.

It says, "No absolute determinations of Aroclor vapor concentration can be made by the method used, due to presence of unknown quantities of chlorine and HCL in the air. The assumptions made permit simplified evaluation of the data."

Q. Okay. So even in 1954 they were able to make measurements that, if they were looking for PCBs in this environmental matrix, they could quantify it at least to the half-a-milligram-per-cubic-meter level?

A. No, they are not. And I know the point eludes you, and they simply are not. And in this point, I'm an expert.

Q. Well, you'll agree that that's, that was the purpose of their inquiry, correct?

A. The purpose of their inquiry was to make a derivative measurement that could be used to indicate what might be there. And what these gentlemen are doing is okay and they qualify it very well and they stated exactly what their purpose is.

Q. And you --

A. If you take this same technique and go anywhere else than they were and apply it, you would not know nor could you assume that the material present might even be derived from PCBs.

This is an inappropriate method except under the specific conditions and with the exceptions noted by the chemists present.

Q. And that's because they were in an Aroclor manufacturing plant and were looking for Aroclor in the air?

A. No. It is because of the method used and the specifications that the method should be used for and the characteristics associated with it.

Q. The, you are aware, of course, doctor, at this point that back in this period of time there were standards by which workers were not supposed to be exposed to more than a certain concentration of Aroclor in the air, correct?

A. This is in 1953?

Q. Yes.

A. I'm not aware.

Q. You're not aware of that?

A. Of the standards in 1953, no, sir.

Q. Okay.

A. I'm not a toxicologist.

Q. Okay.

A. I'm an analytical chemist, which is what we were talking about.

Q. Okay. And I take it you are completely unaware then of the studies done in the 1930s of concentrations of Aroclor and PCBs in the air and their effect on rodents? Is that true?

A. I'm aware that studies of the sort may have been done. I'm not aware of the specifics. I haven't read them, I haven't seen them.

Q. Is it your testimony that all of those studies -- or that any study that attempted to quantify Aroclor or PCBs in the air before 1968 are necessarily invalid?

A. No, sir. And I, I don't believe that, that it is fair to put those kinds of words in my mouth. And I would like to state what I said.

What I said was that the method they used measured chlorine in the air. And furthermore, they used a derivative procedure whereby they took the air with whatever was in it and ran it through a furnace and burned it. And then they collected any residual chlorine.

They looked at that and they said, "Well, if that chlorine were solely derived from Aroclor then there would be this much Aroclor in the air."

And then further in their discussion they clearly defined the exceptions and they clearly defined that the information they were generating was relative and only in certain circumstances could even be considered maximums.

Q. One thing --

A. It is not an acceptable manner to measure PCBs.

Q. Let me object, nonresponsive.

Have you ever heard the term MAC as an analytical chemist?

A. The acronym doesn't jump out at me, and most things I read have acronyms.

Q. "Maximum allowable concentration"?

A. It could stand for that, yes.

Q. And you're aware -- well, you may not be aware, but this document states that there was a MAC, there's a MAC, and I'll just represent to you that stands for "maximum allowable concentration."

It says, "Based on the present MAC, maximum allowable concentration, of 1 milligram per cubic meter, it appears advisable to wear a mask or respirator if concentrations of Aroclor are high enough to be irritable to the nasal membrane."

Did I read that correctly?

A. You read it correctly.

Q. "Since the room painted with Lustrex Latex Paint contains Aroclor 1248 definitely has an odor of Aroclor for several days after painting, caution should be exercised in recommending Aroclor for this use."

Did I read that correctly?

A. Yes, you did.

Q. And Item No. 2 in their conclusion -- we went through Item No. 1 a moment ago -- Item No. 2 in their conclusions is, "The apparent Aroclor concentration in the plant varies greatly from .5 to 1 milligram per cubic meter under mild conditions up to 5 to 8 milligrams per cubic meter under the most severe conditions."

Did I read that correctly?

A. Yes, you did.

Q. Okay. Is it your testimony that Aroclor was not being measured in the tests that they did in 1954?

A. It is my testimony, and it is as stated by the people who did the study, that they were not measuring Aroclors. They state very clearly that they are measuring chlorine, and that from the chlorine number they are making assumptions and deriving an Aroclor number that they report.

So the answer to your question is they are not measuring PCBs; they are not measuring Aroclors; they are measuring chlorine.

Q. Now so does it continue to be your testimony or is it your testimony that prior to 1968 or '69 there was no method available for closely approximating PCB levels in environmental samples below 100 parts per million?

A. Yes.

Q. Let me just make sure that I'm clear in my understanding about what you mean by that.

Without the use of electron capture and I had an environmental sample, air or water or fat, I could identify PCBs and quantify them; but whether it was 300 parts per million or 100 parts per million, I couldn't tell?

MR. PRAUSE: Object to the form of the question.

A. No.

Q. That is not correct?

A. That's not correct.

Q. Okay. So you couldn't tell within 100 parts per million how much PCB is in a sample before the use of the electron capture?

A. Let me say the following. The first question that you have asked had an "or" in it. The second question reduced that question to a specific matrix versus the environmental matrix that you talked about to begin with.

I'm willing to answer the original question, which I answered. Now the second question is a different question and I would like you to state that one again for me, please.

Q. Well, doctor, with all due respect, you have baffled me and I need to object, nonresponsive.

Because what was the original question that you think I asked and that you think you answered?

A. I would suggest we have the reporter read the record so we can both be accurate.

MR. WRIGHT: Okay.

Q. Actually, I would rather have her read the last question and have you, without editorializing, just answer my question. Can you do that ma'am?

MR. PRAUSE: Object to the gratuitous

statement on the record.

(Record read.)

THE WITNESS: Read it again.

(Record read.)

THE WITNESS: Yes.

BY MR. WRIGHT:

Q. Okay, now, let's go back to the method -- hand me back, if you would, Exhibit No. 5 -- let's go back to the method that we were discussing earlier. And I was going to ask you to explain the quantification of the chromatographs or the quantification procedure used.

And it strikes me that the best way to explain that is by letting us look at a chromatograph and you tell us what it means.

A. Is that the way you would like to do it?

Q. Is that the way you think would be best to do it?

A. No.

Q. Okay. How do you think it would be best to explain how PCBs are quantified using this process?

A. There's a section in here that's called quantitation and that describes quantitative determination employing the electron capture detector.

Q. It was my understanding from reading that that you had to have a chromatograph with a peak so that you could look at the peak and measure the area and so forth. Is that true or not true?

A. Yes.

Q. In order to quantify?

A. Yes.

Q. Okay. So why don't we look at a peak?

MR. PRAUSE: If that's what you want to do.

A. Which peak would you like to look at?

Q. You pick one that you think shows -- well, that would allow you to explain the quantification procedure. I think, the reason I picked this document is I think there are examples of several chromatographs in the back part of it and so if you could just pick one?

A. You would like me to pick one?

Q. If you would, since you're the expert.

A. Absolutely, thank you. I appreciate that.

Q. If you would pick one.

A. This theoretical peak probably will

explain -- help me at least explain to you in a fashion that I think we can understand how quantitation occurs.

MR. PRAUSE: Just so the record is clear, we're looking at Dr. Tucker is describing what appears on Page MONS 079362 of the document that is the analytical chemistry method 71-35.

MR. WRIGHT: Yes.

A. If the component that we are looking at and we run through the instrument is a single component or a fairly single component, when it comes out the instrument on the other end we get a peak with a good Gaussian shape.

Q. What do you mean by Gaussian?

A. Gaussian shape means that it has an equivalent distribution, a fairly equivalent distribution, on either side of the center. If you look, there's about as much area on this side of the peak as there is on the left side of the peak.

Q. Why don't you show that? I think the camera can get in. Hold that up.

A. Can you see that?

THE VIDEOGRAPHER: Yes.

Q. Show that you are talking about there is about the same amount of area on either side of the center of the peak?

A. This is a peak and this is the center line on the peak. A nice Gaussian distribution -- which means you are getting a decent peak and that kind of stuff -- means the shape is regular. And the shape means that it has symmetry around the center point.

So it means that about as much area is on the left as on the right. That's a nice, nicer situation.

What happens is that you, and if you look at this closely, I'm not sure the camera can get that close.

THE VIDEOGRAPHER: I got it.

A. Says here "Injection." And as we had discussed earlier, this is where the sample is introduced into the injection port of the chromatograph.

And the sample is usually introduced in a fairly volatile liquid that shoots through the instrument very quickly. And then that leaves the material that you are interested in, plus other things, on the front of the column where it begins with temperature and with the carrier gas to move through the system.

The X axis here shows is basically time. So if we move along the X axis while the material is moving through the column, it hasn't yet reached the detector yet. And as we go down the road here on some arbitrary time scale, at some point it passes completely through the column and the first portion of it comes out of the column and go through the detector.

As it goes through the detector, because of the properties associated with that and the detector, the detector begins to sense it as being there. And in the electron capture detector, what happens is that it attenuates the electron beam; so rather than having a continuous standing current, it starts to change that and it decreases the standing current. Which means that we begin to get a response.

Now as I said, it's flipped. So the response shows that as more and more of the compound comes off, more and more of the beam is attenuated and the peak get bigger and bigger and bigger and bigger. At some point you reach where most of material has come off and it starts to go down.

So this whole peak is reflective of the material that came off the chromatograph from the start to the finish.

Most chromatographs either mechanically or electronically measure the area under this peak. And if you know the concentration because you put in a standard, then you take the concentration and you get a response factor. So every unit of area is equivalent to a certain concentration or amount of the compound in question.

So you measure the area or the peak height -- peak height is a nice way to measure, too, anything that's indicative and proportional. And you take that and you multiply it times your response factor and that tells you how much is, how much is in that peak if it were the compound in question that you are measuring that as.

Q. Okay. now what happens -- well, real quickly, the peaks represent groups of chlorinated isomers when you are talking about PCBs, correct?

A. Yes. When you are talking about PCBs, the peaks on these types of columns are more frequently than not multiple components. Because the isomers of same chlorine number are so close in their properties, the resolution of the system is not such that it can separate it. So in that group, a peak like this might represent two or three compounds. It might.

Q. Now let's look at, I think you have a real world sample in there.

A. These are electron capture chromatograms under equivalent conditions of the different Aroclors.

Q. Okay.

A. And it ranges from the 12 to 21% chlorinated biphenyls all the way up to I believe it's 60%. I'm having trouble reading it from the side.

And the intermediate range, for example, this chromatogram here is what you would see typically for 1242, this would be 1248, this would be 1254, and this would be 1260 run under the same conditions. These are standards.

MR. PRAUSE: Dr. Tucker, could you read the number appearing in the lower right-hand corner of the page we're talking about for the record?

THE WITNESS: MONS 079365.

Q. Now are, so those would be what we would consider or what you would call a neat Aroclor sample?

A. No, they would actually be standards but they are standard Aroclors. They are really very low levels of known Aroclors; they're known, they're standards dissolved in hexene. So they're, so they're not really --

Q. So that would not be from production --

A. No, that wouldn't be --

Q. -- Aroclor?

A. No. Well, it would be from production but it wouldn't be a production sample.

When you do quality control on the production sample you take a portion of the material you're producing and you measure what's in it. Okay?

In this particular instance, we're taking a portion of the production material, using it as a standard, and we're taking a very small amount and dissolving it in a large amount of hexene.

Q. Yeah, but that's --

A. So it is not neat.

Q. -- that's a production sample that is from a known lot and batch, correct?

A. These are taken, yes, these are PCBs that are obtained from known production batches and that are being used after dilution as standards for, in this case, environmental analysis.

Q. Okay. Do you have in that document a sample of an environmental analysis?

A. Yes. In fact, there are a number of them and we can choose any one you wish to look at.

Q. Yeah, I thought there were a number of them. But if this is as good as any, let's just look at MONS 079372. And this is from albino rat muscle extract, correct?

A. The center chromatogram is of Aroclor --

Q. Okay.

A. -- that was obtained from the extraction of --

Q. I apologize.

A. Nothing to apologize about, it's just that these other two are standards.

Q. Three separate chromatograms on that page?

A. That's correct.

Q. And the middle one is an environmental sample. The other two are what you are calling the standards, correct?

A. Correct.

Q. Okay. And obviously the middle one doesn't match either of either the top or the bottom.

A. The, I think it would be more accurate to say that the middle one does not exactly match either the top or the bottom but there are matches --

Q. Okay.

A. -- in terms of retention times.

Q. Tell me how you determine that that's one part per million of the Aroclor 1242?

A. First of all, this one part per million doesn't refer to what's in the sample; it refers to the exposure level of the animal. The animals in this particular instance were being fed a chow that contained one part per million of Aroclor 1242 intentionally put in it.

Q. Okay. I apologize. What is the level of Aroclor 1242 that is reflected by that sample?

A. I don't know. That's not the intention of this particular example. The intention of this particular example, if you would like me to continue, I would be happy to do so.

Q. All right.

A. If not, just say so.

Q. All right, go ahead.

A. The intention of this particular chromatogram is to show the changes that Aroclor 1242 undergoes when it is fed to an animal in its chow.

Q. Okay.

A. And then isolated from the muscle and as you can see --

Q. Let me just stop you.

A. Oh, sure.

Q. I understand that. What I'm trying to figure out right now is how you quantify it using chromatograms. And maybe, would you see if there is another sample in there that would allow us to -- you to explain how you quantify?

A. Yeah. And I would like to exercise my prerogative as an expert in terms of what we are talking about to make sure that the explanation is as I indicated earlier. Because it is not as simplistic as it would be nice if it was.

And in our quantitation procedure there

are four cases that we consider. And it is where the PCB unknown, which would be the middle chromatogram.

Q. Right.

A. Is unchanged with respect to the standard PCB with no evidence of interferences.

Q. Right.

A. Okay. In other words, when you run it, it looks exactly like the standard production material.

Q. Right.

A. Then there's case two, where the gas chromatogram of the PCB unknown is altered with respect to the UC standard PCB with no evidence of interferences. That's this.

Q. Right.

A. We know that, from deductive logic, we know the animals weren't exposed to anything except PCBs so we don't except DDT or anything else. That's case two.

Case three, the amount of PCB unknown unchanged with respect to the standard PCB with evidence of interferences, that is not this particular example.

And case four, where the UC

chromatograph is altered with respect to the standard PCB with evidence of interferences.

So in this particular instance it would be probably quantitated as a case two, where the ECB -- where the PCB chromatogram was changed but there was no evidence of interference.

Under those circumstances, one of the techniques that is employed and what we would recommend is that you prepare a calibration curve and -- as the original 1242 and get a response factor; and then take this and measure the same area and get a response factor back; and calculate and estimate the PCB level that's there.

And what is done nowadays is they would take three of the dominant matching peaks in the most closely -- in the Aroclor distribution that was closest to it and they would use those to quantitate it. That's the EPA procedures used today.

So what they would probably take is this peak, that peak, and -- this peak, that peak and that peak and relate it to these peaks and calculate it as Aroclor 1242.

Q. Okay. What I would like to know is how you did it in 1970. What quantitation method did you use for environmental samples in 1970?

A. In 1970. We in most instances compared it to the closest matching product after looking at the envelope, or products. If it was a long-standing chromatogram and it looked like there might be two different PCBs there, then we chose to two that most represented what was there and then we used those as standards tests to estimate the amount of PCB that was present.

Q. Okay. And how did you go about estimating the amount of PCBs?

A. We took the PCBs in question, Aroclor 1242, for example, or 1254 or 1260; we injected known amounts in the instrument; and we varied that known amount over a specific calibration range.

We then calculated the response factor for that PCB over that range and we had a calibration curve.

So then we calculated the same response in the same region for the unknown. And then we went on the response and we went over to the calibration curve and went down to the concentration.

And that was the way the concentration

was estimated in those samples.

If there were interferences that were obviously there, then we worked around that peak and used peaks that we could see were not interfered with by the ratios and the intensities associated with them.

Q. Okay.

A. And we always clearly stated at this stage of the game how we did the estimation so that others would know that's the way we did it.

Q. By the way, did you keep laboratory notebooks?

A. Yes.

Q. Okay. And these were kept in the lab there at the Queeny plant?

A. Yes.

Q. Did that include the chromatograph strips?

A. Chromatographs were kept as their own entity. And most things that dealt with nondevelopment samples or were actually samples, environmental samples and things of that sort, were initialed, dated, documented and retained.

Q. Okay. And where were they retained?

A. When?

Q. '69, '70, '71.

A. In '69 and '70 most of them were probably retained, you know, in our laboratory because at that point in time we hadn't generated enough information to exceed the capacity to store it ourselves. And we would be using it on a daily basis because we had lots of questions and we were comparing what we did this day versus what we saw the next day and just trying to learn about things.

Q. Right. After that, in later years, where did it go?

A. At some point in time I recall that all my documentation and all the records were boxed, inventoried, and were turned over to the Legal Department.

Q. And that would include the laboratory notebooks?

A. I'm sure it would.

Q. And that would include the chromatographs for the samples themselves?

A. I'm sure it would.

Q. Okay. And that would include any notes or calculations that you made regarding those samples?

A. If the notes or calculations were entered in the laboratory notebooks or if the notes or calibrations were entered on the chromatograms or if the notes or calibrations were attached to the chromatograms, yes.

Q. Was it normal procedure for calculations to be done on one of those three items?

A. Actually there were, there were --

Q. In other words, was it normal procedure to either do your calculations in the lab notebook, do your calculations on the strips themselves, or attach the calculations to --

A. The normal procedure was to do the calculations in the lab notebook.

Q. Okay. Can you describe what the lab notebook looked like or the lab notebooks liked like?

A. No.

Q. Okay. Well --

A. Well, they were --

Q. -- I think you can.

A. They were this size, about that thick.

No, I don't, no, I object to that a little bit. Because I'm telling you that I do not have a definitive memory of the lab books we used at that time. And I have used hundreds of lab books over the years, so.

Q. All I'm asking is, is were they -- the lab notebooks that I have seen, and you tell me if this is the kind of lab notebook it would be, are kind of like what you can buy at the drug store, a composition book where the pages are bound, it has a hard cover, you can open it and then you can make entries?

A. Yeah, I think there were some like that. I think they were a little bit more companyized.

Q. All right. So Monsanto had --

A. I mean they were probably produced in quantity for Monsanto.

Q. Monsanto had its own specific laboratory notebooks that it issued to you all?

A. I'm sure they did. I don't recollect the notebook specifically. I do recollect notebooks.

Q. Okay. Now in your St. Louis laboratories did you become proficient and the people that worked with you become proficient at quantifying PCBs in environmental samples?

A. Does "proficient" mean "practiced"? By definition.

Q. "Proficient" means "good." Did you all become good at it?

A. "Practice" means "good." Yes.

Q. And were there ways that you could tell whether you were good or not?

A. Yes.

Q. I assume you had quality assurance methods, correct?

A. Right.

Q. And can you describe briefly the quality assurance method that you used?

A. Sure. We ran standards. We ran blanks. Intermittently with what we ran, we would run a standard to make sure the instrument was still running properly.

We ran surrogates. That might be something like a pesticide or a simple, yeah, a simple pesticide that we had a known response for and that we could tell from that whether the instrument was still operating the way it should and things of that sort.

So the quality control at that particular point in time wasn't as formalized as it is now in environmental laboratories but it was in the development stages and it was certainly there.

Q. At some point did you -- now I know at least initially you were doing all of the environmental samples for Monsanto from all of the plants basically, is that fair? Early on?

A. I think it's fair to say that we had the capability at South Second Street facility and that most of the samples that were being analyzed were sent to the South Second facility to be analyzed. It is not necessarily fair to say I was doing it by all, everything myself.

Q. No, no, no, I didn't mean yourself --

A. But you did say "you."

Q. Okay. I apologize. I meant -- and that's a fair clarification. You had staff working with you by the '69/'70 time frame?

A. Yes, sir.

Q. Is that correct? And I assume you had more than one machine by, let's say, 1970?

A. Yes, sir.

Q. Okay. And when I said that you became proficient and good at quantifying PCBs and environmental samples, I meant your laboratory there at South Second Street.

And by the way, you were the head of

that section, I assume?

A. Yes.

Q. Correct?

A. I was the technical, I provided the technical supervision.

Q. All right. At some point you brought in people from the other plants and taught them how to do the analysis, correct?

A. It was at least one or two instances where that was done.

Q. And one of the instances was Anniston, correct?

A. Anniston was one of the two plants that we had that manufactured PCBs.

Q. And you turned -- well, you assisted the Anniston plant to set up their own PCB analysis capability. Correct?

A. Yes.

Q. Using the methods that you had documented there at the South Second Street facility?

A. Right.

Q. And you instructed them how to do that, correct?

A. Correct.

Q. And my understanding is that they set up a -- they brought in a portable building so that they had a clean facility and set the machinery up in it and began performing the same kind of analysis that you were doing at South Second Street. Is that your understanding?

A. Yes. They began performing the analysis in the same manner that we were doing it, yes.

Q. Yes. And did you go to Anniston, by the way?

A. No.

Q. You never went to Anniston?

A. Huh-uh.

Q. You need to answer out loud.

A. I apologize. No, I never went to Anniston.

Q. Did anyone from South Second Street go to Anniston?

A. I'm sure they did.

Q. Do you know of anybody that worked for you that went to Anniston?

A. I don't recall specifically, no.

Q. Did anybody from Anniston come to St. Louis?

A. Yes.

Q. Who do you remember from Anniston coming to St. Louis?

A. You know, there was a technician that was sent up there, or a chemist, whichever way you want to look at it. He spent several days in our laboratory, where worked with him and made sure he understood what he was doing and introduced him to everybody and to the methods and just made sure he knew what he was doing. And then he went back and set them up down there.

Q. How long was he in St. Louis?

A. Better part of a week, probably. Could have been more, I don't recall; but I know it took that long to familiarize him with what we were doing.

Q. Was his name Turner?

A. Yes, that name sounds familiar.

Q. Did a Toby Bell come up to St. Louis?

A. Yes, I met Toby Bell several times I think.

Q. Did you ever meet a Bunky Wright?

A. Yes.

Q. So all three of those gentlemen at some point came to St. Louis?

A. Yes.

Q. But you only specifically remember training Mr. Turner?

A. Depends on your definition of "training." We trained Mr. Turner to do the methods and how to prepare the samples and how to interpret this and how to quantitate and how to operate the instrumentation and things of that sort.

The other gentlemen, if I remember correctly, were more supervisory type folks. And they basically were more interested in, "Gee, what do you need to do? How do you do it? How difficult is it? What's this look like and what's that look like?" And things of that sort.

That's my recollection.

Q. Now did you become aware at some point that the Anniston plant was having to submit reports to environmental authorities?

A. I was aware of it. I'm not, I'm not sure when specifically I became aware of it or how I became aware of it.

Q. Okay. Did you -- and by "you," I don't mean you personally, I mean the people in South Second Street -- in let's say by 1970 or so, were you performing analyses that you knew were going to be reported to environmental agencies, either state or federal?

A. All of the information that we generated, generated was ultimately shared with government agencies.

I want to make sure when you say "environmental agencies" I understand what you are talking about. Because the time frame you are talking about was 1970. Was EPA even formed by that time?

Q. All I'm talking about -- that's why I used the term "environmental agencies."

A. I just wanted to clarify that.

Q. Yeah. I'm talking about some governmental entity, whether it's state or federal or even city or county?

A. The results weren't always necessarily generated specifically at the request of those kinds of individuals --

Q. But you knew --

A. When the -- can I complete my answer, please?

Q. Yeah.

A. When they shared samples with us or asked us to do things and it was agreed to do them and we did them, the information was shared with them.

All the information that was generated in the laboratory ultimately was shared with anybody and everybody, including the agencies as they began to form and get into compliance situations.

But initially there were no, there was no EPA, there was, no, it was just interested people.

Q. And, yeah, and I'm just asking. I know at the very beginning that's the way it was and eventually it transformed to where various environmental agencies became aware of the situation and concerned about being informed about it.

And I just want to know when, if you can recall, your consciousness elevated to the point where you realized that the work you were doing had the potential at least for being submitted to regulatory agencies?

A. To be real truthful with you, all of the work that we did had the potential to be submitted to regulatory agencies, to clients, to customers, to international agencies; and none of the information was generated with any more or any less quality than it was required to get the answers in the best manner that we felt we could.

And so in the period that you are talking about, especially prior to 1970 and things of that sort, we generated best information that we could and supported it with proper documentation. But as far as being required to hand it over to a government agency or to meet some compliance level or things of that sort, they didn't exist at that time. And that's important that it be realized.

Q. Okay. Well, I was specific -- I was specifically talking about the 1970 time frame and. And the reason I'm asking you this is that I believe it was in 1970 that the Anniston plant was required to begin submitting reports to the Alabama Department of Environmental Management. And I --

MR. PRAUSE: Object to the form of the question.

MR. WRIGHT: What was the wrong with the form of the question?

MR. PRAUSE: It is the Alabama Water Improvement Commission.

MR. WRIGHT: That later became the Alabama Department of Environmental Management. Okay.

BY MR. WRIGHT:

Q. Were you aware of that?

A. In retrospect, I don't recall being highly consulted or involved in or any of that kind of thing. I recall at some point in time seeing memos and things of that sort that were generated for those purposes.

We trained the folks to do it; we exchanged samples with them; satisfied we knew what they were doing. They always had us available to ask questions and to send samples to verify what they were doing. Things of that sort.

The specifics of what they did with the state or what they provided the state was certainly not filtered through us in any way, shape or form.

Q. Okay. You knew it was obviously important that if information is being transmitted to a governmental agency at that agency's request that that information be as accurate as possible?

A. Okay. I, I'm going to have to say to you from a professional viewpoint the information that I generate. Whether it be for a regulatory agency or for any other use, is defensible and it is in line with the expectations and data quality objectives associated with that information.

And so if you are implying or you're trying to find out whether I stand on my ear or do something particularly special to produce information for compliance agencies, that's not true. I meet the data quality objectives that I need to and the information is provided. If they have any questions about it or the quality control associated with it, we share that information with them.

We understand how to produce the best defensible information that's available.

Q. All right. And that's the way you trained your employees and the people from the other plants that you taught, correct?

A. That's correct.

Q. Okay. And you expected them to do, to adhere to the same high standards that you held yourself and your own laboratory to, correct?

A. We hoped they would, yes.

Q. Well, did you assure that they would?

A. As I indicated earlier, we trained them.

Q. Yes.

A. Secondly, we exchanged samples with them.

Thirdly, we recommended the equipment they buy.

And fourthly, we were always available to provide backup either in expertise or analysis if they so deemed they needed it.

Q. Do you recall ever changing or telling them that they needed to change their methodology to generate more accurate reports?

A. No. If we early on would develop a better way of quantitating or if we generated information with standards that let us understand that if we used, say, 1242 and 1254 as standards and did it this way then it didn't really matter how altered it was, we got a pretty good result -- it was maybe plus or minus 10% of what we were doing -- we would communicate that kind of information.

But certainly at that stage of the game, as long as the person documented very clearly how they did the calculations and they did them consistently and it was acceptable, that's the way it was done.

If we made improvements, we told them about that; and they were, it was up to them and their agreement with whoever they were reporting the information to whether that was the thing they wanted to do.

Q. Okay. Let me just ask this. Did they -- did the outlying labs ever get better than you -- and by "you," I mean you personally and your crew there in South St. Louis -- at performing these kind of analyses?

MR. PRAUSE: Object to the form of the question. I don't know what you mean by an "outlying lab."

Q. Did either Anniston or Chrome Ridge or Ruabon or anybody else in the Monsanto companies ever get better at doing quantitative analysis than you at South Second Street?

A. You know, the objective was to produce defensible information that met the data quality objectives, and that's what was done. And that was what was done by the other laboratories. And I don't know "what better" than is.

Q. Did they ever get -- did they ever produce more accurate or more defensible, to use your term, information than you did in your lab?

A. Not really. It wasn't a contest. This isn't a contest. I mean, it is an effort, a professional effort, to determine to the best of your ability what's there so the information can be used to make appropriate decisions.

And so the "better than" implies that there is some sort of contest or something. They became as good as, certainly, and as capable as we were. But I don't think we ever looked at it like there was a contest or graded each other or anything of the sort.

When they were first starting up, we would look at how they did things in very much detail to make sure that it made sense and that they were doing it consistently and they understood what the objectives were and things of that sort.

But did any lab, did any lab become better than we did? No.

Did they become as good as we were? Yes.

Did they become as capable as we were? Sure.

Q. Now are you aware in 1971 -- well, let me just show you here. For example, page 13145 of the documents that you looked at?

A. Is that the same as Exhibit 3? Is that what that is, or what is it?

MR. SHIELDS: Exhibit 4.

THE WITNESS: It is part of Exhibit 4?

MR. WRIGHT: It is part of Exhibit 4.

BY MR. WRIGHT:

Q. When I say the documents you looked --

A. Okay.

Q. -- at before the deposition, just from now on --

A. Okay.

Q. -- you'll know I'm talking about Exhibit No. 4.

A. If I'm confused I'll continue to ask questions to clarify it.

Q. Yes, sir. Can you state for the record what that is.

A. Let me look at it first of all.

(Witness peruses document.)

Okay, I have had time to look at the two-page document.

Q. Okay, what is it?

A. It is a memo on Monsanto -- it's a copy of a memo on Monsanto company header indicating that it was produced at Anniston, Alabama, on November 6, 1970. It is written to Mr. J. L. Crockett, Jr., Technical Staff Director, Water Improvement Commission, State Office Building, Montgomery, Alabama.

It is written by J. C. Landwehr of the Technical Services -- it says, "Technical Services Supervisor." And on the blind carbon copy it lists G. L. Jessee, F. J. Holzapfel, W. B Papageorge, J. L. Conder, and P. B., I think it's Paul, P. B. Hodges as being sent.

And it also shows that there is an attachment; it doesn't specifically say what the attachment is or --

Q. Well, isn't there an attachment?

A. Then it says, "Attached are data compiled at Anniston," this is in the body of the memo. It says, "Attached are data compiled at Anniston regarding Aroclor content of the plant effluent. As you requested, we shall report this information to you on a monthly basis."

Q. All right. And that document is dated when?

A. November 6, 1970.

Q. Okay. Is it your understanding that

they continued to document data like that until some time in 1971?

A. They could have. Obviously, from review of this, I'm not, didn't receive a copy, I wasn't on the list. And whatever they were doing was they were doing directly in agreement with and as requested by the technical staff director at the WIC.

Q. All right.

A. So did I review this information or look at it or anything? Have I ever seen this before back then? No.

I have seen it recently, obviously; I went through these documents.

Q. Okay. Do you remember seeing reports like that back in the 1970/1971 time frame?

A. Not routinely, no.

Q. Well, you say, "not routinely."

A. Well, in 19- -- yeah, I answered the question too quick. You said the 1970/'71 time frame?

Q. Yes.

A. No.

Q. Did you ever have, to your knowledge, any contact with the Alabama Department of

Environmental Management or its predecessor, the Alabama Water Improvement Commission?

A. In that time frame, no.

Q. Okay. When did you have contact with --

A. I was providing air monitoring and quality control/quality assurance support for a thermal operation for Rust a few years ago down in McIntosh, Alabama at the Ciba Geigy plant down there.

Q. It didn't have anything to do with --

A. Correct.

Q. -- the Monsanto plant --

A. Correct.

Q. Okay.

A. But the reason my contact, in answering your question, is relative. And it is called ADEM now, I think. Right?

Q. Yes. Okay. Did you ever recommend that anybody ever tell the Alabama regulatory authority anything specific?

A. No. Nope.

Q. Okay. Let me show you a document that may or may not be contained in Exhibit 4, I haven't had the time to find it. But it is MONS 044289. And ask you if you are familiar with that?

A. Thank you.

MR. PRAUSE: Is that your only copy?

MR. WRIGHT: That's my only copy. I'm going to look real quick here and see.

MR. PRAUSE: It doesn't look familiar to me.

MR. WRIGHT: What's it dated? What's it dated?

MR. PRAUSE: Not clear, you can't tell.

MR. WRIGHT: It's covered up by the sticky.

THE WITNESS: It's February 197. Oh, here it is, no, there's a sticky on top. It says 3/12/71.

MR. WRIGHT: Yeah, okay.

BY MR. WRIGHT:

Q. So February or March of -- the report I think is probably dated February of '71 and the sticky?

A. The report is dated some time in February in the '70s, from this copy.

Q. All right, okay.

A. I can't t ell.

Q. I don't believe it is in the stack of the things that you were provided in preparation for the deposition.

If you look at the -- first of all, you're not unfamiliar with reports of that type, correct?

A. Well, I'm nowhere to be found on the distribution. Am I?

Q. I bet you are. Let me see it.

A. Sure. I might be, I looked fairly quickly, but.

MR. PRAUSE: Have we marked that as an exhibit?

MR. WRIGHT: No, this will be No. 6. Is that right? Yes.

(Deposition Exhibit No. 6 marked for identification.)

BY MR. WRIGHT:

Q. It's entitled, "Organic Chemicals Division, R&D Laboratories, St. Louis." And it's, the sticky is from W. B. Papageorge. And it says, "Applied Science Staff."

Were you part of the Applied Science Staff?

A. Myself and about 30 other people, yes.

Q. Okay. I'm going to ask you about

something that I think you'll be aware of. But perhaps you'll tell me that you weren't aware of this.

A. Only time will tell.

Q. Yeah. In the one, two, three, fourth paragraph, would you -- let me just read. "Comparative EC/GC," which is the methods we have been talking about, electronic capture gas chromatograph, correct?

A. To be real truthful, before I comment on it I would have to read the statement in its entirety.

Q. Okay. Why don't you read --

A. And I can't see it the way you're moving it.

Q. I apologize.

A. No. You go ahead and read it and then I'll look at it.

Q. No Why don't you read the paragraph out loud and then I'll ask you a question about it.

A. Okay.

MR. PRAUSE: If you feel more comfortable reading the entire document, that would be --

MR. WRIGHT: Yeah. All I'm asking --

(Simultaneous conversation.)

THE WITNESS: We'll see where we go with it.

MR. WRIGHT: All I want to talk about is that paragraph.

THE WITNESS: And I thank you --

MR. PRAUSE: I would like to look at it, too, Scott, when you get a chance.

THE WITNESS: Okay. The paragraph that I have been asked to read is the one, two, three, fourth paragraph on the third page of this fax. And "Speciality Products Aroclor Environmental Program."

THE REPORTER: I'm sorry, read loudly.

THE WITNESS: Sure, absolutely. Usually they tell me to calm down.

"Comparative EC/GC analysis of duplicate Anniston plant effluent samples for PCBs were carried out at Anniston and St. Louis. The levels of PCB found calculated as Aroclor 1242 were two to four times greater than those reported by Anniston. The reason for the disagreement lies in the methods used to estimate the PCB level. Anniston uses the peak height technique, while we employ the total area of the envelope. The two techniques produce equivalent results when the isomer distribution of the Aroclor in question is unaltered. The search for a more absolute quantitation will be continued. Additional exchange samples will be analyzed using the total area calibration procedure."

BY MR. WRIGHT:

Q. Okay. I think you would agree that a 200% to 400% undercount is at least significant, correct?

A. It is a difference in the range stated for the samples that were exchanged between the two laboratories which were undoubtedly exchanged to establish that so that we could make sure that they were doing what they were supposed to be doing.

Q. All right. So a memo or correspondence should have and would have gone out to Anniston to tell them to change their method to make it more accurate?

MR. PRAUSE: Object to the form of the question.

Q. Correct?

A. I think "they should have and would

have" is your presumption. I think the fact that it may have happened is a possibility.

I think that the communication may not have been directly to Anniston but through our management structure to the plant management structure. But I'm not willing to say it should have or would have. I mean, that depends.

Q. Well, I think we established earlier that, that you developed the Monsanto method, correct?

A. That's correct.

Q. You perfected the Monsanto method, correct?

A. We optimized it, yes.

Q. And that you in St. Louis were at least as good as any other Monsanto lab and for much of the time better than any other Monsanto lab, correct?

MR. PRAUSE: Object to the form.

A. I don't, I think we have established that we were able to analyze PCBs and do it as accurately as anybody.

Q. All right. And a two-to-four-times lower level than you were finding on the same sample is a significant undercount, will you agree with that?

A. It is a measurable difference. And the objective of the measurable difference was to ensure that the laboratory in question was using the appropriate approach for the sample in question.

It is obvious, at least from my reading of that particular paragraph, that the peak height technique as applied to that particular sample or samples was not appropriate. And we demonstrated to them and told them they needed to start, now that once they knew it, they needed to understand this.

Now whether or not we communicated that in a letter or something like that, or a memo, or whether or not we called them up and had a conference call and talked them through it and then explained to them how to do it and pointed out -- as I pointed out in the method you had me read where it had four different cases in there -- that perhaps because of their experience they had mis- -- they had chosen the improper case.

Q. Okay. And what I'm asking you is I think you agree with me that they should have corrected their method to more accurately report the data?

A. One would assume that they would if we understood their goal.

Q. Okay. And you believe that somehow you would have instructed them to change their method?

A. No. we probably wouldn't have ordered them to do anything. We would have appraised them of the situation and told them of the differences and let them decide based on their own information what they should do.

For all we know, they could have had an agreement with somebody that this is the way they were supposed to calculate it and, before they could change it, they would have to appraise those individuals of that and why they were doing it. And then those individuals would have to say, "Yeah, that sounds good, we'll accept that."

And then they also would have to know for sure, well, what impact did it have so the earlier numbers could be related to the newer numbers? And they might even want to go back and look at the earlier numbers and see whether or not case one, two, three or four were the appropriate ones there and whether or not there were issues there, too.

So I think there's a quantum jump here that you're asking me to make that I don't make.

Q. Let me object, nonresponsive.

Let me just ask you whether you recollect ever instructing Anniston to change their method? Do you have a recollection of that?

A. I never instructed Anniston to change their method. It was not my position to instruct them to do so.

Q. Do you have a recollection of anyone instructing them to change their method?

A. Nope, I do not.

Q. Do you have a recollection of anyone advising them that in order to be accurate they need to change their method?

A. Yes. I think that what we read here advises them of that.

Q. Other than what we read, do you have a recollection of anybody ever telling them to change their method to be more accurate?

A. Not a specific one. But -- well, no.

Q. Do you have a general recollection? All right. Do you know whether or not they changed their method?

A. No.

Q. All right.

MR. PRAUSE: Larry, I would just like to note for the record that the last page this document is not sequentially numbered in order among the MONS documents; it's 0400070, which, whereas the first page is 04289.

MR. WRIGHT: Let me see it, I might have stuck two documents together. Yeah. That's the first page of another document.

MR. PRAUSE: I guess we should note for the record that that's being removed from Exhibit 6.

MR. WRIGHT: Exhibit 6 is a five-page document sequentially numbered 044289 through 044293.

MR. PRAUSE: And when you are at a good point I would like to request a quick break, it is coming up on 5:00. We have no problem continuing into the evening, but I would like to get a break.

MR. WRIGHT: Why don't we take a break and discuss what we're going to do.

MR. PRAUSE: Sure.

MR. WRIGHT: Because I still don't know how we're going to do all the things we need to do. So let's go off the record.

THE VIDEOGRAPHER: Off the record at 4:51.

(Recess taken.)

(Mr. Shields leaves the deposition)

THE VIDEOGRAPHER: We're on the record at 5:15.

MR. WRIGHT: While we were off the record we decided that, despite mine and probably everybody else's misgivings, the best thing for us to do is probably continue tomorrow. And I'm, we're going to go a little bit further today and then come back and try to complete tomorrow. And to be honest, I'm not sure we'll complete tomorrow but we'll do the best we can.

MR. PRAUSE: Do you want to set a time right now to start tomorrow?

MR. WRIGHT: To start?

MR. PRAUSE: Or do you want to leave that --

MR. WRIGHT: Let's leave that until we see where we get in the next little bit.

MR. PRAUSE: Sure.

MR. WRIGHT: I do want to --

THE WITNESS: I believe that's part of Exhibit 4.

MR. WRIGHT: Yes.

THE WITNESS: Or it may have come from your records.

MR. WRIGHT: We'll put it back through there.

THE WITNESS: It may have been one you didn't have time to find. I don't know which.

MR. WRIGHT: No, it is from Exhibit 4. It is not one of mine.

THE WITNESS: Okay.

MR. WRIGHT: The, I just want to say, and for whatever it is worth, I'm concerned about the report, the expert report, in this case. This expert report is a page-and-a-half and in my opinion basically doesn't give any opinions. It simply says what subjects the witness will talk about.

BY MR. WRIGHT:

Q. I would like to know, Dr. Tucker, what expert opinions do you have that relate to this case?

A. That's a question to me?

Q. Yes, sir.

A. At the moment on the record?

Q. Yes, sir.

A. The expert opinions I have are based on my expertise; and my expertise in the areas that I can talk to are outlined in a reasonable format I think in the expert report that you have been provided.

If you have specific objections, I'm sure we can take it under consideration to do something about it; but at the moment that's kind of how I feel about it.

MR. PRAUSE: Obviously, it's a subject you are free to bring up with me or any of the attorneys you want. If you want to ask Scott questions about his report itself, that's fine.

MR. WRIGHT: Well --

MR. PRAUSE: But I don't think he's the person to resolve the procedural issues.

MR. WRIGHT: Here's the problem we've got.

MR. PRAUSE: Are you talking to me or Scott?

MR. WRIGHT: I'm talking and to him but

mostly to you right now.

MR. PRAUSE: Okay.

MR. WRIGHT: By "you," I don't mean you specifically, I mean you as the lawyers for Monsanto.

MR. PRAUSE: Yeah.

MR. WRIGHT: Because you and I just met this morning.

The only information we have about the expert opinions of Mr. Tucker or Dr. Tucker are contained in the expert report. And the expert report, as I indicated, is a page-and-a-half document, it comprises six paragraphs. The first paragraph tells who he is. The second paragraph tells where he went to college. The third paragraph says he has a lot of experience. The fourth paragraph says he has published numerous papers. The fifth paragraph says, in forming his opinions, he has relied on his education and so forth. And the sixth paragraph says, quote, "I will testify from a scientific and analytical perspective regarding the details of Monsanto's response to the discoveries of the international scientific community in the late 1960 and early '70s regarding the persistence and accumulation of PCBs in the environment."

In other words, that says what he is going to talk about.

MR. PRAUSE: Right.

MR. WRIGHT: Doesn't say what his opinions are.

MR. PRAUSE: Right.

MR. WRIGHT: The next paragraph says, "I will testify as to my involvement in the development and use of analytical equipment," blah, blah, blah. Again talks about what he is going to talk about but it doesn't give what his opinions are.

MR. PRAUSE: Right.

MR. WRIGHT: And then it says, "As necessary, I will also furnish background information regarding analytical techniques and the behavior and properties of PCBs." Again it testifies, it says, I will talk about such-and-such, but it doesn't give any opinions.

MR. PRAUSE: Right.

MR. WRIGHT: And so to that extent this

report gives us no expert opinions, in our opinion.

MR. PRAUSE: I completely understand what you are saying.

MR. WRIGHT: Okay.

MR. PRAUSE: And I think we can supplement that report and it would be appropriate for us to do so at this point.

As you know, different levels of detail are required in different jurisdictions in that sort of a report, and I believe that a similar report was used in the Abernathy and Dyer cases.

MR. WRIGHT: Frankly, I think it was identical.

MR. PRAUSE: Yeah, it very well might have been.

MR. WRIGHT: Right.

MR. PRAUSE: Now as you know, a lot of what Scott has been talking about today is beyond the ken of the average lay person.

MR. WRIGHT: And I recognize that he is a mixed fact and expert witness. My concern and the reason I'm bringing it up at this point --

MR. PRAUSE: Yeah.

MR. WRIGHT: -- is because I'm taking his deposition presumably as a fact witness and an expert witness.

MR. PRAUSE: Right.

MR. WRIGHT: And if I'm going to continue tomorrow and he has additional opinions that are not simply historical recitations, I want some advance warning about what they are.

MR. PRAUSE: I think that's fair. And I think what we will wind up being able to tell you -- and I can probably confirm this with a phone call -- is that Scott is primarily a fact witness here and we have designated him an expert out of an abundance of caution because the matters that he is testifying about are highly technical.

I think that Monsanto has no intention in this case of using Scott to testify about modern-day, present issues as far as analysis of samples in the Anniston area.

I think that, if he is going to give any opinion, it would relate exclusively to what happened in the early '60s -- I mean, I'm sorry, in the late '60s and the early 70s; it would be along the lines of commenting on the, you know, that it was very challenging at that time to use the equipment to analyze for trace quantities of PCBs in environmental matrixes.

And that, to some extent, because he is personally involved in that, that is factual testimony but it arguably crosses over the border into expert testimony also.

MR. WRIGHT: Okay. Will you do this for me then? Will you make that phone call and give me that assurance?

MR. PRAUSE: Yes, I will be glad to do that on the record.

MR. WRIGHT: Because that's going to determine how I prepare tonight. In other words, do I have to prepare for a history lesson plus new scientific opinions or do I just have to prepare for a history lesson?

MR. PRAUSE: Right. I think that's a fair request.

MR. WRIGHT: Okay.

MR. PRAUSE: And if you want, I can do it after you ask some more questions, or I can go ahead and do it immediately.

MR. WRIGHT: Okay. Why don't we do it at the end? Well, are you going to have somebody you can get in touch with?

MR. PRAUSE: Most likely, you know, to be completely safe I can go ahead and do it now.

MR. WRIGHT: Why don't you do it now just to make sure you get hold of somebody.

MR. PRAUSE: Yeah.

MR. WRIGHT: The other thing, just so that you know, the other thing that I have a concern about is the documents that were included in the notice. And --

MR. PRAUSE: What documents were included with the notice?

MR. WRIGHT: Well, the documents provided to the deponent in connection with the above --

MR. PRAUSE: You mean the documents requested? I'm sorry.

MR. WRIGHT: The documents requested. We got number one, I believe.

I assume that Exhibit 4 comprises all of the documents that were provided to you in connection with this case. Is that fair, doctor?

THE WITNESS: Yes, I think that's has been asked before and answered before.

MR. WRIGHT: I think it has, too.

THE WITNESS: But to agree with it, yes.

MR. WRIGHT: But because we're dealing with it now.

THE WITNESS: No, that's okay.

MR. PRAUSE: That's fine. That's consistent with my understanding also.

MR. WRIGHT: Yeah. And by the way, I'm reading from Plaintiffs' Exhibit Number 1, which i the Notice to Produce Documents at Deposition.

MR. PRAUSE: Right. I will say I believe that Monsanto's attorneys received that for the first time yesterday and it was faxed to me, I hadn't seen it before today.

MR. WRIGHT: Yeah. And I don't know whether that's true or not, because it came from Bob's office and whatever it is, it is. Let me just tell you the documents that we don't have.

MR. PRAUSE: Sure.

MR. WRIGHT: So that tonight you can determine whether or not they exist. I think what you are probably going to tell me is, is that most of them don't exist.

MR. PRAUSE: Probably.

MR. WRIGHT: But I want to bring it up and give you the opportunity to get them if they do exist.

"Any and all documents reviewed by the deponent in reaching his opinions and conclusions." Again, Exhibit No. 4 is that universe plus your general knowledge of PCBs and analytical techniques and so forth, correct?

THE WITNESS: Yes.

MR. PRAUSE: Yeah. I mean, who knows what he reviewed --

MR. WRIGHT: I know.

MR. PRAUSE: -- in 1969 and those documents are a part of his background.

MR. WRIGHT: I understand.

MR. PRAUSE: Okay.

MR. WRIGHT: Then number three is, "Any and all documents, specifically including any scientific, medical, engineering or technical publications relied upon you in reaching your opinions and conclusions."

I have a little bit of concern about that because I think you may tell me that there are scientific publications that you reviewed years ago that you are relying on in reaching your testimony today. Is that true or not true?

THE WITNESS: I'm sure it is, in terms especially for the fact portion of it.

MR. WRIGHT: Okay.

MR. PRAUSE: And obviously if we could, if we could, if Scott couldn't specifically say, well, this was something, then we can, to the extent it is in the public domain, obviously you are, you have equal access to it. To the extent it is not in public domain --

MR. WRIGHT: Yeah, but I don't know what he relied on, see, that's the problem.

MR. PRAUSE: I'm saying maybe neither does he. He may not be able to specifically say, "Well, here's what I read." You know that he did read a number of scholarly articles I'm sure in the late '60s and early

'70s; but as far as being able to put a finger on one and say, "Yeah, that's one," you know, to separate it from his collective understanding is maybe something that's not feasible.

MR. WRIGHT: Okay. Well --

MR. PRAUSE: And if it is, we will certainly endeavor to, if you want, ask him right now; and if he can put his finger on any, we'll endeavor to supply them to you.

MR. WRIGHT: Okay. Tell you what, let me go, the last three are going to be the easiest. And then I will come back and I will ask him that question and then can you go back your phone call. Okay?

MR. PRAUSE: Okay.

MR. WRIGHT: Item number four is, "Any and all correspondence, e-mail, notes, memoranda and other writings, documents or things generated by the witness in connection with his employment as an expert witness or anticipated testimony in this action."

MR. PRAUSE: I'm aware of nothing other than what you have.

MR. WRIGHT: No correspondence? You all

have never sent him a letter, he's never sent you a letter?

MR. PRAUSE: We've spoke own the phone a few times, and that's it.

MR. WRIGHT: You haven't made any notes?

THE WITNESS: No. I have not made any notes.

MR. WRIGHT: Okay. "Any and all documents relating to any billing or time records"?

THE WITNESS: I haven't billed anything.

MR. PRAUSE: We haven't received a bill from Scott for his work on this case.

MR. WRIGHT: Okay.

BY MR. WRIGHT:

Q. Do you anticipate billing Monsanto for your time?

A. Yes.

Q. At what rate?

A. I haven't really billed anybody this year but my previous rate was 250 an hour.

MR. PRAUSE: And --

A. And I need to qualify that --

MR. PRAUSE: Yeah.

A. -- to be fair to everybody. The

deposition portion of it or the testimony portion of it, I don't bill for. I do bill for time to get there, the time to be there, time to return, costs associated with it.

And if there is any preparation work -- for example, like yesterday when we sat around and went through documents and things of that sort -- I will bill for that. Today, I don't bill for.

Q. Okay. Well, other than getting here and the ancillary things you mentioned?

A. Correct. And that's what I -- okay, I can do it again to make it clear what I bill for and what I don't bill for.

Q. Let's save that for tomorrow.

A. That would be fine.

MR. PRAUSE: So I think we're in agreement then that there is nothing responsive to, I don't know what the item number of that is but, it is the one asking for his notes and bills and file materials.

MR. WRIGHT: Right.

BY MR. WRIGHT:

Q. And then item six is a catchall. It says, "Any and all documents and things within the deponent's custody and control relating to his employment as an expert witness and anticipated testimony in this case."

And based upon your other answers, my assumption is your answer to that is there is nothing else.

A. That's correct.

MR. PRAUSE: That is correct for mine, too.

Q. Okay. And so where we are left with is the scientific, medical, engineering or technical publications relied upon by Dr. Tucker in reaching his opinions and conclusions in this matter.

Is there anything specific that you can think of right now that is not contained in Exhibit 4?

A. You know, it is hard to condense all the experiences and things of that sort that form the portion of the knowledge base and say that they are all in Exhibit 4.

Which items I particularly rely on, most of -- a lot of those are in there, the methods that I wrote, the, there's some publications that I published.

I believe also associated with the expert report was a curriculum vitae.

Q. Yes.

A. And in that curriculum vitae there is a publication list. And I would say certainly in the past, I didn't take the CV and look up all the publications and review them for this particular deposition.

Q. Those are publications that you wrote?

A. That's correct.

Q. And I understand that you may rely on the things that you wrote. But really what this is getting at is things that other people wrote that you are relying on. And so I'm just wondering if there is anything specific that you can think of that's not included in Exhibit No. 4?

A. No.

MR. PRAUSE: I might volunteer, for instance, I think that articles, some of the early articles that were published obviously Holmes and Tatton, Simmons, you know, those things that he has even been questioned about and that are referred to in some of these documents, clearly he read them. You know.

If you wanted to go through and compile a list of those we would cooperate with you in getting copies of them for you.

THE WITNESS: But in terms of going specifically back and reviewing prepublications copies of Riesbourgh's information, which I know I got --

MR. WRIGHT: Yeah.

THE WITNESS: -- and read very carefully, point-by-point and letter-by-letter. I mean, it was important. I did not do that for this. But to say that opinions I have, expert or otherwise, are not based partially on that?

BY MR. WRIGHT:

Q. Well --

A. The expert opinions that, that are expert opinions when they occur really have a lot to do with analytical chemistry, which is what I am.

Q. I understand.

MR. PRAUSE: I guess it is a little unusual to have an expert who formed his opinions a long time ago.

A. Yeah. I, in other words, I've not been presented for specific issues to say like happens that an expert --

MR. WRIGHT: Why don't you go confirm

that he's not going to talk about anything else?

MR. PRAUSE: Right.

MR. WRIGHT: And in the meantime let me try to think up a solution to the resolution of this --

MR. PRAUSE: Sure.

MR. WRIGHT: -- problem that is raised by item number three.

MR. PRAUSE: That's fine. I think maybe the easiest way to do it is the cutoff date for his employment, which I think he worked for Monsanto until 1978.

MR. WRIGHT: Right.

MR. PRAUSE: We might be able to stipulate on the record that he won't testify about anything as an expert that happened after he left the employment at Monsanto for instance. Then you would have a very bright line date.

MR. WRIGHT: Why don't you go and check on that and we'll see?

THE VIDEOGRAPHER: Going off the record at 5:33.

(Deposition resumed on the written

record but not utilizing the video tape:)

MR. WRIGHT: For the record, we have asked the videographer to turn off because we don't need him right now.

What I'm going to do -- we're waiting on a phone call from somewhere. And what I'm going to do while we're doing that is I'm going to read into the record the beginning Bates numbers of the documents that are marked as Exhibit No. 4 so that we'll have a record of them and then I'm going to request that I be allowed to take the documents tonight to look at them.

What's the matter? He wants the ending Bates numbers as well?

MR. PRAUSE: Yeah, I mean, as long as we have time to kill.

MR. WRIGHT: Well, The problem is --

MR. PRAUSE: It's your call, it's your record.

MR. WRIGHT: I would rather just do the --

MR. PRAUSE: Yeah, I just wanted to through that out there.

MR. WRIGHT: -- beginning Bates numbers

because I think --

THE WITNESS: When you get into some of the documents they are quite thick so it is going to go fast.

MR. WRIGHT: Let me try. I'll try beginning and ending. Okay.

MONS 097069, one page. DSW 014582, one page document. MONS 035902 through 035920.

And, Ms. Court Reporter, instead of saying MONS or DSW, I'll just say M or D and you will know that M means MONS and D means DSW, okay?

THE REPORTER: Yes, sir.

MR. WRIGHT: Okay. MONS 097458 is a one-paged document. DSW 013946 is a one-page document. MONS 097836 is a one page document. DSW 014282 and 283. MONS 097058. MONS 096517. DSW 147839. DSW 014094. MONS 090103. DSW 147840. DSW 015043 through 45. MONS 097053 through 57. MONS 096512 through 514.

DSW 014271 through 275. MONS 096491. MONS 057607 through 618. DSW 014247 through 248. DSW 014003 through 006.

DSW 006369 through 6372. MONS 096500.

MONS 096470. MONS 096469. MONS 098645 and 646. MONS 096454 and 55. MONS 098142. MONS 096614 and 615.

DSW 023541 through 543.

DSW 013747. DSW 013629 and 013630 D014237 through 40. DSW 014236. MONS 097270. DSW 013502 and 503. DSW 014536 through 538.

Where are they going to call, Marsh?

MR. PRAUSE: Right here.

MR. WRIGHT: MONS 096520 and 21. MONS 098680 and 81. DSW 014007. MONS 034570 through 596.

MR. PRAUSE: If you want a break, I'll be glad to take over for you if you want to pass the stack over.

MR. WRIGHT: I kind of have a rhythm going.

MR. PRAUSE: Okay.

MR. WRIGHT: DSW 013804 and 805. DSW 014098 and 99. MONS 088096. DSW 013504 through 506. DSW 013568 and 69. DSW 006368 through 6372. DSW 039232. DSW 013566. MONS 079347 through 079383. DSW 013145 and 146. MONS 099200 through 202. DSW 038724.

MONS 098700. MONS 098699. MONS 096529 and 30. DSW 013625. MSW 100085 through 100120.

MONS 057469 through 478. MONS 059732 through 750. MONS 030667 through 669. MONS 028738 through 755. MONS 099871 and 72.

MONS 043806 through -- it's a good thing you had me do this because I found a mistake. The beginning number is MONS 043806 and it appears to go sequentially through to 875 but then stapled on to it is a letter dated, I mean a letter numbered as MONS 093497.

Do you want me to tear that off?

MR. PRAUSE: Yeah, might as well. It is fine with me if you do. That's clearly a mistake.

MR. WRIGHT: Okay. So the page we tore off is 093497.

Next document, MONS 082646 through 654. MONS 093254 through 61. MONS 072421 through 482. MONS 098676. MONS 021827 through 861. MONS 066790 through 822. MONS 021815 through 826. MONS 067645 through 653. MONS 021462 through 480. MONS 021424 through 448. MONS 067499 through 518. MONS 021384 through 394. MONS 036053 through 135. MONS 057433

through 441. MONS 034162 through 189.
MONS 042235 through 274.

And that I believe completes the stack. Everything that was pulled out and not marked was put back in and I believe the only thing that was pulled out and marked is Exhibit No. 3.

MR. PRAUSE: Yes.

MR. WRIGHT: So 3 and 4, with 4 comprising the numbers that I just read off, are all of the documents that were presented this morning.

MR. PRAUSE: Correct. Off the record.

MR. WRIGHT: Let's go off the record.

(Recess taken.)

MR. WRIGHT: We're going back on the record now after Mr. Prause has had a discussion with some of his colleagues. And, Mr. Prause, you have a statement about what kind of testimony Dr. Tucker is going to be asked to give?

MR. PRAUSE: That's correct, Mr. Wright.

You had concerns an the scope of Dr. Tucker's expert testimony. And Monsanto is willing to stipulate that Dr. Tucker will not critique any of the ongoing or modern-day, you know, I don't want to just say present because obviously the work at Anniston goes back into the early 1990s.

He will not critique any of the analytical chemistry associated with the present-day or, you know, in the 1990s or 1980s any of the remediation work, any of the sampling, any of the litigation-related sampling, blood sampling, environmental sampling. He will not apply his analytical chemistry expertise to critique or evaluate those efforts.

MR. WRIGHT: Well, that takes a lot off the table but I'm not sure that it tells me what --

MR. PRAUSE: What he will do?

MR. WRIGHT: What he will do, yes.

MR. PRAUSE: I can attempt to fill you in on that if you would like.

MR. WRIGHT: Okay.

MR. PRAUSE: Obviously, Scott will testify as an expert about historical state-of-the-art and events that happened in the late '60s and early 70s. We also are proffering him as an expert concerning modern-day state-of-the-art for the analysis of environmental samples for trace quantities of various contaminants, primarily PCBs.

However, he will not apply that knowledge or that expertise to critique any of the analytical work associated with the Anniston plant litigation or the Anniston plant-related remediation.

So, for instance, Dr. Tucker might offer an opinion about, you know, at present day the theoretical challenges associated with analyzing for contaminants in the environment. But he won't take a piece of data that has been generated in conjunction with the Anniston plant remediation or the Anniston plant litigation and say, "Here, this data is good because of X or this data is bad because of X."

MR. WRIGHT: Okay. Let me tell you what my position is going to be.

I anticipated and in all fairness I have awareness of his historical opinions. Because even though they are not set out in the expert report, there is a lot of material that has been provided that, that generally tells me what his opinions were in the late '60s and '70s and presumably still are regarding that.

I have no hint whatsoever about what his opinion is about today's methodology and standards. And so to that extent, I think we're going to object to him giving that kind of testimony because we haven't been apprised of it before his deposition.

MR. PRAUSE: Well, you are, of course, entitled to lodge that objection. I think Monsanto is -- obviously, you are also entitled to ask Scott questions about his more modern-day, you know, these modern-day issues during this deposition to flesh it out further.

I'm sure that Monsanto would also be willing if you wanted to discuss supplementing his expert report if you think it's inadequate along those lines.

MR. WRIGHT: Let me ask the witness this question; because, frankly, it is the witness' knowledge that, I mean the witness' testimony that we are talking about.

BY MR. WRIGHT:

Q. What opinions, if any, do you have about modern-day analytical chemistry that relate to this litigation but that do not relate to specific samples and tests that have been done? If any.

A. I think the environmental type analysis that is done today is a lot more sophisticated, a lot more extensive, and a lot more practiced than it ever was in the past. I also think that it is done in a much more structured fashion in the sense that it is required to do so because of the regulatory and legal issues associated with it.

And so my opinion is, is that we are really into a realm where we are dealing with compliance versus science; and that at this point in time in terms of regulatory procedures and things of that sort, compliance wins.

So today, current practice is to use standard operating procedures which are very uniform and to ensure that the method helps dictate the equivalency of the data from lab to lab and the quality associated with it. And that enough provisions are included in the information that is generated for outside verification and/or validation of that information.

I think more recently that that is changing in the sense that the EPA is beginning to embrace performance-based-based methodology. And really what we did back in the area that I did this type of analysis was performance-based versus compliance-driven.

So I think the type of methods that are used today are different; I think they are more definitive; I think they are more standardized, and I think they are more comparable. And I think the conclusions that are drawn from the information today after it has been evaluated and verified are more conclusive and of more utility to the legal community.

So that's kind of, I don't know if that goes where you want me to go or?

Q. Well, no. Where I want you to go is I want to know your opinions about modern-day science, modern-day expertise that's within your field that relates to this litigation. I need to know your opinions now at the time of your deposition. I object that I haven't been provided your opinions before the deposition, and so now is my opportunity: I'm asking you to tell me your opinions.

A. Okay.

Q. Tomorrow we're going to talk about the opinions that I was aware of. And, and, you know, they will be, the half fact/half expert opinions that we having talking about earlier.

But right now, if there are going to be any new modern-day opinions, I would like to know what they are. So if you have covered them in your statement, then we're done. If there are more that you need to add, then let's add them.

MR. PRAUSE: Let me interject and say I think there's a little confusion now because again Scott is a fact witness and an expert witness in this case. And some of what we are talking about isn't really so much a matter of opinion; while arguably it is knowledge,it is not opinion.

For instance, Monsanto would reserve the right for Scott to testify generally about how PCBs are analyzed for today. The nuts and bolts. That is a matter not of opinion but of knowledge. And I want to clarify that for you.

MR. WRIGHT: No, that is expert testimony, Marsh --

MR. PRAUSE: I did not say it was not expert testimony. But I say it is expert testimony based on knowledge, not opinion. So I just want to make sure we're on the same page and I'm basically trying to give you more disclosure about the way that Monsanto intends to use Scott in this case.

I understood the position that you're in and we're not trying to ambush you and I think we're willing to agree that if you need to schedule another deposition session with Scott in the future to explore these opinions that you were not prepared for that pertain to modern-day general knowledge of the analysis for PCBs then we're willing to do that.

MR. WRIGHT: I really don't want to do that. And the reason I don't want to do that is, is because I have had his report for some time; I have anticipated the historical opinions that are reflected in his report; I didn't see anything about any other opinions in the modern-day in his report.

I'm staying another day at great expense to myself. And if he has got modern-day opinions -- first of all, I object to them even now -- but I want to know what modern-day opinions he has.

He mentioned a couple of paragraphs worth of opinions. You have mentioned in addition to that that you may ask him the nuts and bolts of how samples are analyzed today.

MR. PRAUSE: Yes.

MR. WRIGHT: Is there anything else in addition to that?

MR. PRAUSE: I mean, I do think, too, I agree that this is not an extensive expert report. But I think implicit in discussing the history of analytical chemistry is a comparison of the past to the present. Obviously, if you want to talk about how something has evolved --

MR. WRIGHT: Well, he has already talked about that. He has already told me about how the present compares to the past. And in addition to that, you have mentioned the nuts an bolts of the procedures.

MR. PRAUSE: Correct.

BY MR. WRIGHT:

Q. Is there anything else in addition to that, Dr. Tucker?
A. I'm sorry, you were talking to me?
Q. Yes, sir.
A. Okay, you guys were having, I apologize.
No, specifically analytical chemistry, nothing outside my known area of expertise.
Q. Well, I don't know what all is within your area of expertise. We have talked about two things relating to modern-day: The matters that you have mentioned, comparing modern-day to the olden days, and we have talked about the nuts and bolts of how samples are analyzed in the modern day today.
Is there anything else other than those two areas that relate to the modern day that you are going to testify about in this case?
A. I think it sounds like that adequately covers.
MR. WRIGHT: All right. I will see you in the morning then.
MR. PRAUSE: Yes. Off the record.
(Thereupon, the deposition adjourned at 6:45 p.m., to reconvene at 9:30 a.m., Wednesday, August 2, 2000, at the same

address.)

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(Transcript continues in sequence in Volume II.)

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