IN THE COURT OF COMMON PLEAS
PHILADELPHIA COUNTY

IN RE:	)	
	)	Master File No. 90-0609-C-6
PAOLI RAILROAD YARD	)	
PCB LITIGATION	)	

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

IN RE:	)	
	)	
PAOLI RAILROAD YARD	)	Master File No. 86-2229
PCB LITIGATION	)	Relates to All Actions

DEPOSITION OF GEORGE ROUSH, JR., M.D.

Taken on behalf of Plaintiffs
April 22, 1992

WALLER REPORTING, INC.
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St. Louis, Missouri 63101
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DEPOSITION OF GEORGE ROUSH, JR., M.D., produced, sworn and examined on behalf of Plaintiffs, on April 22, 1992, between the hours of eight o'clock in the forenoon and five o'clock in the afternoon of that day, at the office of Brown & James, 705 Olive Street, 11th Floor, St. Louis, Missouri 63101, before TINA M. STUMPF, a Certified Shorthand Reporter and a Notary Public.

A P P E A R A N C E S

The Plaintiffs were represented by Mr. Arnold E. Cohen of the law firm of Klehr, Harrison, Harvey, Branzburg & Ellers, 1401 Walnut Street, Philadelphia, PA 19102 and Mr. Martin J. D'Urso of the law firm of Kohn, Nast & Graf, P.C., 1101 Market Street, Suite 2400, Philadelphia, Pennsylvania 19107.

The Defendant SEPTA/PCC was represented by Mr. Paul J. Giordano of the law firm of Blank, Rome, Comisky & McCauley, Four Penn Center, Philadelphia, Pennsylvania 19103.

The Defendant General Electric was represented by Mr. Eric A. Kuhl of the law firm of Williams & Connolly, 839 Seventeenth Street, N.W., Washington, D.C. 20006.

The Defendant Monsanto and Dr. Roush were represented by Mr. Michael H. Malin, 1650 Market Street, Philadelphia 19103.

The Defendant The Budd Company was represented by Mr. Willard R. Burns of the law firm of Kelly, McLaughlin & Foster, 260 S. Broad Street, 1700 Atlantic Building, Philadelphia, Pennsylvania 19102.

INDEX OF EXAMINATIONS

INDEX OF EXHIBITS MARKED

INDEX OF EXHIBITS ENCLOSED

IT IS HEREBY STIPULATED AND AGREED by and between Counsel for the Plaintiffs and Counsel for the Defendants, that this deposition may be taken in shorthand by TINA M. STUMPF, a Certified Shorthand Reporter and Notary Public, and afterwards transcribed into typewriting, and then read and signed by the witness.

o-O-o

GEORGE ROUSH, JR., M.D.,

a witness, being produced, sworn and examined on the part of the Plaintiffs, deposes and says:

DIRECT EXAMINATION

QUESTIONS BY MR. COHEN:

Q. For the record, sir, can we have your full name?

A. George Roush, R-O-U-S-H, Jr.

Q. And you're a medical doctor, sir?

A. Yes.

Q. Where do you reside?

A. In Ladue.

Q. Ladue?

A. L-A-D-U-E, Missouri. The address is 10 Babler Lane, B-A-B-L-E-R Lane, 63124.

Q. What is your date of birth, sir?

A. April 30th, 1921.

Q. My name is Arnold Cohen. With me is Martin D'Urso. We are, together, co-counsel for plaintiffs in

certain actions pending in the United States District Court for the Eastern District of Pennsylvania and in the Court of Common Pleas of -- What is it now?

MR. MALIN: Chester County.

Q. Chester County, Pennsylvania, your counsel says with a small smile. We're going to be asking you some questions here today. If during the course of this examination at any time you don't hear a question that I ask you, would you be kind enough to indicate that to me?

A. I'll try to remember that.

Q. All right. If at any time during this examination you don't understand the question that I put to you, would you be kind enough to tell me that?

A. Yes.

Q. In both instances I'll either repeat or have the reporter repeat or I will restate the question as is necessary, because as for myself I'm going to assume that every question you answer you will have both heard and understood; would that be a fair assumption?

A. I think so.

Q. Now, doctor, I'm a layman. If I should misstate any technical term or medical term and you recognize that I have misstated or misused the term or even mispronounced the term, would you be kind enough to indicate that to me?

A. Yes.

Q. I want to be sure that I understand the question I'm asking and that you understand the question I'm asking and that I understand your answer. That way we'll have a nice clean record. You understand, sir, that all of your responses must be made in a verbal fashion?

A. Yes.

Q. Have you had the occasion to testify before?

A. Yes.

Q. Can you tell me how many times you've testified in the past in any type of matter whatsoever?

A. Including workman's comp?

Q. Sure.

A. Many workman comp cases.

Q. When you say many, is that somewhere between five and 10 or 50 and 100?

A. More than 10.

Q. Would it be more than 50 times?

A. No.

Q. So somewhere between 10 and 50 times?

A. Yes.

Q. And you have testified, what, as the employer's physician or in some other capacity?

A. Or as an expert witness.

Q. Can you tell me the entities who have had occasion to call you as an expert witness in workers

compensation cases?

A. Lead poisoning.

Q. Without regard to what the alleged substance was, can you tell me the names of the employers who have called you?

A. No, I don't remember them.

Q. You don't remember?

A. No. I think cases rather than people or companies.

Q. Okay. Then why don't you tell me, if you can, to the best of your ability, the substances then that were involved in various workers compensation cases where you appeared and testified as an expert witness.

A. A number of lead poisoning cases or alleged lead poisoning cases.

Q. Any other substance?

A. Carbon disulfide. Boranes.

Q. Bor --

A. B-O-R-A-N-E-S. PCB's. Dioxin. That's -- Many of them were lead.

Q. Many of them were lead?

A. Yes.

Q. Now, other than in workers compensation cases. Have you had occasion to testify?

A. On the Boranes and on workman's comp.

Q. I'm sorry. You said on the Boranes?

A. Boranes. You have it on the list there. That was a non-workman's comp.

Q. Any other cases that you can recall where you testified either as a fact or expert witness other than in a workers compensation proceeding?

A. And in dioxin.

Q. You've testified in civil cases involving dioxin?

MR. MALIN: I'll make it easy. He testified in the Sturgeon case involving dioxins.

MR. COHEN: Sturgeon?

MR. MALIN: What was the full name of that case?

MR. COHEN: Kemner?

MR. MALIN: Kemner, yes. He testified in the PCB cases for Monsanto. Brewer was one.

MR. COHEN: Do you mind if I get the testimony from the witness. What you have to say is not testimony, counsel. If you want to supply me with a list that the witness can sign as being a listing of the cases --

MR. MALIN: I was just trying to save time.

MR. COHEN: I'm not trying to waste time. I'm trying to get the information.

MR. MALIN: Sure.

Q. (By Mr. Cohen) So, you testified in Kemner?

A. Yes.

Q. You were on the stand for 30 days?
A. Yes.
Q. That was a case involving dioxin?
A. Alleged dioxin at least.
Q. Alleged dioxin, PCB cases. You testified in PCB cases or just workers compensation claims?
A. Workman's -- They were not workman's comp. They were other than workman's comp.
Q. Civil cases?
A. Yes.
Q. When you testified in PCB cases that were civil cases, were you testifying as a fact witness or an expert witness or both?
A. Representing Monsanto.
Q. So, you were speaking on behalf of Monsanto?
A. Yes.
Q. Had Monsanto called you to testify and to offer opinions on their behalf?
MR. MALIN: I object to the form of the question. If you understand that, doctor, go ahead.
A. I don't think I understand the question.
Q. Do you understand the difference between an opinion and a fact?
A. No.
Q. So in the past, you've been called to testify as,

what you believe to be, an expert witness and you offered testimony, but you don't know whether what you were offering was a fact or opinion?

A. Yes.

Q. That's correct?

A. Yes.

Q. You were employed by Monsanto?

A. Yes.

Q. When were you last employed by Monsanto?

A. '88. 1988. April 30th.

Q. And you retired four years ago?

A. Yes.

Q. I gather your retirement was something that you wanted to do?

A. Yes.

Q. Are you a shareholder of Monsanto or any Monsanto entity?

A. No.

Q. Have you ever been a shareholder of Monsanto?

A. Yes.

Q. And did you divest yourself of shares in that I guess?

A. Yes.

Q. When was that?

A. When I retired.

Q. Did you have some sort of employee incentive plan that gave you shares in the company?

A. No. I had options to buy stock that have been issued to me in my name.

Q. And when you retired you got rid of all that?

A. Yes. I still have some that I haven't exercised options yet.

Q. Since your retirement, have you testified on behalf of Monsanto?

A. On PCB's.

Q. When was that?

A. I don't know. I don't remember. I have no basis of thinking of that way.

Q. You retired four years ago?

A. Yes.

Q. Did you testify on behalf of Monsanto -- and I'm excluding today because I don't know about your appearance here today -- at all in 1992?

A. I don't remember when I testified. I'm sorry.

Q. Well, we're three and a half months into 1992.

A. I understand.

Q. Did you have occasion to appear this year?

A. No.

Q. How about in 1991?

A. I don't recall.

Q. You have no recollection of whether you testified?

A. I have no basis for it.

Q. Do you know the names of the cases --

A. No.

Q. -- in which you testified regarding PCB's since April 30th, '88?

A. No.

Q. Do you have a record of what those cases were?

A. No.

Q. Do you keep files on the cases in which you are asked to testify?

A. No.

Q. When you were asked to testify, do you then have a file, whether you keep it after you're finished or not?

A. I'm not sure what you mean by a file.

Q. Does anyone give you information either in documentary form or orally that you reduce to a document that you then retain so that you'll have information about the case in which you're appearing and testifying?

A. No.

Q. So, you just go in and testify and answer whatever questions are put to you?

A. Yes.

Q. Has that always been the case when you testified

regarding PCB's other than during your employment with Monsanto?

A. Yes.

Q. So, you've never had any files on any cases?

A. No.

Q. Now, you're appearing here today. Are you appearing here on behalf of Monsanto?

A. Yes. Well, I was being subpoenaed.

Q. Are you appearing here as a result of having been served with a subpoena?

A. Yes.

Q. Do you have a copy of that subpoena?

A. No.

Q. Who served you with the subpoena?

A. I don't know. Somebody came to the door and gave it to me.

Q. Did it ask you to bring anything?

A. Yes, but I just took it to Monsanto.

Q. Who did you take it to at Monsanto?

A. Mr. Bistline.

Q. Mr. Bistline?

A. Yes.

Q. He's in their legal department?

A. Yes.

Q. Do you know his title?

A. No.

Q. Did Bistline tell you that you had to bring any documents or anything to the deposition?

A. No.

Q. Did he tell you that you didn't have to bring anything to the deposition?

A. No. He showed me a form that said I should bring what information I have.

Q. And what did you bring?

A. Nothing.

Q. Because you didn't have anything?

A. I don't have anything.

Q. You don't have any documents, materials, any information at all regarding PCB's?

A. It's at Monsanto if I do have. I didn't take anything from Monsanto.

Q. In other words, you had materials when you were there up to April 30th, '88, or at least access to materials up until April 30th, '88, but since that time, you have nothing?

A. That's correct.

Q. Mr. Malin said he's your counsel; is that correct?

A. Yes.

Q. He represents you here today?

A. Yes.
Q. Who's compensating you for your appearance here today?
A. We haven't discussed that.
Q. So, you neither discussed that with Mr. Bistline nor Mr. Malin?
A. No.
Q. What's your usual fee for appearing and testifying on behalf of Monsanto?
A. $1500 a day.
Q. And you expect to get paid that for your appearance today?
A. We haven't discussed it.
Q. Are you paying Mr. Malin anything for representing you here today?
A. No.
Q. You haven't discussed that either?
A. We haven't discussed that.
Q. But you don't expect to?
A. No.
Q. Did Mr. Bistline tell you that they would supply you with counsel?
A. Yes.
Q. And is that how you engaged Mr. Malin's services?
A. I'm not sure. Mr. Bistline introduced me to him.

Q. When was that?
A. Yesterday.
Q. Was that the first time you met Mr. Malin?
A. Yes.
Q. Had you spoken with him by phone prior to that time?
A. No.
Q. Did you prepare for this deposition?
A. I looked over a book that I've got on toxicology of occupational things. The title is Patty's, P-A-T-T-Y, Textbook.
Q. Patty's?
A. Yes.
Q. Textbook?
A. Of Industrial Medicine, Industrial Hygiene.
Q. Is that a one volume text?
A. It's three volumes.
Q. And do you know the date of publication?
A. No.
Q. Do you know the date of revision or whatever update you were looking at?
A. It's the most recent one is all I can answer.
Q. Who owns that book?
A. I don't know. You mean now?
Q. The one you looked at.

A. I own it.
Q. You own it?
A. Yes.
Q. Do you have that at home?
A. Yes.
Q. But you didn't bring it here today?
A. Yes -- No.
Q. Does it have a section on PCB's?
A. Yes.
Q. For what purpose did you look at Patty's Textbook?
A. Historically, that's what I do when I talk about any chemical in terms of health effects.
Q. You reference Patty's Textbook to see what's been reported?
A. Yes.
Q. How large is the section on PCB's in Patty's Textbook?
A. Five, 10 pages.
Q. Do you consider it to be a comprehensive review of the subject?
A. Reasonably so.
Q. Do you have other sources of information regarding the health effects of PCB's other than Patty's textbook?

A. I have Zenz Textbook of Occupational Medicine.
Q. Zenz?
A. Z-E-N-Z.
Q. Z-E?
A. N-Z.
Q. Textbook of occupational medicine?
A. Yes, volume 2.
Q. That has a section on PCB's?
A. Yes.
Q. And how large is that section?
A. Two pages.
Q. Do you consider that a comprehensive review of the subject?
A. Reasonably so.
Q. Any other source?
A. No.
Q. Would it be fair to say that prior to April 30th, '88, you had more information regarding the health effects of PCB's available to you than you have now?
A. Yes.
Q. What did you have available to you prior to April 30th, '88?
A. On PCB's?
Q. Yes.
A. I had no reason for looking at them, looking for

the information.

Q. But you had, I gather, some repository of information available to you at that time?

A. Yes.

Q. Can you describe that repository for me?

A. We have a library.

Q. You have a library at Monsanto?

A. Yes.

Q. Did that library to your knowledge contain the published scientific literature on PCB's?

MR. MALIN: I object to the form of the question. He's asking him did it contain all -- Apparently he's asking if it contains all of the published scientific literature. If you can answer that, answer.

Q. Just tell me to the best of your ability what you believe this library at Monsanto contained regarding scientific information on PCB's.

A. It has a good representation. How complete it is, I can't answer that.

Q. And you said earlier you had no reason to look at it; is that right?

A. That's right.

Q. Was that during your employment you had no reason to look at it or now you have no reason to look at it?

A. When I was working I had reason for looking at

it.

Q. During the course of your employment, you did, from time to time, reference that library but you do not now?

A. Yes.

Q. Do I take it that you have not gone to that library since April of '88 to look up any information regarding PCB's?

A. I looked at the library to see if there was anything that was apparent, but I didn't have any reason for looking at anything. I didn't look at anything.

MR. COHEN: Could I have that answer read back, please?

(Reporter read back as requested.)

MR. MALIN: I think your question was directed to after he left Monsanto. Wasn't it?

MR. COHEN: Yes.

Q. (By Mr. Cohen) After you left Monsanto, did you have any occasion to go back and look at that library, that reference material on PCB's?

A. I did go back and look at the library.

Q. How recently?

A. Since this deposition came up.

Q. What did you look for in particular? What were you looking for?

A. Whether I wanted -- Just to see in general what

they had in way of reference books.

Q. Was there anything there that caught your eye?

A. No.

Q. See anything new there since you left in April '88?

A. I didn't look for something new.

Q. When was it that you actually went to the Monsanto reference library to see what was there?

A. Monday.

Q. Day before yesterday?

A. Tuesday.

Q. I'm sorry. Monday or Tuesday?

A. Tuesday.

Q. Yesterday?

A. Monday.

Q. Day before yesterday?

A. Yes.

Q. Today is Wednesday.

A. That helps.

Q. Two days ago?

A. Yes.

Q. Was that prior to your meeting with Mr. Malin?

A. Yes.

Q. Did you see if they have for example the report of the Banberry Conference, report 35?

A. No, I didn't look. I didn't see it.

Q. Do you know if they have any reports of the Banberry Conference?

A. I didn't attempt to find out.

Q. Do you know what the Banberry Conference is about?

A. No.

Q. Did you review any other materials other than going into the library on Monday? Did you review any other materials in preparation for this deposition?

A. No.

Q. What did Mr. Malin tell you about the Paoli case?

MR. MALIN: I'll object to that question. That's attorney-client.

Q. Let's ask it a different way. What do you know about the Paoli case?

A. What I was told yesterday.

Q. Okay. What do you know about the Paoli case?

A. In the Philadelphia area, I have to guess where, there is a trial involving workers exposed to PCB's in railroad as well as inhabitants living in close proximity to where the explosion of PCB's could have occurred. That's, I think, reasonable.

Q. Did anybody show you any photographs of the facility?

A. No.

Q. Anybody show you any drawings or maps of the facility?

A. No.

Q. Did anybody give you a description of the facility?

A. No.

Q. Do you know that it's a rail yard?

A. I knew that we talked about it being a rail yard.

Q. Do you know that it contains a car repair shop, a rail car repair shop?

A. I don't remember.

Q. Do you know how long PCB's were allegedly used at that railroad yard and car shop?

A. No.

Q. Do you know when they were last used?

A. No.

Q. Do you know anything about the levels of contamination that were found outside on the rail yard property but outside the car shop?

A. No.

Q. Do you know anything about the levels of contamination that were found inside the car shop?

A. No.

Q. Do you know anything about the levels of

contamination, if any, that were found on any of the residential properties surrounding the rail yard?

A. No.

Q. No one gave you any information about that at all?

A. No.

Q. Did you ask for it?

A. No.

Q. Did you have any interest in knowing it?

A. No.

Q. Were you told anything about anything, any of the ailments or injuries that any of the plaintiffs claim that they have as a result of their exposure to PCB's?

MR. MALIN: Same objection. That's Attorney-client. Do you want to ask him a different way? Ask him what he knows.

Q. Do you have any information about any of the ailments or injuries the plaintiffs claim they have as a result of the PCB's?

A. No.

Q. So, you don't know what these people contend happened to them as a result of exposure to PCB's?

A. We talked about that they said their health effects were affected by their exposure to PCB's.

Q. What information did you have when you went to

any of the references, reference sources that you described somewhat earlier regarding any of the health effect claims?

A. Nothing.

Q. What were you looking for?

A. Information that would supplement what I had, these two references I had at home.

Q. Do those references discuss adverse health effects from exposure to PCB's?

A. Yes.

Q. What does Patty's discuss as adverse health effects observed from exposure to PCB's?

A. They talk about the syndrome that we call poisoning by PCB's.

Q. What is that syndrome?

A. Pardon?

Q. What is that syndrome?

A. It consists of chloracne, plus involvement irritation of the eye, nose, upper respiratory tract, liver involvement, and a peripheral neuropathy.

Q. Anything else?

A. And I can't tell which one of these books it is, but they talk about an immunologic reaction.

Q. Specifically what?

A. Some effect on the lymphocytes called T cells.

Q. What is the effect on the T cells?

A. Some suppression of the levels of T cells.
Q. Anything else?
A. No, I think that's it.
Q. What do they refer to when they talk about liver involvement?
A. Enzyme effects.
Q. Specifically what enzyme effects?
A. SGOT, SGPT.
Q. Those are the enzymes; but what happens to them?
A. They are elevated and gamma glutamyle pepaidase is the fourth one.
Q. Also elevated or suppressed?
A. Elevated.
Q. What adverse health effects are believed to be caused by elevation of liver enzymes that you know of?
A. Nothing.
Q. What adverse health effects are related to the T cell suppression that you know of?
A. Nothing.
Q. Absent PCB exposure, do you know of any adverse health effects that are reported from elevation of liver enzymes?
A. Many diseases are associated with the effect on the liver. It's a liver respondent.
Q. You want to describe some of those disease for

me?

A. Hepatitis, alcohol, viral diseases.

Q. You're telling me about diseases now that cause elevation of liver enzymes?

A. Yes.

Q. Okay. So, you were answering my question, what disease or health effects are associated with elevation of liver enzymes; is that right?

A. Isn't that the question you asked me?

Q. Yes. That's the answer you were giving?

A. Yes.

Q. And you were describing for me the disease hepatitis and alcohol?

A. Alcohol.

Q. Anything else?

A. Some exposure to chemicals.

Q. Other than PCB's?

A. Yes.

Q. Anything else?

A. I think that's it.

Q. Do any of these references refer to the results of animal studies?

A. I'm sure they do, but I didn't look at them.

Q. You didn't look at, what, the reference or the animal studies?

A. What you had asked me to look at, what I had looked at. We talked about, what are the agents that affect the liver? That includes mostly infections, but it includes drugs, medical drugs; and so I listed those.

Q. Yes. Let me back up. I'll ask you a different question now, sir. I'll ask you whether the reference books you looked at -- You named two; Zenz and Patty's -- whether those reference books refer to animal studies of the effect of the toxic properties of PCB's?

A. That wasn't the question I thought you asked me.

Q. That's all right. Let's forget about that other question. Let's talk about that question.

A. Ask the question again, please.

Q. Sure. Do these texts, speaking of Patty's and Zenz now, and anything else that you looked at, discuss the results of animal studies that were directed toward determining the toxic effect of PCB's?

A. Yes.

Q. And what do they report in animal studies?

A. With big doses.

Q. That's a qualification.

A. Yes. With big doses. There will be an effect on the liver and it produces an obvious effect on the appearance of the liver and this is associated with a relatively large exposure on the order of 50 parts per million, ppm.

Q. And what is the obvious effect on the appearance of the liver?

A. A nodule response and some fibrosis associated with it.

Q. Any other health effects in animals associated with exposure to PCB's?

A. I don't recall.

Q. Do you recall whether there are any reports in animal data reflecting that PCB's have caused neoplastic changes?

A. That's part of it. To me, that's the continuation of the response I was talking about.

Q. So when you were talking about --

A. This nodule response can be included. Cancer in some of PCB exposure, not all.

Q. In some PCB exposure, not all?

A. Yes.

Q. What organs in animal tests have shown neoplastic changes specifically cancer, from exposure to PCB's?

MR. MALIN: I object to the form of the question. If you understand that, doctor, answer.

THE WITNESS: Would you ask it again?

MR. COHEN: You want to read it back? If it's not understandable, Ill ask you a different question.

(Reporter read back as requested.)

A. The liver.
Q. Any other organ that you know of?
A. Not that I recall.
Q. How about kidney?
A. No.
Q. Gastric tube?
A. Pardon?
Q. Gastric tube.
A. No.
Q. Brain?
A. No.
Q. Lung?
A. No.
Q. Bones?
A. No.
Q. Skin?
A. No.
Q. Only the liver that you recall?
A. Yes.
Q. And are these results reported in Patty's and Zenz to your knowledge?
A. I'm not sure it was both of them because I looked at them both. I couldn't tell you what was in one and what was in the other, but it is mentioned in one of them at least; and these --

Q. I'm sorry?

A. About it causing liver cancer.

Q. And as I understand it, these are the only reference materials that you looked at in preparation for this deposition?

A. Yes.

Q. And the only materials you looked at in preparation for this deposition?

A. Yes.

Q. Did you look at any testimony from any of the witnesses in this case?

A. No.

Q. Are you aware of other Monsanto witnesses who have testified in this case?

A. It was mentioned yesterday.

Q. What was mentioned?

A. One man.

Q. Who?

A. Kaley, is that how you pronounce his name?

MR. MALIN: Kaley.

Q. Do you know Dr. Kaley?

A. I know the name.

Q. Have you ever worked with Dr. Kaley?

A. No.

Q. Do you know if he is a medical doctor?

A. No, he is not.
Q. You know he is not?
A. (Witness nodded).
Q. You nodded your head.
A. No, he is not.
Q. So, your answer is, no, he is not?
A. That's right.
Q. Do you know what position Dr. Kaley holds with Monsanto?
A. No, I do not.
Q. Were you told that Dr. Kelly testified?
A. Yes.
Q. Were you told a Mr. Papageorge testified?
A. Yes.
Q. Do you know Mr. Papageorge?
A. Yes.
Q. You worked with Mr. Papageorge?
A. I don't know what the definition of worked with him is.
Q. Well, you were both working for Monsanto at the same time?
A. Yes.
Q. But you were not necessarily working in the same department; is that fair to say?
A. That's right.

Q. How about Dr. Kelly? Did you work with Dr. Kelly?

A. I worked for him when I first came to Monsanto.

Q. Did you subsequently succeed him?

A. Yes.

Q. When did you first start with Monsanto?

A. 1973.

Q. In what capacity, sir?

A. Associate director, medical director.

Q. And the medical director at that time was Dr. Kelly?

A. Yes.

Q. I gather 1973 was not when you graduated from medical school; is that fair to say?

A. That's correct.

Q. So let's start with your graduation from college and tell me about your educational background.

A. I went to the University of Wisconsin from 1940 to 1943. Then I had an interruption with the service and I came out in '45 and went back to the University of Wisconsin; and in 1947, I went to the Washington University Medical School, 1947, and graduated in 1951.

Q. Did you receive a agree from the University of Wisconsin in 1947?

A. No.

Q. No degree.

A. I wrote to them later and said please send me a degree, and they did. I don't recall when that was. It was just some time in the time while I was in medical school that I got that.

Q. So you had accumulated sufficient credits to obtain a degree, but you did not actually obtain it while you were still there.

A. It was part of that interruption with the service that made a difference.

Q. What degree did you receive from Washington University Medical School?

A. M.D.

Q. And that was in 1951?

A. Yes.

Q. Did you have further formal education?

A. I don't know whether you would call an internship formal, but it really is.

Q. Let's talk about your internship then. Where was that?

A. Milwaukee County Hospital. That was the Marquette Teaching Hospital.

Q. Marquette University?

A. Yes.

Q. How long was your internship?

A. One year.
Q. Rotating?
A. Yes.
Q. You saw all services that year?
A. Yes. From there, I went to the University of Pittsburgh, School of Public Health; and I got an MPH in occupational medicine.
Q. What year?
A. That was in '53. And the next year, I had a fellowship with the National Heart Institute on metabolism of the heart.
Q. Metabolism of the heart?
A. Yes. Then I went --
Q. Where was that service?
A. It was at the University of Pittsburgh, School of Public Health.
Q. And when did you complete that fellowship?
A. One year.
Q. 1954?
A. Yes. The next year I went to the National Cancer Institute, National Institute of Health; and that was in clinical cancer. I was a clinical associate.
Q. And that was 1955?
A. Yes.
Q. You were there one year?

A. Yes.

Q. Then what?

A. Then I went to the Staten Island Marine Hospital as a resident in medicine; then back to the University of Pittsburgh.

Q. You say a resident in medicine. Was that the study of internal medicine?

A. Yes.

Q. Was that a one year residency?

A. Yes.

Q. 1956, then, are we up to?

A. Yes.

Q. And then what?

A. Then back to the University of Pittsburgh, Department of Medicine, residency in medicine, internal medicine, one year.

Q. So, you had back to back residencies in internal medicine?

A. Yes.

Q. Two years total; is that right?

A. Yes.

Q. And then?

A. Then I went on the staff of the School of Public Health and Occupational Medicine as assistant professor.

Q. In Pittsburgh?

A. Yes, and in the department of medicine as instructor.

Q. And how long did you stay there?

A. I also was medical director of Callery, C-A-L-L-E-R-Y Chemical Company in Pittsburgh.

Q. What products did they manufacture?

A. The Boranes. Then in 1962, I went to the University of Louisville where I had a fellowship in cardiology.

Q. How long was that?

A. One year.

Q. Next?

A. University of Cincinnati, Department of Preventive Medicine.

Q. Department of Preventative Medicine?

A. Preventive Medicine.

Q. Preventive.

A. And I was an Associate Professor of Occupational Medicine; 1968, Tulane Medical School, Associate Professor of Medicine and then professor of medicine; and then in 1973, I came to Monsanto.

Q. Other than your residencies, did any of these various positions involve the practice of medicine?

A. Only within the clinics. And then the Boranes -- At the Callery Chemical Company, I was responsible for the

health of those workers.

Q. Did you render professional service to those workers at Callery as a physician?

A. Yes.

Q. And what was that? They had some sort of infirmary or some other sort of medical office there?

A. I had a clinic.

Q. You had a clinic?

A. Yes (nodded).

Q. Any in-patient facilities?

A. No.

Q. What sort of injuries or ailments did you treat there at Callery?

A. Exposure to the Boranes.

Q. What did it cause?

A. One of the Boranes was called diborane, produces an acute respiratory response with tightness in the chest of short duration, non-progressive, non-continuing, no increase. Exposure to decaborane produces some change in liver function tests.

Q. Any long-term effects from them?

A. No.

Q. So how did you treat these people?

A. Take them off of exposure. When they were exposed to the diborane, we gave them oxygen; and with time,

plus oxygen, they were able to go back to work when we said that there was no evidence of any long-term effect.

Q. Tell me about the other clinical experience you had practicing medicine.

A. I operated in the clinic at the University of Pittsburgh; and with the medical students, we would work up patients and decide what was going to be done and treatment.

Q. Was that -- Let's see what period that would have been.

A. '57 to '62, I think, something like that.

Q. '57. That was your residency in internal medicine or --

A. No, that's after.

Q. I'm sorry. I apologize. When you were on the staff of the School of Public Health and Occupational Medicine; is that right?

A. And instructor of medicine.

Q. Right. Department of medicine as an instructor.

A. Yes.

Q. So you had clinical practical experience at that time?

A. Plus I would see any consultations on the wards that they thought I should see.

Q. And that was '57 to '62?

A. Yes.

Q. And that was coincided with your experience at Callery?

A. Yes.

Q. So during that five year period, 1957 for '62, you had clinical experience both at the University of Pittsburgh and at Callery Chemical?

A. Yes.

Q. And the clinical experience that you described.

A. Yes.

Q. Did you ever treat a patient at any time with alleged PCB intoxication?

A. No.

Q. How about dioxin?

A. No.

Q. What were your duties as assistant medical director of Monsanto Chemical Company?

A. To assist in the clinic on examinations of the employees who worked at the headquarter site.

Q. What is headquarters called?

A. I think it's called Headquarters of Monsanto.

Q. Where's the plant located?

A. Here in St. Louis.

Q. That's not Queeny or Krummrich or anything like that?

A. No.

Q. They're all different places.
A. Yes.
Q. Is there a factory at the headquarter site?
A. There was a research facility.
Q. Just a research facility?
A. Yes.
Q. Was that a pilot type plant or just a laboratory?
A. Laboratory.
Q. So, you were seeing people then who might have had some sort of illness or ailment while working in the laboratory?
A. Yes.
Q. How many people worked in that laboratory during that time period you were assistant director?
A. I can't answer that. I wouldn't even guess.
Q. You have no idea?
A. No.
Q. How big was a clinic?
A. What do you mean how big was the clinic?
Q. What kind of physical facility was it? Was it a 10 bed hospital?
A. Not a hospital. It is a place where we see workers either bring in their non-occupational problems to decide whether they can go on to work or whether they should see their doctor, things like that, making decisions for

them, and doing examinations on them in a periodic basis.

Q. Did you actually render medical treatment to them at that time?

A. Only for non-occupational, we did not. For occupational, we would treat them if it was appropriate.

Q. So if a fella got burned in the laboratory with a Bunsen burner, he'd come around to see and you'd dress the wounds and take care of it?

A. Yes.

Q. What type of ailments and illness did you see while you were assistant medical director in the clinic?

A. Non-occupational problems.

Q. And then you would refer them to their family physician if appropriate?

A. Yes.

Q. What sort of occupational problems did you see?

A. Didn't see any occupational problems besides injuries.

Q. Injuries such as I described, a fella burned himself on a Bunsen burner or something like that?

A. Yes.

Q. How many people worked in the clinic when you were assistant medical director?

A. Dr. Kelly and I, and four or five nurses, and a receptionist.

Q. Now, did you say that you also did some studies on these employees?

A. No.

Q. Did you do periodic health exams on them?

A. Yes.

Q. What were they for?

A. To tell them about the state of their health.

Q. Just to provide them with routine physical exam?

A. Yes.

Q. Did you keep records on that?

A. Yes.

Q. You were not studying them at any time in these periodic health exams to determine if they had any exposure to anything?

MR. MALIN: We're talking about the period of time when he was associate medical director.

MR. COHEN: Yeah, assistant associate director.

THE WITNESS: And afterward.

Q. I'm just talking about when you were assistant. Were you studying them to determine if they had any adverse health effects from occupational exposure?

A. There could be a question about a man saying, "Was I exposed to a chemical or not, and how much? Was it a health effect?" Being exposed to a gas or a vapor, and he got a whiff of it and come over and say that. That's typical

of the kind of things we would do.

Q. These are folks that were working at the laboratory in the headquarters place?

A. Yes.

Q. What sort of things did they complain about?

A. I just said it usually would be a vapor of some kind that would catch them unaware instead of putting it in the hood like he should.

Q. But never anything on an organized basis, you were never directing any sort of a study on them; is that correct?

A. No.

Q. Did Dr. Kelly to your knowledge direct any such studies?

A. I don't know.

Q. How long were you assistant or associate medical director at headquarters?

A. About a year and a half.

Q. Then what happened?

A. Then Dr. Kelly retired.

Q. That would have been 1974 some time?

A. Yes.

Q. And you became medical director?

A. Yes.

Q. How did your duties change?

A. I'm now responsible for all the employees of Monsanto at all sites; and I was responsible for those people that had reported to Dr. Kelly, like the industrial hygiene section, the toxicology section, the medical section.

Q. Okay. Let's talk about the industrial hygienists. What were your responsibilities with respect to them?

A. Their responsibility was to look at all the work sites and to observe the work place exposure and to gather whether they were in some level of safe exposure, so there would not be an adverse health effect.

Q. During this time period 1974 to 1988, did Monsanto have established levels of exposure for PCB's?

A. Yes.

Q. Did they have established levels of exposure that they considered safe for dioxins?

A. No.

Q. Did they have an established safe level of exposure to furans?

A. No.

Q. Did they have an established safe level of exposure to benzene?

A. Yes.

Q. Did they have established safe levels of exposure to chlorinated benzene?

A. I don't recall, but if it was in the work place, I'm sure we did.

Q. Did they have established safe levels of exposure to tin tetraphenyl?

A. I don't know, but I'm sure we did. We had exposure limits set for everything that we could use to evaluate their exposure.

Q. Was there a publication that would contain this information that was available to you?

A. We used the government standards where they were available.

Q. Prior to the time government standards were available, what did you use?

A. I wasn't with Monsanto before there were government standards.

Q. So, your recollection is, is that as long as you've be with Monsanto, there was established levels for exposure to all of those compounds; and these levels were established by the government and that's what you used?

A. That's right, except for things like dioxin and furans.

Q. Why is that?

A. Because there wasn't ones established.

Q. What do you consider the safe level of exposure to dioxins?

A. The dioxin issue was no longer a realistic one when I came to Monsanto and --

Q. You want to tell me why?

A. Well, no studies had been done. When they first did the studies on the effects of dioxin in animals, then we went back to see what the level of exposure of our people was.

Q. Okay. When was that first study that you know about?

A. I don't recall, something like 1975.

Q. Who did the study?

A. The study was done by Dow.

Q. Dow Chemicals?

A. Yes.

Q. Dow chemical was a manufacturer of dioxins at the time?

A. Yes -- Well, no, they didn't make dioxin on purpose. It was a byproduct.

Q. They manufactured products that contained dioxins; is that correct?

A. Yes.

Q. And you say they did studies on animals. Do you know who the author was of the study?

A. I don't recall.

Q. Do you know the animals that they used?

A. I just recall -- And I'd say rats and mice and I'd probably be right.

Q. In other words, that's your assumption today. You're not sure.

A. Yes, but that's almost a routine for it.

Q. And then as I understand it, your industrial hygienists who would have been working under your direction would have went back and studied the exposure levels that your employees may have had to dioxin?

A. We were out of the dioxin business almost at that time.

Q. So are you saying that by the time this first study on dioxins came about, some time in '75, Monsanto was basically out of the dioxin business?

A. Yes.

Q. What business was it in that involved the manufacture or the potential exposure by employees to dioxin?

A. Agent Orange.

Q. Was that the only product that you know that Monsanto manufactured that would have generated dioxins?

A. Yes.

Q. And that would have been as a byproduct?

A. Yes.

MR. MALIN: I object to the form of that question. He's answered. That's all right.

Q. When did Monsanto manufacture Agent Orange?

A. It started early 50's, 1955, something like that.

Q. And where was it manufactured?

A. Nitro, West Virginia.

Q. And was it at that plant that you went back with your industrial hygienists to determine the levels of exposure?

A. We were working on trying to establish a level of exposure, but these are contaminants, they're not something that's easily measured. These are contaminants at a very low level.

Q. Would you consider dioxin a very dangerous compound?

MR. MALIN: I object to the form of the question. You can answer if you understand it.

THE WITNESS: I didn't hear.

MR. COHEN: You can answer.

MR. MALIN: I object to the form of the question. If you think you understand that question or if you can answer it in a meaningful way --

THE WITNESS: Would you ask the question again?

Q. (By Mr. Cohen) Do you consider dioxin a dangerous compound?

A. I didn't know at that time whether it was dangerous.

Q. We're sitting here in 1992. What do you do you know now.

MR. MALIN: Object to the form of the question. If you think you can answer that easily, you can answer it.

A. Back in 1955, they were studied in some depth, the workers who were making the Agent Orange, and they developed a skin rash; and they were studied in depth in 1955, and then they started to -- Because of that, they worked to control exposure, but it was done methodologically rather than scientifically because they didn't know what the material was that was causing the rash.

Q. Let me see if I understand your testimony. You're relating to me an incident that occurred in 1955 while Monsanto was manufacturing Agent Orange; is that correct?

A. Yes (nodded).

Q. You're nodding your head. Is that a yes?

A. Yes.

Q. These were employees at Nitro, West Virginia?

A. Yes.

Q. Any other plant?

A. Some of the work on finishing up that product was done in Queeny Plant here in St. Louis.

Q. Did you study those employees at the Queeny Plant?

A. This was before I came to Monsanto.

Q. All right. Let me withdraw that question. The employees at the Nitro, West Virginia plant in 1955 began to develop a rash while working on the production of Agent Orange; is that correct?

A. Yes.

Q. Work on Agent Orange was also done during the same time period at the Queeny Plant?

A. Not the same process, but it was a part of the development and production of that material.

Q. Were employees exposed to Agent Orange at the Queeny Plant?

A. Exposed to Agent Orange?

Q. Yes.

A. Yes.

Q. To your knowledge, did employees at the Queeny Plant also develop the same type of rash that was seen on the employees at the Nitro Plant?

A. Not in the same degree.

Q. In other words, they had it but not as bad?

A. I'm not sure how much they had, but it was not much.

Q. Was that skin rash of chloracne type?

A. Yes.

Q. Was it chloracne?

A. Yes -- Well, some of the rashes they had were.

There was a rash, what we call chloracne, that took place there, but they had other rashes from exposure to chemicals.

Q. Which rash were you interested in, the chloracne type rash?

A. This was before me.

Q. Which rash was it that caused concern in the 50's, the chloracne?

A. The chloracne.

Q. Chloracne is also a rash that develops from exposure to PCB's; is that right?

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

A. It can.

MR. MALIN: Answer it if you think you understand it.

Q. I'll ask the question again. I think you said, "It can." Was that your answer?

A. Exposure to -- When we say exposure to PCB's, are we talking about PCB's or something bigger? It's not the same thing. I talk about dioxin when I'm talking about Agent Orange. It's not the same. The PCB's and the association of chloracne is not the same because we didn't have exposure. We didn't have chloracne with PCB's.

Q. Whether or not you had it, would you agree that a reported effect of exposure to PCB's is chloracne?

MR. MALIN: I object to the form of the question.

What do you mean by reported?

Q. In the scientific literature, doctor, would you agree that a reported effect in the scientific literature from PCB's is chloracne?

A. I'm not sure that's right.

Q. You do not believe that its report that exposure to PCB's causes chloracne?

A. Sometimes people exposed to PCB's will have chloracne.

Q. And do you believe that's because of the PCB's or something else?

A. It's something else.

Q. What is that something else?

A. I don't know.

Q. Do you believe that exposure to Monsanto's dielectric fluids is associated with chloracne?

MR. MALIN: I object to that question. You're asking for his opinion. He's hear as a fact witness, not an expert witness. Doctor, I'm going to advise you that you don't have to give opinions unless they're opinions that you held when you were a medical director of Monsanto, but you don't have to give medical opinions unless you're compensated as an expert; and you're not named as an expert in this case. The deposition is not being taken as an expert witness, it is a fact witness deposition. Obviously, you're entitled to do

what you wish on the issue.

Q. (By Mr. Cohen) Do you have an opinion today, sir, whether exposure to dielectric fluids manufactured by Monsanto could produce chloracne?

A. Monsanto doesn't make it.

Q. Not now.

A. It hasn't --

Q. But it did make it?

A. It hasn't since --

Q. I don't know. '77, somewhere around there?

A. Yes.

Q. But they did make it?

A. Yes.

Q. I'm asking you whether you have an opinion today as to whether an exposure to dielectric fluids manufactured by Monsanto during the time they were manufacturing those fluids could produce chloracne?

A. I don't think so.

Q. When you were medical director of Monsanto or associate medical director, did you have an opinion about that subject?

A. That was when I was not associated with it, never saw it, never had any experience with it. During that time, it was not producing -- making chloracne. It was not producing chloracne.

Q. So you're saying to me during the time period you were associate medical director or assistant associate medical director of Monsanto, you were not having reports from employees exposed to dielectric fluids manufactured by Monsanto having incident of chloracne?

A. That's right.

Q. Do you know whether the scientific literature reports chloracne as a potential effect from exposure to dielectric fluids manufactured by Monsanto?

MR. MALIN: I object to the form of the question. If you think you can answer the question, doctor, you may attempt to answer.

A. Monsanto, when it was producing PCB's, did not have a problem with chloracne.

Q. That's not my question, sir.

A. People who were handling PCB's other places, people who used them, did have chloracne from time to time. Now, the cause of that chloracne is not clear.

Q. Is not clear in your mind; is that right?

A. That's right.

Q. So, you're saying you're not sure whether it was because of dielectric fluid contained other compounds other than PCB's?

A. We knew that there were mixtures and we didn't know what those mixtures were.

Q. Is this your own products you're speaking of?
A. I think that's true of all products.
Q. Well, let's focus on your products for a moment. Are you saying you did not know what the mixtures were?
A. That's right.
Q. Now, you also blended, assembled, whatever, products for other manufacturers such as G.E. and Westinghouse.
A. Yes.
Q. They were intended to contain substances other than PCB's; is that right?
A. I don't know.
Q. Well, do you know the name Inerteen?
A. Yes.
Q. Do you know what it's made of?
A. No.
Q. Do you know the product Pyronol?
A. Yes, but I don't know what it is.
Q. Do you know if it contains chlorobenzenes?
A. No.
Q. Do you know if it contains tin tetraphenyl?
A. No.
Q. Do you know if it contains Aroclor?
A. Yes.
Q. It does contain Aroclor?

A. Yes (nodded).

Q. Do you know that Monsanto blended and sold products called Pyronol and Inerteen?

A. No.

Q. They did not?

A. When you give me the names, I would say yes, but I wouldn't be able to -- I don't know it well enough to tell you that.

Q. So you recognize the fact when I tell you that they sold it, that they did sell it?

A. Yes.

Q. Were you aware during the time period that Monsanto was blending and selling that product?

A. No.

Q. Are you aware of the fact that dielectric fluid can in use form furans and dioxins?

MR. MALIN: I object to the form of the question. Answer it if you think you understand it.

THE WITNESS: Could I hear the question, again, please?

(Reporter read back as requested.)

MR. MALIN: I object to the form of the question.

A. I know that they can produce cloracne and the assumption is that it's something in there that apparently was not there when it was made, so there can be a contaminant

there that is not causing the chloracne. It's something that's formulated. The one that they always talk about is overheating that could cause it.

Q. What do you know about the presence of chlorinated benzenes on the formation of furans and/or dioxins in dielectric fluid in use?

A. I don't know that.

Q. So, you don't know anything about that chemical process, whatever it is?

A. No.

Q. Now, do I understand that you assume that it's something different that's causing the chloracne because Monsanto's experience with its production workers, who were working with PCB's, is that they did not develop chloracne?

A. Yes.

Q. So it's not based upon scientific literature per se reporting that people developed chloracne, but rather on the empirical data that you had in-house?

A. Yes.

Q. Let's go back to the situation in 1955. This Dow Chemical study came out in the mid 70's reporting dioxin is a byproduct of Agent Orange and reporting the results of animal studies involving, you believe, rats and mice?

A. Yes.

Q. As a consequence, someone looked back to see what

had happened in the Nitro, West Virginia Plant in 1955 or thereabouts when Agent Orange was being manufactured?

A. Yes.

Q. And apparently there were reports of employees at Nitro having chloracne?

A. Yes.

Q. Were there reports of employees at Queeny having chloracne?

A. When?

Q. In the 70's, when you looked back at the historical manufacture of Agent Orange.

A. Are we talking about in the 70's having chloracne or looking back further?

Q. Looking back at the historical manufacture of Agent Orange, whenever that was.

A. They had a reaction that was called chloracne.

Q. Do you indicate to me that you did not believe it was chloracne?

A. No, I didn't know what it was. We had an expert witness on chloracne who came there and had seen the first cases and followed up on them.

Q. Who was that expert?

A. A man from the University of Cincinnati. His name slips my mind.

MR. COHEN: Well, can you help me out, Mr. Malin?

MR. MALIN: I think Dr. Kelly testified that it was a man named Suskind.

Q. (By Mr. Cohen) Does that refresh your recollection?

A. Yes.

Q. Was he a medical doctor?

A. Yes, Dermatologist.

Q. Dr. Suskind came down. Was he studying records?

A. No, studying people.

Q. When was that? What year?

A. At that time in 1955.

Q. Suskind came down and studied people in the 50's and he diagnosed chloracne.

A. Yes.

Q. Both at Nitro and Queeny?

A. He didn't come to Queeny.

Q. Who diagnosed the chloracne at the Queeny Plant?

A. There wasn't much in the way of chloracne problem there. It was very small if there was any.

Q. Did you tell me a few minutes ago that people had chloracne at Queeny?

A. I told you that I have difficulty because it was such a small problem, if it was any, and that you're talking about before my time in terms of bringing it up to the present time; and I can't do it.

Q. I'm not trying to argue with you, doctor. I'm trying to found out who made the determination -- however many people it was, one, three, a hundred, how many people, I don't know -- who had chloracne.

MR. MALIN: You're asking him to testify to something in which he has no personal knowledge.

MR. COHEN: I don't care whether he has personal knowledge, Mr. Malin, but he had records available to him at the time. He knew that Suskind went to Nitro.

Q. (By Mr. Cohen) Who went to Queeny?

A. I'm not even sure when -- They didn't make Agent Orange. I told you there's a different process at Nitro than there was at Queeny, and so that the hazard of it and the production of it would be quite different in terms of the likelihood of producing chloracne; and so the definition of what they had could have been made by a local doctor rather than having Suskind come to Queeny.

Q. I understand, sir. All I'm trying to find out is who did make the determination of the employees at Queeny. Was it a local doctor?

MR. MALIN: If you know, doctor.

A. I don't know.

Q. But someone apparently reported that employees at Queeny, during some time period during the manufacture of Agent Orange, had experienced chloracne; is that right?

A. I don't know.

Q. You don't know. Okay. What happened in the mid 70's when you looked back at the employees at Nitro and perhaps Queeny? Did you do further studies?

A. Yes, we had Suskind come back and examine them again.

Q. And did Suskind write up his studies?

A. Yes.

Q. Did he issue a report on what happened?

A. Yes.

Q. What did he report?

A. That there was persisting cloracne lesions in the people who had the exposure back in 1955.

Q. And were these people no longer exposed to the Agent Orange?

A. That's right.

Q. So from an exposure in the past, almost 20 years in the past, they were having persistent chloracne?

A. Some of them. Less than 50 percent. There were some of them that had persisting lesions.

Q. Did he study any other health effects other than the chloracne?

A. Yes.

Q. What?

A. He had a general examination. He had a

neurologist; and I think that's it.

Q. Did they do liver function studies?

A. Yes, as part of the general examination.

Q. Did they find any change in liver enzymes?

A. All that had cleared up.

Q. How about back in the 50's? Did he do liver function studies?

A. Yes.

Q. Did he find elevation of liver enzymes?

A. In some.

Q. Did he do any other studies, any serum studies, plasma, body fat, to see if any substance was being stored?

A. No.

Q. By the mid 70's did he know that the exposure was to dioxins when he came back?

A. Yes.

Q. Was that as a result of the work that Dow had done?

A. I don't know how we'd say what the basis of that knowledge was.

Q. But by the mid 70's Monsanto knew that dioxin was a byproduct of the manufacture of Agent Orange?

A. Yes.

MR. MALIN: I object to the form of the question. It is a contaminant not a byproduct; and that's what he

testified to.

MR. COHEN: No. His exact word was a byproduct.

Q. (By Mr. Cohen) Were they not, doctor? I wrote it down when you said it. A byproduct.

MR. MALIN: Just tell us what's correct.

Q. (By Mr. Cohen) You tell me, doctor.

A. I don't know the difference.

Q. Do you believe you used the word byproduct earlier in this deposition?

A. I'd have to assume I did.

Q. So when you say byproduct, that is equal to, in your mind, contaminant?

A. Yes.

Q. Were any further studies made of these folks at Nitro?

A. The people from Mt. Sinai came.

Q. Up in New York?

A. Yes.

Q. Who were those people?

A. I don't recall. It wasn't done for us. It was done for the union.

Q. You don't know their names?

A. No.

Q. If I said some names, would you recognize them?

A. Sure.

Q. Schecter?

A. No, Schecter's not from there.

Q. Selikoff?

A. It was from Selikoff's department, but it wasn't he.

Q. Wolf?

A. No.

Q. Nicholson?

A. No. It was a woman.

MR. COHEN: I'll think of it on the plane on the way home, and I'll give you a call.

Q. (By Mr. Cohen) What other studies did Monsanto perform on these folks?

MR. MALIN: When are we talking about?

MR. COHEN: Nitro, West Virginia. Folks exposed to Agent Orange.

Q. (By Mr. Cohen) What other studies were done?

A. There was, as a part of the Nitro lawsuit, the same population was studied by the West Virginia Medical School Department of Medicine.

Q. Who was directing Suskind's work on these folks at Nitro?

A. No one was directing, but what he had planned to do he gave us to look at, and we agreed with what he was going to do.

Q. Who's we?
A. Primarily me.
Q. You were the medical director of Monsanto at that time?
A. Yes.
Q. Suskind came to you, told you what his plans were --
A. No. He came and asked -- He said he would like to do an examination to see.
Q. Was Suskind working alone on this?
A. He brought with him a team from the University of Cincinnati to do the exam.
Q. Who's J. A. Zack?
A. Who?
Q. J. A. Zack.
A. She worked for Monsanto.
Q. She's an employee of Monsanto?
A. Yes, she was.
Q. She was?
A. Yes.
Q. Industrial hygienist?
A. No, no.
Q. What was her job?
A. Epidemiologist.
Q. What department did she work in when she was

working there?

A. Department of medicine.

Q. Was that your department?

A. Yes.

Q. Was she an employee of yours?

A. Yes.

Q. What's her full name?

A. Judy. Judy Zack.

Q. Where does she live?

A. She doesn't live in St. Louis. She moved away. She was married to a resident in medicine and they went someplace else.

Q. How long did she work at Monsanto?

A. A short time, three, four, five years.

Q. What were the inclusive dates of her employment?

A. I don't know.

Q. Mid 70's?

A. Yes.

Q. Is that correct?

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

Q. Was it about this time that Suskind came back and talked to you and told you what he wanted to do?

A. Yes.

Q. Did Ms. Zack work with Dr. Suskind?

A. Yes.

Q. Didn't they together investigate these employees at Nitro?
A. Yes.
Q. Did they investigate employees anywhere else?
A. No.
Q. Ms. Zack was an epidemiologist. Did she have a Ph.D.?
A. No.
Q. Masters?
A. Yes.
Q. Do you know from what institution?
A. Michigan, I think.
Q. What is epidemiology?
A. Epidemiology, it is a study of epidemics.
Q. And today what do epidemiologists do?
A. Yes.
Q. What do they do?
A. They study epidemics.
Q. They study epidemics. What was she studying with Dr. Suskind?
A. Whether there was an epidemic effect from the exposure to the dioxin.
Q. Epidemic of what?
A. An epidemic. Any epidemic.
Q. Oh. I'm sorry. An epidemic effect, is that what

you said?

A. Yes.

Q. In other words, a broad population of individuals afflicted with some ailment?

A. To see if there was an affliction of some type.

Q. And what did they determine?

A. That there was a persisting effect on the skin, and that was it.

Q. Did they study anything else?

A. Oh, they did the complete medical workup as you would any other person; and the specific test was to look at the skin by Dr. Suskind.

Q. And Dr. Suskind, he was a medical doctor?

A. Dermatologist.

Q. Was there report and epidemiological study?

A. Yes. An epidemiological study can be either a lifetime study or it can be a vertical study in terms of what affects the population. They're both a part of epidemiology.

Q. What was this?

A. What was what?

Q. This study that Zack and Suskind did.

A. It was a vertical study.

Q. What was it called?

A. What was it called?

Q. The study.

A. I've forgotten.
Q. Was it published?
A. Yes.
Q. Was it called a cancer risk specific dose estimate for 2,3,7,8-TCDD?
A. That was one of the studies, yes.
Q. How about the mortality experience of workers exposed to tetrachlorodibenzodioxin in a trichlorophenal process accident?
A. Yes.
Q. Is that one of the studies?
A. Yes.
Q. What's trichlorophenal?
A. It's one of the substances they used to make Agent Orange.
Q. Is that what you were manufacturing at Nitro?
A. Yes.
Q. Was there an accident?
A. Yes.
Q. In the 50's?
A. Yes.
Q. What happened?
A. It's like all chemistry in a chemical company is, they have a large reactor as big as this room and the chemicals that are reacting together are put in these large

vessels and they have a release valve on top of it someplace and that release valve is, if the pressure builds up in there, so they don't have an explosion, that it releases. That's what took place. There was a release of material inside that reactor and it coated the inside of the building where this reactor was; and they went in afterward and cleaned it up off the walls of the reactors and other places.

Q. So it was the workers who did the cleanup work who developed the chloracne?

A. Yes.

Q. Any other workers develop the chloracne?

A. Only those that worked there either for a long period of time or a short period of time. Not all of them developed it.

Q. But you're saying that individuals who worked for a short period of time developed chloracne and individuals who worked for a long period of time developed chloracne.

A. Yes.

Q. As part of this study, were they trying to determine if there was any other ailment caused by the exposure other than the chloracne?

A. They were looking to see what the state of their health was at the time they did the examination.

Q. Did they make an analysis to determine if there was any cancer as a result of the exposure?

A. Yes.
Q. What did they report?
A. There was no excess of cancer.
Q. Was that true?
A. There was no excess of cancer?
Q. Yes.
A. What do you mean is it true?
Q. Was it true?
A. The studies showed there was no excess of cancer.
Q. Do you believe that that is the fact, that there was no excess of cancer?
A. On what would I base it?
Q. I didn't ask you that. I asked you if you believed it was true.
MR. MALIN: He's asking for your opinion again.
A. Based on that study, there was said there was no cancer effect.
Q. And was that your only source of information, the study itself?
A. At that time.
Q. Did you subsequently learn that the study was perhaps flawed?
A. No.
Q. Did you subsequently learn that the study may have been fraudulent?

A. No.

Q. Has it been reported that the study was fraudulent?

A. No, not to my knowledge.

Q. Has anyone from the environmental protection agency ever spoken to you about that study?

A. No.

Q. Has anyone ever told you that the Environmental Protection Agency has issued a memorandum in which they allege that that study was fraudulent?

A. I haven't seen it.

Q. Did you testify about this study on the Kemner case?

A. Yes.

Q. Has anyone ever suggested to you that that research was altered?

A. That what? The study was altered?

Q. Uh-huh (yes).

A. No. That Suskind's study was altered?

Q. Uh-huh (yes).

A. No.

Q. What was the nature of the relationship between Suskind and Monsanto Company when this study was performed at Nitro?

MR. MALIN: I object to the form of the question.

If you can understand that question, you can attempt to answer that.

THE WITNESS: Could you ask the question again, please?

(Reporter read back as requested.)

THE WITNESS: Which study?

MR. COHEN: The one that was performed by Suskind and Zack in the mid 70's on the Nitro employees.

MR. MALIN: Was it more than one study? Did we establish that?

Q. (By Mr. Cohen) All right. Let's get it clear. How many studies did Zack and Suskind together perform?

A. They did the lifetime study.

Q. And that was what, the mortality experience of workers exposed to tetrachlorodibenzodioxin in a trichlorophenal process accident?

A. Yes.

Q. Do you know where it was published?

A. I think it was in the -- No, I don't.

Q. In the Journal of Occupational Medicine?

A. Yes.

Q. Number 22?

A. Yes.

Q. In 1980?

A. I don't know.

Q. Did they do another study?
A. Suskind did another study. That was the lifetime -- I mean the vertical study.
Q. What was that study called?
A. I don't know.
Q. Do you know when that was published?
A. No. That was A.M.A., though.
Q. A.M.A.?
A. That was published in the A.M.A.
Q. Journal of the American Medical Association?
A. Yes.
Q. J.A.M.A.?
A. Yes.
Q. Was that after the 1980 study?
A. I don't know.
Q. Now, when the mortality study was done, what was the relationship between Monsanto and Dr. Suskind?
MR. MALIN: I object to the form of the question. If you think you understand that question, you can attempt to answer it. What do you mean? Do you mean financial relationship? Did he know the chairman of the board?
MR. COHEN: I don't know.
Q. (By Mr. Cohen) Were you working together? What was it?
A. I have a problem with the nature of the

relationship.

Q. Do you know the relationship? Was there a legal relationship that was established?

A. No.

Q. Did you enter into a contract with Suskind?

MR. MALIN: Do you mean a written contract, oral contract?

MR. COHEN: I really don't know and don't care. I just want to know if they had a contract or a relationship.

MR. MALIN: Doctor, tell us how you came to hire them and what he was supposed to do. I think that's what he's looking for here.

A. The study that Suskind did in looking at the health of the people who were still working at that plant and those who had worked at the plant was done based on the need for information on the long-term health effects of dioxin exposure; and that was done as a result of a conference over in Italy, and he came back and said, "I'd like to do a study on these people." And based on that meeting, we said, "Go ahead." Now, the contract. Was there a contract, as who paid to help to get it done? I'm sure Monsanto paid part of it; and he had some money of his own for research that he could use.

Q. Plus you supplied an employee?

A. Yes.

Q. Ms. Zack?
A. To help to do it, yes.
Q. Did she do the epidemiological part of the study?
A. Yes.
Q. Or did they do that together?
A. She did the epidemiologic parts.
Q. What did Suskind do, the medical exams?
A. He went over and talked about who was there in the exposure and helped to define what the people were.
Q. How many people were involved?
A. I don't know. The people who are part of the -- This was a study of people with chloracne; and there was something on an order of a hundred people involved in that study.
Q. Does 121 sound right?
A. Could well be.
Q. And there was analysis to determine whether there was an excess of cancer deaths; is that right?
A. Their goal was to determine what had happened and what it was, the mortality experience of that population. That was what they did.
Q. And was one of the conclusions dealing with an excess of cancer deaths?
A. That would be one of the conclusions. It wouldn't follow always on the mortality studies.

Q. And the report was that there was not; is that correct?

A. That's right.

(A short recess was taken.)

Q. To your knowledge, has Ms. Zack ever obtained a Ph.D.?

A. I don't know. She left while she was -- while she was talking about it, going on. I knew she was talking about it, but whether she did --

Q. Are you aware of the fact that Dr. Zack had done an earlier or predecessor study on the same group of people prior to the time that she worked with Dr. Suskind?

MR. MALIN: I object to the form of the question. You mean on the Nitro people?

MR. COHEN: Uh-huh (yes). Yes, on the Nitro people.

MR. MALIN: You're talking about things I don't know anything about, so I'll withdraw my objection.

A. I don't know.

Q. You don't know anything about that?

A. I don't recall anything.

Q. Has it ever been suggested to you that Dr. Zack had omitted five deaths from the exposed group and put them into the category as unexposed?

A. No.

Q. Let me restate that. Had it ever been alleged to you that she had knowingly omitted five deaths from the group exposed to dioxins?

MR. MALIN: Are we talking about the Nitro study then?

MR. COHEN: Yes.

MR. MALIN: Answer the question if you can.

A. The crux of all such discussions would be whether the people in the epidemiology study put them in the right category or not; and the question is, did she have some that she moved from one category to another?

Q. Yes.

A. And if she did, it was because there was a basis for that interpretation that I took that person from here because they thought we were there, when, in fact, they worked over here. That's a terrible problem in occupational epidemiology in deciding which cohort are you talking about.

Q. So you're saying that it's possible that she had some people in the wrong group?

A. I think it's true of any epidemiology study.

Q. I didn't ask you that. Is it possible she had some people in the wrong group?

A. It's possible.

Q. Do you know that she had some people in the wrong group?

A. No.

Q. Was there another incident in 1949 different than the incident in 1955?

MR. MALIN: I object to the form of that question. Are we talking about another incident?

A. I think we're all talking about the same one. This is -- The 1949/1955 is my problem in saying when that episode took place.

Q. So there was one 1949 accident that you're aware of. When you said '55, you were talking about the same thing.

A. Right.

Q. And that's the incident that we're talking about that involved this -- what was it called here -- this trichlorophenal accident?

A. Yes.

Q. Do you know that five persons who died were omitted from the group that was considered to be the exposed group in that 1949 accident?

A. No, I don't know that.

Q. Do you know that four workers who had been exposed were categorized as unexposed?

MR. MALIN: I object to the form of the question. I mean you're stating something categorically that's not in evidence information and the doctor wouldn't necessarily know

the answer, and he already testified to that. But if you think you can answer the question, go ahead.

A. I don't recall any of this.

Q. Were you asked the same exact questions in your testimony in the Kemner case?

A. Pardon?

Q. Were you asked these questions in the Kemner case?

A. I was asked so many questions, I can't answer that question.

Q. So you're saying you don't know whether you were asked about that?

A. No.

Q. Were you asked about Zack and Suskind's work when you testified in Kemner?

A. Yes.

Q. Were you asked whether the classifications made by Dr. Zack were accurate?

A. I told you I don't recall that. That's a different thing.

MR. MALIN: Wait a minute. He's asking you if you were asked that in the Kemner case, not whether or not you know they were accurate.

THE WITNESS: I don't recall that.

MR. MALIN: Okay. That's his answer.

Q. Is it my understanding of your testimony that the possible classification of individuals for a cohort group in any epidemiological study can lead to the possibility of error in classification?

MR. MALIN: Objection. He said occupational epidemiological studies.

Q. (By Mr. Cohen) Is that correct, sir? Is that what you said?

A. Yes.

Q. So you're referring to occupationally exposed individuals?

A. Yes.

Q. And you are saying that it's possible that any such epidemiological study can contain such errors in classification?

A. Yes.

Q. Is it your experience that they do contain such errors?

A. No.

Q. Do you have any experience to tell you whether they do or do not?

A. No.

Q. On what do you base your testimony that it is possible that that error can occur?

A. I know how they are put into cohorts. They get

this from as many different sources as possible and that's a general statement. When we talk about that looking at those people with chloracne, that was an easier definition that, in fact, this cohort was, in fact, a group that had chloracne. Now, if they didn't have chloracne, then they wouldn't go into a group with chloracne.

Q. Has Monsanto ever, to your knowledge, used the results of the Zack and Suskind study, mortality study?

MR. MALIN: I object to the form. Used for what purpose?

MR. COHEN: Any purpose.

MR. MALIN: If you understand the question, try to answer it, doctor.

A. Not that I know of.

Q. Has Monsanto ever relied upon that study to show that the only health consequence of exposure to dioxin was chloracne?

A. I don't know that.

Q. Did you ever, as medical director of Monsanto, rely upon that study?

A. Rely on it for what?

Q. Anything, advising customers, advising scientists who inquired, anyone.

A. No.

MR. COHEN: Mark this as an exhibit.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 1.)

Q. Have you ever seen this document before?

A. No.

Q. So, this is the first time you've seen this memorandum?

A. Yes.

Q. Has anyone ever discussed this document with you before?

A. No.

Q. Were you unaware of its existence prior to it being shown to you just a few moments ago?

A. I was unaware of this document.

MR. MALIN: In order to understand, this is a document that we're talking about is Exhibit 1, dated February 23, 1990, from Cate Jenkins to Raymond C. Loehr, Ph.D., which is apparently based upon a plaintiff's brief in the Kemner case. Is that what we're talking about?

MR. COHEN: We're talking about a document that is dated February 23rd, 1990, from Cate Jenkins to Raymond C. Loehr. It's been marked Exhibit 1. You can characterize it any way you want to for any purpose you like.

Q. (By Mr. Cohen) Now, let me ask you this, doctor, when you retired in April of 1988, was there, to your knowledge, any ongoing investigation, litigation claim of any kind between EPA's Office of Research and Development or any

other division of EPA and Monsanto?

A. No.

Q. You're unaware of any case that was in existence at that time?

A. That's right.

Q. So where it says in the last paragraph on the last page, "I request that the SAB on its own, or by way of direction to EPA's office of Research and Development obtain the full files from the ongoing case against Monsanto," you have no idea what they're talking about?

A. No.

Q. Is that correct, you have no idea?

A. Yes.

Q. Now, is it true, to your knowledge, from records that Dr. Suskind testified on behalf of Monsanto before the Workers Compensation Commission in 1955?

MR. MALIN: I object to the form of the question. What Workers Compensation Commission? What state? What?

Q. Without regard to what state, are you aware of that, sir?

A. No.

Q. You're unaware of that.

A. (Witness nodded).

Q. You've never seen anything to indicate whether or not Dr. Suskind ever testified on Monsanto before a Workers

Compensation Commission?

A. In 1955, about?

Q. We're talking about in 1955.

A. No, I do not.

Q. Are you aware --

MR. MALIN: The doctor has testified that he came to Monsanto in 1973. Is that 18 years?

MR. COHEN: Thank you for that. I appreciate that, Mr. Malin. I'm asking him from records.

Q. (By Mr. Cohen) From any other source, are you aware of Dr. Suskind having testified on behalf of Monsanto before a Workers Compensation Commission?

A. No.

Q. Are you aware of whether any of the employees at the Nitro, West Virginia Plant ever made claims for workers compensation benefits as a result of harm they allege occurred from their exposure at that facility?

A. No.

Q. And I'm referring specifically to the 1949 trichlorophenal accident.

A. No.

Q. You're unaware of any claim before the workers compensation?

A. That's right.

Q. So where it says in this document on the third

page, "In addition, it was alleged that in November of 1955, Dr. Suskind colluded with Monsanto to conceal findings of psychoneuroses in the exposed workers from the Workers Compensation Commission." You have no information to tell you whether or not that's true or not?

A. No.

Q. And you are unaware of Dr. Suskind ever having offered any testimony, or any reports, any information, to any Workers Compensation Commission?

A. That's right.

Q. And let's move away from testimony for a moment. Did Dr. Suskind, to your knowledge, from records or otherwise ever offer any reports or affidavits or statements of any kind to any Workers Compensation Commission regarding these employees?

A. I'm not sure what the question is, but I know the subject. What was the question?

(Reporter read back as requested.)

MR. MALIN: I object to the form of the question. That's very confusing. I'm not sure what you're asking. Are you asking, do you know from records whether or not he did it? Well, I think you're asking him, do you know from any records that you have seen while you were at Monsanto, whether Dr. Suskind ever offered any testimony with respect to any of the Nitro workers for any workman's compensation

boards? Is that what you're asking?

MR. COHEN: No.

Q. I'm asking the doctor, from any source of any information whatsoever available to you, whether you were aware that Dr. Suskind offered either testimony, reports, affidavits or statements of any kind before any Workers Compensation Commission regarding the employees at Nitro, West Virginia?

A. No.

Q. Are you aware of whether there was ever any litigation brought by any of the workers or their survivors against Monsanto or anyone as a result of injuries that they allege occurred at that trichlorophenal explosion?

A. No.

Q. There has been no such litigation?

A. No, I don't know.

Q. You don't know whether there has been or not?

A. That's right. I have no knowledge about the subject.

Q. Now, it states here in this document again, on page 3, "An earlier, predecessor study performed by Dr. Zack was alleged to have deliberately and knowingly omitted 5 deaths from the group exposed to dioxins in the 1949 accident." And it goes on. Are you aware of any predecessor study performed by Dr. Zack?

A. No.

Q. Second full paragraph, on that page, starts off, "The Monsanto study performed by Dr. Suskind on workers exposed to dioxins" --

A. I'm not with you.

Q. On page 3.

A. The same page.

Q. "The Monsanto study performed by Dr. Suskind on workers exposed to dioxins in the 1949 accident, published in 1980 in the Journal of the American Medical Association and the same year, in the Journal of Occupational Medicine with Dr. Zack as co-author" -- and there's a parenthetical phrase -- "was also alleged to be fraudulent." Are you aware of Dr. Suskind having published a study in 1980 in J.A.M.A. regarding that 1949 accident?

A. Yes.

Q. Are you aware that that is the same study that was also published in the Journal of Occupational Medicine?

A. No.

Q. It is not, to your knowledge, the same study?

A. Not the same study.

Q. They are separate studies?

A. Yes.

Q. Is Dr. Zack a participant in any way in both studies?

A. No.

Q. She was a participant in one study only; is that correct?

A. In the J.O.M. study.

Q. And that's the study that we discussed earlier, the mortality experience of workers exposed to tetrachlorodibenzodioxin in a trichlorophenal process accident?

A. Yes.

Q. What is the study that was published in J.A.M.A.? What was that about?

A. That was a medical study. That's the vertical study. That's looking at --

Q. That was not an epidemiological study?

A. That's a vertical epidemiologic study. That's a study of a population rather than the person. That makes an epidemiological study.

Q. And that is the 1980 study?

A. Yes.

Q. In J.A.M.A.?

A. Yes.

Q. And that was performed by Dr. Suskind alone?

A. And people with him at Cincinnati.

Q. Now, in either of these studies, are you aware of any allegations of knowing or unknowing misclassifications of

participants?

A. No.

MR. MALIN: He's answered that question several times already.

MR. COHEN: We're trying to get it clear.

Q. (By Mr. Cohen) Have you ever had occasion to talk to Dr. Suskind about either of these studies since you testified in the Kemner case?

A. No.

Q. Have you ever talked to Ms. Zack about either of these studies?

A. No.

Q. We had started talking about your responsibilities as a medical director. You had said that you had had industrial hygienists working for you and you looked at work sites in order to determine whether the levels of exposure were safe levels. Do you recall that?

A. Yes.

Q. And you started to tell me about the incident in 1955 at Nitro. Did you make any other determinations regarding the exposure of workers at any Monsanto plant for any of the substances that by that time the government had published exposure levels for?

MR. MALIN: I object to the form of the question. If you think you understand it, you can try and answer it.

Q. You had told me that you had no published levels for dioxins prior to that time. Do you recall that?

A. Yes.

Q. That's how we got on this whole discussion.

A. Yes.

Q. Until this Dow report. Did you make determinations at that time in the mid 70's regarding the exposure levels of employees in Monsanto plants to other substances?

A. Yes.

Q. Where are those results of those analyses?

A. In our industrial hygiene section. They keep records of those.

Q. And those were the work of the industrial hygienists?

A. Yes.

Q. When you found levels of exposure beyond what the government had published as so-called safe levels of exposure, what did you do? What was it your responsibility to do?

A. Determine whether, in fact, they were elevated; and if they were elevated, either to give them some protective gear or to change the ventilation in the area in order to get it down to a level where it is at a safe level.

Q. Who made the determination as to what was the

appropriate step to take?

A. Well, appropriate step to take about what?

Q. What measures you were going to do to bring the exposure levels down.

A. That's the responsibility of the plant together with industrial hygiene that, in fact, met the goal.

Q. And ultimately was it your determination as to what was to be done or did you just supervise this?

A. Just supervised.

Q. Other than the industrial hygienists, what other responsibilities did you have as medical director?

A. Supervise the toxicology section.

Q. And what were their activities?

A. To do appropriate studies to insure we knew enough about our chemicals to say that they can be handled safely, as well as what safety device would probably be effective.

Q. Handled safely by whom?

A. The workers.

Q. Your own workers?

A. Yes.

Q. Was any of the work of the toxicology section directed toward the handling of your products by persons other than workers of Monsanto?

MR. MALIN: I object to the form of the question.

He's testified what his responsibility was. His responsibility was as medical director to supervise the health of workers at the Monsanto facilities. I don't think he described any other.

MR. COHEN: Are you coaching him now, or are you instructing him not to answer?

MR. MALIN: I'm describing what he has described as his duties; and you haven't established that he has or would have any such knowledge.

MR. COHEN: I don't believe I have to establish anything. This is a discovery deposition. I'm trying to find out what he knows.

MR. MALIN: I object to the form of the question. If you can understand the question, answer it.

MR. COHEN: I think we probably both forgot the question. Do you want to hear it back?

(Reporter read back as requested.)

A. The toxicology section had the responsibility to define how a product should be handled safely; in other words, if the product is not toxic, then it can be a relatively non-specific safety procedure, but if in fact it was a more toxic material, they would say something needs to be done in addition to that.

Q. When you say how to handle the product safely, are we speaking strictly of Monsanto employees or are we

speaking of the world at large?

A. Our customers.

Q. So this went beyond then trying to protect your own workers?

A. Yes.

MR. COHEN: What time do you want to break for lunch? Off the record.

(A recess was taken for lunch.)

Q. When we had broken off, doctor, we were talking about the work of the toxicology section; and I believe you said that they had the responsibility to determine how to handle a product safely. And that was, as I understood it, for your customers; is that right?

A. Yes.

Q. Now, when you say your customers, do you mean just those people who buy the product, how it should be handled safely, or was it intended to determine its safe handling throughout its useful life and perhaps beyond that, on through salvage?

MR. MALIN: If you understand that question, doctor, you may attempt to answer it.

A. Their responsibility was to write out how they think it should be handled to be handled safely.

Q. What was the duration of their intended scope of instruction?

A. That it would appear as a label on the product for use.

Q. So would it be fair to say then that their job was to provide appropriate labeling for the product?

A. Yes.

Q. What was that labeling to inform whoever received the product? What information was it to give them?

A. To explain to them what they must do to protect themselves.

Q. From the product itself?

A. Yes.

Q. Now, at the time that you came there in 1973 --

A. Yes.

Q. -- did you have any responsibility toward the toxicology section?

A. Yes.

Q. Were they the same responsibilities --

A. Between '74, I became responsible for them.

Q. So it was after Dr. Kelly left?

A. Yes.

Q. What did you do at that time to determine that the toxicology section had prepared appropriate labeling for the products?

A. I don't understand the question.

Q. Did you do anything to determine whether the

labeling of the products was appropriate when you took over the role of medical director?

A. Indirectly.

Q. What do you mean indirectly?

A. Dr. Levinskas was responsible for the labeling.

Q. And who was Dr. Levinskas?

A. He's the head chief toxicologist.

Q. Was he in your department?

A. Yes.

Q. Did you supervise him?

A. Yes.

Q. Would he have been the individual who was head of the toxicology section?

A. Yes.

Q. When you took over as medical director, did he report to you on the status of his work?

A. Yes.

Q. What did he tell you?

A. On what?

Q. Anything.

A. Tell me about the products, if he had any concern for them, whether there should be more studies done on them.

Q. Do I take it then that the toxicology section did some sort of work in order to determine whether the labeling was appropriate?

A. Yes.
Q. What sort of work did they do?
A. Do animal studies.
Q. Animal studies?
A. Yes.
Q. Why did they do animal studies? Can you tell me?
A. To observe what biologic effects of the chemical are on that species.
Q. Yes. Is that it?
A. Yes.
Q. Now, I gather that your principal concern was not the biological effects on the species that you were testing; is that fair to say?
A. That's right.
Q. What species were you primarily concerned with?
A. With man.
Q. Why was it that you did animal studies then?
A. It's a way to get information that will provide some understanding of the biologic effects of such chemicals.
MR. COHEN: Could I get that last answer again?
(Reporter read back as requested.)
Q. Biologic effects of those chemicals on any species or on man or on animals?
A. Where appropriate.
Q. What does that mean?

A. If it was for man, then we would establish and write the safe handling procedure for man. If it's a cow exposed to a chemical, then it will be responsible to the farmer to take care of him or whatever.

Q. Did you do testing on cows?

A. No, but if we did have, we would do that. We would do a study that would be appropriate to the use of that chemical.

Q. Did you have any products that you were writing labels for at that time in a toxicology section where the intended user or the individual exposed was a species other than man?

A. I don't recall, but it could well be.

Q. Was that sort of feeds and that sort of thing?

A. Pardon?

Q. Feeds, animal feeds?

A. Sure.

Q. You were manufacturing feeds during that time, were you?

A. No.

Q. So are we talking hypothetically then?

A. All I'm saying is there could be some chemicals in Monsanto that are being used in a farm where an animal could be exposed and we wanted to handle that animal properly if there was an exposure.

Q. Can you give me an example?

A. I cannot, but all I'm saying is we would do it if, in fact, there was one.

Q. During the time that you were there as medical director from '74 to '88, did you have an occasion where you were worried about the exposure of some species other than man on the particular project?

A. I don't recall.

Q. In a 14 year period, you don't recall whether there was one product where the potential exposure was to a species other than man?

A. No, I do not.

Q. Do you believe that the results of animal studies, that is the observed biologic effect of the chemical on that species, can be translated into an expected biologic effect on man?

A. It's a procedure by which it's done.

Q. Well, I don't think I asked you that. I asked you whether you believed that you could translate that biologic effect observed in one species to man?

A. Yes.

MR. MALIN: I object to the form of the question. Go ahead. Answer the question.

MR. COHEN: On what basis do you object? What is it about the form that you object to?

MR. MALIN: The question you asked is, do you believe that you can translate an observed effect in an animal to man; and that's too vague in terms of the words translate. It's too vague, too general. For the question to have any meaning, it would have to deal specifically with the kind of tests, dosage, animals used, etc. It's far more complex than that.

MR. COHEN: Are you testifying then? Are you testifying now, Mr. Malin?

MR. MALIN: That's not testifying.

MR. COHEN: All right. In any event, the witness answered the question. Do you have the witness's answer?

THE REPORTER: His answer was "Yes."

Q. (By Mr. Cohen) Would it be fair to say, doctor, excepting if you will for a moment, the possible odd exposure to an animal such as a farm animal, which you don't even recall if it occurred, excepting that category for a moment, you were doing research in animals to observe biologic effects with the intention of determining potential biologic effects in man.

A. Yes.

Q. Do you believe that animal studies of PCB's and their byproducts, such as you alluded to earlier -- Strike that. Do you believe that animal studies to observe the biologic effects of PCB's and their byproducts can be used to

determine biologic effects of the same compounds in men?

MR. MALIN: I object to the form of the question. If you think you understand that question, answer it.

A. The animal studies are not done to give a one-on-one interpretation. The studies are done to determine whether there is an inhalation hazard; and if there's an inhalation hazard, how to handle it. It can be you don't get it on your hands because of something, and make sure you don't get it in your mouth, don't breathe it. All of these things can be brought up; and it's not on a one-on-one basis, but to answer those questions, I just cited that's what the test is for.

Q. In other words to determine if there's the potential danger from exposure to whole skin, you will not test humans, but test an animal to see if it absorbed through the skin?

A. Or produce an effect on the skin.

Q. All right. To see if there's an adverse effect on the skin of the animal or if a transdermal route of absorption is possible; is that fair to say?

A. Yes.

Q. Would you look for --

A. And that's acute effect.

Q. Your animal studies were looking for acute effects?

A. The ones we have been discussing are acute studies.

Q. You didn't do chronic studies?

A. We did chronic studies when they were indicated.

Q. If you saw an acute effect, were you doing chronic studies?

A. No.

Q. What would be an indicator for a chronic study, doctor?

A. An observation in man; another chemical is quite similar to it; something reported. In other words, there's a whole host of collections, could be, would influence whether we did chronic studies.

Q. Did Monsanto ever of its own initiative determine to do chronic animal studies in order to observe chronic long-term adverse effects from exposure to PCB's in animals?

A. Yes.

Q. Can you give me some examples during your tenure as medical director?

A. There was a lifetime study done with PCB's.

Q. What species?

A. Rats and mice.

Q. And again was the goal to determine biologic effects of potential chronic long-term exposure in man?

A. If there are any.

Q. I don't know what you mean. What do you mean if there are any?

A. There may not be any chronic lifetime effects.

Q. In other words, you would do chronic long-term studies in animals to see if there are any adverse effects from such exposure?

A. But you don't do it on all chemicals, lifetime studies.

Q. You did do it on PCB's?

A. Yes.

Q. When you say you did it on PCB's, were you using Monsanto product?

A. That was before me.

Q. So the test you're alluding to now occurred prior to your tenure?

A. Yes.

Q. Was it prior to your employment with Monsanto?

A. What was before? Did they do the study before?

Q. Yes.

A. Yes.

Q. So it wasn't just before you became medical director, it was before you even worked there?

A. Yes.

Q. I know there was only a short time period between the time you joined and became medical director. What were

the results of those chronic long-term studies?

A. There was cancer in one of the species that was studied of the PCB's.

Q. Now, again, was the product that was being used in that study, which I know was before your employment, Monsanto product, that is, an Aroclor?

A. Was it -- I'm not sure I got the question out of that. Restate it.

Q. Sure. A chronic long-term study was done prior to your employment to determine long-term adverse health effects from exposure to PCB's?

A. Right. Yes.

Q. I'm trying to determine if the product that was being tested for adverse health effects was a Monsanto product, specifically an Aroclor.

A. I'm sure it was.

Q. In other words, you don't have the study in front of you but you believe they used Aroclor?

A. Yes.

Q. Was it production grade or production quality Aroclor?

A. Again, as, I'm sure it was.

Q. Do you know if it contained the byproducts that we had discussed earlier, like dioxins?

MR. MALIN: Objection. He never testified that

PCB's contained dioxins.

Q. Let me back up then. Do you believe that your production grade Aroclors in this time period when this test was done, whenever it was done prior to your employment, contained anything other than PCB's?

A. It's like all chemicals. It's not 100 percent PCB's.

Q. What else did it contain, to your knowledge?

A. I don't know.

Q. Did it contain furans?

A. If it did, they wouldn't have known it because they didn't know what furans were back then.

Q. I understand that, but I'm asking you, do you believe it contained furans?

A. I said before, I don't think that furans were present in this or dioxins were present in these products.

Q. You do not believe that the Monsanto product contained furans?

A. That's right.

Q. Do you know what stereo chemicals are?

A. No.

Q. Do you know what coplanar PCB's are?

A. No.

Q. You never heard of that?

A. No.

Q. It was not a subject that was ever discussed during your tenure of employment?
A. No, it was not.
Q. Do you know the name James Mieure, M-I-E-U-R-E?
A. No.
Q. A Dr. James Mieure?
MR. MALIN: It's pronounced Mieure.
WITNESS: Mieure. I know Mieure.
Q. Do you know James Mieure?
A. I know Mieure.
Q. I'm sorry.
A. Yes.
Q. He apparently had a business address of 800 North Lindbergh in St. Louis. Do you know that address?
A. I know about where it is, yes.
Q. Is that where you worked?
A. Yes.
Q. Is that where your office was?
A. Yes.
Q. In '74?
A. Yes (nodded).
Q. Is Mieure a medical doctor?
A. No.
Q. Ph.D.?
A. I'm sure.

Q. What department was he in in '74?
A. I don't know.
Q. Did you have any dealings with him at that time?
A. Casually, I'm sure I did.
Q. Were you made aware of the fact that apparently some scientists by the name of Roach and Pomerantz in 1974 contended that they had found contaminants, dibenzofurans, chlorinated dibenzofurans in certain PCB's?
A. No.
Q. Are you saying you don't recall that today or you never knew it?
A. No. Isn't that the same answer? That's the same answer to me.
Q. Back in the early 70's, did you have any dealings with Dr. Kaley?
A. No.
Q. He did not report to you on his activities?
A. No.
Q. Do you know when Monsanto first got gas chromatography?
A. No.
Q. Do you know what gas chromatography is?
A. Sort of.
Q. Would you agree that gas chromatography is what enabled Monsanto to detect these byproducts or contaminants

in their product?

A. I'm not a chemist.

Q. So, you don't know?

A. I have an idea, but I don't know.

MR. COHEN: Mark this as Roush Exhibit 2.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 2.)

Q. Have you had a chance to look at the document?

A. It's a chemistry document, though.

Q. Have you ever seen it before?

A. No.

Q. This is dated December -- Am I looking at the write document? It's dated December 23rd, '74.

A. Yes.

Q. And it refers to an AOAC meeting presentation from October, '74.

A. Whatever that is.

Q. Whatever that is. But you see on the first page here of the report itself, it says, "In this paper, we report the finding of chlorinated dibenzofurans in production lots of Aroclor 1254, 1242 and 1016 that were manufactured in 1973."

A. Do you see that?

A. Yes.

Q. Did you see the attachments here? They have been stamped with the numbers PRR 4369, 4370, 4371, 4372.

A. Yes.
Q. They refer to Aroclor products.
A. Yes.
Q. Would it be fair to say about this time in 1974 was when you became aware of the fact that the product contained furans?
MR. MALIN: Objection to the form of the question. I don't think he ever testified that he became aware that the product contained furans.
MR. COHEN: I'm asking him that.
A. No, I didn't know that.
Q. Did you ever know that it contained furans?
A. No.
Q. So through 1988, were you aware of the fact that the product contained furans?
A. No.
Q. Did you ever see any data subsequent to this in '74 that indicated that the product did not contain furans?
A. No.
MR. MALIN: Off the record.
(Colloquy held off the record.)
MR. COHEN: Mark Exhibit 3.
(Reporter marked Plaintiff's Deposition (Roush) Exhibit 3.)
Q. Have you had a chance to look at the document, sir?

A. Yes, but not in depth as I should because it's pretty deep for me.

Q. It's a little heavy.

A. Yes, it is.

Q. You'll agree with me, however, on the first page it is a handwritten memo from the desk of R. E. Keller dated 11/11/71, that the document appears to be a typewritten memo with attachments sent to a number of people within the Monsanto organization including Mr. Mieure and, again, it is directed to W. R. Richard, but appears to be, again, from R. E. Keller; is that right?

A. Yes.

Q. Now, this predates your employment with the firm. I understand that. Were you aware of the existence of this document when you came to the medical department?

A. No.

Q. Do you see that there are on page 2 of the memo dated October 28th, '71, questions for medical?

A. Yes.

Q. Would that have been your department, that is, at that time Dr. Kelly's department?

A. Yes.

Q. Were you aware that these questions were raised in 1971 in the medical department?

A. No.

Q. Are you aware of any test that was done to determine the toxicity of furans in 1971?

A. No, I'm not sure that they would have known how to do it at low levels.

Q. Do you know if the medical department either had done or had access to information regarding the toxicity of what are called impurities, chlorinated naphthalenes, anthracene, phenanthrene? Do you know if you had any of that information in that time period?

A. No -- I don't recall it if I did.

Q. Do you know if the PCB product Aroclor that Monsanto manufactured during that time period contained any of these impurities such as chlorinated naphthalenes?

A. Not for sure.

Q. At any time prior to your employment in 1973, are you aware of any acute toxicity studies having been done on chlorodibenzofurans?

A. No.

Q. That's either inside, in-house, or paid for by Monsanto, sponsored by Monsanto, or otherwise?

A. Right.

Q. You're unaware of any?

A. No (nodded).

Q. And the answer is no? You shook your head.

A. No. Right.

Q. See down in the last paragraph, it says "I suggest that the only immediate analytical work would be to firm up furan data for remaining PCB/PCT products with existing methodology." See that sentence?

A. Yes.

Q. What's PCT?

A. I don't know.

Q. Would you turn, sir, to the page marked 4245, dated June 13, '72, apparently from J. R. Savage, St. Louis. It is to W. R. Richard. Do you see that page?

A. Yes.

Q. Do you see that symbol T3A --

A. Yes.

Q. -- under the name?

A. Yes.

Q. What's that mean?

A. That's his location.

Q. And would B2SL likewise be a location?

A. Yes.

Q. Now, it says, "Cumming Paton has asked that we develop a history on chlorodibenzofuran content of our PCB products. The plant has no methods for this analysis. If we just need to screen a few current batches, this is perhaps better done in Research, but if we want to develop a continuing history, of say every fifth batch as we did with

Dioxins and Penta, we should have a method developed," etc., etc. Were you aware as to whether or not there was a continuing program to test product for Dioxins and Penta, whatever that is?

A. No.

Q. Do you know what products they're talking about they would have been testing for Dioxins and Penta?

A. I have to guess. I'd say they're talking about PCB's.

Q. The memo refers to PCB's in the same paragraph.

A. Yes.

Q. As director of the medical department at Monsanto Company, wouldn't you have had access to information regarding the content of the product?

A. Not necessarily. They could give it and we could talk about PCB's and we would test PCB's and we would include that as a contaminant of it.

Q. You're assuming that the testing of PCB's was on production grade material; is that right?

A. Yes.

Q. In other words, I'm distinguishing from laboratory grade that could be made to a higher degree of refinement.

A. Yes.

Q. So, you think that whatever the tests would show

it would include whatever was in there?

A. Yes.

Q. And again, I asked you earlier, you have no information as to what effect there is on having the chlorinated benzenes in there with respect to the formation of dioxins and furans?

A. No.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 4.)

Q. Have you ever seen this memo before?

A. No.

Q. You see it refers to apparently a memo or some communication between the same two individuals. HSB, I assume, is H. S. Bergen. Do you know who that is?

A. I know the name, but I don't know him.

Q. WRR is W. R. Richard. Do you know who that was?

A. Yes.

Q. Copies were sent again to Mieure and Munch. Munch, did he work for you?

A. No.

Q. The memo does however refer to Dr. Levinskas?

A. Yes, it does.

Q. In May '75, he worked for you?

A. Yes.

Q. He was head of toxicology?

A. Yes.

Q. Again a report of the presence of dibenzofurans in Monsanto product; is that correct?
A. Yes.
Q. You were not aware of this at that time?
A. I don't recall it at least.
Q. Do you see in the fourth paragraph there's a reference to a case against Dow, "The case was never brought to trial vs. Dow because of lack of evidence."
A. Yes.
Q. Do you know what they're talking about?
A. I can only surmise what it is.
Q. Which is?
A. The tetrachlorodibenzodioxin --
Q. Right.
A. -- was a subject of interest to Dow. Dow was working on dioxin and the fact that they had difficulty in analyzing some form, there's a reason that Dow was never brought in.
Q. Do you know anything about a lawsuit against Dow in that time period regarding dioxin?
A. I don't think there would be a lawsuit. I think they're talking about what regulations they would be pushing on them.
Q. You see the sentence, "The case was never brought to trial vs. Dow because of lack of evidence."

A. Yes.

Q. You don't think that refers to a lawsuit?

A. That one sentence isn't very much for me.

MR. MALIN: Doctor, please don't speculate. Either you know or you don't.

Q. Let's go to the next sentence. First sentence, of the next paragraph. "In our case the argument is about chlorinated dibenzofurans." Do you know anything about a lawsuit against Monsanto in May of '75 regarding chlorinated dibenzofurans?

A. No.

Q. And you have no recollection of Dr. Levinskas discussing this situation with you?

A. No.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 5.)

Q. Have you had a chance to look at the memo, doctor?

A. Yes.

Q. Now, this apparently is a memo that was sent to, it looks like Mr. Papageorge, although his name appears to have been crossed out, from David Wood. Did you know Mr. Wood?

A. Yes.

Q. And apparently a copy of this document went to you?

A. Yes.
Q. Your address was A2SA?
A. Yes.
Q. Do you recall this situation with Dr. Allen calling about furans and dioxins?
A. No.
Q. You don't recall?
A. No.
Q. Does looking at the memo refresh your recollection at all about this event?
A. No.
Q. Does this memo refresh your recollection that you were aware that furans were being reported as being found in Aroclors?
A. No, I do not recall it.
Q. You see where it refers to a Risebrough paper?
A. Yes.
Q. Do you know that paper?
A. No, I do not.
Q. Have you ever read it?
A. No.
Q. Do you know what the subject matter is?
A. No.
Q. Between the time of this memo in August of '75 and the time you retired in April of '88, did you ever

receive information that indicated that furans were present in Aroclor products, in Monsanto products?

A. I don't recall.

Q. Did you ever discuss with Dr. Levinskas what you should do about warning labels for PCB's as a result of the reported presence of furans?

A. I don't recall.

Q. You were aware during that time period, however, that furans can be formed in certain operations that involve dielectric fluids?

A. Yes.

Q. Now, you knew throughout this time period in '74 to '88 that there was an awful lot of dielectric fluids that Monsanto manufactured and sold; didn't you?

A. Yes.

Q. And you knew certainly as of some time in '77 that there was a general market trend to get those dielectric fluids containing PCB's out of transformers; didn't you?

A. I knew that they were to stop putting them in, but I don't think they were told to take them out.

Q. Well, were you aware at any time prior to April 30, 1988, that industry was generally trying to get the dielectric fluids containing PCB's out of the transformers?

A. I didn't know how broad it was.

Q. But you did know that there were efforts to take

dielectric fluids containing PCB's out of transformers?

A. Yes.

Q. Were you aware of what's called frequently cross contamination, where mineral oil transformers were contaminated with dielectric fluids containing PCB's?

A. Yes.

Q. Were you aware that there was industry developing ways to remove those PCB's from those mineral oil transformers?

A. No.

Q. Were you aware that there were substitute dielectric fluids coming to market during that time period to replace the dielectric fluids containing PCB's?

A. Yes.

Q. What did you know or believe was happening to the dielectric fluid containing PCB's?

MR. MALIN: I object to the form of the question. If you can understand it, answer it.

Q. Did you understand it, doctor?

A. Would you say it again?

Q. I'm trying to understand, doctor, sometime in the late 70's people started taking dielectric fluid containing PCB's out of transformers; is that right?

MR. MALIN: I object to the form of that question.

Q. You already answered that, didn't you, doctor?
A. Yes.
Q. You know that's true; don't you?
A. Yes.
Q. What did you know or believe was happening to that PCB fluid?
MR. MALIN: You mean the PCB fluid that was being taken out of transformers?
MR. COHEN: Yeah.
MR. MALIN: Answer the question if you think you understand it, doctor.
A. I understand the question, but I don't know. I wasn't a part of that.
Q. So you don't know what was happening to it?
A. No.
Q. But you knew at least as of the late 70's it was coming out of transformers in the field?
A. I didn't know how broad it was. I knew they were talking about it.
Q. When did you know that under certain operating conditions dielectric fluids in transformers could develop furans and dioxins? When did you have that information?
A. I don't know.
Q. Did you have it by the late 70's?
A. I don't know.

Q. Well, I believe there's a report by Hudsinger. Is that his name? Are you familiar with that paper?

A. No.

Q. Have you ever seen any of the studies of the Binghamton fire, the Binghamton office building fire?

A. I knew about the fire and I've seen discussions of it, but not in any depth.

Q. That goes back into the 70's, doesn't it, doctor?

A. I'm sure it does.

Q. And furans and dioxins were all detected in the suit from the transformer fire; isn't that right?

A. Furans were. I don't know whether dioxins were.

Q. So at least some time during that time period in the late 70's to early 80's you were aware that furans were being formed under certain conditions in dielectric fluids in the field?

A. I wasn't sure that it wasn't by leaks and some other exposure but not in the transformer itself.

Q. You were unaware that the fluid could form furans in the fluid itself still in the transformer?

A. That's right.

Q. Doctor, let me show you an article from Environmental Health Perspective Volume 60. I can't read the date. It looks like 1980 something. It's an article by Hudsinger, Chaldry, Chittam, and Johnston, a Formation of

Polychlorinated Dibenzofurans and Dioxins During Combustion, Electrical Equipment Fires and PCB Insineration. Have you ever seen this before?

A. No, and I can't tell you anything about this.

Q. You have no recollection of having seen it before?

A. No.

MR. MALIN: Mr. Cohen, I think you may be under the impression that Dr. Roush worked for Dr. Kaley as an analytical chemist as opposed to being a medical doctor. I think he told you what the medical director does.

Q. Do you believe or did you believe while you were a medical director of Monsanto Chemical Company that dibenzofurans were a toxic substance?

A. Yes.

Q. Did you believe that they could cause adverse health effects in man?

A. Depends on --

MR. MALIN: I object to the form of the question, unless you're talking about dose.

A. Depends upon dose.

Q. Do you believe that at some dose, that could form and cause adverse health effects in man?

A. I don't think there was an experiment done to talk about that, but it has to do with how much of a dose

could be out there.

Q. You're familiar with the Yusho and Yucheng incidents?

A. Yes.

Q. They involve, I think it is now believed, furans?

A. Yes.

Q. People developed very significant adverse health effect from ingesting rice oil containing --

A. I sure did.

Q. -- dielectric fluids that contained, amongst other things, furans. You're familiar with those studies?

A. Yes.

Q. When were you familiar with those studies?

A. '75.

Q. Between 1975 and 1988 what, if any, instructions did you give to Dr. Levinskas in the toxicology department to inform customers and others of the dangers of furans?

A. If we did anything, it would be to put it on the label of something.

Q. You said, if we did anything. Did you do anything?

A. I would have to talk to Levinskas to see what was done.

Q. You have no recollection of what you instructed Levinskas to do?

A. That's right. I do not.

Q. You were Levinskas's boss?

A. Yes.

Q. Do you know, as you sit here today, whether you ever put warnings, on the labels of PCB containers going out, of the dangers of furans?

A. You'll have to go back. We're still talking about dose. The question is how much of this was present.

Q. I'm asking you, doctor, if you ever did anything to change those labels?

MR. MALIN: He's answering your question.

MR. COHEN: Mr. Malin, can I please have the witness's testimony?

MR. MALIN: Tell him to give you an answer and explain his answer.

Q. Sure. Explain your answer, please, feel free, but tell me the answer.

A. It was a contaminant of PCB's and the concentration was very low; and the people who had been exposed to PCB's in Yusho were exposed to concentrations that were in the thousands of ppm; and they're the ones who got the chloracne. And when we come back from that, we're talking about chloracne being related, there's no evidence that there was chloracne associated with PCB's unless it was in part of a fire or an explosion.

Q. What, if anything, to your knowledge did the medical department of Monsanto Company do between 1974 and 1988 to warn people in the field that were taking dielectric fluid out of transformers that that fluid could be contaminated with furans or dioxins?

MR. MALIN: He hasn't testified that he believed it could be contaminated with benzofurans or dioxins.

MR. COHEN: I didn't ask him that. I asked him what he did.

MR. MALIN: Well, you premised it on its being contaminated or possibly being contaminated. He never testified to that.

MR. D'URSO: He just said furans were present in PCB products and --

MR. COHEN: You also said under certain circumstances in the field.

MR. MALIN: In the field, not necessarily in the transformer as a result of operations in the transformer.

MR. COHEN: I'm still asking him what he did.

Q. (By Mr. Cohen) What did you do? If the answer is nothing, tell me nothing.

A. It's nothing.

Q. Thank you. Is it your contention that people in Yusho and Yucheng only developed chloracne?

A. No.

Q. What other ailments did they develop allegedly as a result of their exposure to this dielectric fluid?

A. There was an irritation of upper respiratory tract, of the eyes, nose. There were liver effects. There were enzyme effects in the liver; and there was a sensory neuropathy.

Q. Anyone develop cancer?

A. There were several who developed cancer.

Q. Anyone develop birth defects?

A. Yes, but it wasn't a true -- It was a birth defect, but it went away with time, which makes it different.

Q. Which was -- What was the birth defect that went away with time?

A. The pigmentation went away, and the eye effects.

Q. It was Cola Baby Syndrome?

A. I don't remember that.

Q. You don't remember that phrase?

A. No, but they -- Most of these things disappeared on the babies born with this defect, so it was not a permanent effect.

Q. Were the cancers that developed associated with exposure to the dielectric fluids?

A. There's no indication that they were. There was only a couple of them.

Q. Were any of the cancers that developed neoplastic

-- I'm sorry -- a metastatic disease?

A. I don't think that there's any evidence about spread, but cancers do spread. That's a characteristic of them.

Q. Now, in the lesions that you referred to earlier as developing in animal studies from exposure to PCB's --

A. Yes.

Q. -- were they metastatic lesions?

A. No.

Q. They were non-metastatic?

A. That's right.

Q. Were any of the animals allowed to live long enough after the neoplasms developed to develop metastasis?

A. I don't recall that.

Q. So, you don't remember whether the sacrifices of the animals occurred prior to the time that any metastasis would have been detected?

A. The studies by Colandra would have done that.

Q. Colandra was with IBT?

A. Yes.

Q. Were you at Monsanto when the investigation of IBT took place?

A. Yes.

Q. And were you there when Keplinger was prosecuted?

A. I was there when that lawsuit took place. I was

not privy to what took place at that time.

Q. When you say the lawsuit, he was prosecuted criminally; wasn't he?

A. I don't know.

Q. You were not aware that he was convicted of altering or faking animal studies?

A. I don't know.

Q. You're aware that whatever the charges were, they arose out of studies that were being done for Monsanto?

A. No.

Q. You're not aware of that?

A. No.

MR. MALIN: If you're aware of that, we'd like to know about it.

MR. COHEN: Well, they weren't PCB's. I'll agree with that.

Q. (By Mr. Cohen) Did you ever order any studies done to determine any adverse health effects that would result from the combination of chemicals that was used in the product Pyronol or Inerteen?

A. No.

Q. You were aware however that you were manufacturing and selling a product called Pyronol?

A. Yes.

Q. And another product called Inerteen?

A. Yes.
Q. Do you know the ingredients of those products?
A. No.
MR. MALIN: The question has been asked and answered. He said before he didn't know the ingredient.
MR. COHEN: I was trying to refresh his recollection.
(Reporter marked Plaintiff's Deposition (Roush) Exhibit 6.)
A. I don't understand it.
Q. You don't understand the document?
A. No.
MR. COHEN: What have we marked it as, as 6?
THE WITNESS: Six.
Q. You do see that there are a number of compounds contained in these various product numbers for Pyronol, and apparently it varied year by year. Do you see that, sir?
A. I see something. Yes.
Q. Do I understand that you never ordered any tests done on the combination of Aroclors and chlorinated benzenes?
A. I don't recall.
Q. Do you know what the scientific literature is with respect to the toxic properties of chlorinated benzenes?
A. No.
Q. Do you know if they're toxic?
MR. MALIN: At what dose?

A. I don't know.

MR. COHEN: At any dose.

MR. MALIN: Everything is toxic at a dose.

MR. COHEN: Only if you gag on it.

Q. (By Mr. Cohen) Do you know if chlorinated benzenes are more or less, at the same dose, more or less toxic than chlorinated biphenyls?

A. I don't know.

Q. Do you know if chlorinated benzenes are more or less toxic at the same dose than benzene?

A. No, I do not know.

Q. Do you know anything about the toxicity of tin tetraphenyl?

A. No, I do not.

Q. Do you know anything about epoxide dicyclo-diepoxy carboxylate?

A. No.

Q. Do you know anything about 3,4-Epoxycyclohexylmethyl-3,4 epoxycyclohexane carboxylate?

A. No, I do not.

Q. Are you aware of any literature indicating that certain epoxide compounds, known Epoxide 201 was a known carcinogen?

A. No.

Q. Do you know whether your product, that's product

manufactured by Monsanto Chemical, contained at any time Epoxide 201?

A. No, I do not.

Q. Would it be fair to say you never directed Dr. Levinskas or anyone to issue any warnings to customers or anyone regarding Epoxide 201?

A. No, I do not.

Q. How about tin tetraphenyl?

A. No.

Q. How about chlorinated benzenes?

A. I don't recall.

Q. How about benzene?

A. We do for benzene.

Q. But not part of PCB products; is that right?

A. If it were benzene itself, it would have been.

Q. I'm talking about PCB's now. Did your warnings for PCB's contain any warnings about the toxic effects or toxic interaction between PCB's and benzene?

MR. MALIN: I object to the form of the question. He hasn't testified there is any toxic interaction.

A. I don't think there was benzene as such in Aroclor.

Q. Have you ever heard it claimed that PCB's may have a promotional effect on the carcinogenicity of other compounds?

A. I've heard it said, yes.

Q. Do you believe it?

A. I don't know. The whole idea about promoters is not well understood. It's still in the stage of thinking and trying to understand.

Q. Do you believe that benzene is a carcinogenic agent in humans?

A. Yes.

Q. You'll agree with me that benzene is a fairly common industrial compound?

A. Yes.

Q. You'll agree with me that people who work in industry can have exposure to benzene on an ongoing basis?

A. But their exposure should be protected.

Q. But they can have exposure, you'll agree with that?

A. But at low levels.

Q. Benzene is a common ingredient in motor fuels?

A. Yes; and not all, but in some it is.

Q. Do you believe that long-term chronic exposure to benzene can cause leukemia?

A. The circumstances under which it produces leukemia is not well understood. If you keep it down below one ppm, that is largely protective. To say absolute is a very difficult subject.

Q. You say below one ppm, you mean on a -- what do they call it -- TEL?

A. No. TLV.

Q. TLV, right. Is that what we're referring to?

A. Yes.

Q. One ppm TLV. TLV is -- What is TLV time?

MR. MALIN: Threshold limit --

A. Threshold limit value.

Q. Threshold limit value. A government term.

A. And an industry term. ACGIH does that. American Conference of Governmental Industrial Hygienists by and large do the rating of TLV's.

Q. You're not an epidemiologist; is that right?

A. No.

Q. You've never designed an epidemiological study; have you?

A. No.

Q. Is that the work of your toxicology department?

A. When Zack came, then we had an epidemiology section.

Q. And when did she come there again?

A. Early 70's.

Q. And when did she leave?

A. I don't know. 75, '76, something like that.

Q. Was she your epidemiology section?

A. For a while.
Q. When she left, did you have others?
A. Yes.
Q. Their names?
A. Bill Gaffey.
Q. Gaffey?
A. G-A-F-F-E-Y.
Q. Anyone else?
A. He had a couple of people with Master's degrees working for him.
Q. Was he a Ph.D.?
A. Yes.
Q. By the way, have you ever published anything?
A. A couple of things.
Q. Do you have a CV?
A. Yes.
Q. Is it available?
A. Yes.
Q. Could you supply it to counsel?
A. Sure.
MR. COHEN: Would you be kind enough to supply the witness's CV?
MR. MALIN: Sure.
Q. (By Mr. Cohen) Is there any resource that you could go to enable us to find out the names of the court

terms and numbers of cases in which you testified?

A. I can work out and come up a lot closer than we have thus far.

Q. So in other words, if you had enough time and gave it enough thought, you could probably think of most of them?

A. I hope so.

Q. You know the phrase low dose extrapolation?

A. Yes.

Q. What does it mean?

A. That largely refers to a risk assessment procedure for evaluating a carcinogen.

Q. Is that something that you do from animal studies?

A. Yes.

Q. You make risk assessments to the population at large?

A. And what you do is you take a place where you see an effect and go back to zero.

Q. Other than low dose extrapolation and risk assessment activities, do you think that animal studies can be used in order to determine a biologic effect in man?

MR. MALIN: This question has been asked and answered. And if you want to try to answer it again, doctor, go ahead?

THE WITNESS: Would you say that again for me?

MR. COHEN: Would you like to take a break?

THE WITNESS: Yes.

(A short recess was taken.)

MR. COHEN: Go ahead and read back the last question.

(Reporter read back as requested.)

A. No, not directly at least.

Q. What do you mean by that, doctor?

A. There's a study in man -- an animal, and then you look at a population and you may see an association or you may not. Now, that can be metabolically or pharmacologic handling of it or it can be the metabolic activity of the animal and its response to that chemical.

Q. How about if the particular substance causes the same metabolites in both animals in tests and in man?

MR. MALIN: I object to the form of that question.

Q. Do you understand the question, doctor?

A. Ask it again, please.

(Reporter read back as requested.)

MR. MALIN: I don't know if I understand the question. Is this question, will the biological effect be the same in animals as in man if the substance being tested produces the same metabolites in man as it produces in

animals?

MR. COHEN: That's a good question.

MR. MALIN: Or will it produce the same effect in both?

MR. COHEN: Yes. That's a good question.

MR. MALIN: Is that the question?

MR. COHEN: That's a good question.

MR. MALIN: Do you understand the question?

THE WITNESS: Yes. It is a very complicated question. The understanding of man from animal is most difficult; and there are very few examples where the studies in animal have been seen in man, but as you do more and more things to make it the same metabolic activity, which is quite hard to do and do it with different doses and make it different, and then have the same lesion appear would be quite unusual. To say it could happen or not, I think it can -- could happen.

Q. How about if the substance attacks the same target organ in both animals and in man?

A. At the same dose?

Q. Well, I can't say at the same dose, doctor. I don't know that you have humans getting the same dose. It may be a different dose but attacks the same organ.

A. Practically all studies are done at doses that are multiples of what man is exposed; and they do that to try

to take into account the fact that we don't have many animals exposed. But the fact is, we do the studies to see what we think may happen in man, but the interpretation of it is most complicated.

Q. But you would agree not impossible?

A. Yes.

Q. Are you aware of any government documents that indicate with respect to PCB's that there is a high degree of concordance between animal studies and epidemiologic studies in man?

A. No. I think that's not correct.

Q. So, you disagree with that?

A. Pardon?

Q. You disagree with that?

A. I disagree with that.

Q. You're not aware of any such government documents that say that?

A. I know there's lots of written reports that talk about that, and that there's no association.

Q. Have you ever had a chance to talk to Dr. Kelly about this particular subject, that is, the translatability, if you will, of the effects in animal studies to man?

A. No.

Q. Would you agree or disagree that in animal studies and in epidemiological studies, PCB's -- whatever

PCB's means whether it includes those contaminants or not --

A. Yes.

Q. -- have attacked the same target organ?

MR. MALIN: I object to the form of that question. If you think you understand that -- I don't think he testified that he knows that PCB's have attacked any target organ in man at the levels in animals.

A. We have an effect with big doses. We do get an effect on the liver and they're enzymatic responses primarily and in the animal, but the dose is so different. They haven't done at the same dose level in the animal as we've done on man.

Q. What dose levels are you assuming in man?

MR. MALIN: I object to the form of the question. For what purpose?

MR. COHEN: He's talking about dose levels in man. I'm asking him what he's referring to?

MR. MALIN: Dose levels to do what? For what effect?

MR. COHEN: Mr. Malin, please. I'm asking him.

MR. MALIN: I object to the form of that question on the grounds that it's unclear. If you think you understand that, doctor, go ahead.

MR. COHEN: I'm asking the witness what he's referring to when he says dose levels in man.

Q. (By Mr. Cohen) What are you referring to, sir?
A. Either the levels of exposure in Yusho; and coming back to occupational exposure, occupational exposure is in milligrams.
Q. Milligrams what?
A. Per day.
Q. For how many days?
A. In the animal?
Q. No, no. Occupational exposures.
A. In occupational exposure?
Q. What's the longest occupational exposure you're aware of at milligram per day level?
A. I'd have to have the epidemiologic studies to see what those were.
Q. So it varies from study to study, depending on how long they were studying the individuals --
A. And the dose.
Q. -- and how long the individuals were employed? In fact, there was no particular dose you can refer me to in any study for man; is that right?
A. All I can tell you is that man has been exposed in the work place at least a milligram per day; and there's no evidence that they get liver cancers from that.
Q. You have no information about the exposure at Paoli; is that right?

A. No.

Q. Would you agree that it is possible that human beings in the work place ingest PCB's?

MR. MALIN: I object to the form of the question. It is possible. Anything is possible. Anything is possible. The distance of the Norse gods is possible. The question is too vague.

MR. COHEN: We have your objection. I'm not asking you about the Norse gods. I'm asking you about ingesting PCB's.

THE WITNESS: Please?

(Reporter read back as requested.)

A. Yes. Primarily it comes from them using -- wiping it off from their hands and putting it in their mouth.

Q. You would agree that individuals that have PCB's on their hands may then go ahead and either smoke a cigarette, for example, and inhale the fumes and perhaps even consume products of the PCB's, or perhaps may eat their lunch and actually consume the PCB's then?

A. Yes.

Q. May wipe their face and consume the PCB's from their hands?

A. Yes, but they shouldn't be doing that.

Q. I understand that. That the PCB's may be on the skin on their face and they may sweat and swallow the sweat?

A. Yes.

Q. In fact, these are all rather recognized modes of ingestion of PCB's in the work place; would you agree?

A. Yes, that's the source of the level that they've got.

Q. Then, of course, they may have dermal absorption besides ingestion; is that right?

A. What kind of?

Q. Dermal, from their skin, actually going through the skin.

A. Dermal. I thought you were saying thermal.

Q. No, sir. I'm sorry. We have the window open a little bit and that may affect. I'll try to speak up. Dermal absorption through the skin.

A. Yes.

Q. That's another means of absorption of PCB's in the work place?

A. Yes.

Q. It's recognized; isn't it?

A. Yes.

Q. And, in fact, there is some level of inhalation absorption from fumes and airborne particles on dust and the like. That's also recognized; would you agree?

A. Yes.

Q. So all of these are methods of absorbing PCB's in

the work place?

A. But they all can be protected from all of those.

Q. I understand that, but what I'm saying is that these are all recognized methods of absorption.

A. Of exposure.

Q. Of exposure. Are you aware if in the studies that you have seen on work place exposure, an effort was made to quantify on a daily basis the level of absorption through these various routes of exposure?

A. No, but I've seen the blood levels reported for such workers.

Q. Do you think that blood levels are a good measure of absorption?

A. Yes.

Q. You would agree with me that if the person had an acute short-term exposure that shortly after that acute exposure, they may show a high blood level of PCB's?

A. I'm not sure how soon, but it will reflect it.

Q. Would you agree that after a long period of time they may show a low blood level of PCB from one acute exposure?

A. I think that it will follow after, with no further exposure.

Q. And what causes it to fall from the blood level? Why does the blood level go down?

A. We know that it appears in the urine and feces.
Q. Are you saying it's excreted?
A. Yes.
Q. Anything else cause the blood level to drop?
A. It can be metabolized, but metabolism isn't well understood.
Q. Do you think it's going to be transported and stored in any of the other cells in the body other than the blood?
A. In the fatty tissues primarily.
Q. So would you agree after an acute exposure, some of the PCB's will be excreted, some maybe metabolized and some will be stored in fatty tissues?
A. And it's all in equilibrium.
Q. So that you believe that the blood level after the storage process will then again reflect the entire body level?
A. Yes. Not instantaneously, but it will reflect it.
Q. How about with chronic long-term exposures?
A. The same will be true in terms of the equilibrium may be changed and he may put something into another depot.
Q. Like fat cells?
A. Another fat depot because they're not all equally available.

Q. So, you may fill up the fat cells in the liver and then fill up the fat cells in another organ and fill them up in another organ, etc.; is that correct?

A. Yes.

Q. And you still believe that the level in the blood will be reflective in equilibrium that the body burns?

A. If you give it time.

Q. How much time?

A. I don't know. It depends on what the level is compared to where it's going to.

Q. What's the difference between testing serum and plasma?

A. I don't know. Serum has more relative fat than does --

Q. Serum what?

A. The serum has more fat in it than does the --

Q. Plasma?

A. Yes (nodded).

Q. Would it then be likely to report a higher level or a lower level?

A. I don't know, but I would say it would reflect a higher level.

Q. Do you think there's any disagreement in the scientific and/or medical community about the utility of animal data for determining an ailment or illness in an

individual human being?

MR. MALIN: I object to the form of that question. If you think you understand it, doctor, you may attempt to answer it. I think it also has been asked and answered several times.

MR. COHEN: No, I think this is different.

THE WITNESS: Ask it for me again, please.

(Reporter read back as requested.)

A. There is no question about the value of doing animal studies, both given an estimation how it is metabolized, how it's handled, and then you do it within man to see if it handles the same. But the obvious one if I got something very irritating or toxic and I give it to the animal and it drops dead, I've learned a great deal in terms of what the implication of that is, so that's the acute or the easy one. That more difficult one is the long life time because there the differences become more apparent and it's difficult. Nevertheless, we do animal studies lifetime to understand what is a possible effect rather than saying we know what the effect is.

Q. Other than animal studies, if you as a medical doctor are evaluating an individual who has an ailment and you know has been exposed to a particular substance, what other information would you want to have?

A. Do I understand that at all, his problem? Is

this the first time I've ever seen it?

Q. Right.

A. First time I've ever seen it?

Q. First time you've ever seen this person.

A. Have I seen the chemical before and its action in man?

Q. Are you asking me?

A. I want to know if that's another --

Q. I'm trying to understand. Let me ask you this. In making a diagnosis about a particular individual, would you be interested in looking at the scientific literature of the effects on man or animals of similar compounds, related compounds?

A. If I didn't have it on that chemical, I'd welcome any material that I could use.

Q. With respect to PCB's, what similar or related compounds would you look at?

A. I'm not enough of a chemist, but I would look and see some closely related chemical that I may know something about.

Q. Would you have any interest in looking at polybrominated biphenyls?

A. Yes.

Q. How about chlorinated naphthalenes?

A. Yes, but I'm not sure that it would be the same

as this, as PCB's.

Q. How about dioxins?

A. No.

Q. Furans?

A. No.

Q. Chlorinated benzenes?

A. I don't know that.

Q. How about other chlorinated hydrocarbons?

A. But there's a big range on chlorinated hydrocarbons that you can't take -- You have to look over the whole gamut before you decide.

Q. Would it be fair to say that you would look at all of these other possibilities with which you were familiar in order to see what they're known to cause in making a diagnosis in this person?

A. Yes.

MR. COHEN: You want to mark this, please.

(Reporter marked Plaintiff's Deposition Exhibit (Roush) 7.)

Q. Did you ever see this document before?

A. It's got my name on it.

Q. You notice that down at the bottom there are two series of numbers, SCM77226 and PRR43367?

A. Yes.

Q. Notice that the next page is numbered SCM77227 and PRR 43368, and the next page is again numbered in

sequential order?

A. Yes.

Q. Now, do you also notice that the first page ends in the middle of a sentence, and it doesn't start again on the second page?

A. Yes.

Q. Do you think that was the condition of the document when you got it back in 1975?

A. I don't recall.

Q. Do you recall receiving this document?

A. No.

Q. Do you recall having a meeting to discuss the results of a rat feeding study completed by Dr. Kimbrough?

A. I know we talked about her study, but I'm not sure I did it in the presence of all these.

Q. P. L. Wright, is that Paul Wright?

A. Paul Wright. Yes.

Q. Is he the chap who worked first for Monsanto and then for Industrial Bio-Test and then came back to Monsanto again?

A. Yes.

Q. He had worked for Monsanto prior to the time Monsanto gave research work to Industrial Bio-Test?

A. That was before my time.

Q. When he was here, at this time in '75, was this

after he returned from Industrial Bio-Test?

A. Yes.

Q. Was he supervising any of the work at Industrial Bio-Test for Monsanto while he was there?

A. I don't know.

Q. Did you ever review any of the work done by Industrial Bio-Test to see if he had supervised that work or participated in any way in that work while he was there?

A. Levinskas was the one who was supervising the Bio-Test studies.

Q. Where is Levinskas now?

A. He's retired.

Q. Do you ever see him?

A. Yes.

Q. Do you know where he lives?

A. Close to Monsanto.

Q. Do you have an address for him?

A. I don't have his address. We can get it.

Q. Is he in the white pages?

A. I'm sure it is.

Q. What's his first name, George?

A. George.

Q. And does he live in the City of St. Louis?

A. No, he lives in Creve Coeur. It's a suburb of St. Louis.

Q. What's it called?
A. Creve Coeur. Broken Heart.
Q. How old a man is -- Is it Dr. Levinskas?
A. Yes.
Q. Medical doctor?
A. No. Ph.D.
Q. Ph.D.?
A. Yes (nodded).
Q. How old is he?
A. He just retired a short time ago.
Q. Is he about 65?
A. 67, I think.
Q. Do you remember that cancerous cells were observed in a certain number of Dr. Kimbrough's laboratory animals?
A. Yes.
Q. You see the page that's marked as page two?
A. Yes.
Q. According to this document, you had a number of responsibilities here.
A. Yes, I did.
Q. Item 1 is, "Publish the results of the Monsanto studies conducted by Industrial Bio-Test Laboratories." What was the purpose in doing that; do you know?
A. To get the information out of the data that had

been gathered by Calandra.

Q. He's the chap at Industrial Bio-Test; right?

A. Right.

Q. Was. As of 1975, how old were those studies; do you know?

A. A couple of years.

Q. Had you ever published them before?

A. No, they were Bio-Test studies. They were the ones who had to publish it.

Q. Had they published it before?

A. They had published other things, but they didn't publish this.

Q. So they had not prior to 1975 published their studies?

A. This study.

Q. That's right. This study referred to on page 1, similar studies; is that right? Similar to Dr. Kimbrough's studies?

A. Yes.

Q. So they had not previously published it and now you wanted it published; is that right?

A. That's right.

Q. Was that in an attempt to counter the results of Dr. Kimbrough's study?

A. It was to get the information out to the public.

Q. Item 2, "Obtain services of cancer specialists to review both studies and interpret significance to current PCB applications." Did you do that?

A. Yes.

Q. Who did you get?

A. Dr. Pour, P-O-U-R, from the University of Nebraska.

Q. And did he do a study?

A. No. No, he wasn't supposed to. He was supposed to interpret these studies.

Q. Were the results that he -- Were his results ever compiled in a document?

A. Yes.

Q. Where is that document?

A. They were given to the Washington scene. They were given to FDA.

Q. EPA?

A. EPA.

Q. What were Dr. Pour's results?

A. That there was cancer found, but they weren't the same, exactly the same as those of Kimbrough.

Q. Now, whose study was he interpreting, Kimbrough's?

A. IBT's as well as Kimbrough's. Both.

Q. Now, do I understand that the IBT interpretation

was that cancer was not found?

A. No, no. They found cancer.

Q. So in other words, both the IBT study as interpreted by IBT and as interpreted by Dr. Pour showed cancer in animals fed?

A. One species.

Q. Sherman rats?

A. I don't know which rat it was.

Q. The species of rats developed cancer?

A. Yes.

Q. And then Dr. Kimbrough, in her studies, found in a species of rats cancer, but a different lesion?

A. She had found cancer in the same species. I don't recall what more than that in way of an interpretation.

Q. Where are those results of Pour's work now; do you know?

A. No, I don't, but they were given -- We took them to the Cancer Institute as well and talked to different agencies.

Q. Were any of those lesions metastatic?

A. No.

Q. Were any of the animals allowed to survive long enough to see if the disease would metastasize?

A. I can't answer it without qualification.

Q. Tell me your qualifications.

A. I think it was long enough to do that.

Q. You think the animals were allowed to live long enough to have allowed the disease to metastasize if it was going to metastasize?

A. Yes, and that's kind of the way the liver acts. That's the way the liver acts.

Q. What?

A. It doesn't metastasize very much.

Q. It does not metastasize very much?

A. Right.

Q. And is that in any kind of cancer to your knowledge?

A. Liver cancer.

Q. Does not metastasize very much.

A. Yes (nodded).

Q. And that's in man and animals?

A. I can't answer that in all animal species. I don't know.

Q. In man, though?

A. That's right. And it was also true in the 1260 study.

Q. And how about the study done by IBT, was that a 1260 study?

A. That was all species. There were other Aroclors besides 1260.

Q. So IBT tested other Aroclors besides 1260 to see if it would develop cancer. Did all of the Aroclors that they tested produce cancer?

A. No.

Q. Which Aroclors did?

A. 1260.

Q. How about 1254?

A. I don't think so.

Q. Was it tested?

A. I can't answer that.

Q. How about 1248?

A. I can't tell you which ones were tested.

Q. So, you don't recall?

A. No.

Q. But the 1260 did produce cancer?

A. Yes.

Q. And it was the same species of rat as used by Dr. Kimbrough?

A. I can't answer that.

Q. You don't know, but you do know that the lesions were different?

A. No, I didn't say that.

Q. I'm sorry. I thought you did.

A. No (nodded).

Q. Same lesions as found in Dr. Kimbrough's study?

A. I think so.
Q. What was the difference then in the results between Kimbrough's study and IBT's study?
A. I don't know, but there were differences.
Q. Was it the difference in frequency percentage?
A. I can't answer the question.
Q. But you do know that Pour's work was reduced to writing and apparently --
A. And transmitted.
Q. -- to the National Cancer Institute?
A. To agencies, right.
Q. How about EPA?
A. EPA.
Q. Where's the National Cancer Institute located?
A. National Institute of Health?
Q. No, no. National Cancer Institute.
A. That's part of the National Institute of Health. It's all in Bethesda.
Q. Item 3, "Obtain National Cancer Institute interpretation." You were supposed to do that?
A. Did that.
Q. Did you?
A. Didn't get a reply that was helpful.
Q. What was their reply?
A. I don't recall.

Q. When you say not helpful, not helpful to whom, Monsanto?

A. Didn't give us any interpretation of the two studies.

Q. Do you believe that the results obtained by Dr. Kimbrough in that study and by IBT in their study are good results?

A. Yes.

Q. So you believe that in the dosage that was utilized in those studies of Aroclor 1260, that Aroclor 1260 will cause cancer of the liver in that strain of rats?

A. Yes; and the dose that was used was in the order of 50 ppm.

Q. In both your study and in Kimbrough's study?

A. Yes.

Q. Did you and Mr. Pappageorge and someone by the name of Easley discuss these tests with NIOSH, OSHA, EPA, and FDA?

A. That's what I just said.

Q. I'm sorry. I was referring to the National Cancer Institute interpretation.

A. Yes.

Q. So you did both?

A. Yes.

Q. You talked to National Cancer Institute, and you

talked to NIOSH, OSHA, etc.?

A. Right.

Q. How about number 5, did you discuss these tests with your key customers?

A. I didn't.

Q. You did not?

A. No.

Q. It was designated as your task, but you didn't do it?

A. That's right.

Q. Who did do it?

A. I don't know, but I would suspect it was Papageorge or Gossage.

Q. T. L. Gossage, who's that?

A. One of the people with business.

Q. Not in Papageorge's department?

A. No.

Q. Who were the key customers? Do you know who they were referring to?

A. No.

Q. Would they have been the G.E.'s and Westinghouses?

A. I'm sure it was.

Q. Is it your belief that some time in 1975 G.E. and Westinghouse was advised of the results of both Dr.

Kimbrough's studies and the IBT studies?

A. Yes.

Q. Next was 6, "Complete WGK" -- That's the Krummrich plant?

A. Yes.

Q. "Employee exposure study." Did you do that?

A. Yes.

Q. Who worked on that?

A. That's Johansen.

Q. Johansen?

A. Yes, before Zack joined us.

Q. And who was Johansen?

A. A toxicologist.

Q. Not an epidemiologist?

A. No.

Q. Johansen, is that a man or woman?

A. Man, Fred Johansen.

Q. Was it an epidemiological study that he was doing?

A. Yes.

Q. Had he had experience doing epidemiological studies?

A. No.

Q. Did you look over his work?

A. Yes.

Q. Were you satisfied with his work?
A. We had difficulty interpreting.
Q. In other words, you didn't know what the results meant?
A. We did some work and I've forgotten what it was with them.
Q. What did the results show?
A. I don't recall.
Q. Where is that test?
A. I don't know.
Q. Where's the raw data?
MR. MALIN: Do you know the answer to his question, where's the raw data?
A. I don't know.
MR. MALIN: The answer is no. He doesn't know.
Q. Do you think any of those classification errors that we discussed earlier this morning in connection with Dr. Zack's work on the Nitro, West Virginia plant occurred in Johansen's studies of Krummrich?
MR. MALIN: Objection to the form. He didn't admit that there was ever -- there were any such classification errors or that there were any at all.
MR. COHEN: I didn't say that he did. I said that we discussed in connection with. I was giving that to him as a reference. Would you like me to rephrase that,

doctor?

A. Could you now? Yes, please.

Q. Do you recall this morning we discussed the possibility of classification error in epidemiological studies between cohort groups and other groups?

A. Yes.

Q. And we discussed that in connection with Dr. Zack's work at the Nitro, West Virginia plant.

A. Yes.

Q. Did you detect any such errors in the work done by Johansen?

A. No, we did not.

Q. Do you recall that Johansen's study showed four deaths attributable to lung cancer out of 23 deaths with an expected rate of 1.24 deaths attributable to lung cancer from the 1969 U.S. Male population?

A. Yes.

Q. Did you think that was statistically significant?

A. It's very difficult to interpret lung cancer in the population without knowing smoking, without having background levels in that immediate area. We had an excess of lung cancer in that area anyway; and there is in that Krummrich area an excess of lung cancer.

Q. You're saying that the population of Krummich had an excess of lung cancers anyway?

A. All I'm saying is there were things that made us have difficulty in interpreting the lung cancer problem and then we struggled with that and wished we had an epidemiologist.

Q. Did you ever publish the results?

A. No.

Q. I think I asked you, you don't know where the raw data is anymore?

A. I don't know.

Q. Did you work with Johansen -- Was it Dr. Johansen?

A. Yes.

Q. Ph.D.?

A. Yes.

Q. Did you work with Johansen in an effort to rule out the other confounding factors like smoking and that sort of the thing?

A. Yes.

Q. Did you have any success?

A. I'm not sure how we went to the next stage, but we continued on.

Q. Let me show you something. Tell me if you recall it.

(Colloquy held off the record.)

(Reporter marked Plaintif's Deposition (Roush) Exhibit 8.)

Q. Have you had a chance to take a look at Exhibit 8?

A. Yes.

Q. What is he referring to when he says highly significant . . . cni X squared?

A. That's --

MR. MALIN: It's chi squared. It is a standard statistical method for determining significance of some kind.

MR. COHEN: Can I have the testimony from the witness, please?

MR. MALIN: It's not cni.

MR. COHEN: It looks like cni.

THE WITNESS: The top of the "h" is cut off some way.

Q. (By Mr. Cohen) Okay. Chi X squared. What does that mean? Do you know?

A. It is a test of significance.

Q. Does this indicate statistical significance?

A. Yes, that's what it says. In excess of lung cancer.

Q. Was that conclusion of this study by Johansen?

A. I think we did something else. There should be another sheet of paper after this.

Q. You sent this out for evaluation by an outside contractor?

A. I don't remember what we did. We did something with it.

Q. Were you satisfied with these results or not satisfied with these results?

MR. MALIN: I object to the form of the question. I don't know what you mean by satisfied.

Q. Did you think that this was a well done, well conceived, well carried out study that had results that are worth relying upon?

A. No, that population is too small. Any time you have a population as small as 23, you're going to have movement one way or another; and it's difficult to interpret by itself. We really have to take another population that's equal to it and study it.

Q. Well, the actual population was 311; wasn't it?

A. Yes.

Q. And then you ruled out all those people who worked there for less than six months?

A. Right.

Q. That left you a population of 140?

A. Right.

Q. Of which you had 23 deaths?

A. Yes.

Q. That's what you were referring to as the 23?

A. Yes.

Q. Of which there were actually six who died but two were ruled out. Was that right?

A. Yes.

Q. So that left you with four?

A. Yes.

Q. And your conclusion is that that was too small of a population to rely on this study?

A. Well, we didn't know what to do with it because it was so small.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 9.)

Q. Doctor, let me show you another document. Have you had a chance to look at this document 9?

A. Yes.

Q. Did you have any participation in the preparation of this document?

A. No.

Q. Had you ever seen it before?

A. I don't think so.

Q. You never recall seeing it prior to today?

A. No.

Q. So, it would be fair to say if I asked you if this was ever used, you wouldn't know?

A. That's right.

MR. MALIN: He was the medical director. He didn't sell PCB's, and he wasn't in the business department.

And this is a contract provision, so I think it's fair to assume it's not in his area of responsibility or knowledge.

(Reporter marked Plaintiff's Deposition (Roush) Exhibit 10.)

THE WITNESS: What about the date of these two?

MR. COHEN: The date of this is September 17, '75.

THE WITNESS: Yes.

MR. COHEN: The date of the other one?

THE WITNESS: Yes.

MR. COHEN: You said you didn't know anything about it.

THE WITNESS: I'm trying to see.

MR. MALIN: He's not asking you a question.

Q. (By Mr. Cohen) Your counsel made this nice speech, but if you don't know anything about it, I'm not going to ask you anything about it. Have you had a chance to look at number 10?

A. Yes.

Q. What can you tell me, sir -- Strike that. You're the author of number 10; correct?

A. I'm the one who signed it.

Q. Did you write it?

A. No.

Q. Who wrote it?

A. I can't answer that.

Q. Down here where it says, "GR/ln," doesn't that indicate you dictated it?

A. That says the things that will be done in the second paragraph, I will do that. This up here I didn't write that.

Q. Did you normally sign your name to things that you hadn't written?

A. Yes. If I was in agreement with it and the fact that I would have to -- the effort that's required in the second paragraph is ours, the medical department's.

Q. I see. So the first paragraph was information that was supplied to you; is that right?

A. Yes.

Q. By someone on your staff?

A. No.

Q. Someone outside of Monsanto?

A. No, no, in Monsanto.

Q. Oh, but outside of the medical department?

A. Right.

Q. And you incorporated it into your memo?

A. That's right.

Q. What if any activities did you have or anyone in the medical department under your direction or control have with respect to any state or federal agency in formulation of legislation controlling PCB's?

A. My department had no responsibility with contact.

Q. So, you did nothing?

A. Did nothing.

Q. With respect to EPA or FDA, NIOSH, anybody?

A. No.

Q. You did not participate in any way in efforts to change or modify proposed Toxic Substances Control Act or anything else?

A. That's right.

Q. What did you mean by, "We will have to do much more epidemiology in the future although clear cut conclusions are almost impossible."

A. The workers in our plant had not had any epidemiology studies done on them, and there were a number of them which we could be talking about to make sure we don't have some long-term health effects that we were missing; and this is only a demonstration.

Q. Well, you said you were doing long-term health effects -- I'm sorry. Strike that. Questions from outside Monsanto about the long-term health effects of chemicals used in two Monsanto plants on the workers in the plants have required organization of epidemiological studies. What studies are you referring to? Was one of them the Johansen study?

A. Yes.

Q. Any others that you can think of?

A. I don't recall.

Q. You don't recall. You say, "We will have to do much more epidemiology in the future although clear cut conclusions are almost impossible." What did you mean although clear cut conclusions are almost impossible?

A. The statistics of epidemiology make it difficult to explain small variations that appear big on small populations?

Q. I see. And that's an inherent limitation in epidemiology itself?

A. Yes.

MR. COHEN: Thank you. Anybody wish to examine the witness?

MR. BURNS: No.

MR. GIORDANO: I have no questions.

MR. KUHL: I have no questions.

CROSS-EXAMINATION

QUESTIONS BY MR. MALIN:

Q. I just have a few to clear up some questions. Doctor, after you came to Monsanto in 1973, could you give us an estimate of how much of your time you spent on issues involving PCB's if that's possible?

A. A very small portion of my time.

Q. Could you break it down any better than that,

less than five, less than 10?

A. Less than five.

Q. And why was that?

A. I had responsibilities to do and many things I assigned out to be completed by someone else.

Q. Well, you had other responsibilities besides PCB's; is that correct?

A. That's right.

Q. What other responsibilities did you have? What other types of chemicals or divisions did you have responsibility for? What other types of chemicals or divisions did you have responsibility for?

A. We were involved in the Keller trial as a major project.

Q. Anything else?

A. Some efforts with the ag products.

Q. Monsanto makes a great many agricultural chemicals; does it not?

A. Right.

Q. And you had responsibilities in all those areas?

A. That's right.

Q. Approximately how many other products were there for which you had responsibilities, if you recall?

A. I can't answer that.

Q. Well, during your tenure as medical director of

Monsanto, were you aware of any adverse health effects among Monsanto PCB workers?

A. No, none.

Q. Do you believe that you as medical director during the period of time that you were there, that '73 to '88, did everything that was reasonable to determine if Monsanto's workers who worked on PCB products experienced any adverse health effects?

A. Yes.

Q. During your tenure as medical director, were you aware of any reports of adverse health effects from people outside of Monsanto who were the users of PCB fluids?

A. I don't recall.

Q. Well, do you recall receiving any reports of adverse health effects?

A. On Monsanto products?

Q. From Monsanto PCB products.

A. On PCB's, the question of people being exposed to the product and wanting to know whether they're going to be adversely affected or not.

Q. Were there actually reports of actual adverse effects, of people sick?

A. No.

Q. Doctor, do you now consider PCB's to be a human carcinogen?

A. No.

Q. Did the -- Strike that. Did Monsanto follow your recommendations for determining whether or not Monsanto workers, in fact, had any adverse health effects from producing PCB's?

A. Yes.

Q. Were there ever any recommendations that you made for studies or otherwise that they did not follow?

A. No.

Q. Do you know of a single case of PCB poisoning during your entire tenure as medical director, either inside Monsanto or outside Monsanto?

A. No.

MR. COHEN: I object to the form. I object to your leading your own witness.

MR. MALIN: We're not leading our own witnesses. He's a subpoenaed witness.

MR. COHEN: Not only is he your witness, he testified that you represent him. I don't know how much more of your witness he can be.

Q. (By Mr. Malin) Do you consider that Monsanto was adequately staffed to handle any inquiries that were made from the outside on PCB health effects or PCB usage?

MR. COHEN: I object. Same objection.

Q. You may answer the question.

A. Yes.

Q. What kind of a staff did you have? Would you describe the staff, its size, and its composition with the extent you can remember?

A. Well, the industrial hygiene had gone to the place where we could monitor what was taking away of exposure in each one of our plants. We have got it recorded. We set up a medical surveillance program and got it so that we could record the data and have it transmitted electrically into headquarters, so we could look at the data in a relative PC form. We set up and put together a toxicology laboratory and had something of the order of a hundred people or more working in that facility, doing the studies that was within their province of being able to do, because a lot of toxicology is very specific and people who do it only do one little precise study. And we also developed our epidemiology to a reasonable form under Dr. Gaffey.

Q. Do you believe that it's possible to extrapolate from one species of animal studies to determine human causation with respect to any disease if we assume that the animal studies are from especially sensitive animals; they are high dose, and -- well, all right -- especially sensitive animals; and they are high dose?

MR. COHEN: Objection. I object not only to the form of the question, but I object to it being a hypothetical

and assuming a whole bunch of facts that may not have any relevance to anything in this case.

MR. MALIN: You may answer the question.

A. We had the facilities developed so that we could do the animal studies and we could follow the workers with their exposure to see whether they're responding the same. So we knew quite well whether the animal data was related to human exposure or not and we could make the judgment based on what we got.

Q. Did you make any such judgment?

A. Lots of times.

MR. COHEN: Same objection.

Q. You have not been hired as a consultant by Monsanto in this case; have you?

MR. COHEN: I object to the form.

A. No, I have not been hired.

Q. And you don't have the authority to speak on behalf of Monsanto in this case; do you?

A. No.

MR. COHEN: Object to the form.

Q. You're hear as a subpoenaed witness. Doctor, you were asked whether or not you knew of trace levels of impurities such as anthracenes, naphthalenes, phenanthrenes, polychlorinated dibenzofurans in PCB's during the 70's. Would it have made any difference to anything that you had

done had you known about the existence of those impurities?

MR. COHEN: I object to the form.

Q. You may answer the question.

A. We have looked at the history and the data that's available on human poisonings, primarily Yusho, and we did not see anything there, but we did say that we had to have some other effect besides PCB and the dioxin to be causing the Yusho incident. The workers exposed to PCB's did not show that they had any response to PCB's at the levels of presence in the work place.

Q. So therefore, even if we assume that these impurities were there, they made no difference.

MR. COHEN: I object to the form.

A. In terms of the fact that if there was sporadic cases of chloracne, and those sporadic cases of chloracne occurred where there was a possibility of some other contaminants that was producing the effect.

Q. Were there any cases of chloracne while you were with Monsanto?

A. No.

MR. COHEN: Object to the form.

Q. Do you yourself know of any cases of chloracne that occurred while you were medical director of Monsanto anywhere?

MR. COHEN: Object to the form.

A. No.

MR. MALIN: I have no further questions for this witness.

REDIRECT EXAMINATION

QUESTIONS BY MR. COHEN:

Q. Earlier, doctor, in response to a question put to you by your counsel, you said that you do not presently consider PCB's to be a carcinogen; is that correct?

A. Human carcinogen.

Q. Is that what you were limiting it to?

A. Yes.

Q. Do you believe it to be an animal carcinogen?

A. Yes.

Q. Is that only in certain special strains of animals?

A. Yes.

Q. Do you believe those to be animals that were bred to be particularly susceptible to this particular toxin?

A. No.

Q. Then what makes them a special strain?

A. They're responding to this and the others did not.

Q. So it's just that they did respond. You don't know that they were bred or have any particular genetic predisposition to?

A. That's right. There's something else that makes that one respond to dose.

Q. And it happened in that particular animal?

A. That's right.

Q. Now when you said that you don't consider PCB's to be a carcinogen, are you speaking of just the PCB's or are you talking about the commercial production grade compound that you were selling, such as 1248, 1254, 1260?

A. Commercial grade.

Q. That includes then whatever it is that's in there. You don't consider it to be carcinogenic in humans.

A. That's right.

MR. COHEN: I have no further questions.

RECROSS-EXAMINATION

QUESTIONS BY MR. MALIN:

Q. Just one last question, doctor. With respect to animal carcinogenicity, do you believe that all PCB mixtures are animal carcinogens in this special species of animal or rat or whatever it is, that is whether it's 1016, 1242, 1254, or 1260?

MR. COHEN: I'll object. I don't think he said that at any time. He said -- I think he said 1260 was the one which proved to be carcinogenic.

THE WITNESS: Yes.

Q. It's only 1260; isn't it?

A. Yes.

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

DIRECT EXAMINATION

QUESTIONS BY MR. D'URSO:

Q. Doctor, you mentioned the attempts to improve the data collection, epidemiology and toxicology efforts that were made under tenure. All these efforts --

A. Yes.

Q. were designed to protect Monsanto workers; were they not?

MR. MALIN: I object to the form of the question.

A. Yes. But also to understand the chemical because we do have a responsibility to a customer. That was one of my assignments.

MR. D'URSO: Thank you, doctor.

MR. COHEN: I want the witness to read and sign. I want all exhibits attached.

_____

GEORGE ROUSH, JR., M.D.

Subscribed and sworn to before me this _____ day of _____, 1992.

My commission expires _____.

_____

Notary Public

(TMS/PAOLI RAILROAD YARD PCB LITIGATION)

NOTARIAL CERTIFICATE

STATE OF MISSOURI)
)
CITY OF ST. LOUIS)

I, TINA M. STUMPF, a Certified Shorthand Reporter and a duly commissioned Notary Public, within and for the State of Missouri, do hereby certify that there came before me at the offices of Brown & James, 705 Olive Street, 11th Floor, St. Louis, MO 63101,

GEORGE ROUSH, JR., M.D.,

who was by me first duly sworn to testify to the truth and nothing but the truth of all knowledge touching and concerning the matters in controversy in this cause; that the witness was thereupon examined under oath and said examination was reduced to writing by me; and that this deposition is a true and correct record of the testimony given by the witness.

I further certify that I am neither attorney nor counsel for, nor related or employed by, any of the parties to the action in which this deposition is taken; further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in this action.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this _____ day of _____, 1992.

My commission expires February 1, 1994.

_____
Notary Public

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

DATE: February 23, 1990

SUBJECT: Newly Revealed Fraud by Monsanto in an Epidemiological Study Used by EPA to Assess Human Health Effects from Dioxins

FROM: Cate Jenkins, Ph.D.
Chemist, Waste Characterization Branch (OS 332)
Characterization and Assessment Division

TO: Raymond C. Loehr, Ph.D.
Chair, Executive Committee
Science Advisory Board (A 101)
Office of the Administrator

On November 28, 1989 you transmitted to the Administrator a review by the Science Advisory Board (SAB)[1] of "A Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD."[2] This review concluded that the existing epidemiologic studies were conflicting, and did not provide definitive data on human health effects of dioxins, and thus EPA should continue to utilize animal toxicologic data as a basis for dioxin risk assessments.

A key epidemiological study leading to this conclusion was performed by Monsanto Corporation. This study examined medical records were examined of employees exposed to dioxins from a 1949 explosion of a 2,4,5-trichlorophenol manufacturing process, and

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[1] U.S. EPA, Science Advisory Board, Ad Hoc Dioxin Panel (November 28, 1989) Review of Draft Documents "A Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD and "Estimating Exposure to 2,3,7,8-TCDD."

[2] U.S. EPA, Office of Health and Environmental Assessment (June, 1988) A Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD, EPA Publication No. EPA/600/8-88/007Aa.

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Exhibit 12

found no statistically significant excess cancer deaths.[3] The Monsanto study was important, since although the exposed population was small (121 workers), exposure to dioxins was clearly established because the workers experienced chloracne. Other studies were confounded by the fact that exposure to dioxins was not so demonstrated.

In Appendix B of "A Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD" this Monsanto study is discussed in juxtaposition with other studies on small populations where excess cancer morbidity and mortality were in fact found. As a result, the studies where excess cancers were observed were rendered suspect. For example, EPA discussed in the same sentence the fact that although the studies by Thiess et al.[4] and Axelson et al.[5] reported statistically significant excesses of stomach cancer, the study by Monsanto did not. EPA discussed the fact that significantly elevated levels of cancers (e.g. prostate, non-Hodgkins lymphoma, connective tissue, soft tissue sarcomas, reticulum cell sarcoma, kidney cancer, etc.) had been found in other dioxin-exposed populations. The study by Monsanto, however, either did not find any such cancers, or the cancers observed were not statistically significant.

This study by Monsanto apparently has now been shown to be a fraud. Attached is a brief filed by the plaintiffs in a case where damages are being sought resulting from a spill of dioxin-contaminated pentachlorophenol wood preservative by Monsanto.[6] This study on behalf of Monsanto is described, where it is

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[3] Zack, J.A. and R.R. Suskind (1980) The Mortality Experience of Workers Exposed to Tetrachlorodibenzodioxin in a Trichlorophenol Process Accident. J. Occup. Med. 22(1):11-14.

[4] Thiess, A.M., R. Frentzel-Beyme, and R. Link (1982) Mortality Study of Persons Exposed to Dioxin in a Trichlorophenol-Process Accident that Occurred in the BASF AG on November 17, 1953. Am. J. Ind. Med. 3:179-189.

[5] Axelson, O. (1986, Jan. 21) Rebuttals of the Final Report on Cancer by the Royal Commission on the Use and Effects of Chemical Agents on Australian Personnel in Vietnam. Department of Occupational Medicine, University Hospital, Universitetet Linkoping, Linkoping, Sweden.

[6] Plaintiffs-Appellees' Brief (October 3, 1989) Frances E. Kenner, et. al. V. Monsanto Company, Appeal from the Circuit Court of St. Clair County, Illinois, No. 80-L-970, filed by Rex Carr, CARR, DORIN, TILLERY, DUNIN, MONROY, GLASS & BOGARD, 412 Missouri Avenue, East St. Louis, IL 62201 and Jerome W. Seigfried, SIEGFRIED, RUNGE, LEONATTI & POHLMEYER, P.O. Box 160, 123 East Jackson St., Mexico, MO 65265-0160.

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alleged that the record demonstrated a deliberate course of conduct by Monsanto through "altered" research to prove to the world that the only health consequence of dioxins was the relatively harmless, reversible condition of chloracne. The cross examination of Dr. Roush, Medical Director of Monsanto, was said to clearly establish the fraudulent nature of the cancer mortality study by Dr. Zack, a Monsanto employee, and an "independent" researcher, Dr. Suskind, described as having performed "joint" studies with Monsanto.

An earlier, predecessor study performed by Dr. Zack was alleged to have deliberately and knowingly omitted 5 deaths from the group exposed to dioxins in the 1949 accident, while removing 4 workers who had been exposed and putting these workers in the unexposed group, serving to provide an apparent increase the cancer death rate in the unexposed group. The overall cancer death rate was alleged to have actually been 65% greater in the exposed population, with 143% higher lung cancers, 108% higher genitourinary cancers, 80% higher bladder cancers, and 92% higher lymphatic cancers.

The Monsanto study performed by Dr. Suskind on workers exposed to dioxins in the 1949 accident, published in 1980 in the Journal of the American Medical Association and the same year in the Journal of Occupational Medicine with Dr. Zack as co-author (this was the study was reviewed by EPA), was also alleged to be fraudulent. It was claimed that the actual medical records revealed gross misclassifications and omissions. The correct classification was said to have been 25 cancers in the exposed group compared to only 2 in the unexposed group; Suskind reported 14 cancers in the exposed group and 6 in the unexposed group. In addition, it was alleged that in November of 1955, Dr. Suskind colluded with Monsanto to conceal findings of psychoneuroses in the exposed workers from the Workers Compensation Commission. Dr. Suskind was alleged to have falsely stated that workers' nervous system and liver problems had disappeared by 1953, with the stated intention by Suskind to make the world believe that only a few of the workers continued to have problems. Dr. Suskind was reported as acknowledging to the Court that the world and the scientific community were intended to, and indeed had, relied upon his reports of no adverse cancer effects from human exposures to dioxins.

It is a commonly bandied adage that dioxins have not been demonstrated to have caused cancer in humans, despite documented exposures. Perhaps this may now been seen as yet another "old industry tale" in light of the fraud allegedly committed by Monsanto in conducting its "research" on its workers exposed to dioxins. It could be that other studies on exposed populations are similarly flawed and subject to fraud.

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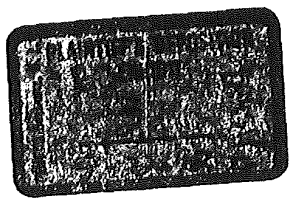
I request that the SAB on it own, or by way of direction to EPA's Office of Research and Development, obtain the full files from the ongoing case against Monsanto to determine whether definitive conclusions may now be drawn regarding the evidence establishing a causal link between dioxins and human cancer in the Monsanto population. I believe that an audit of other dioxin-related human epidemiological studies should be performed, to determine whether misclassification of medical records or other errors has resulted in similarly flawed conclusions. Studies that would be particularly prone to bias would be those performed by any manufacturing firm on its own employees, or in conjunction with an outside researcher, since a positive finding of excess cancer mortality or morbidity would result in the financial liability of that firm.

cc: Donald G. Barnes, Ph.D.
Director, Science Advisory Board (A 101)
Office of the Administrator

Hugh McKinnon, Ph.D.
Director, Human Health Assessment Group (RD 689)
Office of Research and Development

Peter M. Preuss, Ph.D.
Chairman, Interoffice Workgroup for a
Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD

(127)



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
WASHINGTON, D.C. 20204

December 23, 1974

Dr. James Mieure
Monsanto Company
800 North Lindbergh
St. Louis, Missouri 63166

Dear Dr. Mieure:

In response to your recent request made to John Roach, I am enclosing a copy of the presentation made at the October 1974 AOAC Meeting, entitled "Finding of Chlorinated Dibenzofurans in Aroclor PCB's of Recent Manufacture." Additional work to determine the levels of chlorinated dibenzofurans in the Aroclors is now underway in our laboratory.

You are probably aware that evidence for chlorinated dibenzofuran contaminants has been reported for PCB's made in France and Germany, by Vos, and in Japan, by Reach and Pomerantz, prior to our recent findings in the 1200 Series Aroclors. You may have considered, as we have, possible means by which the chlorinated dibenzofurans are formed. Can you please tell us whether the parent dibenzofuran has been looked for or found in the starting biphenyl? Are hydroxylated, chlorinated biphenyls, conceivable precursors to the dibenzofurans, present in the Aroclors? Are they formed in a base treatment step (lime or alkali) after chlorination? Perhaps there are alternative explanations for which you have some experimental support.

Your discussion of these points would be welcome and I look forward to your response.

Sincerely,

C F Jelinek

C. F. Jelinek, Ph.D.
Director
Division of Chemical Technology (HFF-420
Bureau of Foods

Enclosure

PRR 004361

The procedure used in the current work was a considerably modified version of that applied earlier to the analysis of Kanechlor 400. The current procedure used three types of adsorbent columns for sample preparation.

Call for Slide 1. (Flow chart of sample preparation)

The alumina column was 50 g of WOELM W-200 alumina which was eluted with 400 ml of 1% methylene chloride/hexane followed by 400 ml of 20% methylene chlorid hexane. The 20% eluate containing the material of interest was then concentrated to less than one ml prior to addition to an alumina micr column.

The micro columns were disposable pipets of roughly 5 mm bore into wh a small wad of glass wool had been inserted to retain the aluminum ox WOELM W-20) alumina was poured into the columns to a depth of 2.5 cm. micro columns were eluted with 10 ml of 1% methylene chloride/hexane and 6 ml of 20% methylene chloride/hexane.

Prior to the Florisil column, eluates from two, 100 mg Aroclor portio each being less than one ml, were combined. The Florisil column was 8 g of 60/100 mesh PR grade Florisil which was eluted with ml of hexane and 100 ml of 5% ethyl ether/hexane. The latter eluate was concentrated to less than 20 microliters and was never permitted go to dryness.

All for Slide 1.

The concentrated eluates were analyzed by combined gas chromatography/mass spectrometry using a Finnigan 1015 quadrupole mass spectrometer interfaced thru a Gohlke all-glass jet separator to a six-foot by two millimeter bore 3% OV-101 column at 200°C with a helium carrier gas flow of twenty milliliters per minute. Mass spectra of authentic chlorinated dibenzofurans were obtained under identical operating conditions using a mixture of mono-, di-, tri-, and tetra- chlorodibenzofurans kindly provided by Dr. Albert Pohland of FDA. A summary of the results for each Aroclor sample analyzed is given in the following slides. In each case, the mass spectral data obtained for the chlorinated dibenzofurans included the parent ion and fragment ions derived from losses of CO + Cl. Taken together, these data are considered characteristic for the chlorinated dibenzofurans. Each analyzed extract also gave evidence of some chlorinated biphenyls indicating the column separation procedure used did not completely separate Cl-DBF from the chlorinated biphenyls.

In each Aroclor found to contain Cl-DBF, the level of contamination was estimated to be in the ppm range. Studies are now under way to obtain more meaningful quantitative data on the level of Cl-DBF contamination.

Call for Slide 2.

Six, 200 mg replicates of an Aroclor 1254 sample were analyzed along with a rea blank. Tetra- and pentachlorodibenzofurans were found in all six extracts. Hexa- and heptachlornaphthalene were also found. None of these compounds was found in a reagent blank equivalent in size to a 200 mg sample.

Call for Slide 3.

Two 600 mg replicates of an Aroclor 1242 sample were analyzed. Di, tri, tetrachlorodibenzofurans were detected in both. In addition, tetra-, penta- and hexachloronaphthalene, a trichloroterphenyl, and three unidentified halogenated compounds were detected. The unidentified halogenated compounds may form a homologous series differing from one another only in their degree of chlorination. The tentative molecular weights of these unidentified components were 278 (possible 4 chlorines), 312 (5 chlorines) and 346 (possible 6 chlorines).

These may have been methylchloronaphthalenes or chlorophenyl cyclopentadienes. However, their only observed fragmentation was a loss of one chlorine atom. The data for these unidentified compounds was therefore too sparse to permit identification.

Call for Slide 4.

Two, 200 mg replicates of an Aroclor 1016 sample were analyzed. Dichlo dibenzofuran was found in each of the samples.

Call for Slide 5.

Initially, 2, 200 mg replicates of an Aroclor 1221 sample and a reagent were analyzed. No Cl-DBF were detected. Sensitivity of the instrument for the molecular ions of lower Cl-DBF was then enhanced by limiting the mass scan to roughly 170 to 290 a.m.u. and a third 200 mg sample was analyzed. The results were again negative for Cl-DBF. Mono-, di- and trichlorobiphenyls were the only halogenated species detected in the sample extracts. The reagent blank analyzed with this lot contained a barely detectable trace of dichlorobiphenyl. Another reagent blank was then prepared and was found to be free of halogenated materials.

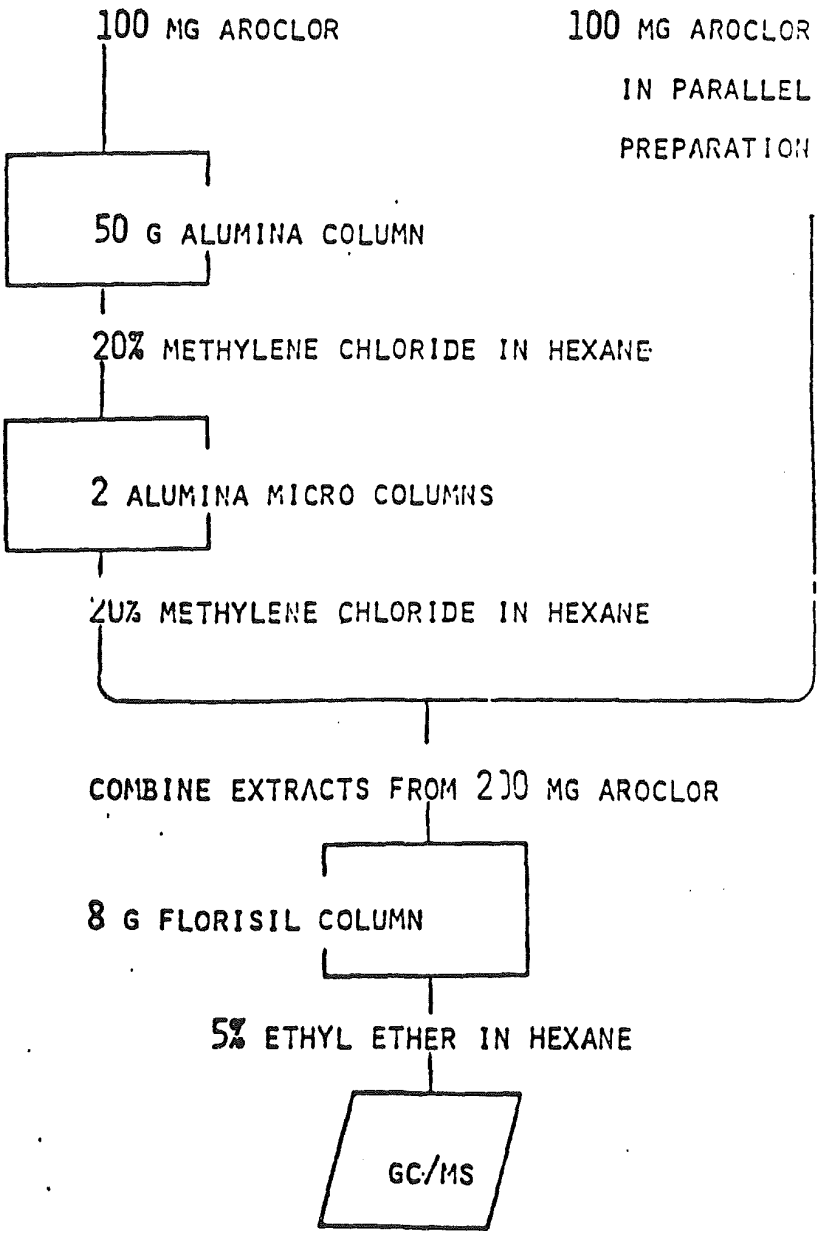
Call for Slide 6. (flow chart of recycle experiment)

To investigate the possibility that the observed chlorinated dibenzofurans may be artifacts produced in the sample analytical

procedure, duplicate experiments with Aroclor 1254 were carried out in all eluates normally discarded in the procedure were retained and pooled. The pooled sample eluates were then concentrated and re-subjected to the sample preparation procedure. The original samples and the samples prepared from the pooled eluates were examined by combined gas chromatography/mass spectrometry on the same day under identical operating conditions. No chlorinated dibenzofurans were detected in the samples resulting from the pooled eluates that had been resubjected to the sample preparation procedure. If we had found a significant level of chlorinated dibenzofurans in the pooled samples, this would have suggested that the procedure itself was capable of making chlorinated dibenzofurans from one or more constituents of the sample.

In summary, we have shown the presence of chlorinated dibenzofurans as trace contaminants in recent production lots of Aroclor 1254, 1242, and 1016 but not in Aroclor 1221 when samples of comparable size were analyzed. No dibenzofurans were detected in reagent and equipment blanks run with the samples. The procedure itself does not appear to produce chlorinated dibenzofurans as an artifact of analysis.

The authors wish to acknowledge the technical assistance of Tom Lyon and Linda Laderach in the preparation of these samples for analysis.



PRR C04368

PRR 004369

AROCLOR 1254 PRODUCTION DATE 10/73

SAMPLES ANALYZED: 6

SAMPLE SIZE: 200 MG

FOUND: TETRA- AND PENTACHLORODIBENZOFURANS

CHLORINATED NAPHTHALENES

PRR 004370

AROCLOR 1242 PRODUCTION DATE 9/73

SAMPLES ANALYZED: 2

SAMPLE SIZE: 600 MG

FOUND: DI-, TRI-, AND TETRACHLORODIBENZO-FURANS

CHLORINATED NAPHTHALENES
TRICHLOROTERPHENYL
UNIDENTIFIED HALOGENATED COMPOUNDS

PRR 004371

AROCLOR 1016 PRODUCTION DATE 10/73

SAMPLES ANALYZED: 2

SAMPLE SIZE: 200 MG

FOUND: DICHLORODIBENZOFURAN

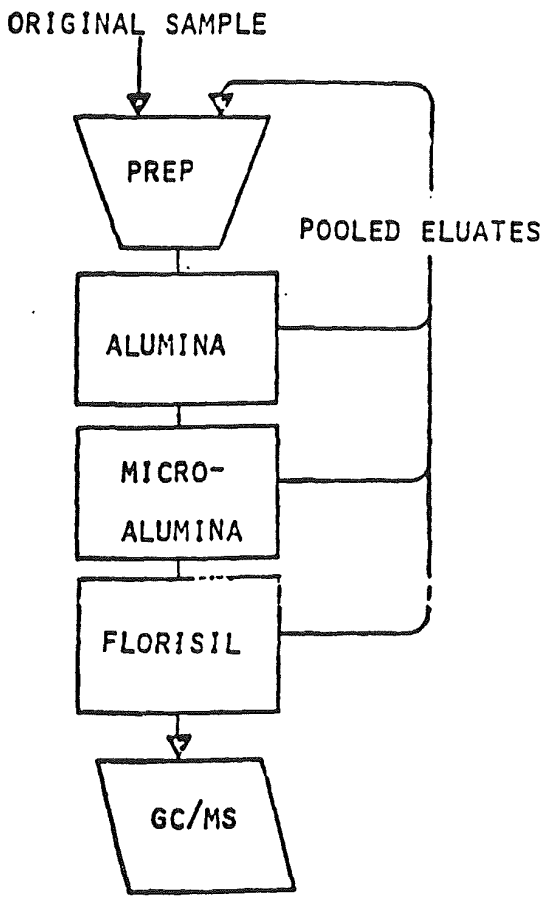
PRR CC4372

AROCLOR 1221 PRODUCTION DATE 6/73

SAMPLES ANALYZED: 3

SAMPLE SIZE: 20.0 MG

NO CHLORINATED DIBENZOFURANS DETECTED



PRR 004373

[redacted]

[redacted]

From the desk of

R. E. KELLER

11-11-71

Gordon Taylor

Howard Bergen

The attached summary on furans & dioxins in PCB's covers inputs for the report you requested. It is sent to you in case you need background info before the EPA report issues via Bill Ruckelshaus.

RCK

[redacted]

PRR 064260

[redacted]

Monsanto INDUSTRIAL CHEMICALS COMPANY

FROM (NAME & LOCATION) R. E. Keller - South Second Street - St. Louis

DATE October 28, 1971

SUBJECT ALLEGED DIOXINS AND BENZOFURANS IN PCB'S - INPUTS FOR REPORT

REFERENCE HSB 10-22-71 Memo to REK/WRR

cc C. W. Roos - Res. 1
T. M. Patrick - Res. 1
M. W. Dietrich - Res. 2
J. P. Mieure - Res. 2
E. S. Tucker - Res. 2

TO W. R. Richard
General Offices

The attached reports and summary data table for furans cover information in hand on the above subject.

Overall, we should be able to meet predicted regulatory agency maximum permissible levels of chlorodibenzofurans in our PCB/PCT products. Data in hand show that Areclor 1242, 1254, 1260 and MCS 1016 contain no detectable (<2 ppm)[a] furans (or chlorodibenzo-p-dioxins). Aroclor 5442 contains no detectable (<5 ppm) furans.

The above position is based on the belief that higher levels would be permitted for furans because of lower toxicity compared to dioxins. The data shown on the confidential attachment from a European manufacturer shows that tetrachlorodibenzo-p-dioxin has an acute toxicity to rabbits at least 30X that for tetrachlorodibenzofuran. Regulatory agencies, including the EPA, are currently imposing 0.1 ppm max. for tetrachlorodibenzo-p-dioxin in 2,4,5-T and hexachlorophene. On this basis, a 2 ppm max. level should be acceptable for furans.

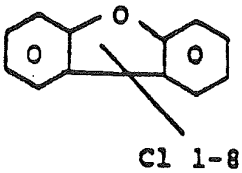
If we are required to push the detection to 0.1 ppm, we will need to synthesize furans and develop more sensitive methods. This will be costly, and difficult technically, especially for PCT products.

Based on experimental work in our own laboratories and in part at the University of Utrecht -

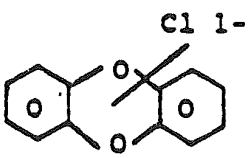
We Know

1. Monsanto Aroclor 1242, 1254, 1260 and MCS 1016 contain no detectable (<2 ppm) chlorodibenzofurans (I) or chlorodibenzo-p-dioxins (II) of the type below. Aroclor 5442 also contains no detectable (<5 ppm) chlorodibenzofurans or chlorodibenzo-p-dioxins.

(I)



(II)



[a]On a per component and not total furan basis.

PRR 004241

2. Competitive products - Prodelec and Bayer chlorinated biphenyls similar in composition to Aroclor 1260 contain detectable furans (up to 30 ppm) and no dioxins (<2 ppm). Japanese product from Shizuki similar to Aroclor 1242 contains no detectable (<2 ppm) furans or dioxins.

3. All the above PCB products contain chlorinated naphthalenes at ppm levels. Aroclor 5442 contains either chlorinated anthracene or phenanthrene.

Don't Know or Limited Information Only

1. Biodegradability of furans -

   Toxicity to bacteria may be a problem for biodegradation studies.

2. Photodegradation of furans -

   Work by the USDA indicates that photodegradation of dioxins under conditions in which water is the solvent is probably extremely slow in the natural environment.

3. Existence of furans (or dioxins) in the environment or as biological residues -

   Methodology normally applied to analysis of environmental materials will not make this detection.

Questions for Medical

1. Toxicity of other impurities -

   Chlorinated naphthalenes, anthracene and/or phenanthrene found in above commercial products?

2. Acute toxicity or teratogenic effects of chlorodibenzofurans relative to dioxins? Availability of published data in the public domain for reference purposes?

3. Based on the above - the odds that 2 ppm max. for chlorodibenzofurans will be put on our products?

I suggest that the only immediate analytical work would be to firm up furan data for remaining PCB/PCT products with existing methodology. Out of this, we should decide what minimum monitoring is needed to insure that our manufacturing process produces no furans in our final products. Additional analytical method development work should be done only if lower detections are needed, based on inputs such as adverse toxicity findings from others.

REK

R. E. Keller

PRR 004242

db

GC/MS ANALYSIS DATA FOR TOXIC COMPONENTS IN PCB/PCT PRODUCTS

LABORATORY/PRODUCTS	CHLORODIBENZOFURANS FOUND		
	<4 Cl/mol	4 Cl/mol	5 Cl/mol
Vos, et al			
University of Utrecht			
Prodelec Phenoclor DP6 (Composition similar to Aroclor 1260)	ND (<1 ppm)	Detected (1-20 ppm)	Detected (1-20 ppm)
Bayer Clophen A60, Lot 912434 (Composition similar to Aroclor 1260)	ND (<1 ppm)	Detected (1-20 ppm)	Detected (1-5 ppm)
Monsanto Aroclor 1260, Lot AK-3	ND (<1 ppm)	ND (<1 ppm)	ND (<1 ppm)
Applied Sciences			
Monsanto Industrial Chemicals			
Prodelec Phenoclor DP6	ND (<2 ppm)	Detected	Detected (15-30 ppm)
Prodelec Phenoclor DP6	ND (<2 ppm)	Detected	Detected (15-30 ppm)
Bayer Clophen A60, Lot 931134	ND (<2 ppm)	Detected	Detected
Kaneclor KC-300 Shizuki, July 1970 (Composition similar to Aroclor 1242)	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto Aroclor 1242, Lot AK-255	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto Aroclor 1254, Lot AK-38	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto Aroclor 1260, Lot AK-3	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto MCS 1016, Drum B	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto MCS 1016, KA-708	ND (<2 ppm)	ND (<2 ppm)	ND (<2 ppm)
Monsanto Aroclor 5442, Lot AI-9	ND (<5 ppm)	ND (<5 ppm)	ND (<5 ppm)

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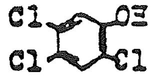
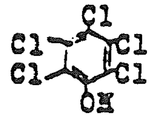
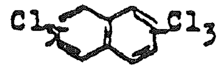
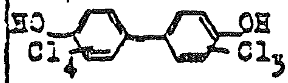
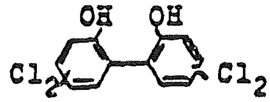
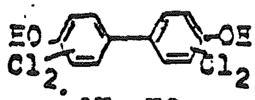
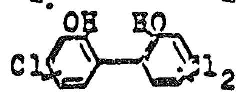
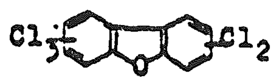
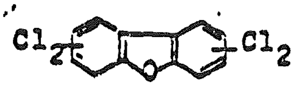
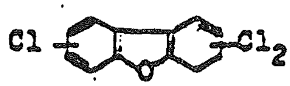
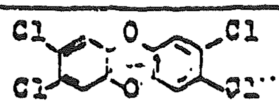
2,4,5-Trichlorphenol		1,0	0/8	0/
1,2,4,5-Tetrachlorbenzol		1,0	0/6	1/
Pentachlorphenol		0,5	0/2	-
		0,2	0/2	2/2
Hexachlornaphthalin		0,1	+ 2/2	-
		0,05	+ 2/4	-
		0,01	+ 1/4	3/4
		0,003	0/2	0/2
Pentachlordiphenyl		0,05	0/1	0/1
		0,005	0/2	0/2
Heptachlor-4,4'-dioxy-diphenyl		0,05	0/2	0/2
Tetrachlor-2,2'-dioxy-diphenyl		0,05	0/2	0/2
Tetrachlor-4,4'-dioxy-diphenyl		0,05	0/2	0/2
Trichlor-2,2'-dioxy-diphenyl		0,05	0/4	0/4
Hexachlordiphenylenoxyd		0,005	+ 2/2	2/2
		0,001	+ 3/4	3/4
		0,0003	+ 1/7	3/7
		0,0001	0/2	0/2
Pentachlordiphenylen-oxyd		0,001	+ 5/6	3/4
		0,0003	+ 1/2	2/2
		0,0001	+ 1/11	11/11
Tetrachlordiphenylen-oxyd		0,001	+ 2/2	2/2
		0,0003	+ 1/2	2/2
		0,0001	0/2	2/2
Trichlordiphenylenoxyd		0,005	+ 2/2	1/1
		0,001	+ 6/20	9/20
		0,0003	+ 4/9	6/9
		0,0001	0/2	2/2
Tetrachlordiphenylen-dioxyd		0,000[illegible]	+ 4/4	3/4
		0,000[illegible]	+ 3/[illegible]	-
		0,000[illegible]	+ 3/3	3/3
		0,000[illegible]	0/3	3/[illegible]

CONFIDENTIAL

J. R. Savage - St. Louis - B2SL

June 13, 1972

C. Paton

Chlorodibenzofuran

W. R. Richard
T3A

Cumming Paton has asked that we develop a history on chlorodibenzofuran content of our PCB products. The plant has no methods for this analysis. If we just need to screen a few current batches, this is perhaps better done in Research, but if we want to develop a continuing history, of say every fifth batch as we did with Dioxins and Penta, we should have a method developed that is suitable for routine plant use. Let me know how you would like to proceed.

J. R. Savage

/bi

PRR 004245

Monsanto

FROM (NAME & LOCATION): B2SC Cumming Paton

Final

DATE: May 23, 1972

SUBJECT: Dielectric Aroclor

REFERENCE:

cc B2SL T. L. Gossage
T3A W. R. Richard
1760 R. H. Munch
B2SC P. G. Benignus
B2NK W. B. Papageorge

TO : B2SL
J. R. SAVAGE

Jim, at our presentation to the PCB Task Force in Washington on May 15 we presented the composition of Aroclor 1016 as containing 1% pentachlorobiphenyl and higher homologs and 0.1% hexachlorobiphenyl and higher homologs. By now I think the idea that Aroclor 1016 has under 0.4% pentachloro and higher homologs is pretty well established. The fact that methodology is involved in making distinctions is not going to be of immediate significance to many people. In order to prevent more of a credibility problem I think we need to know what current Aroclor 1016 is running as far as penta-chloro and higher homologs and hexachloro and higher by our latest analytical techniques. We should have available evidence to show that our May 15 numbers can be substantiated.

The second point concerns chlorodibenzofurans. At our meeting the FDA showed concern regarding getting definite proof that chlorodibenzofurans were absent from our PCBs. I suggest we have several current batches of Aroclor 1016, 1242 and 1254 screened. I think we need to have this data available.

Cumming Paton

cs

Jim. See notes

PRR 004246

IN-10 REV 11-65

Monsanto

FROM (NAME & LOCATION) M. W. Dietrich - Technology Department - S. Second Street

DATE January 27, 1971

SUBJECT DIBENZOFURANS IN AROCLOR PRODUCTS

REFERENCE R.E.Keller Memo to W.B.Papageorge 10/20/70

TO : W. R. Richard
General Offices

cc: W. B. Papageorge - GO
M. W. Farrar - Res. 1
H. S. Bergen - GO
E. P. Wheeler - GO
E. S. Tucker - Res. 2
E. M. Emery - Res. 2
R. E. Keller - Res. 1
R. H. Munch - Res. 2
Q. E. Thompson - GO
J. P. Mieure - Res. 2

also cc to [redacted] Anniston
W Engram K
G Miller - Anniston
R McCutcheon K.
J Sanderson Anniston

We initially reported that Aroclor 5442 (Lot AI-9) contained 1-3 ppm tetrachlorodibenzofuran. Additional work by Dr. Mieure has shown that this identification is not conclusive; tetrachloromethylbiphenyl cannot be distinguished from the above dibenzofuran. Since Dr. Mieure has also found methylbiphenyl in Santowax R, chlorinated methylbiphenyls could be expected in Aroclor 5442.

High resolution mass spectrometry at the Physical Sciences Center has been unsuccessful in distinguishing between these materials. We have explored several other approaches to make this identification and feel none have reasonable odds of success. At this time, we plan no additional work on this problem.

Recipients of this memo are asked to delete the identification of "1-3 ppm tetrachlorodibenzofuran in Aroclor 5442, lot AI-9" (memo JPM to REK, 10/20/70) and replace it with 1-3 ppm unidentified tetrachloro compound with molecular weight of 304 (based on Cl = 35.0). The other analyses in that memo including that of 15-30 ppm pentachlorodibenzofuran in Pheneclor DP 6, Prodelec are unchanged. At this higher 15-30 ppm level, an unambiguous identification is possible.

If it becomes necessary to quote a figure for oxygenated impurities in Aroclor 5442, a figure of less than 5 ppm should be safe based on our analyses.

M W Dietrich

M. W. Dietrich

db

PRR 00424

Monsanto

FROM (NAME & LOCATION): W. R. Richard - T3A

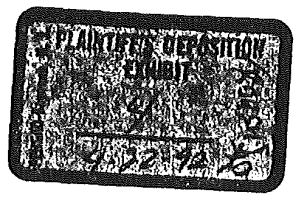
DATE: May 29, 1975

cc: J. P. Mieure - T2F
R. H. Munch - T1B

SUBJECT: DIBENZOFURANS IN AROCLOR

REFERENCE: HSB/WRR 5/23/75

TO: H. S. Bergen - B2SL



Bob Kaley attended "5th Annual Symposium on Recent Advances in Analytical Chemistry of Pollutants", May 19-21. Irwin Pomerantz of FDA presented a paper claiming 1 to several ppm chlorinated dibenzofurans in Aroclor 1016, Aroclor 1242, none in Aroclor 1221. No technical proof was presented - just a claim.

Kaley and Mieure have done more work. They are still not convinced chlorinated benzofurans are present; possible level 10X less than Pomerantz claim. Papageorge and Mieure are to call on Pomerantz to discuss analytical methods next week.

Mieure does report 0.3 ppm benzofuran in biphenyl. We have speculated that we could have 0.3 ppm of chlorinated benzofuran present in Aroclor.

Munch has not tackled Levinskas on the biological significance of 0.3 ppm. This is the level of argument for tetrachlorodibenzodioxin in 2,4,5-T. The case was never brought to trial vs. Dow because of lack of evidence.

In our case the argument is about chlorinated dibenzofurans. The toxicity should be lower and the chlorination level should be lower than tetra if they are present in Aroclor 1016. Fractional distillation at the same chlorination level as biphenyl should concentrate any chlorinated dibenzofurans in the still pot.

Will tackle Levinskas and see what comes out of Papageorge-Mieure visit before doing more work.

WR.

W. R. Richard

/is

PRR 004382

Monsanto

FROM: David Wood-St. Louis-B2SD

DATE: August 29, 1975

SUBJECT: TELEPHONE CALL REPORT

REFERENCE: 8/29/75

AUG 29 1975

TO: [redacted]
B2SK

CC:
H. S. Bergen-B2SL
C. Paton/T. L. Gossage-B2SC
G. Roush-A2SA
G. Levinskas-A2SC
R. Keller-T1B
J. P. Mieure-T2B
W. R. Richard/R. E. Munch-T
W. W. Withers-B2SA

CALL FROM: Dr. J. R. Allen
University of Wisconsin
(608)263-3524

Dr. Allen called about Dibenzylfurans and Dioxins in Chlorinated Biphenyls as a result of his reading the Risebrough paper. He is concerned about levels of these compounds in the Aroclors which he is using for his U. of Wisconsin feeding studies since he is unclear as to potential interferences in results which can be ascribed to PCB per se or contaminants in PCB.

He asked if we could check samples to be used in his studies to determine positively if contaminants were or were not present in those specific samples. I said that I did not believe our analytical techniques were fully developed to the stage where we were confident that we could properly consider ourselves able to meet his need. I told Dr. Allen that we would discuss his request and call him next week.

David Wood

/deb

PLAINTIFF'S EXHIBIT
#120 CW 8-6-8

PRR 074856

IN-10 REV 1 73

EXHIBIT 3
M. WISE
1/16 1990

PYRANOL™ COMPOSITIONS

GENERAL ELECTRIC COMPANY
1932 - 1976

* GE Specification - 1488, 1467, 1470, A13B3B. (1497 = A13B3B), A50P5..
# ASTM D 2283 Type (_), Annual Book of Standards, Vol. 10.03.
1242, 1254, 1260 - Aroclor™ PCB mixtures - Monsanto Chemical
$T_{3,4}CB$ - tri- & tetra-chlorobenzenes - Hooker Chemical
$Sn\Phi_4$ - tin tetraphenyl - Hooker Chemical(1944-1957), Metal & Thermite Corp
EDDC - epoxide dicyclo-diepoxy carboxylate - ERL 4221, Union Carbide & CY-179, Ciba-Geigy

PITTSFIELD, MA

1932-NOV 1944 1488*	NOV 1944-APR 1952 1467	APR 1952-MAR 1963 1470	MAR 1963-APR 1972 A13B3B (B)#
60% 1260	60% 1260	45% 1260	45% 1260
40% T_3CB	40% T_3CB	40% T_3CB	40% T_3CB
	0.125% $Sn\Phi_4$	15% T_4CB	15% T_4CB
		0.125% $Sn\Phi_4$	0.125% EDDC

APR 1972-NOV 1973 A13B3B2 (F)	NOV 1973-FEB 1974 A50P559	JAN 1974-END A13B3B3 (G)
45% 1254	65% 1254	60% 1254
40% T_3CB	23% T_3CB	40% T_3CB
15% T_4CB	12% T_4CB	0.125% EDDC
0.125% EDDC	0.125% EDDC	

ROME, GA

1953 - 1963 1470	1963 - 1965 A13B3B (B)	1965 - 1970 A50P524 (C)	SEP 1969 - OCT 1970 A13B3B (B)
45% 1260	45% 1260	80% 1242	45% 1260
40% T_3CB	40% T_3CB	13% T_3CB	40% T_3CB
15% T_3CB	15% T_4CB	7% T_4CB	15% T_4CB
0.125% $Sn\Phi_4$	0.125% EDDC	0.125% EDDC	0.125% EDDC

1970 - 1972 A50P559	1972 - 1974 A13B3B2 (F)	NOV 1973-FEB 1974 A50P559	MAR 1974-END A50P570
65% 1254	45% 1254	65% 1254	40% 1254
23% T_3CB	40% T_3CB	23% T_3CB	60% T_3CB
12% T_3CB	15% T_4CB	12% T_4CB	0.125% EDDC
0.125% EDDC	0.125% EDDC	0.125% EDDC	

HICKORY, NC & SHREVEPORT, LA

Pyranol - never used

/3800B

tor 12-29-87

GEP 000654

W. B. Papageorge B2SK

February 10, 1975

AROCLOR 1260 - NEW STUDIES

H. S. Bergen - B2SL

D. R. Bishop - C2SA
G. L. Bratsch - B3NA
K. W. Easley - 1920
F. J. Fitzgerald - B3SA
T. L. Gossage - B2SL
G. J. Levinskas - A2SC
C. Paton - B2SC
W. R. Richard - T3A
G. Roush - A2SA
E. Tillman - A2SA
W. W. Withers - B2SA
P. L. Wright - A2SC

The following met on Thursday, February 6 to review the results of a rat feeding study recently completed by Dr. Renate Kimbrough, Center for Disease Control, HEW:

T. L. Gossage
G. J. Levinskas
W. B. Papageorge
C. Paton
W. R. Richard
G. Roush
E. Tillman
W. W. Withers
P. L. Wright

George Levinskas summarized a meeting held at the National Cancer Institute, Washington, D. C. on January 31, at which sections of liver tissue from Dr. Kimbrough's study were reviewed. Discussion relating to interpretation, significance and required action followed. The following conclusions were drawn:

1. Cancerous liver cells were observed in approximately 8% of the rats exposed to Aroclor 1260 in Dr. Kimbrough's study.

2. This effect was not observed in similar studies conducted for Monsanto Company by Industrial Bio-Test Laboratories.

3. This difference in observed effects could be due to the difference in rat strains used in the two studies.

4. Dr. Kimbrough will in all probability present and/or publish her findings as soon as she can.

5. NIOSH has Dr. Kimbrough's data and certainly, following publication of this information and in the absence of any contradicting reports, the regulatory agencies will be pressured into reviewing their policies and regulations relating to polychlorinated biphenyls. As in the past there will very likely be limited attempts made to distinguish between types of commercial mixtures of polychlorinated biphenyls. The cancer cell formation observed in Dr. Kimbrough's study with Aroclor 1260 under conditions unique to that test will in all probability be quickly and without scientific basis assumed to occur with all polychlorinated

The following action plan was developed and is recommended for adoption:

Action	Responsibility	Dates Start	Dates Complete	Estimated Cost
1. Publish the results of the Monsanto studies conducted by Industrial Bio-Test Laboratories.	G. Roush J.F. Stapleton	Immediately	July 1, 1975	-
2. Obtain services of cancer specialist to review both studies and interpret significance to current PCB applications.	G. Roush	Immediately	April 1, 1975	$2000 - $5000
3. Obtain National Cancer Institute interpretation.	G. Roush	Following 2 above.		-
4. Discuss with NIOSH, OSHA, FDA, EPA.	G. Roush K.W. Easley W.B. Papageorge	Immediately following 2 and 3 above.		-
5. Discuss with key customers	G. Roush T.L. Gossage W.B. Papageorge	Coincident with 4 above.		-
6. Complete MOK plant employee exposure study.	G. Roush	Immediately	April 1, 1975	
7. Conduct study of Aroclor 1260 with rats to determine effect at 24 months when exposure is withdrawn at 18 months.	G. Roush	Immediately	March, 1977	$ 70,000
8. Conduct study of Aroclor 1260 with second species (hamster?) to establish if species differences exist	G. Roush	Immediately		$ 70,000

Action	Responsibility	Dates Start	Dates Complete	Estimated Cost
9. Conduct 2-year rat feeding study with Aroclor 1016.	G. Roush			$ 85,000
10. Review rat liver sections from Monsanto A-1242 study.	G. Roush	Immediately		$2000 - $5000

Monsanto

FROM (NAME & LOCATION) Dept. of Medicine & Environmental Health - F.R. Johannsen, A2SC

DATE: August 27, 1976 CC:

SUBJECT: Epidemiology

REFERENCE: Krummrich Plant

TO G. Roush
A2SA

A group of 311 present/former W.G. Krummrich Plant employees have been compiled. Each of the 311 is known to have worked in Dept. 246, based on work history records. Information on the cause of death has been obtained on 50 former employees from this group. Evaluation of death certificates attributes 6 of those deaths to lung cancer.

A review of this population, omitting all those who worked in Dept. 246 for less than 6 months, yielded the following sub-population:

total number of employees	- 140
identified deaths (all cases)	- 23
deaths attributed to lung cancer	- 4

When compared to the 1969 U.S. male population, this group of 23 deaths would be expected to contain 1.24 cases attributable to lung cancer. Statistical comparison of the observed lung cancer versus the expected lung cancers yielded a highly significant chi X^2 value of 7.1. This number is even more significant than the value (chi $X^2 = 6.8$) obtained following evaluation of the full 50-person mortality population.

F.R. Johannsen

Frederick R. Johannsen

alw

PRR 034870

IN-1044 10/78

SCH 068365

Monsanto

MONSANTO INDUSTRIAL CHEMICALS CO.
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

SPECIAL UNDERTAKING BY
PURCHASERS OF POLYCHLORINATED BIPHENYLS

Monsanto Company ("Monsanto") manufactures certain polychlorinated biphenyl products ("PCB's") which _____ _____ ("Buyer") desires to purchase. While Buyer desires to purchase PCB's because of certain desirable flame resistant and insulator properties, Buyer acknowledges that it is aware and has been advised by Monsanto that PCB's tend to persist in the environment; that care is required in their handling, possession, use and disposition; that tolerance limits have been or are being established for PCB's in various food products.

Monsanto has therefore adopted certain restrictive policies with respect to its further production, sale and delivery of PCB's, including the receipt of undertakings from its customers as set forth below, and Buyer is willing to agree to such undertakings with respect to sales and/or deliveries of PCB's by Monsanto to Buyer.

Accordingly, Buyer hereby covenants and agrees that, with respect to any and all PCB's sold or delivered by or on behalf of Monsanto to Buyer on or after the date hereof and in consideration of any such sale or delivery, Buyer shall defend, indemnify and hold harmless Monsanto, its present, past and future directors, officers, employes and agents, from and against any and all liabilities, claims, damages, penalties, actions, suits, losses, costs and expenses arising out of or in connection with the receipt, purchase, possession, handling, use, sale or disposition of such PCB's by, through or under Buyer, whether alone or in combination with other substances, including, without implied limitation, any contamination of or adverse effect on humans, marine and wildlife, food, animal feed or the environment by reason of such PCB's.

PRR 043740

SCM 016437

All existing contracts for the sale of PCB's by Monsanto to Buyer are hereby amended to contain the provisions set forth above.

Nothing herein shall create or imply any duty or obligation of Monsanto to sell or deliver any PCB's to Buyer. No conditions, understandings or agreements purporting to modify or vary the terms hereof shall be binding unless hereafter made in writing specifically referring to this agreement and signed by the party to be bound and no modification or variance of the above undertaking shall be effected by tho acknowledgment or acceptance of any sale document, purchase order, shipping instruction or other forms containing terms or conditions at variance herewith.

_____ (Buyer)	MONSANTO COMPANY
BY: _____	BY: _____
TITLE: _____	
DATE: _____	

PRR 043741

SCM 016438

Monsanto

PLAINTIFF'S DEPOSITION EXHIBIT 24

FAW
FAJ
File

FROM : George Roush, Jr., M. D.

DATE : September 17, 1975

SUBJECT : MONTHLY COMMENTS - MEDICAL DEPARTMENT

REFERENCE :

CONFIDENTIAL

TO : Corporate Administrative Committee

State and federal agency activities related to PCB's continue to require Medical Department attention to support business group efforts. Recent public hearings in Wisconsin served as a forum for Mr. Schweitzer, of EPA's Toxic Substances Office, to make his pitch again in support of the Toxic Substances Control Act now being considered in Congress. Between now and the end of November, FDA, EPA, and NIOSH will conduct hearings on various aspects of the PCB's in foods and the environment.

Questions from outside Monsanto about the long-term health effects of chemicals used in two Monsanto plants on the workers in the plants have required organization of epidemiological studies. These require acquisition of data on individual work assignments within the plant over long periods of time, collection of death certificates of deceased employees, and comparison of causes of death with frequency of cause to some segment of the general population. We will have to do much more epidemiology in the future although clear cut conclusions are almost impossible.

George Roush, Jr., M. D.

GR/ln

EXHIBIT "A"

PRR 073526