MF 500 - Dr Emmet Kelly

COPY

In the Court of Common Pleas
Philadelphia County

In Re:	)	
Paoli Railroad Yard	)	Master File Number
PCB Litigation	)	90-0609-C-6

In the United States District Court
For the Eastern District of Pennsylvania

In Re:	)	Master File Number
Paoli Railroad Yard	)	86-2229
PCB Litigation	)	Relates to all Actions

Volume III

July 16, 1991

Continuation of the deposition of DR. EMMET KELLY, taken on behalf of Plaintiffs.

GORE REPORTING COMPANY

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VOLUME III

Continuation of the deposition of DR. EMMET KELLY, taken on behalf of Plaintiffs, at the offices of Brown & James, 705 Olive Street, in the City of St. Louis, State of Missouri, commencing at 10:00 a.m. on the 16th day of July, 1991, before J. Bryan Jordan, certified shorthand reporter and notary public.

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EXHIBITS

(The deposition of Dr. Emmet Kelly was resumed on the 16th day of July, 1991, at 10:00 a.m., as follows:)

MR. COHEN: Same stipulation, Michael?

MR. MALIN: Yes, same stipulation as last time.

Now, do I understand, Arnold, I didn't hear from you by Thursday afternoon about anything that we were supposed to have had here that we don't have, so I presume that you have everything.

MR. COHEN: Well, I don't know if that's a good presumption, but it's true, you didn't hear from me. I'm not going to try to reserve any rights to recall the witness based upon any document that I had asked you for before and that you had offered to produce and it was not produced, but to the extent that I had asked you for it and it was not produced, I may reserve rights, but I don't know what those documents are at this time. I'd like to proceed with Dr. Kelly's deposition, picking up, if I can, where we left off and trying as much as possible,

Doctor, considering the intervening time, to not duplicate anything that has been previously asked and answered, and I'm sure that your counsel has --

MR. MALIN: Thank you.

MR. COHEN: -- your entire transcript memorized, so if I do ask --

THE WITNESS: Would you speak a little louder?

MR. COHEN: I'm sure Counsel has the transcript memorized, so if I do ask something that's been previously asked, he'll give me the page and line number.

MR. MALIN: I wouldn't necessarily count on that, but --

MR. McLAUGHLIN: For the record, am I correct that I think in your prior deposition, we agreed that an objection by one counsel will be considered an objection by all?

MS. COONELLY: All defense counsel.

MR. MALIN: Yes.

MR. COHEN: Well, I guess that depends, now that there are a number of

counterclaims that have been asserted or cross claims, here, that have been asserted. Do you want to have those same objections you made before? I mean, I don't care.

MS. COONELLY: Why don't we have that agreement unless someone says otherwise.

MR. McLAUGHLIN: Fine.

MR. COX: So stipulated.

MS. GROSS: Fine.

MR. COHEN: Do we have both captions?

Do you have a Federal Court caption?

MR. MALIN: I really don't think I do. I don't have.

MR. COHEN: If we don't have one with us, we'll make sure you get one, but we're taking this in both the state court actions and the Federal Court actions.

MR. MALIN: We can easily make a phone call and get the number for you, so that's no big deal.

Whereupon. . .

EMMET KELLY, M.D.,

of sound mind, having been previously duly sworn to tell the truth, the whole truth, and nothing but the truth in the case aforesaid, testified upon his oath as follows, to-wit:

EXAMINATION (Continued)

BY MR. COHEN:

Q. Doctor, when we were last together, we had asked you some questions about a number of different analytical tests that Monsanto had used over the years. One of the issues that came up was gas chromatography. Do you recall --

A. Yes, sir.

Q. -- discussing that earlier?

A. Yes, sir.

Q. What was the first time, to your recollection, that Monsanto had the analytical tool of gas chromatography available to them?

A. I can't answer that. I do not know.

Q. Was it -- it was during your tenure as Medical Director?

A. Oh, yes, certainly.

Q. So it would have been sometime prior to 1975?

A. Yes, sir.

Q. Do you recall whether it was prior to 1970?

A. Well, there were additions to the simple gas chromatography. In other words, I'm not sure when gas chromatography was a standard analytical tool, but Jensen had some adaptations of the gas chromatography. I don't know enough about analytical chemistry to know what they had, what he had, but Monsanto did not have that expertise, instrument at that time.

Q. When you say Jensen, who is Jensen?

A. Jensen and Widmark, the Swedes who --

Q. Oh, the scientists who had first done the studies in Europe.

A. That's correct.

MR. MALIN: For the record, Jensen and Widmark are the two Swedish scientists who discovered the existence of certain

fluorinated hydrocarbons in bird feathers in approximately 1966 -- we discussed that last time -- using a method of gas chromatography.

MR. COHEN: Yes.

BY MR. COHEN:

Q. Had you finished your answer, Doctor?

A. Yes, I did.

Q. Now, do I understand your testimony to be that Monsanto did not have the analytical tool of gas chromatography available to them when Jensen and Widmark did?

A. But I do not know if it was, if they had gas chromatography but did not have an adaptation of further refinement of the tool that Jensen and Widmark had. That's correct.

Q. What was that adaptation called?

MR. MALIN: I'm going to object to the form of the question insofar as it doesn't define gas chromatography and all of the other accouterments that accompanied its development, its rather, its rather rapid development during that period, which were

very critical.

MR. COHEN: I have no idea what that objection means, and certainly, it's already contrary to our stipulation, but you can make whatever objection you want to make for the record.

MR. MALIN: I'll object to the form of the question. It's too broad and vague.

MR. COHEN: I'm asking the witness what adaptation he was referring to.

A. I do not know. I am not an analytical chemist.

BY MR. COHEN:

Q. What were you aware of -- in the field of analytical chemistry, that is -- what was available in the way of technique during the time period that we're referring to, which would be the mid Sixties?

A. Practically nothing.

Q. What did you know Monsanto had available to it in its own laboratories from the standpoint of analytical technique at that time?

A. I did not know anything about the

details of their analytical expertise.

Q. Would it be fair to say, then, whatever reports that they were providing to you regarding product or the contents of product or the makeup of the product was all tempered by your lack of knowledge of their analytical technique?

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

Answer the question.

A. Please repeat it.

MR. COHEN: I don't know if I can. Mr. Jordan?

(The requested portion of the record read by the reporter)

A. Well, I don't understand what you mean by what's tempered by. What does that mean?

BY MR. COHEN:

Q. Well, from your understanding of the reports or the information they gave to you, you were unable, in your own mind, to know the technique that they used. Is that correct?

A. I did not know the technique they

used, but I accepted their reports as valid.

Q. So the information was information that you accepted from another department within your employer's organization, and you accepted it at as being a valid report?

A. That is correct.

Q. Did you ever question whether they had the ability to further analyze the material that was being manufactured, for example?

A. No, I never questioned it.

Q. Did you ever see reports done by the Quality Control Department while you were Medical Director, indicating an analysis of the product?

A. I may have, but I do not recall it.

Q. And would it be fair to say that whatever the report said is what you accepted as being the available information within house?

A. Yes, that's correct.

Q. When did you first hear of the technique called gas chromatography?

A. I haven't the slightest idea when

I first heard of it.

Q. More than ten years ago, though?

A. More than twenty years ago.

Q. Would it have been during the time you were still employed by Monsanto as Medical Director?

A. That is correct, yes, sir.

Q. Would it have been in the decade between 1960 and 1969?

A. 19 --

Q. '60 and '69.

A. I cannot answer that. I do not know when I first heard of it

Q. You have no recollection of it?

A. No, I do not.

Q. When did you learn that Monsanto first had the technique available to them?

A. Which technique, now?

Q. Gas chromatography.

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

Answer the question.

A. I don't remember.

BY MR. COHEN:

Q. Do you recall, sir, an

investigation being conducted by a Dr. Horwtiz of the Food and Drug Administration looking for a chlorinated compound X?

A. No, sir.

Q. I realize it was quite some time ago. I'm not expecting you to recall everything that happened thirty years ago, but I'm going to try to refresh your recollection if I can. C. J. Eby; do you remember that name?

A. Yes, I do.

Q. All right, can you tell me who was C. J. Eby?

A. I believe he was a Monsanto employee at one time. He was associated with the Washington office.

Q. And what was his first name?

A. Chuck, as far as I know.

Q. Chuck?

A. That's correct.

Q. Was that for Charles, or you don't know?

A. I don't know. It probably was for Charles.

Q. Did you ever meet the man?

A. Yes, I did.

Q. What did he do in the Monsanto office in Washington?

A. Represented Monsanto's interests.

Q. Where?

A. With the government.

Q. Was he a lobbyist?

A. No, he wasn't a lobbyist. I don't know what, what position the Washington office had or what he did in it, but he was the man who made appointments with the -- for me with the Food and Drug Administration, the Department of Agriculture, things of that sort.

Q. So he facilitated your ability to see government employees?

A. That's correct.

Q. Did you ever meet with Mr. Eby when you went down to Washington, D.C.?

A. Yes.

Q. Did Mr. Eby attend these meetings with you and government employees?

A. He may in some and he may not. I don't know which ones he went with me.

Q. When he did attend these meetings,

did it seem clear to you that Mr. Eby had a certain familiarity with the individual in the government?

A. Well, not particularly. He knew the office he was in; he made the appointment.

Q. But beyond that, you didn't notice anything indicating any particular familiarity between Mr. Eby and the official that you went to see?

MR. MALIN: Object to the form of the question. I don't understand what he means by "particular familiarity." It even has some connotations that I think may be offensive, but that's all right.

MR. COHEN: That's certainly a product of your own mind, then.

BY MR. COHEN:

Q. Well, did he indicate that they played golf, or --

A. No

Q. -- or went out for a drink or anything like that?

A. None.

Q. Play cards, anything?

A. No. He was just a person who arranged a meeting with me with people I wanted to see, and he, he didn't show any undue familiarity or friendship with these people.

Q. What was the office in Washington called at that time?

A. The Washington office.

Q. That's it?

A. That's it.

Q. How big was it?

A. Two people at one time, three or four at another time.

Q. So they didn't have any production facility there, obviously.

A. Oh, no.

Q. Was it strictly some administrative activity?

A. No, I think they, this person, these people there had something to do with seeing what government contracts were going to be let.

Q. For manufacture of product?

A. Yes, for selling them to this.

Q. So was it a sales office?

A. Well, it represented Monsanto to the government, so I don't know if they took the orders or referred it to the possibilities of sales to the marketing group in St. Louis. I just don't know that.

Q. Were you, in that time period when Monsanto was maintaining this office and Mr. Eby was working there, was Monsanto, to your knowledge, regulated by any government agency?

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

A. I wouldn't know.

MR. MALIN: Answer the question.

A. I don't know.

BY MR. COHEN:

Q. Well, if you don't know, just tell me you don't know.

A. I don't know.

Q. Did any product that you sell have to be registered with any agency such as the Food and Drug Administration?

A. We got approval by the Food and Drug Administration on some products. As far as the registration was concerned, we had

agricultural products that were registered by the Department of Agriculture. I do not believe that the Food and Drug Department registered products.

Q. So you got type approval from them for certain products manufactured in the agricultural division?

A. Who is the "them"?

Q. The Food and Drug Administration.

A. No, the Department of Agriculture --

Q. Oh, I see.

A. -- registered the product.

Q. And what type of products were they? Do you remember?

A. Herbicides.

Q. Just herbicides?

A. We may have had an insecticide registered. We may have had Parathion registered.

Q. Did any of those products, to your knowledge, contain chlorinated hydrocarbons?

A. Not that I recall, no, sir.

Q. And you have no recollection of an investigation of a so-called chlorinated

compound X?

A. No, sir.

Q. Who was H. S. Bergen?

A. He was in the Marketing Department of Monsanto.

Q. Do you know where Mr. Eby is today?

A. I don't have the slightest idea.

Q. Do you know if he's even alive?

A. I don't know anything about him.

Q. Was he a chap younger than yourself, same age, elder, older than yourself?

A. He was considerably younger.

Q. Than you?

A. Than I, yes.

Q. And Mr. Bergen, do you know if he's alive?

A. I don't know.

Q. Do you know his first name?

A. Howard.

Q. And did you have occasion to work with Mr. Bergen in any activities while you were Medical Director?

A. Oh, I'm sure I did. I mean, I --

he had a group of compounds, I don't recall which ones they were, but I certainly had contact with him during my term.

Q. A group of compounds that he was responsible for marketing?

A. Probably, if he were, at one time if he were the product director, he would be responsible for marketing, research, and development of products in that field.

Q. He was responsible for all of those activities? Marketing, research and development?

A. Yes, sir.

Q. Do you know what his title was with the company?

A. Director of, or product director of whatever compound it was, whatever group it was. It might have been functional fluids, it might have been heat transfer agents. I don't know what it included.

Q. You don't recall?

A. No.

Q. Do you recall any of the products that were within his scope of authority?

A. Well, I'm not sure. I mean, he

may have had some plasticizers, he may have had, as I said, hydraulic fluids. I don't know if the electrical fluids came under his domain or not.

Q. Well, PCB products were sold in all of those categories that you just mentioned, weren't they?

A. Yes.

Q. They were sold in plasticizers, sold in hydraulic fluids, and they were also sold in electrical fluids?

A. Yes I do not know if the electrical fluids were under him. I do not know that.

Q. Do you have a recollection, then, that Mr. Bergen's responsibility would have included marketing research and development of products containing PCB fluids?

A. Yes, sir.

Q. Now, you said that you had contact with him. What would have been the nature of your contact with Mr. Bergen in his capacity doing research, development and marketing of those categories of products, plasticizers, et cetera?

A. Well, he was not doing the research, obviously, the research and development, and people who reported to him, he may have very well talked to me about the, the toxicological aspect of any of these newer products or combination of products. He might very well have talked to me about consumer inquiries related to the safety or safe handling of any of these products.

Q. Did you maintain a record of consumer inquiries?

A. Yes.

Q. Now, would that have been -- when you say consumer inquiries, are you speaking of retail consumers out on the street, or are you speaking of your wholesale consumers, such as other manufacturers, other users?

A. Well, we did not sell any of the products out on the street. We sold them to other manufacturing people.

Q. I understand that you didn't sell them as a retail outlet, but my question to you is, did your inquiries just deal with other manufacturers or did it involve what would be considered ultimately retail

consumers, also?

A. I don't recall any from ultimate retail consumers. Like, you mean there's a can of a Monsanto product on a hardware shelf?

Q. No, but you did manufacture an additive for plastic seat covers for automobiles, did you not?

A. Well, that would go to General Motors or Ford? I don't consider that out on the street.

Q. I understand that, but did any consumers of those products ever trace the product back to Monsanto and make inquiry?

MR. COX: I object to the form of the question. Any retail consumers?

MR. COHEN: Yes. That's what we're talking about, retail consumers.

BY MR. COHEN:

Q. Did someone who bought a GMC product and had plastic seats in it ever trace the product back to Monsanto and make an inquiry?

A. They may or they may not. I do not recall any such. They may very well

have.

Q. Would it be fair to say since you don't recall any such inquiries, you don't recall whether you maintained any file of any such inquiries?

A. Well, no. I maintain a file on the products, but I don't know where the inquiry came from. I don't know that it came from General Motors Detroit, or a Chevrolet agency in South Bend, Indiana. I don't know that. I might very well have gotten a report from, inquiry from General Motors in their central location, but I certainly didn't get any from the retail outlets.

Q. So if there was an inquiry that, where someone said they got a rash from sitting in the upholstery in their new Pontiac and that made its way through the chain at General Motors and then came over to Monsanto, you would have that inquiry from General Motors?

A. Yes, I would.

Q. And if it happened to attach the inquiry all the way down to the retail customer, you might just happen to have that,

also?

A. If it came from General Motors, certainly, yes.

Q. But you would not have had anything direct to you?

A. I don't recall any such.

Q. What toxicological information would Mr. Bergen have been seeking from you at the time regarding the products he was responsible for?

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

You can answer that, Doctor, try to answer it.

A. Well, whatever the -- whatever information we had on the toxicity of a particular product.

BY MR. COHEN:

Q. Now, when you say of a particular product, would it have been for an ingredient in that product, such as PCB's, or would it have been for the finished product, such as "X" brand pesticide?

MR. MALIN: Objection to the form. Again, it's speculative.

A. By Monsanto, you mean?

BY MR. COHEN:

Q. Yes.

A. I think he probably would want both, because the basic active ingredient might be in several different formulations, but he also would want to know the information as to the toxicity, and safe handling procedures and recommendations for the product as it left our warehouses.

Q. Would you, then, have provided him with information for both the product as a whole, and its component parts?

A. Yes, I would have.

Q. How far down would you have taken those component parts if you had a product that contained, for example, a PCB that was chlorinated, 48 percent: Would that be Aroclor 1248?

A. Yes.

Q. If it was chlorinated to 48 percent, would you give him the information on Aroclor 1248, as well as the product?

A. It depends on what he was asking for. In other words, if we sold a product

that contained Aroclor 1248 that was blended with another product, I would give him the information on the finished product. He might very well have asked what is the toxicity of Aroclor 1248 in relationship to 1254, or 1242, then I would give him that information.

Q. Did you have that information available to you?

A. Well, I would have had it, yes. Obviously, if it wasn't available, I wouldn't give it to him.

Q. You would have had information that broke it down between the different degrees of chlorination?

A. Yes, sir.

Q. And the source of that information would have been the studies, the scientific studies, the animal tests, et cetera, that you had done over the years; is that correct?

A. Yes, sir.

Q. And I gather, also, any outside sources of information that you had accumulated.

A. If there were such information,

yes, sir.

Q. If it exists. Would I understand when you did the testing of products like a PCB product, you never asked for testing to be done on the individual component parts of that product?

A. That's not correct.

Q. Am I incorrect on that point?

A. Yes, you are, because if we had a product that contained Aroclor twelve-forty -- 1254, it was blended with trichlorobenzene, for example, we would have the information on our Aroclor 1254. I mean, if we had basic toxicological information on all the Aroclors, then we would get a test on the final mixture of the two products.

Q. So if you had a product, the example you just gave me was a mixture of Aroclor and, what did you say, a trichlorobenzene?

A. That's correct.

Q. You would test both the Aroclor and the combination?

A. We would already have tested it. I mean, we, we had tested Aroclor, all the

Aroclors during the past thirty years before I left, so then if we had a mixture of a compound, we would test the finished mixture. We wouldn't sit down again and say, well, we'll break these, this ultimate product into various raw materials, as it were, and test those again, because we already knew what the toxicity of the Aroclors was.

Q. Well, I think that the question I had asked was with respect to the Aroclor, you never tested the individual components of the Aroclor, not while you were Medical Director.

A. Individual components of the Aroclor?

Q. Yes.

A. Well, Aroclor is a product, and then you mean, are you saying what individual components of this Aroclor are there?

Q. Well, I'm speaking of the other components of the product Aroclor 1254, 1260, 1242.

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

MR. COHEN: Well, what's the

objection?

MR. MALIN: Well, the other components of the product, I think, I think you are aware that Aroclor 1254 and others are mixtures of various PCB conjugants, if that's what you are talking about.

BY MR. COHEN:

Q. You agree that Aroclor 1254 contained your product as it went out on the street contained other compounds other than simply a, a polychlorinated biphenyl chlorinated to 54 percent chlorine, wouldn't you?

A. Yes. It's an average chlorination of 54, of 54 percent chlorination. There were some that would be chlorinated, some at {12E6}, some slower.

Q. Higher chlorination?

A. Yes, but it's an average.

Q. But besides the chlorinated, the polychlorinated, but it contained other compounds?

A. It may have trace amounts of other compounds, certainly. Any manufactured product is not a hundred percent pure

product. There may be trace amounts, parts per million of other compounds in there, yes.

Q. And it's my understanding that you never tested the toxicity of those trace amounts of other compounds, as you call it?

A. Only test the whole finished Aroclor. We know what the toxicity of it is, regardless of these trace amounts. They are obviously included in the toxicity testing.

Q. Right.

A. But we did not --

Q. But we covered this before, that this is the reason why you didn't feel it was necessary to trace the individual trace compounds; isn't that correct?

A. That's correct, yes, sir.

Q. Because you tested the toxicity of the finished product.

A. That's correct.

Q. And do I take it that likewise, when you had a combination product such as you just described, where you were mixing Aroclor 1254, 48, 42, whatever, with a trichlorobenzene, you did not separately test the toxicity of the trichlorobenzene?

A. We did not, no, sir. We tested the finished product.

Q. Did Monsanto, to your knowledge, when you made a product where you made a mixture like that, did Monsanto also manufacture the other component of the mixture, the trichlorobenzene?

A. They did not manufacture the trichlorobenzene.

Q. Did Monsanto ever manufacture trichlorobenzene?

A. I'm not certain.

Q. Did Monsanto obtain toxicity data on the other component from its manufacturer or supplier?

A. Well, if we are speaking of trichlorobenzene, there was ample information in the literature about the toxicity of trichlorobenzene.

Q. Well, you are telling me now that you could have gotten that information from literature?

A. Yes, sir.

Q. Did you ever ask the manufacturer for their information?

A. No, sir.

Q. Did you ever determine whether the trichlorobenzene that you were receiving from the manufacturer likewise didn't contain trace components of other compounds?

A. The Binnacle Department did not; the Manufacturing Department may well have.

Q. Was that information made available to you?

A. I can't recall whether it was or not.

Q. What is the toxicity of trichlorobenzene?

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

If you can answer that, Doctor, you may answer it.

A. Well, I can't give you the numbers, but I can tell you that it is a compound that is a chlorinated hydrocarbon, obviously, that can cause liver damage, that if inhaled in sufficient amounts or elevated temperatures, would cause a chemical hepatitis. Whether it has any effect on the blood-forming organs or not, I'm not certain.

BY MR. COHEN:

Q. Do you consider it to be more or less toxic than PCB's?

A. I don't believe that there's a great deal of difference between it. It's obviously more volatile than PCB's, so the exposure would be greater. The inherent toxicity, LD-50 may very well be pretty close.

Q. With respect to the elements of toxicity that you've just discussed, the effect on the liver, is the effect of trichlorobenzene on the liver similar to the effect of PCB's?

A. I don't know whether the enzyme action of trichlorobenzene, whether it affects the same enzymes as PCB. There are any number of functions of the liver, but you can get the chemical hepatitis from both in sufficient quantities.

Q. Are the quantities similar required to induce the chemical hepatitis?

A. I can't answer that. I haven't tested the toxicity of trichlorobenzene for almost twenty years.

Q. You are talking about effects in man or animals?

A. Beg your pardon?

Q. Are you talking about effects in man or animals?

A. Animals. I do not recall any case histories of intoxication by trichlorobenzene, although there very well may have been reports of such.

Q. How about the effects of PCB's? Were you referring to man or animal?

A. Animals.

Q. How about on the blood-forming compartment of the body?

A. I know of no reports of, or toxicological information that PCB's had any effect on the blood-forming organs.

Q. And that's both in man and animals?

A. That's correct.

Q. And how about trichlorobenzenes?

A. Again, I say I do not, I'm not familiar at the present time with the effects of trichlorobenzene on the blood-forming elements.

Q. Do you consider trichlorobenzene more, or less toxic than benzene?

A. Less toxic.

Q. So benzene, by itself, would be more toxic than trichlorobenzene?

A. That's correct.

Q. Did you ever make an effort to determine whether the trichlorobenzene that was being sold to Monsanto Chemical Company contained benzene?

A. No, sir, I did not.

Q. Do you know whether it contained benzene?

A. I do not know.

Q. Did the Manufacturing Department ever determine whether it contained benzene?

A. They may very well have. I have no information concerning that point.

Q. But there is no dispute in your mind that for a number of years, Monsanto Chemical Company manufactured, mixed and sold a product that contained trichlorobenzene?

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

MR. COHEN: Well, which part do

you object to: Manufacture, mix or sold?

MR. MALIN: He's already testified that Monsanto did not manufacture trichlorobenzene.

THE WITNESS: Well, Mr. Malin, I said I was not certain. We manufactured a product at Nitro that was an insecticide, a herbicide, in which trichlorobenzene was used. I do not know if we bought the trichlorobenzene or manufactured it. Now, then you had a triple, a tripartite question, there, so we certainly sold material that contained trichlorobenzene, so the answer to that part is yes.

BY MR. COHEN:

Q. Okay, which, without question, you got from somewhere. You bought it --

A. I couldn't hear you. What did you say?

Q. You got the material from somewhere, bought it on the market or whatever?

A. Or made it, yes, certainly.

Q. You had established suppliers, I gather, of trichlorobenzene?

A. I'm sure we -- I'm sure they did, but that was certainly not -- that was outside my field, obviously.

Q. Oh, you weren't in purchasing.

A. No, I wasn't in purchasing or manufacturing.

Q. You do know that you sold a dielectric fluid that contained trichlorobenzene.

A. Yes, sir.

Q. Pyranol?

A. Both Inerteen and Pyranol.

Q. Both contained trichlorobenzene?

A. That's correct.

Q. And do you know what else it contained?

A. Sure. It contained one of the Aroclors.

Q. Who did you manufacture those products for?

A. Pyranol for GE and Inerteen for Westinghouse.

Q. Do you know how many years you manufactured and sold Pyranol?

A. Well, Pyranol was GE's product.

They discovered it or originally formulated it, so it was, we were the sole manufacturer in the United States for it. So my -- I think it was probably for forty years.

Q. Did GE ever make it themselves?

A. I don't know.

Q. How about Inerteen?

A. What about it?

Q. Well, Inerteen was a product of Westinghouse?

A. Yes, sir.

Q. Were you the sole manufacturer of Inerteen?

A. Yes, sir.

Q. For how long?

A. I don't know.

Q. Do you know what Inerteen contained, other than trichlorobenzenes?

A. Yes, one of the Aroclors.

Q. Did either Pyranol or Inerteen contain anything other than PCB's and trichlorobenzene?

A. There may be trace amounts, parts per million of contaminants, but I don't know.

Q. Did you ever make any effort to determine the trace amounts, parts per million, of other contaminants in those products?

A. Did I, did the Medical Department?

Q. Yes. I don't expect to you have done the work yourself, but did you ever order it done?

A. No, I thought you meant did Monsanto.

Q. Yes.

A. Yes what; did Monsanto or did the Medical Department?

Q. Well, sir, I wouldn't know who would have done it. In the past, you have testified that you were responsible for ordering tests done.

A. Yes, sir.

Q. As the Medical Director?

A. That's correct.

Q. Now, when I speak of "you," it's impossible for me to know whether "you" means you individually or you Monsanto Company because you are the person who did it and you worked for the company that did it, so it

would be helpful to me if you told me who did it.

A. May I have the question of who did what?

Q. Right.

THE COURT REPORTER:

"Q. Did you ever make any effort to determine the trace amounts, parts per million, of other contaminants in those products?"

MR. MALIN: Just so the record is clear, we did at one time furnish with you the formulation of what went into these various products, and I think both Inerteen and Pyranol, as you recall, did have trace amounts of chemicals which were added to it as, one as a chlorine scavenger and two as a stabilizer of some kind. The exact chemical, I don't recall, but you were furnished with that formulation.

MR. COHEN: Are you giving substantive testimony now, Mr. Malin?

MR. MALIN: I'm just telling you what you've already been furnished, and you could save a lot of time if you would get

that and ask about it. It would tell you exactly what was in the particular products that you are apparently asking about.

MR. COHEN: Good.

Can I have the last question, Mr. Jordan?

(The requested portion of the record read by the reporter)

A. No, I did not. I don't know what he means by "other contaminants." I don't know what that word "other" refers to, because up to now, we have not singled out any contaminant, but the answer is no.

BY MR. COHEN:

Q. Do you consider tetrachlorobenzenes to be more or less toxic than trichlorobenzenes?

A. I would think they are in the same ball park, but I do not have figures for it.

Q. What would be your source of information on the toxicity of trichlorobenzenes and tetrachlorobenzenes, for that matter?

A. The various toxicological books, their reports from Henry Smith on various

chlorinated benzenes where he lists the various toxicities.

Q. When did you first become aware that benzene, itself, was more toxic than either tri- or tetrachlorobenzene?

A. I would say probably in medical school, they talked about benzene, causing anemia and they did not talk about trichlorobenzene causing anemia.

Q. In medical school, were you aware that trichlorobenzene was a benzene derivative?

A. If it ever came up, I would -- anybody with rudimentary chemistry would know if you've got trichloribenzene, you got it from benzene; you start with benzene.

Q. Well, I guess the question I'm asking you is, when you were talking about the toxic effects of benzene in medical school, were you just talking about benzene, itself, or were you discussing all the various compounds that you can make with benzene?

A. No, just benzene.

Q. So really, you didn't get any

information in medical school about trichloro- or tetrachlorobenzene?

A. Not that I recall.

Q. So I guess I'm back to the same question: When did you first become aware that benzene was more toxic than trichloro- or tetrachlorobenzene?

A. Well, if you have, in medical school, reports that benzene causes leukemia, and you have no reports about trichlorobenzene or tetrachlorobenzene, I assume that benzene was more toxic because they talked about it and wrote about benzene and did not write about the other two.

Q. Benzene does, in your opinion, cause leukemia in man?

A. One type of leukemia, yes, sir.

Q. What kind?

A. Beg pardon?

Q. What type of leukemia?

A. I think it's a myelocytic.

Q. Myelocytic?

A. Mm-hmm. Could be lymphatic. I'm not sure, but --

Q. Is that monomyelo -- I'm trying to

remember. Monomyelo -- I can't remember. Okay. Myelocytic leukemia, you believe, is caused by benzene?

A. I believe that is the one. I could be mistaken. There are two types, myelocytic and lymphocytic, and I thought the myelocytic was the one that is accepted as being caused by benzene.

Q. And you are unaware of any scientific data, any studies that indicates that tetrachloro or trichlorobenzene causes that effect in man?

A. I am not aware of it.

Q. How about in animals?

A. I'm not aware of that, either.

Q. Is there any relationship between the toxicity of benzene, by itself, and trichloro- or tetrachlorobenzene in relationship, on a relationship of toxicity that you are aware of between those compounds?

MR. MALIN: I'll object to the form of that question because I don't understand it, but go ahead.

MR. COHEN: Let's back up. We'll

try again.

BY MR. COHEN:

Q. Would you agree that polychlorinated dibenzofurans are more toxic than PCB's?

A. Yes.

Q. Would you believe it's generally -- do you believe that it's generally accepted in the scientific community that they are at the same level of chlorination, that there is an established relationship of the toxicity between the compounds?

MR. MALIN: Object to the form of that question because I don't understand it, but if you do understand it, Doctor --

A. I don't understand the question.

BY MR. COHEN:

Q. Well, would you agree that a polychlorinated biphenyl and a polychlorinated dibenzofuran with the same level of chlorination would have a relationship where the dibenzofuran would be perhaps ten times or a hundred times more toxic than the PCB?

A. Yes.

Q. Do you know if any relationship that exists, similar type relationship that exists between benzene and trichloro- or tetrachlorobenzene?

A. No, I do not.

Q. How about chlorobenzene, itself?

A. Monochlorobenzene?

Q. Yes.

A. You mean in relationship --

Q. In toxicity between monochlorobenzene and benzene.

A. I still believe that benzene is the more toxic compound than the chlorinated benzenes, whether it's mono or tetra.

Q. So it's your understanding that when you chlorinate the benzene, it reduces its toxicity?

A. Well, it certainly reduces the aplastic anemia and leukemia potentiality of the benzene.

Q. And do you know the -- what is the effect in the organism of the benzene that makes it more toxic for aplastic anemia and the leukemias as compared to the

monochlorinated, dichlorinated trichlroinated, and tetrachlorinated compounds?

A. That affects the formation of the red cells, and it has something to do with change in the white cells that causes the leukemia. I do not know the actual physiological mechanism of how that occurs.

Q. Were you aware, during the 40 years that Monsanto was manufacturing Pyranol, that benzene was more toxic than trichlor- or tetrachlorobenzene?

A. Yes, I considered it more toxic.

Q. Did you ever make any effort to determine whether the product you were receiving, mixing and subsequently selling contained benzene?

A. No, sir, I did not.

Q. Do you know today whether it contained benzene?

A. I do not know.

Q. Do you recall having toxicologic information other than from scientific, published scientific text material regarding the toxicity of tri- and tetrachlorobenzene

during the time period that you were manufacturing and selling Pyranol?

A. I don't, do not believe we ran any toxicity testing on trichlorobenzene, so I would -- we may have. I don't know. I don't recall, but certainly, I relied on the scientific literature as far as the toxicity of trichlorobenzene was concerned.

Q. Do you know if the, if the test work that was done and reported in the scientific literature was a test on a product that contained benzene or whether it was a test on benzene, itself?

A. It was a test on trichlorobenzene, and I do not know whether it contained trace amounts of benzene.

Q. You are familiar with the name Hooker Chemical Company?

A. I cannot hear you.

Q. You are familiar with the name Hooker Chemical Company?

A. Yes.

Q. Does that refresh your recollection that they were a supplier of Monsanto?

A. No, sir.

Q. Do you know whether Hooker Chemical Company was a supplier of product to Monsanto?

A. No, sir, I do not know.

Q. Do you know what tin tetraphenyl is?

MR. MALIN: Would you say that again?

THE WITNESS: Tin tetraphenyl.

MR. MALIN: Could you spell that, perhaps?

MR. COHEN: Tin, t-i-n, tetra, t-e-t-r-a, phenyl, p-h-e-n-y-l.

A. I've heard the name, but I don't recall what its use was. I do not recall anything about the toxicity of it, but I have heard the name before.

BY MR. COHEN:

Q. So you anticipate my next question; you don't know anything about the toxicity of tin tetraphenyl?

A. I don't recall any such information at present.

Q. How about epoxide dicyclo-diepoxy

carboxylate?

MR. MALIN: Could you write that down for the doctor and the rest of us?

MR. COHEN: Sure.

MR. COX: Is there an acronym to put with that chemical?

MR. COHEN: Sure.

MR. MALIN: We want the whole thing.

While you're doing that, can we make a five-minute break?

MR. COHEN: Absolutely, but it won't take five minutes to complete this.

(Recess)

BY MR. COHEN:

Q. You never heard of it?

A. I may have heard of it, certainly.

Q. You don't remember hearing it?

A. No, but --

Q. Do you know any toxicity information?

A. Not that I recall.

Q. When were you first aware that dielectric fluid containing PCB's was escaping into the environment?

A. I can't answer that. I mean, obviously, sometime, the potential existed and I knew about the potential, but when I actually knew it was out there, that it was defined as PCB, was the Jensen and Widmark, '67, something of that order.

Q. Mid to late Sixties. You say you knew the potential for it was there. Is that because you knew the various uses that the product was being, to which the product was being put?

A. Yes.

Q. Did Monsanto, to your knowledge, ever make any study at any time to determine what was happening to their product after it was manufactured?

MR. MALIN: Object to the form of that question. It's entirely too broad at the same time.

A. I don't know what you mean by was it happening. Did it break down, are you talking about?

BY MR. COHEN:

Q. No, I'm trying to determine if they ever made a study to determine how the

product was being used and what was happening to the product.

MR. MALIN: Same objection.

Answer it if you can answer, Doctor.

A. Well, if they sold it to a transformer manufacturer, they knew pretty well it was going to be used in a transformer. If they sold it to a capacitor manufacturer, they knew it was going to be used in a capacitor. Once they sold it to the, to their customer, we did not follow the material into the customer's plant to see what they did with it, or how they disposed of it, or whether there were leaks at the plant.

BY MR. COHEN:

Q. To your knowledge, was Monsanto aware that the product was being sold for refilling and replacing, replenishing fluid in transformers and other electrical devices?

A. Did -- I want to be sure -- repeat that, please.

(The requested portion of the record read by the reporter)

A. Yes, I knew they were.

BY MR. COHEN:

Q. Did Monsanto know what was happening to the fluid that was first being used in the transformers?

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

If you can answer that, go ahead.

A. I don't know whether Monsanto did or did not know. The Medical Department did not know what was happening to it.

BY MR. COHEN:

Q. Prior to 1966 or '67, when the Jensen and Widmark article came out, to your knowledge, did Monsanto have any program to reclaim PCB fluid from transformers?

A. In '66 or '67?

Q. Prior to that time.

A. They did not that I know of.

Q. Subsequent to that time, did they ever have such a program?

A. Yes.

Q. When did they start it?

A. I thought 1970, approximately.

Q. Do you have any documents on that?

A. Well, they didn't use it to -- they incinerated the material. They had it sent back for incineration. They did not recycle it, if that's what you are asking, or reformulate it or -- it just --

Q. It was not purified and remanufactured, it was incinerated; is that correct?

A. It was incinerated, that's correct.

Q. And do you know how much they were incinerating from 1970 onward?

A. No, I don't.

Q. Do you know when Monsanto first started a program of marketing the product only for use in totally sealed systems?

A. I thought that was around 1972.

MR. COHEN: Why don't we mark that as Kelly 23.

(Kelly Deposition Exhibit 23 marked for identification.)

MR. COHEN: I regret that I don't have multiple copies of every document that we have. We have multiple copies of some, but not all.

BY MR. COHEN:

Q. Doctor, if you would, just take a look at Kelly 23 for a moment.

MR. COX: Well, since it's not being passed around, may we have an identification of the document when it is marked for the record?

MR. MALIN: Its purports to be on the letterhead of Monsanto Chemical Company from Washington, D.C., dated October 23rd, 1961: Subject, "Aroclors -- FDA," and purportedly signed by C. J. Eby and directed to H. S. Bergen in St. Louis.

BY MR. COHEN:

Q. Do you have any recollection of ever having seen that document before?

A. I certainly know about X disease, and I don't know about this specific memorandum, but I do know that I recall in the early Sixties about X disease in chickens.

Q. You do agree the document is addressed to you or copied to you, rather?

A. Copied to me, addressed to Bergen.

Q. In the ordinary course, would you

have received this document?

A. Yes.

Q. Tell me what you know about X disease.

A. Well, it's a disease characterized by edema, which is a collection of fluid in the pericardial, peritoneal and probably pleural spaces in chickens, and I do not know whether the causative agent was ever identified. They occurred in various outbreaks at various times around the country, and whereas -- and I do not whether PCB's was indicted or not. It was suspected, obviously, at one time, but I do not recall ever having seen a statement saying that that was a causative agent.

Q. So would it be fair to say as you sit here today, you cannot tell me what was the end of this investigation?

A. That's correct.

Q. See the language that "Dr. Horwtiz is hot on the trail"?

A. Yes, sir, I see that.

Q. What did, what do you suppose Mr. Eby meant by that?

MR. MALIN: Objection to the form of that question.

If you think you can answer, speculate as to what was in his mind.

A. No, I can't speculate what he was thinking. How hot is hot? No, I don't know.

BY MR. COHEN:

Q. "Hot on the trail," it doesn't mean anything to you in particular?

A. Well, it means he's got an idea that this may be connected in some way, but I can't speculate as to what Eby means by that, how intense he's on the trail or if he's just sniffing around.

Q. You see the reference here, sir, to Monsanto's analytical analysis, your methods of analysis? Do you see that, second paragraph?

A. In the same paragraph, the one he says, "We transmitted a sample of 1242 to Horwtiz. Was unable to find compound X in the sample. This seems to give our Aroclors a clean bill of health." Is that what you wanted?

Q. Well, you just chose to read those

two sentences. Do you accept --

A. I thought you said it was in the first paragraph.

Q. No, you chose to read those two sentences. Do you accept the fact that because Dr. Horwtiz was unable to find so-called compound X in your Aroclor, that the PCB's are not involved?

A. Well, certainly, according to Horwtiz said it wasn't.

Q. You are saying Horwtiz didn't find it.

A. That's correct.

Q. And would you accept that as being dispositive of the issue?

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

If you think you understand the question --

MR. COHEN: I didn't ask him about the sentence; he read it. I'm asking him now does he accept that as dispositive of the issue as to whether or not PCB's were involved.

A. Accept it as what? You used --

BY MR. COHEN:

Q. Dispositive of the issue.

MR. MALIN: Same objection.

A. I don't know what -- "dispositive" is a legal term that I don't know what it means.

BY MR. COHEN:

Q. Well, does it resolve the question for you as to whether or not compound X is related to PCB's?

A. Well --

MR. MALIN: Same objection.

A. It settled it as far as I was concerned unless new evidence showed up.

BY MR. COHEN:

Q. It did settle it as far as you were concerned?

A. Yes, but it seems like there is an ongoing investigation, so it settled it as far as July was concerned. Now we're back here in October in a different -- it looks like it's a different ball game back in October.

Q. Who was the Dr. Horwtiz referred to in this memo?

A. Of the Food Division of the Food and Drug Administration. That's Dr. Horwtiz.

Q. Yes, but what do you know about him?

A. Don't know anything about him.

Q. Is he a medical doctor?

A. I don't know that.

Q. Would you accept the results of this man's work as being -- I don't want to use the word "dispositive" -- as resolving the issue for you?

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

A. Well, in July, it seemed like to resolve it for Horwtiz, and he's the one that brought up the problem, and it resolved it for him. I'd accept that fact that, if he was happy about it, I was happy about it.

BY MR. COHEN:

Q. Do you know what Dr. Horwtiz holds his doctorate in?

A. I haven't the slightest idea of anything about Dr. Horwtiz outside of this memorandum.

Q. Could he even be a doctor of

theology, as far as you know?

A. I don't know what he is.

Q. I asked you about the sentence on the analysis, methods of analysis. Do you see that? Second paragraph, sir, about halfway through.

(Pause)

BY MR. COHEN:

Q. You see that reference, sir?

A. Yes, I do.

Q. And there's a reference to "chromatographic"?

A. That's correct.

Q. Can you tell me what he was talking about?

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

A. He was talking about some analytical procedure for determining the, the ingredients in Aroclors, yes.

BY MR. COHEN:

Q. Called chromatographic?

A. That's correct.

Q. Those are Mr. Eby's words?

A. Yes, sir.

Q. Or that is Mr. Eby's word, to be precise, "chromatographic," one word.

A. Well, that's -- he wrote the memorandum and that's what he used.

Q. Do you know what he was talking about?

A. Well, I know what I would interpret it as.

Q. What?

A. Well, a chromatographic is an analytical procedure using color, and I don't know with whether that's gas, liquid chromatography or not. I don't know that. But it's a form of analytical chemistry.

Q. What did you take it to mean back in '61? Do you know?

A. Just what I said. It was a method of analysis.

Q. Had you ever seen it done?

A. I may have walked into a laboratory where someone was doing it, but I'll have to repeat again, I am not an analytical chemist.

Q. So you don't know exactly what chromatographic technique he was using at

that -- I'm sorry, that Monsanto was using at that time and that Mr. Eby was referring to?

A. I do not.

Q. Does it refresh your recollection that sometime in the early Sixties, Monsanto Chemical Company had chromatographic analysis techniques?

A. Well, I do --

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

Go ahead answer the question.

A. I would have to answer that question by explaining we had a Dr. Munch, M-u-n-c-h who was a Ph.D. in the Analytical Research Department who was one of the early workers with gas chromatography and was one of the authorities in that particular field.

BY MR. COHEN:

Q. What department was he in?

A. Beg pardon?

Q. What department was he in?

A. The Research Department, in the analytical area.

Q. Is that the same Dr. Munch who later worked with Drs. Suskind and Zach doing

studies on Monsanto employees?

A. No.

Q. Another person?

A. That man was not a Ph.D. That was not a doctor.

Q. Any relationship between the two that you know of?

A. Not that I know of. I don't even know if they spelled the name the same.

Q. So would it be fair to say, then, that Dr. Munch, who was a pioneer in chromatographic techniques, was an employee of Monsanto Chemical Company at the time he pioneered these techniques?

A. That's correct.

Q. Would it be fair to say, then, that Monsanto Chemical Company had chromatographic analytical techniques as early as anyone did?

A. No, I wouldn't say that, because they -- it depends on what you are analyzing for and where you are analyzing it. We certainly did not have the technique to pick up PCB's in feathers of birds which Jensen and Widmark had at the time, in 1965, or '66.

We may have had expertise in other fields of analytical chemistry, looking for PCB's, but we didn't have it in the work that Jensen was doing.

Q. Is that because Jensen and Widmark had more sophisticated analytical techniques than Monsanto had in the Sixties?

A. I knew they had different equipment at Monsanto obtained after visiting Widmark and Jensen. That's all I could comment on the various expertise of both, of either group.

Q. Well, if you weren't looking at bird feathers, what were you looking for? What types of milieu or media were you looking for PCB's in in the Sixties?

A. I don't know what they were looking for.

Q. How about your own product?

A. Beg pardon?

Q. How about your own product?

A. I don't know.

Q. Do you know if you were looking in your own product to see what it contained?

A. I don't know.

Q. Who would know that?

A. Well, I'm sure Munch would.

Q. What's Munch's first name?

A. Ralph.

Q. Is he alive?

A. I don't know.

Q. He's a medical doctor?

A. No, he's a Ph.D.

Q. In what field?

A. I don't know what field he was in. I mean, he was in analytical chemistry, so -- but I don't know any more about it than that.

Q. Do you know where he obtained his degree?

A. No, sir, I do not.

Q. Do you know, can you tell me, sir, is he a younger man than yourself?

A. Yes, he's younger. Most people are.

Q. When is the last time you heard anything about Dr. Munch?

A. During one deposition, they were trying to find him, and he was on his own boat outside of the State of Washington someplace and they tried to get him on a

ship-to-shore telephone. He had retired from Monsanto about five years after I did, and I do not know if there was any connection with Monsanto after he retired. I haven't seen him for fifteen years.

Q. So he was employed by Monsanto up until about 1979?

A. I can't be sure of the date. I mean, he was there when I left, and I don't know when I left at the end of '74, so I don't know when he left.

Q. Do you know how old a man he was when he retired?

A. No, I don't, whether he retired early or whether he retire at 65, I don't know.

Q. Do you see the reference that Mr. Eby apparently made some efforts and succeeded in calming down Dr. Horwtiz?

A. Yes, sir.

Q. Do you know what he meant by that?

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

If you think you can understand that question, Doctor, try to answer.

A. Well, I do not know what Mr. Eby meant by the term "Calmed Horwtiz down," except that it would appear to be that he gave him information that was important to Horwtiz and he was going to check back with Eby if he needed any more information.

Q. So that's what you took it to mean?

A. Yes, sir.

Q. Did you ever get involved in the hunt for compound X?

A. Did I ever get involved with compound X? No, sir, I did not.

Q. E. P. Wheeler, we identified him before, I believe. He was one of your assistants?

A. That is correct.

Q. Was he a medical doctor, also?

A. No. He was a chemical engineer who was in charge of our Industrial Hygiene Department and was administratively in control of our Toxicological Department.

Q. And Mr. Wheeler, where is he now?

A. Beg pardon?

Q. Where is he, Mr. Wheeler?

A. I hope, in Heaven.

Q. He's deceased?

A. Yes.

Q. So we're not going to take his deposition.

A. It would be hard.

Q. Nor are we going to reach him on a ship-to-shore radio.

MR. COHEN: Why don't we mark this as Kelly 24. I have a couple of extra copies, folks.

(Kelly Deposition Exhibit 24 marked for identification.)

MR. McLAUGHLIN: Is this 24 or 27?

MR. COHEN: Well, we had a list that went 1 through 22. I'm sworn to secrecy as to where we got this.

MR. INNELLI: The same source as everything else, Gore Reporting Company.

MR. COHEN: Yes.

MR. COX: Again, may we have the document described for the record, please?

MR. COHEN: Do you want to ask these questions, John? It's my deposition so far. You are welcome to start..

MR. MALIN: Well, all right, for Roger's information, it's --

MR. COX: For the record purposes, as well.

MR. COHEN: I'm letting the witness look at it. I thought that would be a courtesy before I asked him to identify it.

MR. COX: What the document is: Not just the number of the document, but what it is.

MR. COHEN: I think the witness can look at the document first before he's asked to identify it. I think that we should have the witness identify the document. That's testimony. Having Counsel identify the document is not.

(Witness peruses said document.)

BY MR. COHEN:

Q. Do you recognize the document that's been marked as Kelly 24, sir?

A. Yes, I do.

Q. Can you tell us what it is?

A. It is a memorandum from Albert P. Wheeler to W. R. Richard of Monsanto, with

copies to seven different people at Monsanto, including myself, dated December the 9th, 1968, and the subject is Aroclor -- minutes of our discussion with Dr. Calandra, C-a-l-a-n-d-r-a.

Q. Is there something missing up there on the line below "R. E. Keller" and above "W. T. Johnson"?

A. Yes, sir, there's a space there. I don't know what that means.

Q. Does it appear to you that after the word "of," another word starts and then it's sort of obliterated?

MR. MALIN: Where are we referring to?

A. Where are we?

BY MR. COHEN:

Q. Or is that "Minutes of our"? Is that what it says?

A. "Our discussion," o-u-r.

Q. Okay. So that's, as far as you know, opposite the word "Subject," Aroclor is -- "Minutes of our discussion with Dr. Calandra" would be the entire subject?

A. That's what it looks to be like.

Q. Do you have any idea what is obliterated, then, between the name "Keller" and "Johnson"?

A. No, sir, I haven't the slightest idea.

Q. Do you have any recollection of having seen this document before?

A. Yes, I recall it.

Q. You do recall it? And Mr. Wheeler is the gentleman we just discussed a few minutes ago and discussed six, seven months ago, likewise?

A. Yes, sir.

Q. And Mr. Richard?

A. He is a man in the Research Department.

Q. What position did he hold in the Research Department in the late Sixties? Do you recall?

A. I don't know. He's a Ph.D. that was fairly high up in the Research Department.

Q. So it's actually Dr. Richard?

A. Dr. Richard.

Q. First name?

A. William, Bill.

Q. You see the handwritten material on this memo?

A. Yes, sir, I do.

Q. Do you have any idea who wrote that material?

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

Q. It's not your printing, is it?

A. I cannot hear you.

Q. It's not your printing, is it?

A. No, it certainly isn't.

Q. Do you see paragraph numbered 5?

A. Yes, sir.

Q. "The advisability of determining the character and possibility of isolating the 'major fraction' in each of the Aroclors to be studied is to be explored."

A. Yes, sir, I see that.

Q. What do you make that language, "major fraction," to mean?

A. Well, we stated it before that Aroclors are a mixture of chlorinated materials chlorinated to various degrees, and certainly, I would interpret that as saying if you have Aroclor 1254, a major fraction

may be chlorination of 54 percent. I can't give you figures as to what percentage would be 1254 and what percentage would be 1250, 1242, or even 1260, but I think for analytical reasons, they try to pick the major fraction to use that as a standard for identification of Aroclors.

Q. And that would be the biphenyl chlorinated to the degree that the particular Aroclor was intended to be chlorinated; is that right? Such as in Aroclor 1254, the biphenyl that was chlorinated to 54 percent?

A. Well, I don't understand what you mean by "intended," because when they chlorinate the biphenyl, they end up with a certain mixture of varying chlorination groups. I don't know if they intended it or could chlorinate it to precise 1254. They may, as a laboratory compound, a laboratory compound, do it under that type of research facility, but in manufacturing processes, you get the mixture, so they really are looking for an average of 1254.

Q. Do I understand that you are saying that in the laboratory, you may be

able to control the process to the point that you could get Aroclor 1254?

A. That's my understanding.

Q. When you manufacture it, you are going to get something around 1254?

A. That's correct.

Q. And it's going to contain Aroclors that are chlorinated to much higher levels and Aroclors chlorinated to lower levels?

A. That's right. I don't know about much higher. It could be higher. I don't know if it's much higher: I don't know if you go up to 1268 or something like that.

Q. I'll withdraw the "much": Somewhat higher and somewhat lower?

A. That's correct.

Q. But average, the product, if it was as said, would come out to 1254?

A. That's correct.

Q. Or thereabouts.

A. Yes, sir.

Q. And that's what you take "major fraction" to mean?

A. That's what I believe.

Q. In 1968, to your knowledge, was

Monsanto aware that their Aroclors contained, as you called it, trace compounds of contaminants?

A. Yes, I think so.

Q. Do you know what they believed those trace compounds of contaminants to be?

A. No, I don't know if there were inorganic compounds like iron or something like that. I'm not -- I don't know what they were.

Q. How about organic compounds?

A. They may, but they did not -- I'll anticipate your question -- they did not know whether it contained dibenzofurans.

Q. So when we get to the chlorinated hydrocarbons, you are going to say they did not know that it contained a dibenylfuran, dioxins, quarter phenyls, et cetera?

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

A. They --

MR. COHEN: What's the objection? I'm asking about all these compounds.

MR. MALIN: Well --

MR. COHEN: They were not worried

about it at that time.

MR. MALIN: Well, you are intimating --

MR. COHEN: That what?

MR. MALIN: That certain compounds may have been contained therein, so I object to the form of the question.

BY MR. COHEN:

Q. Well, you would agree with me, Doctor, would you not, that trace compounds, as you called it, of contaminants such as dibenzofurans exist in the manufactured Aroclor?

A. They may, yes, sir.

Q. How about dibenzodioxins?

A. No, I've never seen any report of that.

Q. How about quarter phenyls?

A. I've never seen any report of those.

Q. How about benzenes?

A. I object to the form of that. Well, make it clear: Are you talking about the Aroclors compounds --

MR. COHEN: I'm talking about your

Aroclor product, your Aroclor product.

MR. MALIN: Before it's formulated with trichlorobenzene?

MR. COHEN: Yes, before it's formulated.

MR. MALIN: All right.

BY MR. COHEN:

Q. Aroclor, let's talk about Aroclor right now. Let's not talk about the Pyranol and the Inerteen that you also sold, but in the Aroclors, do you have any information that it contained benzene, whether chlorinated or otherwise?

A. I do not know. I have no information to answer to that.

Q. How about naphthalenes?

A. I do not have any information about that.

Q. Chlorinated naphthalenes?

A. I still don't know that, have any information about that.

Q. Would it be fair to say the only trace contaminant that you are aware of being present in the product from time to time is dibenzofuran?

A. At the present time, yes, but I feel sure I have seen analytical reports of other trace compounds, but I do not recall them.

Q. Do you remember when we were talking, here, last time, you talked about some very early studies that had been done by a Dr. Drinker?

A. Yes, sir.

Q. And you said that you felt that when you looked at his studies regarding the toxicity of dielectric fluids, supposedly PCB fluid that he was testing back in the late Thirties, that you didn't think that that was reflective of Monsanto products; is that right?

A. That's correct.

Q. And was that because it contained chlorinated naphthalenes?

A. No, sir, it turned out it contained chlorinated poly -- there was another benzene ring hooked on. It was chlorinated dibenz -- my analytical expertise is failing me, but it was, he thought it was 1260 or 1268. Oh, it was chlorinated

diphenyl benzene, I believe. It was not a chlorinated naphthalene, it was a chlorinated, more or less of a terphenyl. It was chlorinated diphenyl benzene.

Q. Which was not a product that you were manufacturing?

A. Hmm? Yes, we manufactured it, but it was not a PCB.

Q. Did you sell it for dielectric fluid?

A. No, we did not.

Q. What was it used for? Do you recall?

A. I don't recall.

Q. If I could ask you, sir, to look at the Kelly 24 exhibit again, do you see that paragraph with the asterisk at the bottom, below paragraph 6?

A. Yes, sir.

Q. It says, "Equally important, it will provide Scott an opportunity to look for the GC peaks reported in the literature."

A. Yes, sir.

Q. I believe that asterisk refers to the last sentence in Paragraph number 1.

A. Yes, sir.

Q. Who is Scott?

A. My guess, my assumption is it's Scott Tucker, who is a Monsanto analytical chemist that was working on this problem.

Q. Which problem?

A. The problem of analyzing chickens and toxicological specimens for the presence of PCB's.

Q. What were they referring to when they say, "GC peaks reported in the literature"?

A. Gas chromatography, I presume.

Q. Would this refresh your recollection that as of the late Sixties, the literature was reporting gas chromatographic tracings for the Aroclors?

A. Would what? Would you repeat that question?

(The requested portion of the record read by the reporter)

A. Well, I'm sure they were, but what I said earlier was, we did not have the additional refinements that Widmark and Jensen had when they found it in eagle

feathers and other avian species. Now, this is December '68. I'm sure we had that, that refinement in the added equipment that was obtained.

Q. What was that added equipment? Is that mass spectrometry?

A. I don't know whether it was associated with other analytical things like electron captures, things of that sort that I don't know anything about, but all I know is, they didn't have it and they got it.

Q. You don't see any mention in this memo of electron capture or mass spectrometry, do you?

A. No, I don't.

Q. Do you know what the detection limits were that Monsanto had been working with in their chromatographic analytical technique prior to the time that they met with Jensen and Widmark?

A. No, sir, I do not.

Q. Was it in the parts per million range, or parts per billion, or parts per trillion? Do you know?

A. I do not know.

Q. How about Jensen and Widmark: Do you know what detection limit range they were working?

A. No, sir, at the present time, I do not know that.

Q. Do you believe, sir, that using epidemiological techniques or otherwise, that you can establish to an acceptable level of certainty whether an exposure to any chemical can cause any form of medical injury?

MR. MALIN: Object to the form of that question. It has too many vagaries.

If you think you can answer that, Doctor.

THE WITNESS: Well, I'll have to have it repeated.

(The requested portion of the record read by the reporter)

A. What do you mean by "or otherwise"?

BY MR. COHEN:

Q. Other than epidemiological studies.

A. Yes, that's what you said, "or otherwise."

Q. Animal studies, anything you would care to use, any scientific testing technique.

MR. MALIN: Same objection.

A. Well, first of all, it's very hard to prove a negative, but I think you could get a certain area of confidence through epidemiological studies, if they are correctly carried out, and follow the four accepted tenets of epidemiology. I think animal testing is not as important because they are usually given enormous amounts vis-a-vis what the individual is exposed to, but the answer, I would say, with those qualifications, is yes.

BY MR. COHEN:

Q. Well, do I understand your criticism of animal studies is the high dosage of the agent that's being studied?

A. Well, that's one of them. The other is, animals do not metabolize things the same as humans in all respects.

Q. Have you, yourself, ever engaged in animal research?

A. You mean have I done toxicological

handling of the animals that administered the material to them? I have not. I've read lots and lots of toxicological reports.

Q. I'm sorry, you've read lots of toxicological reports?

A. Yes, but I'm not a toxicologist; I did not do the actual animal experimentation.

Q. Well, without regard to whether you actually were in the lab, feeding the animals the agent, and studying them either during their lives or postmortem, my question is, have you ever been involved in animal research at any level, whether you supervised it, ordered it, directed it, controlled it, established the protocol, any element of the activity?

A. Well, you had four verbs in there. I certainly ordered them.

Q. Okay.

A. I certainly read their reports. I certainly was at the beginning of the experiment where the protocol was decided upon, so I don't know what other questions. I did not engage in the actual dosing of the animals.

Q. At any time during your educational process or subsequent thereto, were you involved, other than as you've just described, in doing animal research?

MR. MALIN: Object to the form of that question. I don't know what you mean by educational process or otherwise, but if you understand it, Doctor, go ahead.

BY MR. COHEN:

Q. Well, start with medical school.

A. Yes, sir.

Q. Did you do any animal testing in medical school for research projects?

A. Just for educational and pharmacology, you dosed animals, but that was not for research; that was just for educational purposes.

Q. Well, that's what I was asking about. So during your educational process, you actually did do animal-type research as part of your educational process, itself?

A. Well, what you say, it isn't what you say as research. I don't agree that the animal work we did in medical school was research. That was educational. We knew

what was going to happen, and it gave us a better idea of what was going to happen. We weren't trying to find out something unknown, which is my impression or definition of research.

Q. So you were doing the testing at that time, I guess, to learn the technique? Would that be fair to say?

A. To learn the action of the drugs, yes. The technique, I don't think, was -- you don't need much technique to inject an animal.

Q. All right, let's talk about the studies, then, that you had, as you said, ordered. I believe you said that you were involved in ordering them and you were also involved in establishing protocols. Is that correct?

A. That is correct.

Q. What was your purpose in undertaking the animal studies?

A. To find out what the toxicity of a particular product was, either the acute toxicity or the chronic toxicity.

Q. Now, what was -- what organism

were you interested in learning the toxicity of?

A. Well, obviously, we would be interested in knowing -- the organism would be man, but man is not an accepted laboratory test animal, so we used the common ones of rodent species and canine species.

Q. You also used other animals, too, did you not?

A. In special cases, we used fowl, and later on, monkeys may have been used, but they were not used anytime when I was there.

Q. Did you feel that the information that you would gain from the animal tests would be relevant to determining the toxicity in man?

A. It could and could not, yes, but it's the only thing we've got. It's the only game in town. It might give you the target organ, and it would give you a, an appreciation of the toxicity of this compound versus other compounds that were tested in the same species.

Q. Well, when you were, as Medical Director of Monsanto Chemical Company, asked

questions about the toxicity of certain compounds, you gave opinions, didn't you?

A. Yes.

Q. Those opinions were based in large measure on animal studies, were they not?

A. Yes, sir.

Q. Animal studies that were negative, for example, that induced no toxicity, you reported to inquirers that the substance was negative, it was not toxic.

A. In the doses given, yes, sir.

Q. So you felt that the animal studies were probative, certainly, of negative levels of toxicity?

A. Well, usually, in an animal study, you strive to set the protocol so that you will get positive findings, and a level that you will get negative findings, and a level in between that you hope would be the highest negative level obtainable, so when we would report to our inquiries, in answer to questions, we would say this has an LD-50 of "X" grams, which we consider to be a mild toxicity as far as an industrial chemical is concerned.

Now, if you are talking about other information gained from animals, you could say that this material shows it can be absorbed through the skin, this material shows that -- I mean, these data show that small amounts can be given over a lifetime of animals with no demonstrable ill effect.

Q. So you would agree that the animal tests, for example, are probative of routes of absorption?

A. Yes, sir.

Q. Would you believe that the information you gained regarding routes of absorption in animals would be translatable into man?

A. Yes, sir.

Q. But as I understand it, you do not feel that the results of the toxicity in animals would be translatable to man?

A. Well, it could and could not.

Q. What would be the factors that would make it translatable to man?

A. If one were to find out that the material was metabolized by the test species in the same way as it occurs -- as it does in

man, that would be probative, as you stated. Animal species vary. The guinea pig may or may not be ten times as sensitive or one-tenth as sensitive as a rat.

(Pause for telephone call.)

MR. COHEN: Hold it there, please, Doctor.

(Pause)

(Discussion off the record)

THE WITNESS: Where were we?

MR. COHEN: Why don't you read the answer back for him, Mr. Jordan.

THE WITNESS: Start with the question.

MR. COHEN: Good.

(The requested portion of the record read by the reporter)

A. (Continuing) And the human may be entirely different to either of them.

BY MR. COHEN:

Q. How would you find out if the material were metabolized by the test species in the same way as it is in man?

A. I think you look for the breakdown products in the blood and the urine.

Q. Did you, in your animal testing, make any efforts to look for the breakdown products, like the metabolites in the blood and the urine?

A. We may have in some of them. I do not believe we did for the PCB experiments.

Q. You did not?

A. Not that I know of. I don't know.

Q. Any particular reason why you did not look for the breakdown products in the blood and the urine for PCB's?

A. It may be that we did not have, in 1969-70, as refined methods to get down to a detection level that would be needed. That may be it, and I think we also found the target organ in the animals was the same as the target organ in the human, as judged by the rare cases of acute exposure to hydraulic fluids containing, or to heat transfer compounds containing PCB's.

Q. And that target organ is the liver?

A. I can't hear you.

Q. That target organ is the liver?

A. Yes, sir.

Q. So you determined that, in your animal tests, the target organ in the animals was the same as in humans, the liver.

A. That's correct.

Q. That's for PCB's.

A. Yes, sir.

Q. So did you, thereby, feel that it was no longer necessary to look for the metabolites in the animals to determine that they were the same as in humans?

A. I, as I said before, I do not know if we did, if they did look during the course of the experiments for the metabolites. I do not know, but I think if you found, had the same target organ in both, you would be on very, relatively safe ground to think that they were metabolized the same.

Q. Well, then, would you agree that the results of the animal studies, the animal studies of PCB's, would have relevance to determining or predicting disease in man?

A. Yes, sir, but again, one has to look at the exposure level and the route of exposure.

Q. Now, sir, you said it may be that

we did not have the refined techniques back in the late Sixties. Are you saying that you did not have the refined techniques back in the Sixties to look for the metabolites in the animals?

A. We may not have. I do not know if we had analytical techniques to look for the metabolic end chemicals in the blood. I don't know if we had that.

Q. Do I understand that as you sit here, today, in 1991, you lack the recollection to tell us what you had available to you in the late Sixties?

A. That's correct.

Q. Would it be fair to say that as of the time you retired as Medical Director at the end of 1974, that you had the analytical techniques to determine the metabolites in the animals' blood and urine?

A. I can't answer that because I don't know what the metabolites were. I mean, I don't know that. I didn't know it then and I don't know it now, so I do not know whether we had such refinement. We certainly had a more refined analytical

procedure in '74 than we had in '68 or '70, but I can't answer that any more than --

Q. Let me ask you this: If you had the technique available to you, would it be fair to say that you would not have done anything to limit the protocol or the scope of the examination so that the metabolites would not be studied?

MR. MALIN: Object to the form of that question. I really don't understand it.

If you understand it, answer it.

MR. COHEN: If you are confused, Doctor, I'll restate it.

THE WITNESS: Restate it, please.

MR. COHEN: Certainly.

BY MR. COHEN:

Q. You never made any effort to restrict the examination of the blood and urine products of the animals to determine the existence of the metabolites in those animals, did you?

A. No, the answer -- you said I never made any effort to restrict the examination --

Q. Right.

A. No, I did not.

Q. You didn't do anything to prevent them from finding out if it was metabolized the same way as in humans?

A. No.

Q. Do you know of anybody in Monsanto who ever said, "Don't do that"?

A. No, sir, they did not.

Q. Do you know of any responsible scientist who ever took such action?

A. Such action saying, "Don't do it"?

Q. Yes, trying to prevent the discovery of the metabolites.

A. No, sir.

MR. MALIN: Object to the form of the question as too broad and vague, but --

A. I know of no scientific person, I know of no person who tried to restrict the testing we carried out.

BY MR. COHEN:

Q. From 1975 to the present, have you seen evidence from animal studies that indicate the study of metabolites of PCB's in animals?

A. I think I have, but -- I have some

recollection, but I don't know where I saw them.

Q. Would you agree that the results of those tests indicate that the material is metabolized the same way in laboratory animals as in humans?

A. No, sir, I can't answer that. I don't know whether that's true or not.

Q. You don't know?

A. No.

Q. Do you know if it's metabolized in any laboratory animal the same as in humans?

A. No, I don't know that.

Q. Are you familiar with the work that has been done on primates?

A. Vaguely. I don't know the exact details, yes, sir.

Q. Do you know whether they determined, when they did their study on primates, whether the PCB's were metabolized in primates the same as in humans?

A. Who is the "they"?

Q. The scientists who did those studies.

A. I do not know whether they went

into metabolites or not.

Q. Have you ever seen any of the work done by Drs. Allen and Bersotti?

A. I may have. The name sort of rings a bell, but I don't recall the details of their study.

Q. Now, you said that you feel that animal studies are relevant to predict, animal studies of, involving PCB's are relevant to predicting disease in man; is that right?

MR. MALIN: I object to the form of the question. You talked about toxicology.

MR. COHEN: If you want to, we'll go back and read his last answer.

MR. MALIN: He talked about toxicological effect. He didn't say disease.

BY MR. COHEN:

Q. All right, let's talk about the toxicologic effect, Doctor. Do you believe that the animal studies are relevant to showing the toxicological effect of PCB's in man?

A. Yes, they are relevant if one

considers the dose and the exposure.

Q. Okay. Now, when you say they're relevant if you consider dose and exposure, step by step, tell me what you mean.

A. What I mean is, if you give an animal a PCB in 10,000 parts per million, you will get an effect, obviously. Now, that effect could be relative to man with the exception that you don't expect the man to get 10,000 parts of PCB in his diet for a lifetime. That's the -- that's as far as the dose is concerned.

As far as the exposure is concerned, if you have an individual or animals that have certain ill effects from skin contact, that is relevant to the action of the material as being absorbed through the skin, but it's not relative to the use that the material is put to. In other words, if you -- if a man has exposure to PCB over a good part of his body every day for the -- for during his working career, that is -- the animal experimentation would be relevant to that, but you do not expect that kind of an exposure.

Q. All right. Now, while you don't expect that kind of exposure, you would agree that if a human was exposed to PCB's so that it was on his body, as you described, during substantial portions of his workday over a long period of time, you could expect the same type of absorption as you found in the animal?

A. Yes, sir, I think so. That's why we were against repeated or prolonged skin contact.

Q. And that's because you are concerned that it will be absorbed into the human?

A. We don't want it absorbed into the human, yes.

Q. Now, if it is absorbed into the human, what toxicologic effects would you expect?

A. It depends on the dose. If -- you may have no toxicological effects at all.

Q. At extremely low dose levels?

A. Yes, sir. I don't know what you mean by extremely low. I mean, if you are talking about a teaspoonful on the skin,

but -- or the average work exposure the person has had in the electrical industry, that's one thing. I mean, as, from your epidemiological standpoint, there have not been any illnesses in industrial workers who were manufacturing or using PCB's with the exception of chloracne.

Q. What do you know about the exposures in those epidemiological studies?

A. Well, I've been in a couple of plants where they had it, but I don't know if -- I'm taking the word of the government epidemiologists, I'm taking the word of Kimbrough, who is the leading government expert on PCB's, in which he stated that there have been no, with the exception of chloracne and acute episodes, have been no demonstrable clinical effect in workers.

Q. So you are sitting here, today, you are relying upon Dr. Kimbrough.

A. Among other people, yes, sir.

Q. I'm asking you what you know about the exposures that these people had in the epidemiological studies.

MR. MALIN: Object to the form of

that question.

Do you want to identify the studies you are talking about?

MR. COHEN: Any studies. He just talked about studies in electrical workers.

BY MR. COHEN:

Q. What do you know about the exposure, whether from the report or from your own information from those studies that you referred to?

A. I don't know the details of the exposure levels, but there have been studies on PCB levels in industrial workers, and those were the ones that Kimbrough relied on in her statement. There were certain levels of PCB's found in her blood. I've been in a transformer factory where I've seen the exposure that they get, and I assume that the other transformer manufacturers were pretty much like the one I was in.

Q. Do you know if the exposures in those epidemiological studies involved new dielectric fluid?

A. I don't know that.

Q. Do you know if it involved used

dielectric fluid?

A. I would assume it did involve both, because there were topping off transformers, there were repair of transformers, where the people were, were getting exposure.

Q. It's an assumption on your part?

A. Yes, sir.

Q. You don't recall what the report said?

A. Well, the report said there have been no cases of clinical --

Q. I don't mean to interrupt you, sir. I'm trying to focus on this one issue of what you know about the exposure from these epidemiological studies. Do you know whether it involved new dielectric fluid, or used fluid, or some combination of both? Do you know?

A. No, I do not know.

Q. Do you know whether the fluid was Aroclor?

A. I don't know if it was Aroclor, except that these people who reported the epidemiological studies said that industrial

workers exposed to PCB's, and Monsanto was -- Aroclor were the only PCB's manufactured for the industrial transformer use, capacitor use, and conceivably, they may have used foreign material, but I don't know.

Q. Could have used Cantaclor?

A. Beg pardon?

Q. Could have used Cantaclor?

A. Could have, but I've seen no reports to the United States that they used French PCB's or Japanese PCB's.

Q. The Japanese PCB's, some of them have five times as many dibenzofurans in new product as Aroclor; you agree with that?

A. Yes.

Q. How about the French?

A. I don't know about five times, but they've had the one test I've seen that they had more than was found in the Monsanto product.

Q. Do you know if the dielectric fluid that was involved in any of these tests also contained tetrachlorobenzenes?

A. I do not know that.

Q. Free benzenes?

A. I do not know that.

Q. Chlorinated naphthalenes?

A. I do not know that.

Q. What about animal studies from repeated exposure through skin; do they show any toxicologic effects?

A. Yes, sir.

Q. What toxicologic effects do they show?

A. Chemical hepatitis, changes in the liver.

Q. Anything else?

A. Not that I recall.

Q. Any neoplasms?

A. No, sir.

Q. No neoplastic disease reported?

A. Not that I recall. Usually, skin, skin applications do not run over prolonged periods of time.

Q. So they -- the testing is too short to develop a level of absorption in those tests to develop other types of changes such as neoplasms?

A. I would think that's correct.

Q. Would you feel, from what you know

about oral ingestion animal studies, that if dermal absorption tests were continued over a longer period of time, chronic high-level exposures, that neoplasms could develop in animals?

A. I do not think that, to use your term, "chronic high-level exposure" would allow the animal to live long enough to develop any neoplasms.

Q. And is that because of the life expectancy of the animal, or because it would die from other toxic reactions to the substance?

A. He would, he would have problems with other toxic reactions, if you say chronic high-level exposure. You'd have to really quantify what you mean by "high-level" for me to answer that with hundred percent accuracy.

Q. All right. So without a hundred percent accuracy, you would expect the animal to die from other toxic reactions before it developed neoplasms?

A. If you gave it, if you had a high enough level, yes.

Q. You do agree that animal studies have shown neoplastic disease when the animals have had high-level oral ingestion of PCB's?

A. There have been positive studies and negative studies.

Q. You do agree there are positive studies?

A. Yes, sir.

Q. How about changes to the bone marrow, the blood-forming cells?

A. I do not recall of any such action.

Q. How about other forms of liver disease?

A. There has been hypertrophy of the liver; there's been enlargement of the liver in chronic feeding of animals.

Q. How about derangement of enzyme production?

A. Yes, sir.

Q. Are you aware whether derangement of enzyme production has any other adverse physiologic effects?

MR. MALIN: Are you talking about

animals, here?

MR. COHEN: In animals.

THE WITNESS: Say that over again. Repeat the question.

(The requested portion of the record read by the reporter)

A. Any other than what?

BY MR. COHEN:

Q. Other than the derangement of the enzyme production, itself.

A. Well, usually, the, the enzymes are affected by any toxic compound. If a person takes three ounces of alcohol at night, he will get changes in his enzyme production. Now, whether --

Q. Does anyone care?

A. Yes, let me finish.

So whether the next day or a week later his enzymes are normal, there is no clinical effect.

Q. But if he takes three ounces of alcohol daily, there will be other physiologic effects?

A. No, I think the dose is probably too low, because millions of people take

three ounces of alcohol a day with no ill effect clinically.

Q. But there certainly is a level of the alcohol ingestion that you've used, as an example, that would ultimately result in other physiologic effects from the enzyme derangement?

A. Yes, sir.

Q. Similarly, with PCB's?

A. Well, I don't believe that's ever been occurring. It certainly hasn't been -- there have been no reports of other physiological effects.

Q. Are you aware of tests to determine other physiologic effects?

A. Well, there are liver function tests, yes.

Q. I'm asking you whether you are aware of the test that set out to determine whether there was an effect from long-term enzyme derangement as a result of PCB exposure and the consequent physiologic effects from that.

MR. COHEN: Try it again. Try it again.

(The requested portion of the record read by the reporter)

A. Well, I don't know of any test they could test for a particular enzyme derangement. The liver has enormous amount of functions in the metabolism of the body that you test for liver function by checking levels of various enzymes. Now, I don't know how you test for the end result of enzyme derangement with the exception of checking on the levels of these enzymes in the blood.

BY MR. COHEN:

Q. I don't think you understood my question. I was trying to determine whether you were aware of either an epidemiological study or an animal toxicity study that was done or formulated with the goal of determining the effect of long-term liver enzyme derangement from PCB exposure.

A. I think that the epidemiological studies that have been done have been morbidity studies and mortality studies. I do not think, I do not recall any that went into the mechanism of the morbidity or the mechanism of the mortality.

Q. Is the answer to the question asked whether you are aware of an animal toxicity study or an epidemiological study wherein they were seeking to determine the other physiologic effects of long-term liver enzyme derangement as a result of PCB exposure, that you know of no such tests?

A. Well, you are looking at epidemiological studies to see if the people develop clinical problems. The clinical problems are the end result of enzymatic derangement. You are looking at animals for microscopic analysis of tissue of the liver, which is also a result of enzymatic derangement in animals, so I don't know how you -- I don't know how to answer your question. You are not looking specifically what a deranged enzyme does to you unless you are looking for the pathological process that follows it, so I think that any epidemiological study or any animal study has the end result of giving you what occurs during this, as a result of the enzymatic derangement. I don't know if that's answering your question, but I find it hard

to --

MR. COHEN: I don't think it is, but let me have the last sentence back.

(The requested portion of the record read by the reporter)

BY MR. COHEN:

Q. You have dealt with the establishment of protocols or animal toxicity studies.

A. Yes, sir.

Q. Do you recall ever setting up a protocol wherein you set as the goal of the study to determine the long-term physiologic effects that flow from chronic derangement of liver enzymes as a result of exposure to PCB's?

THE WITNESS: That's a long question which I will have to ask you to repeat.

(The requested portion of the record read by the reporter)

A. Well, what we -- when we set up a protocol for animal studies, we set it up to find out what deleterious action of PCB's in the dose applied occurs in the animal. The

mechanisms from that really do not enter into setting up of a protocol. What you want to do is to find out do the animals get harm, and you are not particularly concerned about why they get the harm done; physiological mechanism.

Q. Do you know of anybody who ever set up an animal study with such a specified protocol as I have just identified?

A. I don't know. The answer is no, I don't recall.

Q. Do you know if anybody has ever set up an epidemiological study with such a specified protocol?

A. Now, when you say "specified protocol," you mean you are setting up a study on a group of workers that you assume have altered liver enzymes and that's the purpose of this, or are you setting up an epidemiological study to see if the workers get sick from working with the compound?

Q. Well, Doctor, you would agree that an epidemiological study would not be set up to expose, intentionally expose people to a compound to see if they got sick.

A. Well, you don't do that at an epidemiological stage. You work with papers; you don't work with a person.

Q. You don't work with a person at all?

A. No.

Q. You study what a group has had as a history as a result of certain factors in their lives. Is that correct?

A. That's correct.

Q. So it would be impossible to structure an epidemiological study where you established a protocol to look for a certain specific ailment.

A. Look for --

MR. MALIN: Object to the form of the question. That's a different question.

A. Yes, you are saying --

MR. MALIN: It employs the same question.

A. (Continuing) You say -- the last few words were, "Look for a specific illness." Wasn't that what you said?

MR. MALIN: "Ailment," he said.

MR. COHEN: Ailment.

A. What?

BY MR. COHEN:

Q. Ailment.

A. Ailment.

Q. Yes.

A. Well, you don't look for specifics, you look for general health of the individual, or deaths, so I do not know of any epidemiological study where they may have set up a study to find out if people had chloracne. I think that's part of the epidemiological study. I think that in the epidemiological study, they may ask if the person has liver problems. That would be part of the epidemiological study, but when they started out the epidemiological study, I don't think they said, "We're going to start doing this study just to find out if the fella has had chloracne or not."

Q. You don't know of an epidemiological study where they would be able, through the vehicle of the epidemiological study, to determine the long-term physiologic effects of derangement of liver enzymes associated with exposure to

PCB's?

A. Well, the derangement of liver enzymes are part and parcel of what happens to the person, and if you have a negative epidemiological study, regardless of the -- any documented or undocumented changes in the liver enzymes, you've got a pretty relevant study.

Q. In other words, when you say you have a negative study, you are saying that there is not an excess of any particular ailment to a statistically significant degree?

A. If, by "ailment," you mean altered, a pathological process, a pathological process in the worker, an illness in the worker, the clinical condition in the worker --

Q. Are you asking me?

A. I'm asking what you said, yes.

Q. Let me rephrase the question, then.

MR. MALIN: Can we make it clear whether or not you are using ailments, using the word "ailment" and "changes in liver

enzymes" as the same thing?

MR. COHEN: No, I'm not.

MR. MALIN: No, they're not the same.

(The requested portion of the record read by the reporter)

MR. MALIN: That's what was confusing me.

MR. COHEN: Is it confusing you, sir?

A. Yes, sir. I don't know what you mean by "ailment."

(The requested portion of the record read by the reporter)

BY MR. COHEN:

Q. Are you aware of epidemiological studies that have shown to a statistically significant degree derangement of liver enzymes as a result of exposure to PCB's?

A. Yes, sir.

Q. Now, are you aware of any epidemiological study wherein there was a derangement of liver enzymes to a statistically significant degree in this population associated with exposure to PCB's

where they also found any particular ailment or disease to a statistically significant degree?

A. No, sir, all the --

Q. Please, just answer --

A. No.

Q. No. Now, do you take it from that, that that study would be negative to say that long-term derangement of liver enzymes associated with exposure to PCB's does not cause any particular ailment in a human being?

A. Well, that, you were giving me a hypothetical study in which you have not quantified how serious the derangement of the liver enzymes were, you have not stated whether or not this study was reproducible in other studies, so I think that invalidates one of the four tenets epidemiology, that you have to have a study reproducible.

Certainly, people have found, done studies of PCB workers and they found rectal cancer in women in one group; four years later, they found no excessive rectal cancers. They've had prostate cancers of one

group, none in another group, so they have not been reproducible.

Q. So even though that these studies, one study may show an excess of a certain disease or ailment over the expected amount, if it doesn't happen in another study, you feel that that that first study is not valid?

MR. MALIN: Objection. That's not what he said he said. That's one of the tenets of epidemiology, not that he feels that way.

BYMR. COHEN:

Q. Well, I'm asking you; do you feel it's not valid?

A. I can't hear that.

Q. Do you feel it's not valid?

A. Yes, if it's not reproducible, it's not valid, yes, sir.

Q. Reproducible, does that mean that you can take a different population and duplicate the results?

A. Yes, sir, or a different worker on the same population.

Q. A different worker, you mean a different scientist?

A. A different -- yes.

Q. So the same population, the same papers that you were talking about before, some other scientist should be able to come along and come up with the same result?

A. On the same papers, or a different, different group?

Q. No, same group. Isn't that what reproducible means?

A. No, reproducible means, in my definition, that your results are reproducible or agree with a different study on different groups to come up with the same illnesses.

Q. But now you would be talking about different people?

A. Yes.

Q. Different exposures, different doses?

A. Conceivably, if they are all in the --

Q. All of that's going to affect the validity of the reproducibility of the two studies?

A. Yes. That's why epidemiology is

not a hundred percent accurate.

Q. Animal research can generally be duplicated, can it not?

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

BY MR. COHEN:

Q. Let's not use "duplicated."

Animal research can generally be reproduced?

MR. MALIN: I'll object to the form of that question, too.

A. Generally.

MR. COHEN: Everybody?

MR. COX: Do we have a stipulation? Thank you.

A. I can give you two -- in some instances, it is reproducible, but I could give you two animal studies on 1260, Aroclor 1260. One, Kimbrough, found a large amount of what she called liver cancers. Another study did not show it.

BY MR. COHEN:

Q. Do you have an explanation for that?

A. Well, one good explanation is the

interpretation of the slides interpreting what you mean by a liver cancer, because Kimbrough said, "I have found liver cancers in very high percentage of these animals after two-years' study," she gave us the slides and we sent them to two cancer experts, two different ones, one at Nebraska, one at Northwestern, and they said, "We don't believe they're cancerous."

Q. So you think Kimbrough was wrong?

A. I think so, yes.

Q. She read the slides wrong?

A. Well, I don't know if she read them or she had somebody else at the government read them.

Q. Did you ever inquire whether she read them?

A. I had one meeting with her, and I don't know whether that came up. I mean, she -- I thought she was sort of a pathologist, but I don't know whether she had another pathologist read it. I think she had at least two people read it.

Q. Did you meet with her after she published her study wherein she found

evidence of cancer in rats from exposure to PCB's?

A. I don't know. I think -- I don't know when she published it. It was finished, because obviously, we got the slides from it, and I don't know if it was in 1973 that -- I believe. It was shortly before I left; I don't know whether it was '73 or early '74.

Q. Did you meet with her?

A. Beg pardon?

Q. Did you meet with her after you knew what her results were?

A. Yes.

Q. And did you discuss her methodology with her?

A. Yes.

Q. And you didn't ask her if she read the slides?

A. I may have. I don't know whether I did or not. I don't know whether she did it or whether she had a full-time government -- full-time pathologist read them, or whether she read them in conjunction with him. I don't know that.

Q. Well, let me ask you this. Did

anyone else meet with you at the time that you met with Dr. Kimbrough?

A. Yes.

Q. Who else was there?

A. There was somebody from Industrial Bio-Test, there was people, I don't know if Papageorge was there at that time in the environmental group. I know Ellenberg Wheeler was.

Q. You all met with Dr. Kimbrough together?

A. What?

Q. You all met with Dr. Kimbrough together?

A. Yes.

Q. In the same room?

A. She came down to St. Louis.

Q. She brought her slides?

A. No, that was done afterwards. That was, she -- we asked for her slides. We said, "We'll give you Bio-Test slides, and would you send us your slides," so we both agreed.

Q. Had Bio-Test tested on the same test protocols that Dr. Kimbrough had done?

A. I don't know if she used two species or not. I think she only used one species, and Bio-Test used two species. I think Kimbrough's was either in males or females; I don't know which we used, one species, and Bio tested two species.

Q. Species, or sex?

A. I mean, I'm sorry, sex.

Q. You used the same species?

A. Same species, both rats, and we used, I think, male and female and she used either male or female.

Q. Did you use the same type of rat?

A. I can't remember that. I don't know.

Q. You agree with me that rats can be bred in a way that you can breed out genetic wildness?

A. Breed out what?

Q. Genetic wildness.

A. Well, yes, but I also could be bred to increase the possibility of obtaining malignancies.

Q. Well, I understand that, sir, but you'll agree with me that rats can be bred to

breed out genetic wildness, and in fact, rats are bred that way.

A. Yes, sir.

Q. And rats are bred as laboratory test animals.

A. Yes, sir.

Q. And you can breed them to create an animal that has greater susceptibility at certain target organs or lesser susceptibility at certain target organs.

A. Yes. It's not absolute, of course.

Q. Well, we're dealing with living things, dealing with science that's not absolute, either; you agree with that?

A. Yes.

Q. Do you know if you used the same species and type of animal at Industrial Bio-Test that Dr. Kimbrough used?

A. I don't know at this date whether --

Q. Did you know then?

A. Yes, but I don't recall what the answer would be.

Q. Do I understand that Industrial

Bio-Test had previously done a similar test and come up with different results than Dr. Kimbrough?

A. Yes, sir.

Q. So you wanted to meet with Dr. Kimbrough?

A. Yes, sir, or she wanted to meet with us. I think it was mutual.

Q. Whose invitation was it?

A. I don't remember.

Q. She came here?

A. She came down to St. Louis, right.

Q. Where did you meet?

A. At Monsanto.

Q. And you don't recall whether she told you that she read the slides herself?

A. No, sir. I don't think that was very important, frankly. I'm sure she had an adequate pathologist. You must remember, in those days, they changed the definition of what is a liver malignancy and what isn't just about that time, so one person's interpretation may have been different than another person's interpretation.

Q. They changed it from what to what?

A. Well, they changed for the criteria that would call, allow a particular section to be called malignant, rather than a hepatoma, which is just increased the liver cells.

Q. Now, when you say "malignancy," does that mean that it is capable of becoming metastatic disease?

A. Not necessarily, no, because these were not metastatic, these were --

Q. These were nonmetastatic lesions?

A. That's correct.

Q. In fact, have PCB's ever been, has exposure to PCB's, either in animal tests or epidemiology, any type of test whatsoever, has exposure to PCB's ever been associated with a lesion that can become metastatic?

A. Well, I certainly know of no epidemiological studies that show that PCB's are associated with a higher incidence of malignancy. I don't know of any of those.

Q. I'm not asking you about malignancy, I'm asking you about metastasis, sir.

A. I don't know of any. I mean, in

animals, I don't know. I don't recall.

Q. You do agree that they have been associated in animal studies with malignancies?

A. Some workers believe it and some don't believe it.

Q. Some scientists have published studies in which they believe exposure to PCB's in animals has caused malignancies?

A. Yes, sir, and some scientists have also published material in which they state there were no malignancies.

Q. Do you know of a test where a scientist in animals has said that the malignancies were capable of being metastatic?

A. I don't recall those reports.

Q. But to your knowledge, they may exist?

A. They may and they may not. I don't know.

Q. Is Dr. Kimbrough a pathologist?

A. Whether she's board certified in pathology, I don't know, but I had thought that was one of her early training in Germany

was in pathology.

Q. She's a medical doctor?

A. Yes, she is.

Q. Do you know if she has any other specialties for which she is either certified or eligible for certification?

A. No. I don't know whether she even tried to be certified.

Q. Do you know if she had anything at that time for which she was certified or eligible?

A. What it is, did you say?

Q. Do you know if at the time you met with her in and around 1973, she had any specialty for which she was either certified or eligible?

A. I do not know.

Q. Is it your recollection that she told you she had another pathologist read the slides?

A. No, sir, I do not know that. I don't recall that she said that.

Q. Do you know that if, after you took possession of her slides and had them reviewed by other pathologists, she reviewed

them, herself, again?

A. I do not know that, and I believe that whole procedure went on after I left the company.

Q. Did you ever follow up on it?

A. I was gone from Monsanto.

Q. Well, I know you were gone, but did you ever follow up, intellectual curiosity or otherwise?

A. I do not know whether she re-reviewed her slides or not.

Q. Do you know if she had any other scientist review the slides?

A. I do not know that, either.

Q. Was her study reviewed by peer reviewers?

A. I don't know that, either.

Q. Who was your successor, again?

A. Dr. George Rausch.

Q. Did he follow up on this?

A. I don't know.

Q. You never discussed it with him?

A. Never did.

MR. COHEN: Off the record.

(Discussion off the record.)

BY MR. COHEN:

Q. As far as we know, Dr. Rausch is still with us, alive in St. Louis?

A. That is correct.

MR. MALIN: What's your other question? Did he retire from Monsanto?

THE WITNESS: Yes, sir.

MR. MALIN: Is he retired from Monsanto?

THE WITNESS: He retired from Monsanto at the age of 66 or 67, and I don't know, I think that was about two years ago or three years ago.

BY MR. COHEN:

Q. Do you know the phrase "low-dose extrapolation".

A. I can't hear you.

Q. Do you know the phrase, "low-dose extrapolation"?

A. No, I do not.

Q. You've never heard of it in association with animal studies?

A. No, sir.

MR. COHEN: Why don't we break off at this time for lunch.

MR. MALIN: Okay. Fine with me.

BY MR. COHEN:

Q. Oh, before we break off, just so that we're clear on the record, while we still have Kelly 24, on the record, Doctor, could you identify Page 2 of that document?

A. Page 2 of the document is a memorandum dated October the 21st, 1968, from Wheeler to Richard, and titled "Polychlorinated Biphenyls in the Environment" with copies to Kelly, Tucker, Keller, Paton, Bergen and Johnson.

MR. COHEN: Thank you, sir.

THE WITNESS: Beg pardon?

MR. COHEN: Thank you.

(Luncheon recess)

BY MR. COHEN:

Q. Doctor, we were talking about animal studies, and let me ask you this. To your knowledge, does the EPA or any other federal regulatory agency rely upon the results of animal studies in making decisions?

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

Answer the question.

A. I do not know what they rely on.

BY MR. COHEN:

Q. Is that something that's outside the scope of your knowledge?

A. No, but government decisions are, the reasons for government decisions are. I'm not privy to them. I don't know what they rely on and how much they rely on animal studies, how much they rely on media, how much they rely on public opinion.

Q. Let me ask you this. Have you ever seen any documents, either while you were Medical Director for Monsanto or subsequent thereto, wherein the EPA or any other governmental agency expressed any view of the applicability of animal research regarding the toxicity of PCB's to ailments in human beings?

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

Answer the question, if you think you understand it, Doctor.

THE WITNESS: I got interrupted. Would you repeat it?

(Record read.)

MR. MALIN: And I objected to the form of the question.

A. There have been animal studies quoted in the NIOSH documents, N-I-O-S-H. How much they relied on that, I don't know, but they quoted them as part of their belief in, when they set standards. The EPA, I do not know. Somebody, some group in the government stated that PCB's were an animal carcinogen and could be considered a human carcinogen.

Q. Do you agree with that view?

A. I agree with part of the view. I do not, I do not agree with the fact that it's a human carcinogen.

Q. You agree that it is a proven animal carcinogen?

A. It depends, again, on the dose, it depends on -- you can -- you could take, there are animal studies that -- take saccharin: They use five percent of the diet, of the human diet, in saccharin, so they get two percent animals. Well, by somebody's definition, that could be a

carcinogen, an animal carcinogen. Five percent of the diet is a completely irrelevant dosage, so I would not agree with that. I think that there are certain compounds that no matter how much you give, you will not get a malignancy. There are certain compounds that, in animals, if you go high enough and long enough, you can get cancer. Now, what the definition of a human carcinogen without dosage levels is -- I don't, I don't accept that type of thinking.

Q. The question I'm asking you, Doctor, is whether you agree that PCB's have been proven to be a carcinogen in animals.

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

Answer the question.

THE WITNESS: Beg pardon?

MR. MALIN: Objection to the form of the question. Give me a --

A. A litle -- okay.

MR. MALIN: -- a little time before you answer the question, in case I want to object to the form.

MR. COHEN: Since all your

objections are to the form, why don't you just say for the record, "Objection"? We'll know it's an objection to form, and if you have an objection on any other basis, you can state it, and that way, we can speed this up.

MR. MALIN: Fair enough. Fair enough.

MR. COHEN: And the doctor can continue with his testimony without interruption.

Can I have the last question read back before the last objection to the form of the question?

(The requested portion of the record read by the reporter)

A. According to some studies, they have been, and according to other studies, they have not. When you are talking about PCB's, the only one was 1260. You can't include all PCB's under that statement.

BY MR. COHEN:

Q. That's Aroclor 1260.

A. Yes.

Q. Are you aware of any studies that have studied the dielectric fluid known as

Pyranol?

A. Yes --

MR. MALIN: Objection. Answer the question.

A. Yes.

BY MR. COHEN:

Q. Animal toxicity studies that have studied Pyranol?

A. Yes. Which Pyranol?

Q. Any Pyranol.

A. Yes.

Q. Okay, which Pyranol was studied?

A. I thought it was Pyranol PPR or something like that. We ran an acute test on it.

Q. A who?

A. Beg pardon?

Q. You ran a who? A what?

A. An acute test on Pyranol, one of the PEER-an-ols (Phonetic), PIE-ran-ols (Phonetic).

Q. Your firm, Monsanto, ran an acute toxicity test on a Pyranol liquid?

A. That's correct.

Q. When was that done?

A. Sometime before 1970, to the best of my recollection, but I don't know the date.

Q. Who did the test?

A. Either Scientific Associates or Younger Laboratories in St. Louis.

Q. You used them before you used IBT?

A. Well, we used them for acute testing. We didn't use IBT for acute testing, we used them for subchronic and chronic testing.

Q. But hadn't -- wasn't your experience with Scientific and Younger substantially -- didn't that substantially predate the IBT testing?

A. Well, yes, but there were two different types of laboratories, two different types --

Q. Doctor, all I'm trying to do is get a time frame. If the answer is "No, we used them without regard to time but for different tests," that's fine, but I'm just trying to find out the time frame.

A. We used them before and during the times we used IBT.

Q. Thank you.

Do you know when this test was done relative to the time that you were doing PCB tests with IBT?

A. I would have to guess. I do not know.

Q. What was the acute toxicity test? Was this to find an LD-50?

A. Yes, sir.

Q. What was the LD-50? Do you recall?

A. Around four grams per kilo.

Q. Is that more or less than a pure PCB?

A. About the same.

Q. And compared to what PCB? Which Aroclor?

A. Probably 1254 or 1248. I'm not sure.

Q. Is 1254 and 1248 more, or less toxic than 1260?

A. Yes, they are less toxic.

Q. Less toxic?

A. Less toxic.

Q. Than 1260?

A. Beg pardon?

Q. Than 1260?

A. Yes, sir.

Q. And you say you thought it was a PPR?

A. I thought that was it.

Q. What does PPR mean to you, sir?

A. I don't know what it means.

Q. Well, was PPR, as you understood it, their specification or product name, such as Aroclor 1260 is one of your product names?

A. I don't know. I just remember seeing a label, and I thought it was Pyranol PPR.

Q. What animals were used in that test?

A. Rats.

Q. Did you order the test done?

A. Either I or somebody in the department, yes, sir.

Q. But it was during your tenure as Medical Director?

A. Yes, sir.

MR. COHEN: Have you ever produced that test, Mr. Malin?

MR. MALIN: I don't know. I'd have to check.

MR. COHEN: All right, I'll make a request at this time -- and make a note of the request, if you would, please, in a separate index -- for all toxicity tests, animal toxicity tests done by Monsanto Chemical Company on Pyranol, P-y-r-a-n-o-l.

BY MR. COHEN:

Q. Did you ever do any tests on Inerteen?

A. I don't recall. We may or may not.

Q. Same question for Inerteen, I-n-e-r-t-e-e-n: Is that the only tests that you are aware of, animal toxicity tests that you are aware have been done on Pyranol?

A. Yes, sir.

Q. Did I ask you this before? Are you aware of any animal toxicity tests done on mono-, di-, tri- or tetrachlorobenzenes?

A. By anybody, anyplace?

Q. Anybody, anyplace, anytime.

A. Yes, I think Henry Smith did some on them.

Q. And that's in the literature that you had available in your office?

A. Yes, sir.

Q. Did you ever order any such tests done?

A. Not that I recall.

Q. What caused to you do the test on the Pyranol liquid?

A. I don't recall. It could have been freight classification, it could have been somebody asked for it. I don't know.

Q. So you determined an LD-50 and you never did anymore tests?

A. Well, there was a package that we were doing at that time: We would do skin absorption, we would do LD-50, we would do ocular testing, drop it in the eye, and we would do saturated ambient temperature -- saturated atmosphere at ambient temperatures.

Q. You wanted to determine how much the atmosphere could hold at elevated temperatures?

A. No, not elevated, ambient.

Q. At ambient. I'm sorry, so room temperature?

A. At room temperature.

Q. And that would be before it would turn into droplets's?

A. Well, I don't know how they dispersed it, whether they dispersed it as a spray or just in open containers in the testing cage. I don't know how they did that.

Q. So you don't know if it was misted or otherwise?

A. I don't know whether it was misted. I don't believe it would be misted.

Q. Who designed the protocol for that series of tests?

A. I thought it was sort of a standard procedure that most acute testing laboratories did. I don't know who designed it.

Q. You didn't have any input into its design?

A. Well, I'm sure I told them what we wanted, but as far as designing of the test, no, I didn't.

Q. Do you know of any other subacute chronic toxicity tests done on Pyranols or

Inerteen?

A. At one time, Westinghouse did some work on Inerteen. I saw a copy of that at one of these depositions, and I don't know whether -- how far along that was as far as subacute is concerned. I thought it was a relatively acute testing. I had nothing to do with it.

Q. Do you know anybody who's ever done epidemiological studies using Pyranol, exposures to Pyranols?

A. Yes, somebody at GE did it.

Q. You are aware of GE tests?

A. I don't know if it's GE -- I mean, it was a group at GE, Medical Department, did an epidemiological study on workers exposed to Pyranol, yes.

Q. On GE workers exposed to Pyranols?

A. That's correct.

Q. Are you familiar with those results?

A. Yes, they didn't show any ill effect, any association of illness with workers.

Q. Do you know how to design an

animal study?

A. Beg pardon?

Q. Do you know how to design an animal toxicology study?

MR. MALIN: Objection. Answer the question.

MR. COHEN: Wait, strike that.

BY MR. COHEN:

Q. Do you know how to design an animal toxicity study?

A. As of now, or as of what time frame?

Q. Well, did you ever know how to do one?

A. Certainly, I did.

Q. Tell me how you go about designing an animal toxicity study.

A. Well, you decide on what the use of the product is going to be, what the exposure levels are going to be, presumed exposure levels, the type of exposure, and whether the exposure is going to be short-term, long-term, inhalation, or oral, or determineal, so they are all, any number of factors that go into designing the test.

Q. Do you start off with a hypothesis of what you want to prove?

A. I don't know if you -- the term is what you want to prove; it's what you want to find out.

Q. Okay, if you sat up something that you want to determine through your tests, that is, that an exposure of this compound, at this dose, through this mode of absorption for this period of time will or will not result in "X"?

A. That's true. That is correct.

Q. Is that how you do it?

A. Beg pardon?

Q. Is that how you do it?

A. Yes, except if you are doing a test that would come under government regulations, if you were doing a test for a food additive or an indirect food additive, then there are other criteria that have to be carried out.

Q. Now, we're not talking about foods, here, so --

A. Okay.

Q. -- we can put that aside. PCB's,

to your knowledge, were never food additives?

A. Beg your pardon?

Q. PCB's to your knowledge were never food additives?

A. Never were, no.

Q. First thing you said is, is you decide on a use.

A. Yes.

Q. What did you mean by that?

A. Well, if the stuff is going to be used where it comes in contact with people in an open operation, that's one use. If it's going to be, if there's going to be exposure at elevated temperatures, that's the another use. If it's going to be intermittent exposures or continuous exposures, that's a third use. There are any number of variables.

Q. You agree, then, that the purpose in conducting the animal toxicity test is to test a hypothesis of the effect of the substance on humans?

A. I don't understand your use of the word "hypothesis" in this particular case. You are testing it to find out what a safe

level of the material may be or what its inherent toxicity is that you compare it with other compounds that you know have been used without ill effects.

Q. My point, sir, the question was, with respect to animal toxicity tests, you agree, then, that the purpose of the animal toxicity test is to establish safe levels of use in humans?

A. Yes.

Q. Do you believe that there is scientific validity to such testing?

A. Well, there's a scientific use, usefulness of it.

Q. Tell me what that is.

A. Well, as we went over it this morning, it gives you a relative toxicity of this particular compound vis-a-vis other compounds that you know have been used in industry. It also may show you a target organ that could be correlated with what clinical experience have been, has been in the workplace.

Q. And that's something that happened to occur in PCB studies?

A. Yes.

Q. That you identified a target organ, to-wit, the liver, which has proven to be the same target organ in clinical studies.

A. No, that isn't correct. That isn't what I said.

Q. Tell me what you said.

A. Well, in clinical studies, we have seen acute chemical hepatitis from inhalation of PCB's at elevated temperatures. They, the target organ there was the, was the liver. The target organ in animals, both acute and chronic, also was the liver. There have been no clinical studies that showed, epidemiological studies that showed harm to the liver in industrial workers.

Q. Okay, now, you threw in two factors, there. You said inhalation studies of PCB's at elevated temperatures. What, in your mind, is the significance of the issue of the mode of absorption being inhalation?

A. What is its significance?

Q. Yes.

A. Well, it's a route of exposure if you have, if you have the material at

elevated temperatures, or in a confined space, you'll get more exposure, and the more exposure you get --

Q. I think you misunderstood my question, Doctor. I was asking you about --

MR. MALIN: I'm going to object because this line of inquiry was covered in the last deposition and we've been over the freon studies, and the two cases where there was jaundice developed as a result of inhalation. We went over those, I think, half a day.

MR. COHEN: We're talking now about the formulation of studies and the comparability of studies. We're not talking about --

MR. MALIN: Answer the question.

BY MR. COHEN:

Q. I'm asking you the significance of the mode of absorption, which is inhalation. What was the significance of the mode of absorption?

A. The significance of the mode of absorption is that it gives you the basis for telling people how to avoid such exposure.

Q. Do you feel that the mode of absorption had any effect on the outcome of the study?

A. Well, certainly, it did.

Q. What was the effect?

A. If you got enough of the material absorbed, or if you got enough of the material generated by elevating the temperature of the material, you would absorb more of the compound.

Q. I was -- I haven't gotten to the elevation of temperature yet, sir.

A. I thought we were talking about that.

Q. I'm talking about inhalation as the mode of absorption as distinguished from ingestion by eating; eating it or absorption through skin? Dermal absorption?

A. I can tell you this, then, that there is no worker exposure at room temperature by inhalation. The vapor pressure of the PCB's is too low to cause a hazardous, or cause a condition which absorption could occur.

Q. It's simply not volatile enough to

be inhaled?

A. That's correct.

Q. Fine. Let's talk about inhalation, sir. Is there any significance to inhalation as the mode of absorption as distinguished from ingestion or determineal absorption?

A. The action of the compound on the body is, to my opinion, the same as, no matter how you get the material into the body.

Q. Fine. And the elevated temperature is, as you just discussed, significant because there is no inhalation absorption at room temperature because of the lack of volatility of the material?

A. Except if you are in a quite confined space and in there for a long period of time.

Q. So in a very confined space, the fumes would be sufficient to cause some absorption?

A. May be, yes.

Q. Maybe; okay. How elevated need the temperature be before the -- before you

increase the risk?

MR. MALIN: Objection. Give him Boyle's law.

BY MR. COHEN:

Q. Give me Boyle's law, or if you prefer, give me your answer.

A. I'll give the answer.

Q. Good.

A. First of all, you said increased risk. I do not accept the fact that there is any risk at ambient temperatures. There is a risk if you -- depending on which Aroclor you use. The more highly chlorinated ones are not as volatile as the lower chlorinated ones, and I cannot give you an absolute figure of 220 or 300 that would start constituting a risk. I don't know that.

Q. So as I understand your testimony, the route of absorption, that is, whether it's dermal absorption, ingestion or inhalation, is not significant in the effect of the compound on the organism?

A. I would say in general, yes, but it may be that you may have to have different levels of exposure. I think that inhalation

at elevated temperatures would probably be, could constitute more of a possibility of absorption than skin contact. I may be wrong on that, but that's just an impression I have.

Q. Is it readily absorbed through whole skin?

A. I don't know how readily you mean by "readily", but it can be absorbed if you put a -- it can be absorbed, but I've seen dozens of cases where people have had good-size amounts that were wiped off without -- with no ill effect at all.

Q. Is the rate of absorption through whole skin equal to or greater than the rate of absorption through broken skin?

A. Through --

Q. Broken skin.

A. I would think it's more absorbed through broken skin. I don't think that's been tested.

Q. You don't know if any test -- has it ever been tested on burned skin?

A. Not that I know of.

Q. Are the only tests that you are

aware of on dermal absorption through whole skin?

A. That's correct.

Q. And they are animal tests?

A. Yes, sir.

Q. Do you feel that those results are applicable to human exposure?

MR. MALIN: Objection. Answer the question.

THE WITNESS: Hmm?

MR. MALIN: I said objection, but answer the question, if you can.

THE WITNESS: Oh.

A. Do I think the animal --

BY MR. COHEN:

Q. Tests regarding dermal absorption rates are applicable to humans.

A. Well, they're applicable, but I do not think they are a hundred percent applicable because animal skin is not the same as human skin is concerned.

Q. What would you do to determine the degree of applicability, Doctor?

A. I don't believe you could do that because I don't agree with human

experimentation, and that's the only way you could find out.

Q. So short of experimenting with humans, you could not develop a hundred percent correlation, in your mind?

A. That's correct.

Q. Are you aware of any studies that compare the rates of absorption in animal toxicity studies with observed absorption rates in humans in epidemiological studies?

A. No, sir.

Q. Are you aware of any study that has, epidemiological study that has looked into the issue of rates of absorption through whole skin?

A. No, sir.

Q. So it would be fair to say there's simply no science on that point?

A. No science known to me. I don't know.

Q. Do you think that you can base any inferences from animal data on the increased risk of contracting disease -- and in this case, let's talk about cancer -- in humans from any animal toxicity study on any

chemical?

MR. MALIN: Objection. If you think you understand that question, try to answer it.

THE WITNESS: Well, give it back to me and I'll try to understand it.

(The requested portion of the record read by the reporter)

A. Well, I think there is a certain amount of, of reliance, but I don't know what percentage that is, because as I said earlier, that animals vary in species, they vary in the results of animal experimentation. Where the human animal fits into that, in the vast majority of cases we don't know. There are some cases, as I mentioned earlier, where the dosage in animals, where you develop cancer, is completely irrelevant to any possible exposure that a human may have.

Q. The dosage issue, the dosage issue aside, for the moment, would you agree that the fact that animals can be bred to eliminate genetic wildness enables you to have a higher level of predictability from

animal studies than you would have from epidemiological studies in humans?

MR. MALIN: Objection.

A. No, sir.

MR. MALIN: I don't understand that question. If you think you understand it, go ahead.

MR. COHEN: He already answered "No, sir."

A. (Continuing) As I understand it, you are saying that you have these hypothetical animals that are bred not to have cancers without a severe insult. Is that what you are talking about, genetic wildness?

BY MR. COHEN:

Q. No, when I speak of genetic wildness, we would agree that human beings, unlike purebred dogs or horses, thoroughbred horses or whatever, we know very little about the genetic makeup of one human being who mates with another human being and produces an offspring, and because human beings are not bred, but rather, choose to do their own breeding for whatever indiscriminate reasons

that they choose, the genetic pool in any individual human being is going to differ wildly from the next human being.

A. Yes, we agree to that.

MR. COX: I object to the question, if that's a question --

MR. COHEN: He agrees with me.

MR. COX: -- or statement, whatever it is, I object to that series of --

MR. COHEN: Well, I don't know the basis of your action. The witness agress with me.

MR. COX: I object to it as to form.

MR. COHEN: Fine.

MR. COX: And I object to your making statements to the witness.

MR. COHEN: You've made your objection.

MR. MALIN: I join in that objection.

BY MR. COHEN:

Q. Now, we agree that with the concept that humans are genetically wild; that is, there is not a great deal of genetic

similarity between humans other than, perhaps, identical twins.

A. Well, there are genetic differences between the black race and the white, the Caucasian race. There are ethnic groups that are genetically different. Jewish people may have a tendency towards some diseases that Irish people may not have.

Q. Right, such as Tay-Sachs.

A. Right.

Q. And other Eastern Europeans may also share the same genetic predisposition towards Tay-Sachs disease; right? And blacks may share a predisposition towards sickle cell anemia that whites may not necessarily have, although certain whites from Eastern areas of the world have also been found to have genetic predisposition to sickle cell anemia; correct?

A. I lost the last half of your discourse. What was the last two sentenses you said?

Q. Again, I'm trying to establish, sir, of --

MR. COX: Again, I object. It is

a discourse, and I object to it.

MR. MALIN: I join.

BY MR. COHEN:

Q. All I'm trying to establish, sir, is that we can agree that while there are certain characteristics that are linked to certain categories of humans, for the most part, human beings tend not to be genetically similar one to the other.

A. I agree with that.

Q. Whereas animals can be bred to be genetically similar one to the other.

A. I agree with that.

Q. And we can identify certain characteristic genes in animals and breed the animal for an increased likelihood of that characteristic or a decreased likelihood of that characteristic.

A. I don't know about that.

Q. Well, you do know about Mendel's laws.

A. Yes.

Q. And you would agree that animals can be bred to enhance certain characteristics or decrease them?

A. Yes.

Q. Now, considering genetic wildness, do you --

A. Considering genetic --

Q. Considering this characteristic that distinguishes humans from laboratory animals, would you agree or disagree that you can have a higher degree of predictability of result in animal tests than in human tests?

MR. MALIN: Objection.

Answer the question.

A. Predictability of what kind of results?

BY MR. COHEN:

Q. Well, let's go back to what we were talking about before, establishing a hypothesis and trying to establish and prove it through a toxicity test.

A. Okay. Now, what's the question?

Q. Would you agree that you have a greater degree of predictability in establishing and proving that hypothesis through animal tests, rather than humans?

A. Not necessarily, because the compound may be metabolized differently, the

absorption may be different by humans than it is by animals, no matter how they are bred.

Q. And the only way to determine that rate of absorption, as we discussed this morning, is by comparing the metabolites in the blood and the urine?

A. Yes, sir.

Q. Which may or may not be done.

A. That's correct.

Q. And if you do it in humans and you do it in animals and you find out that it's the same, then what's your answer?

A. Then there is -- what was the question, now? Answer to what?

Q. Let's go back to the last question. Will you have a greater degree of predictability in the animal toxicity tests rather than in human tests?

A. That's an assumption that I just can't answer because I -- it's an assumption that I don't know whether it would turn out to be scientifically valid.

Q. So you are not willing to make that assumption?

A. I'm not willing to make the

assumption.

Q. Is there agreement or disagreement on the -- in the scientific and medical communities on the significance of animal data?

MR. MALIN: Objection.

Answer the question if you think you understand it.

A. Yes, there is. Some of the people in the scientific community pay no -- give no weight to animal testing, and some give it a great deal of weight to it.

BY MR. COHEN:

Q. Where do you fall in that spectrum?

A. I cannot hear you.

Q. Where do you fall in that spectrum?

A. I think it depends on the, the compound you are testing, it depends on the animal you are using. I would tend to believe that there is some value in animal testing, yes. How great a degree, I don't know. I don't belong to the group that says, bases a hundred percent of their calculation,

of their belief on animal testing, and I don't belong to the nihilists who say that animal testing is mp good. I'm someplace in the middle.

Q. You are someplace in the middle. Are you more of one mind or the other with respect to any particular compound?

MR. MALIN: Objection.

Answer that question if you think you can. I don't understand it.

MR. COHEN: I would appreciate you didn't make a speech every single objection, Mr. Malin. Just say "Objection." Before, we agreed, it's for form.

A. Well, there are some compounds that are carcinogenic in animals and there's been no clinical evidence of their being carcinogenic in humans.

BY MR. COHEN:

Q. Is that, for example, PCB's?

A. Yes, and a host of other compounds. There are probably two thousand compounds that are carcinogenic in animals and are probably only a couple of dozen of those that may be carcinogenic, or maybe less

than that, that are carcinogenic in humans.

Q. Are you saying that are carcinogenic in humans or that have been proven to be carcinogenic in humans?

A. Have been accepted as being, causing cancer in humans, yes, sir.

Q. Accepted by whom?

A. By a good part of the scientific community. Nickel carbonyl is one, nickel carbonyl is one, aminonaphthylamine is one, so there it is. Those are certainly accepted by the medical people, and they are carcinogenic in animals in the same organ.

Q. Now let me ask you this, sir. Are you saying that because PCB's have not been proven to be carcinogenic in epidemiological studies in humans, that you reject the animal data as having application to humans?

A. Yes, I think that's true, because we have not had carcinomas in humans. Now, I don't know whether that is because the material does not cause cancer in humans or because there is not that exposure in the usual use of the PCB's to give you enough dose to cause cancer.

Q. Well, you are not saying you haven't had carcinomas in humans, you are saying that you have not had epidemiological studies that have established to a statistically significant degree an excess of carcinomas in humans that were exposed in that particular study.

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

MR. MALIN: Same objection.

A. And I want to be sure I got this question right. Will you tell me what the question was?

MR. COHEN: And you don't have to say "Objection" a second time when the reporter reads it back; once the is enough.

MR. COX: Arnold --

MR. COHEN: Yes.

MR. COX: I think you are, perhaps, using up more time than you are saving by being so rigid about how the objections are lodged.

MR. COHEN: You are trying to prevent the witness from hearing and answering the question when he's ready to

answer.

MR. COX: I'm going to make my objection.

(The requested portion of the record read by the reporter)

THE WITNESS: Well, speaking as the witness, I haven't paid to much attention to him.

MR. COHEN: Thank you. I appreciate that. That's, unfortunately, his history in life.

THE WITNESS: No, as far as I'm concerned, he is not influencing me as to how I'm going to answer this question.

Now, will you give me the question again?

MR. COHEN: Good. Thank you, Doctor.

(The requested portion of the record read by the reporter)

A. You were talking now of a particular study that showed an excess of carcinomas in humans that were associated during their working period, working life with PCB. Now, there have been individual

studies that have shown this, but these individual studies have not been reproducible, and in some of the cases, follow-up studies have negated the original conclusion.

BY MR. COHEN:

Q. I understand what you are telling me about epidemiological studies, sir.

A. Well, I'm trying to answer your question on it, and I think I've answered it.

Q. What you said in response to a question about two questions back was that we haven't had carcinomas in humans.

A. Proven due to exposure to PCB, yes.

Q. Well, the key, there, is the word "proven." Isn't that right, sir?

MR. MALIN: Objection.

A. Well, no, I don't believe that's a key word. I mean, that appears valid evidence to me, that if you do not have reproducible, statistically correct epidemiological studies that have repeatedly shown the same cancer in different groups, it looks like it's pretty scientifically proven,

to me, that there is no association.

Q. So what you are saying is that you are relying upon the results of the epidemiological studies done thus far to conclude that we haven't had carcinomas in humans as a result of exposure to PCB's?

A. Yes, sir.

Q. You have not individually followed any of these people in those studies to know whether they had carcinomas or not.

A. That's correct.

Q. And in fact, some of the people in those studies did have carcinomas.

A. Well, yes, you are talking about something else now. Certainly, they had carcinomas. Whether that carcinoma was due to a PCB is the key question, it seems to me, and I admit the fact they had carcinomas, but I also state that it has not bean scientifically or statistically proven that such carcinomas were due to PCB exposure.

Q. And that's because that study did not reach statistically significant levels?

MR. COX: Objection.

MR. MALIN: Same objection.

A. Or there are other reasons besides that. It was not reproducible.

BY MR. COHEN:

Q. So in some studies, it did reach statististically significant levels but was not reproducible in another study?

MR. McLAUGHLIN: Objection.

MR. MALIN: Objection. Again, he's asked and answered the same question, months apart, many, many different times. You've asked it in so many different ways, and you've gotten the same answer.

MR. COX: You twist it each time you ask him.

MR. MALIN: It seems to me you've taken an awful lot of time on this. I'm not going to tell you how to take your deposition, but it seems to me that we're wasting time on the same issue.

But go ahead, Doctor; answer it again.

THE WITNESS: Well, I'll have to hear the question.

MR. COHEN: So will I. I've forgotten it, too.

(The requested portion of the record read by the reporter)

A. Well, there's no question on that couple of sentences you told me. I don't know what to answer.

MR. COHEN: Read the last question before that. Two questions, answer, question.

MR. COX: Cox objection to that.

MR. MALIN: Objection to that, as well.

(The requested portion of the record read by the reporter)

A. I think you'd have to show me the epidemiological study, and I could comment much more intelligently on it.

BY MR. COHEN:

Q. Do you know of any study, animal study or epidemiological study that dealt with chronic, long-term exposure to PCB's?

A. Would you break that down into both animal and experiment, and --

Q. I'll do it separately. Do you know of any animal toxicity study that dealt with chronic, long-term exposure to PCB's?

A. Yes.

Q. What was long-term in those studies? Can you tell me?

A. Two years.

Q. And what type of animals were we speaking of?

A. Rats.

Q. And what were their life expectancy, normally? Do you know?

A. Two years and a few months.

Q. So this was almost the entire period of their lives?

A. That's correct.

Q. And what was the method of exposure?

A. Oral feeding.

Q. And what was the dosage level? Do you know?

A. One, I know, went up to a hundred parts per million in the diet. I do not know what the National Cancer Institute's study on PCB was, but I have sort of a belief that they used about the same level, a hundred parts per million in the diet.

Q. And do you recall what the results

of those studies were?

A. Yes. The National Cancer Institute did not find any statistical increase in cancer that they could attribute to the PCB. The Bio-Test studies done at Monsanto, for Monsanto, did not show any increase. Kimbrough's work did show an increase, using 1260, in her rats.

Q. You said did not show a statistical -- the National --

A. Cancer Institute.

Q. -- Cancer Institute did not show a statistical increase. Was that an animal toxicity study?

A. Yes.

Q. And they used statistical sampling techniques?

A. I'm sure they did.

Q. Did they sacrifice the animals?

A. Oh, yes, certainly.

Q. And they studied them for evidence of neoplasms?

A. Oh, yes.

Q. And what were they comparing the results to? Are you saying they found no

neoplasms or they found no more neoplasms than they would have expected in any population, unexposed population of the same breed of rats that were two years old?

A. I am saying I do not know the exact number of tumors in the control, in the test group, but --

MR. MALIN: The answer to your question is, it was a control group; isn't that the case?

A. Yes, there was a control group. They did not find any significant increase in tumors of any kind in the treated group.

BY MR. COHEN:

Q. Other than neoplasms, do you know if they studied the animals for any other form of medical injury?

A. Medical injury?

Q. Medical condition.

A. I don't believe -- it's been quite a few years sense I read this study, but I think they were reporting primarily on malignancies, and I do not know whether there were other illnesses that affected these animals. I don't know that.

Q. Now, same question for epidemiological studies in humans.

A. Okay, now, what was the question, again?

Q. Do you know of any long-term, chronic long-term exposure studies done in humans, epidemiological studies done in humans that showed a relationship between that chronic long-term exposure and the development of a medical condition or disease?

A. As I have said repeatedly, there are some studies over -- of workers who have worked with PCB's over a long period of time that, in some cases, have shown tumors. Some have shown them of the prostate. A follow-up on that showed -- didn't show excessive prostate cancer.

There have been studies showing carcinoma of the rectum in female employees. The next time they followed these up, they did not have an increase of carcinomas in the rectum, so there have been reports of an excess of cancer in workers who were exposed long-term to PCB's, but as I said, they were

not reproducible, have not been reprcducible, they have been different cancers, so I have to agree with the epidemiologists that say there is no valid epidemiological studies that shows that working with PCB's in the industrial environment can cause cancer.

Q. And as we discussed earlier, you have no personal knowledge of the exposures that were covered by those epidemiological studies?

A. No, sir.

Q. Do you believe that long-term low-level exposure to benzene can cause leukemia?

A. How low is low?

Q. Do you believe that there is a level of exposure to benzene over a long period of time that will cause leukemia in humans?

A. Yes.

Q. Do you remember when we took your deposition the first part of this deposition back in December, we talked about quality control testing in order to determine the presence of the benzofurans in the product

going out the door?

A. Yes, sir.

Q. And you believed that that testing occurred subsequent to your retirement?

A. That's what I believed, yes, sir.

Q. Were you aware of any such testing going on prior to your retirement?

A. I don't believe I was. I don't recall it.

Q. Would internal protocols in Monsanto Chemical Company have caused the quality control people to report to you the presence of dibenzofurans in production lots of PCB's?

A. Well, I don't believe there was any formal reporting, but after that, you show incidents in which dibenzofurans were indicted as a causative agent of the problem. I feel sure that if we were running, if we were finding, if we were capable of finding the material in the PCB's, they -- I would probably hear about it, but I don't recall any formal reporting system that would notify me.

Q. Were you aware that in late 1973,

samples of Aroclor 1254 were found to have tetra- and pentachlorodibenzofurans?

A. I may have, and I don't know, but it does not strike me that I -- that it was very prominent in my remembrance.

Q. Would the presence of tetra- and pentachlorodibenzofurans have caused you any concern regarding the toxicity of the product?

A. Well, it's always concern, but after all, we had tested the product with the material in it. If it was in it, when you test the whole product, you are giving the toxicity for the whole product. The manufacturing procedure stayed the same, so one would assume that the levels of benzofurans, if there were such that occurred in 1970, would be the same as 1972, and if you tested the 1970 material, the presence of that dibenzofurans would not have altered my thinking as to the fact that PCB's as an industrial compound have a mild to moderate toxicity.

Q. Would you expect production lots to remain roughly consistent in what was

found?

A. I think, generally speaking, yes.

Q. Were you aware in late 1973, the production lots of Aroclor 1254 were found to contain chlorinated naphthalenes?

A. No, sir. I was not. I may have been aware of it, but I don't recall it.

Q. Have you ever seen toxicity studies done on chlorinated naphthalenes?

A. Well, sure. Drinker did some of that along back in 1938.

Q. That's part of the Halawax materials he was studying?

A. That's correct.

Q. Is it your understanding that your product did or did not contain chlorinated naphthalenes?

A. My understanding if Monsanto's product did or did not?

Q. Yes.

A. I have no recollection of if it did, but I would -- if it did, it would probably be in the parts per million range.

Q. Do you consider chlorinated naphthalenes to be more or less toxic than

PCB's?

A. I think they're considerably more toxic.

Q. Were you aware that in late 1973, production lots of Aroclor 1242 were found to have trichloroterphenyls?

A. I may have been and I may not.

Q. Do you consider trichloroterphenyls to be more or less toxic than PCB's?

A. Probably they were somewhat more toxic, but I think you probably are reading some statement saying how much is in there. We're talking in parts per million. They do not add any appreciable addition to the toxicity of straight Aroclor or straight PCB.

Q. Let me ask you this. If the substance was found in the product, wouldn't you want to know at what level it was found?

A. Oh, sure.

Q. Would you find the reporting of unidentified halogenated compounds in your product to be acceptable reporting?

A. Well, it depends on how much. I mean, if you've got five parts per million,

that's one thing. If you've got a hundred thousand parts per million, that's something else.

Q. Let me show you a document that's been marked as PRR 004370.

(Witness peruses said document.)

MR. McLAUGHLIN: Is this marked as an exhibit?

MR. COHEN: No, it's not.

MR. COX: I don't understand the process of showing the witness an exhibit that's not been marked.

MR. COHEN: It's a document that's been well identified about a dozen times.

MR. COX: But it ought to be made a part of the record.

MR. COHEN: Well, maybe I'll do that, to keep you happy, Richard. I don't want you to be unhappy.

MR. COX: Thank you.

THE WITNESS: Is there a request for me to do something with me with this?

BY MR. COHEN:

Q. Just look at it. Have you had a

chance to look at it?

(Witness peruses said document.)

A. Yes, sir.

Q. You are looking at more pages than one, but do those reports give you very much information?

A. No, sir, because it seems to me that I don't know who did the report, and I've no way of knowing even what company it says, to identify this report, and it says, "Aroclor 1242 induction date, 9/73. Samples analyzed, 2. Sample size, 600 milligrams. Found di-, tri- and tetrachlorodibenzofurans, chlorinated naphthalenes, trichloroterphenyl and unidentified halogenated compounds."

It doesn't say anything about the amount present in there at all, so what did you ask me about the report?

Q. Does it give you much information?

A. It doesn't give me any.

Q. Thank you. You said it said "Induction date." I think it says "Production date," if you'll look at it again.

A. Oh.

Q. It's not a great copy, I'll agree.

A. It's "Product date, 9/73."

MR. COHEN: Okay. Why don't we mark --

THE WITNESS: Does it say when they did it? I mean, I don't know if they did that when I was there or not.

BY MR. COHEN:

Q. So you are saying you don't know when the test was done without regard to the production date?

A. Yes. In other words, they grabbed a sample that was made in August '73, October '73 -- September '73, but I don't know when they ran the test.

MR. COHEN: Okay, we'll take this six-page document previously marked as Kaley 4 and mark it Kelly 25.

(Kelly Deposition Exhibit 25 marked for identification.)

MR. COHEN: We'll make extra copies of it.

BY MR. COHEN:

Q. Doctor, do you remember we talked

somewhat in the earlier session of your deposition, not today, about the conditions at Paoli?

A. I can't hear the last.

Q. Do you remember that we talked somewhat earlier in your deposition about the conditions at the Paoli rail yard and car shop?

A. Yes, we talked about it, but I don't remember saying much outside of the fact that I had never seen it, I'd never been to the Paoli rail shop.

Q. What information do you have about the various modes of exposure that allegedly occurred at Paoli?

A. Very little.

Q. Can you tell me what you do have?

A. Well, there was, working on transformers that had PCB's in it. I don't know what they did to them, so very little.

Q. What do you know about the claimed medical problems that the Plaintiffs have as a result of their exposure to PCB's?

MR. MALIN: Objection to the question; asked and answered.

A. Nothing.

BY MR. COHEN:

Q. Do you have an opinion whether PCB's or any other related compounds we've been talking about, PCBF, PCBD, the various chlorinated benzene compounds that are in Pyranol, were in any way responsible for any of those claimed conditions?

MR. MALIN: Objection. He doesn't know what they are.

A. I mean, I don't know what the claims are.

BY MR. COHEN:

Q. So you have no opinion today?

A. No, sir.

Q. Are you familiar with the term "Superfund endangerment assessments"?

A. Just what I read in the paper. I'm familiar with the term. I don't know what it means.

MR. COHEN: Mark this as Kelly 26, please.

(Kelly Deposition Exhibit 26 marked for identification.)

(Witness peruses said

document.)

BY MR. COHEN:

Q. Have you ever seen that document before?

A. I think I have. I think I've seen it in one of these depositions.

MR. COX: Could we know what the document is?

THE WITNESS: The document doesn't have any date on it, don't have any heading, doesn't have any anything.

MR. COHEN: It was an interview -- who was this interview with, Michael?

MR. MALIN: I think, if I'm not mistaken, this is a letter that -- a response to a letter that Westinghouse wrote, and I think Bill Papageorge responded to it.

MR. COHEN: That's what I thought; the questions and answers were Papageorge's answers.

MR. MALIN: It was included in their response to our motion for summary judgment.

MR. COHEN: And then you attached the letter, the Westinghouse letter with it.

MR. MALIN: And there was a letter that was attached to it.

MR. COX: Was it the -- what's this, the question-and-answer document?

MR. MALIN: It's the addendum to it; it's not the full document.

BY MR. COHEN:

Q. So you've seen it before in depositions but you have never seen it prior to that time?

A. No, sir. What was the date of this, by any chance? Does anybody know?

MR. COHEN: I think Mr. Malin knows, if he recalls.

MR. MALIN: I don't know the exact date because I'd have to have that letter, so I can't tell you off the top of my head the exact date of it.

A. Well, I don't recall ever seeing it while I was with Monsanto.

BY MR. COHEN:

Q. What was your relationship with Mr. William Papageorge?

A. Well, we were working in the same problem in different fields, it was very

close; he was in our office two or three times a week. I saw him lots.

Q. What was the problem?

A. Hmm?

Q. What was the problem you were working on?

A. Well, the effect of PCB's on the environment.

Q. When you say the environment, does that include humans?

A. Well, yes, it could.

Q. And what was Mr. Papageorge's department?

A. Well, that depends on the time. At 1970, he was made environmental chief of the Monsanto Chemical Company, which is a major subsidiary of the Monsanto Company, I mean, not subsidiary where he -- a major division of the Monsanto Company, and prior to that, he was the plant manager at Anniston, Alabama, where they made PCB's.

Q. During this time period when you were dealing with this --

A. A little louder please.

Q. Sorry, sir.

During this time period when you were dealing with this problem, as you described it, of PCB's in the environment, what was his title?

A. I think, Director of Environmental something, I don't know what, for the Monsanto Chemical Company, which is not the whole Monsanto Company. It was probably a fourth of the company or a third of the company.

Q. What were the other companies?

A. Well, the Monsanto Agricultural Company, the Monsanto Plastics Company, the -- gosh, the Fisher Controls Company, there were about four or five of them.

Q. What was his role at that time? Do you recall?

A. Well, he was the chief investigating it, and answering questions about disposal, answering questions about uses, or notifying the customers of what we were going to do about the ceasing supplying certain use, for certain uses. He ran the whole environmental aspect of PCB's.

Q. Where did he get his information

on the toxicological properties of PCB's?

A. Well, I think, from information he got from the Medical Department over the years that he was plant manager at Anniston where he -- where they manufactured PCB's, as well, as I said, frequent, two- or three-time-weekly visits to our department, he and Wheeler and I were very close to each other as far as passing information back and forth.

Q. So the information he would have had would, of necessity, through one group or another, come from your department during that time period?

A. Well, also, though, he had, he had a lot of dealings with the electrical industry, he had dealings with the plastics industry, and he got information from them also, I'm sure.

Q. He got outside information on the toxicologic properties of PCB's?

A. Well, I would say if you mean toxicological properties --

Q. Yes, sir.

A. -- due to animal experimentation,

he did not, but he got toxicological information due to the lack of, due to the lack of injury to their workers. I mean, he would get their workers' experience manufacturing, using these products.

Q. And would he pass the information that he got from outside sources on to you?

A. Yes, if it were anything positive, certainly.

Q. So in other words, negative information he would not pass on to you?

A. Well, that's not necessarily so. He may say, "I was at 'X' company. They haven't had any problem in 25 years." He might pass that on to me.

Q. Did you make any record of that information when it was given to you?

A. I would doubt it.

Q. May I see the exhibit for a moment, please?

(Witness complies)

Q. Do you see this statement that he makes, here, where he says, "The potential toxic effects in humans" -- if I may, since I don't have an extra copy -- "The potential

toxic effects in humans from excessive exposure to polychlorinated biphenyls include injury to the liver and chloracne"?

A. Yes, sir, I see that.

Q. What would have been his source of information for that statement, sir?

MR. MALIN: Objection.

Answer the question.

A. I do not know where he got the information concerning chloracne unless he got it from the Usho experience, which was a nonindustrial use or a Japanese, just Japanese PCB's manufactured by a different process from Monsanto, containing different contaminants than Monsanto had, different levels. As far as ingesting to the level, I'm sure he got that from us because we talked to him about the two cases of acute illnesses that we had and in heat transfer units.

BY MR. COHEN:

Q. The sentence, last sentence, "Although chloracne is difficult to evaluate in animals, in humans this takes the form of comedones, large blackheads with typical acne

pustules and may be an external symptom of overexposure preceding serious -- the word underlined -- "liver injury."

What serious liver injury was he speaking of? Do you know?

MR. MALIN: Objection again.

Answer the question.

A. I do not know what he was speaking about unless -- well, I just don't know because the "serious" injury we were seeing in the two different episodes I've described over and over occurred so fast that chloracne did not occur. You don't get chloracne in two or three weeks after an exposure, and so I do not know the basis of a statement, "May be an external symptom of overexposure preceding serious liver injury." I don't know how he equates the term "preceding serious injury." If he means you get chloracne before you get anything else, I think he's correct. That seems to be accepted as a sort of the hallmark of PCB overexposure.

BY MR. COHEN:

Q. Do you know what "serious" --

underlined -- "liver injury" he is speaking of?

A. No, sir, I certainly do not.

Q. In response to question 3, the question, as I understand it, reads, "Since Inerteen affects birds and other animals, if there is no real effect to human beings, how do you explain it to employees in such a way that they will understand why it can kill a bird and not a human?"

The answer is, "There is a potential real effect to humans -- including death -- as discussed in the answer to question 1."

Where do you suppose he would have gotten that information?

MR. MALIN: Objection.

Answer the question.

A. There is a potential real effect to humans, including death. If you inhale a material in sufficient quantity, you could get chemical hepatitis, and if you keep on doing it or get enough in the one or two doses, you could die from it, yes. The cases we have talked about, the ones that have been

reported to me and I repeatedly mentioned, are two episodes where people developed jaundice and acute chemical hepatitis from breathing material in a jury-rigged heat transfer unit at elevated temperatures. That's where the -- now, conceivably, if those people had stayed on, instead of getting out after they developed their jaundice, if they stayed on for another couple of weeks, they conceivably could have died from it, yes.

BY MR. COHEN:

Q. And you have already stated earlier that the mode of ingestion, that is, inhalation, as compared to dermal absorption or ingestion, is not significant.

A. No, I didn't say that.

Q. What did you say?

A. I said that I believed the effects on the human body were the same whether you took it orally, whether you had it absorbed through the skin, or by inhalation, but I did say, I believe I said that you can get a significant amount by inhalation, and if I didn't say it could occur faster, I'll say it

now.

Q. So in other words, you could take more up by inhalation than the other means?

A. That's correct, and I think it would act more rapidly.

Q. Do you agree or disagree that there is a possibility of serious human injury, including death, from an absorption other than through inhalation?

A. Well --

MR. MALIN: Objection. You said in sufficient amounts.

A. You said in sufficient amount. You mean -- certainly, if a person wanted to commit suicide and drank a quart of the stuff, conceivably, a quart would be enough to kill you. I don't know.

BY MR. COHEN:

Q. How about through dermal absorption?

A. Well, I can't figure out that particular scenario because I've seen places where people have immersed their hands repeatedly and developed only chloracne, and that we advise strongly against repeated or

continuous skin contact.

Q. Do you know when you first started giving that advice?

A. Sometime, I don't know whether it was before or after World War II. I don't know, but a long, long time.

Q. Through what vehicle were you giving out that advice?

A. On labels, on bulletins, and any letters to customer inquiries.

Q. Was it something that was prominently on the barrels of the products?

A. Well, yes, it was, seemed to me to be pretty prominent.

Q. Do you recall seeing labels that said --

A. Oh, yes.

Q. -- "Don't let this contact your skin"?

A. Sure, I've seen it.

Q. Did the label describe the risk of harm?

A. No, it just described how to avoid all harm.

Q. What did it say?

A. It said "Caution," may have said at some time, they put on, "Contains chlorinated hydrocarbon. Do not breathe in confined spaces or at elevated temperatures. Do not --" and "Avoid repeated or continuous skin contact."

Q. And that was labels that was on the package, itself?

A. Yes.

Q. On the barrel?

A. Mm-hmm.

Q. But it didn't describe what the consequence was of that exposure?

A. You mean, "Do not get this on your hands continuously or on your body or you will get liver trouble"?

Q. Or anything to that effect.

A. No, I don't think that's usual on labels at the gasoline station. They say "Do not smoke around here." They do not say, "Do not smoke while filling the gas tank or it'll blow up." I think you'd tell them what not to do to protect themselves. That's what's liable to happen.

(Recess)

BY MR. COHEN:

Q. Doctor, you remember earlier I asked you whether there was agreement on the applicability of animal data to understanding diseases in humans, and you said that there are some who are in full support and there are others who are naysayers or nihilists who say no, and you fell somewhere in between, and it depended on the compound, that sort of thing?

A. Yes, sir.

Q. Let's go back and ask the same question on the applicability of human epidemiological data.

MR. MALIN: Objection. I don't quite understand what that question is. Could we have the full question on this one?

MR. COHEN: Sure.

BY MR. COHEN:

Q. With respect to human epidemiological data, sir, would you agree that all scientists accept the validity of human epidemiological data as a predictor of ailments in human beings?

MR. MALIN: I'll object to that

question.

A. As a predictor of what?

BY MR. COHEN:

Q. Ailments in human beings.

A. Animals?

MR. COHEN: Ailments.

A. Oh, ailments. I'll object to the form of that question.

Go ahead; answer the question if you can.

A. Well, there is, certainly, divergence of opinion. In fact, I don't know of any epidemiologist that believes the perfect epidemiological study has been made. They all will say there are some flaws in it, but I think if you go by the concurrence of opinion, you could come to a fairly reasonable scientific conclusion.

BY MR. COHEN:

Q. Are you saying from looking at a number of epidemiological studies on the same subject matter, you could come to a conclusion with respect to the subject of those studies?

A. I think so.

Q. Are you aware of scientists who reject epidemiological studies?

A. You mean all epidemiological studies or --

Q. Generally reject the notion that epidemiological studies are particularly probative of a cause-and-effect relationship in humans.

A. I don't think so. I don't know of any. There may be.

Q. Just if I can clarify one point, on the issue of epidemiological studies, you cited the four factors, and one of them is repeatability, as I understand it.

A. Yes, sir.

Q. Do I understand that you are saying that repeatability means that using a different sample population, you can repeat the results obtained in a particular sample population?

A. Yes, sir. If I may phrase what you are saying, an epidemiological study in one group of individuals in the, doing the same general work as another group, come out with the same answer.

Q. And that's what you mean by repeatability?

A. Yes, sir.

Q. And again, earlier today, we were discussing a meeting that you apparently had with Dr. Renate Kimbrough, and I think you said that she had come here to St. Louis. I believe you had stated that you thought it was about the time that you had retired. Is that right?

A. Well, before I retired, yes. I had not retired. I was still working for Monsanto, but I do not believe -- I do not recall whether it was at the first part of '74 or the last part of '73.

Q. Was that a meeting with Dr. Kimbrough individually, or was it as part of her membership with an agency?

A. Oh, I'm sure she came as a government, member of a government agency, and to the best of my impression, she had somebody else along. I thought there were two "feds" there. I don't --

Q. Two? You recall two people?

A. I believe there were two, yes.

Q. Let me ask you to look at this document.

MR. COHEN: Let's mark it, just one moment, sir. We'll mark it as Kelly 27.

(Kelly Deposition Exhibit 27 Marked for identification.)

marketed marked.

(Witness peruses said document.)

(Discussion off the record)

BY MR. COHEN:

Q. Dr. Kelly, 27, could you identify that?

A. This is Exhibit 27, a meeting with NIOSH November the 22nd, 1974 -- and also for your information, I retired eight days later, November the 30th -- re: PCB's. For NIOSH, there were one two three four five, five government people besides Kimbrough. For Monsanto, there were three people from our department: Kelly, Wheeler, and Levinskas, our toxicologist, Papageorge, Director of Manufacturing -- Manager of Manufacturing, and had a Manager of Environmental Affairs, G. F. Fort, who probably -- I don't know who

he was. That's a new name for me. He probably reported to Papageorge, but I don't know. Papageorge was there. Papageorge had a different title, too, Product Acceptability Specialist at Process Chemicals Division. I don't know what all that title meant.

Q. Does this memo refresh your recollection at all about what -- who was at the meeting, at least?

A. Oh, yes. I mean --

Q. Do you remember this whole gang of people there?

A. I didn't remember there were that many. I thought somebody came along with Kimbrough.

But obviously, there were.

Q. Is this the meeting at which you discussed the results of her studies?

A. Yes, sir. I do not know if that was the only thing. I mean, at some time around that time -- now remember, this is right when I'm getting ready to leave, so I wasn't paying too much attention to what's going to happen two weeks from then. NIOSH was somewhat interested in doing a, an

epidemiological survey of our workers. I think they were talking about that before. Whether this was a follow-up to that or not, they at one time sent people around when they looked the thing over and said, "Well, you don't have enough workers to do anything on it," so they didn't do it. So I don't know if this was directed solely to, to Kimbrough's work and our work; I don't know, but I don't see any, that biometric branch person was probably an epidemiological, and then there's another epidemiologist in Dr. Heath from the CDC, so I don't know what we discussed. I'm pretty vague on it.

Q. Do you know if any of these people are still with Monsanto Company? Bratsch, Savage, Engman or Fort?

A. I don't know.

Q. How about Levinskas?

A. He retires in a week.

Q. He's still there now?

A. Yes. Right now, he's still there.

Q. Did you ever did talk to Dr. Kimbrough again after this meeting?

A. Beg pardon?

Q. Have you ever spoken to Dr. Kimbrough again after this meeting?

A. I don't think so, no, because as I said, I went out with the company eight days later.

Q. And that was it?

A. That was it.

MR. COHEN: John, you want to ask a few questions?

(No response)

MR. COHEN: Just a couple of more. Let's mark this as 28.

(Kelly Deposition Exhibit 28 marked for identification.)

BY MR. COHEN:

Q. Can you identify the document, 28?

A. This is a document, Deposition Exhibit Kelly 28, from Elmer Wheeler, dated March the 7th, 1969, to me concerning two things: One, about Aroclors, and the other, about incinerating plastic wastes.

Q. Referring to the section regarding the Aroclors, what's the first sentence of that letter?

A. "The Aroclor pot is really

boiling."

Q. Do you know what that means?

A. I guess there was an awful lot of publicity about the findings from the West Coast.

Q. And that was what; the presence of PCB's in various forms of wildlife?

A. And the problem with the thin eggshells in avian species.

Q. Do you agree that PCB's can cause those effects on wildlife?

A. They can cause thinning of the eggshells, yes, they can.

Q. May I see that exhibit?

(Witness complies)

Q. The reference in here to Calandra, that's IBT?

A. That's correct.

Q. Do you remember at the last session of your deposition we talked about two individuals who were apparently epidemiologists who had done studies on the effects of PCB's in employees at the Krummrich plant?

A. Yes, sir.

Q. Sauget, Illinois?

A. I don't know if they were both employees. Two people did -- you say two employees did it?

Q. Yes. Weren't they --

A. I don't know if that Munch worked for Monsanto or not. Zach did.

Q. Zach did?

A. Yes, the other one may. I don't know. That was after I left.

Q. This all occurred after you left?

A. Yes.

Q. And do you know the individual named Suskind?

A. Oh, yes, very well.

Q. Are you aware that there has been an allegation made recently by the Environmental Protection Agency against those same individuals regarding dioxin studies on employees at the -- at a Monsanto plant?

A. I don't know if it was at the same employees. I know anecdotally that somebody said that they had some thoughts about Suskind's epidemiological studies, but I thought that was at our Nitro, West Virginia,

plant, not doing -- having nothing to do with PCB's. I thought it was 2,4,5T.

Q. 2,4,5T?

A. That's what I thought I could be wrong on that, but --

Q. What is 2,4,5T?

A. 2-dichlorodiphenoxene, trichlor -- I thought you want the chemical. It's a herbicide.

Q. What is it?

A. It's a herbicide.

Q. Are you aware of any such allegations regarding his exposure studies with respect to dioxins?

A. Where? You mean --

Q. Against the same scientists, regarding exposure studies on Monsanto employees to the substance dioxin.

A. Well, I thought that they believed that there was dioxin in the 2,4,5T, if this is the one they're talking about. I don't recall Suskind ever doing a PCB study.

MR. COHEN: Okay. John?

BY MR. INNELLI:

Q. Dr. Kelly, my name is John Inelli. I also --

A. John who?

Q. Inelli.

A. Yes, sir.

Q. I'm also here on behalf of the Plaintiffs, and I have a few questions to ask you.

A. I'll ask you to speak a little louder, please.

Q. Yes, I will. I'm sorry.

I note on Kelly 27 that it identifies Elmer P. Wheeler as Director, Environmental Health in the Medical Department. Do you know when he became Director of Environmental Health?

A. No. When's the date of that memorandum?

Q. This is the November 22nd, 1974, memorandum.

A. Oh, this, well, obviously, it was sometime before I left. Monsanto was always changing titles. I mean, first they would

say, "You can't have two directors of one department, you can't have a Medical Director and a Director of Environment. That man has to be a manager." Now there's a little less, a manager has less status than a director, even though they get the same money, but then they changed their mind and let people go back to being called directors under a director.

Q. You were the Director of the Medical Department?

A. That's correct.

Q. Did there come a time when an Environmental Health Group within the Medical Department was created?

A. Well, there was a time when, to use an Army phrase, in addition to their other duties, members of the Industrial Hygiene Department became an Environmental Group.

Q. And what were the responsibilities of the Environmental Group?

A. They were to see and report to the Executive Committee if there were any environmental problems in the plants that

needed correction, they were to speak as one voice on matters affecting various manufacturing installations. If we had, in Alabama, we may have a textile plant, an organic chemicals plant, and probably another plant belonging to a different division, and rather than three people going down testifying for or against a particular bill, the Environmental Group would go down, and -- since they all spoke for the same voice from a company viewpoint.

They also had the charge by the Executive Committee that they would look over any appropriations for major changes or new plants, to be sure that the effluent in the flow chart, whether it be air, or solid, or water, was correct; instead of putting an arrow to sewer, it would, the outflow would have to be directed to a suitable method of disposal, or reclamation or treatment.

Q. When you say Executive Committee, to what are you referring?

A. The group of five people that ran the company.

Q. How did the Environmental Health

Group's responsibilities differ from the Industrial Hygiene?

A. Oh, a great deal, because they dealt with company-wide matters. Industrial hygiene was really a plant matter; you know, they acted in the same fashion the safety inspector did at a plant. They worried about the atmosphere in the individual plant, but the Environmental Group dealt with company-wide problems, although they were consulted by the individual plants as to what was the current thinking as far as disposal was concerned.

Q. Do you know who Jack Garrett is?

A. Yes. He was a member of the Industrial Hygiene Department.

Q. And to whom did he report?

A. Wheeler.

Q. And Mr. Wheeler reported to you?

A. That's correct.

Q. Do you know an L. A. Watt?

A. I knew him 45 years ago, or -- he was a member of the Technical Service Department when Monsanto had a population, a an employee population of 7,000 people.

Q. And what was the responsibility of the Technical Services Department?

A. Well, at that time, it was called -- well, he was there before I came there, and his background was that of a pharmaceutical chemist, I believe, and he had handled some of the problems for the Organic Division before I showed up.

Q. When you showed up, where was he relative to you in the reporting lines for the company?

A. No connection at all. I reported to the plant manager at the Plant A, which was subsequently called the Queeny plant, and Watt reported -- I was just the plain company physician there, and Watt was in the general office in the Organics Division where he reported. I don't know if he reported to Marketing or what, but the Technical Service Group was a group that helped Sales by -- helped the Marketing Group by giving them technical advice as to how to use Monsanto's products or try to introduce new products to the customer.

Q. Would Mr. Watt ever discuss with

you the kind of language that should be used in any materials that might be prepared for distribution to users of Monsanto products?

A. Yes, after I was there for a year or so, I mean, we got -- I got called over to the general office because I was the only Monsanto doctor around, and even though I was a part-time doctor who was being paid by the Queeny plant, so yes, we talked about various things; about what we needed, what we needed to know as far as toxicity is concerned, what warning label should be put on, what should be put in bulletins and things of that sort that have medical connotations.

Q. Am I correct in understanding, then, when you first started with Monsanto, you were a part-time physician?

A. Yes, I was part-time till after the service, after I became full-time in '46.

MR. INNELLI: Let's mark this as Kelly 29.

(Kelly Deposition Exhibit 29 marked for identification.)

(Witness peruses said document.)

BY MR. INNELLI:

Q. Dr. Kelly, for the record, could you identify this document?

A. This is a document dated October the 11th, 1937, Kelly Exhibit 29, by L. A. Watt. It's a memorandum of -- doesn't show who it went to, but it discusses a publication in bulletins or in correspondence concerning Aroclors, the toxic effect and how to avoid it.

Q. Do you recall any conversation with Mr. Watt regarding the subject?

A. I don't recall this one specifically, but I know I -- he was probably one of the -- my closest contact in the general office, and in fact, when I went into the service, I gave him Medical Department files on the various products. We were relatively unsophisticated back in '38, '39, '40. Yes, I, I'm sure I talked to him about Aroclors.

Q. Why would he come to you to discuss Aroclors?

A. Beg your pardon?

Q. Why would he come to you to

discuss Aroclors during that time period?

MR. MALIN: Objection.

Answer the question if you think you understand it.

A. Well, I think he wanted to get a physician's input, and at that particular time, I was the contact the company had with Drinker who did the work, the early work on the PCB's. He did it in 1937 and '38, I believe, and I was up at that meeting, so he came to me as probably the most knowledgeable person as far as the toxicological aspect of Aroclors would be concerned.

BY MR. INNELLI:

Q. Now, did Mr. Watt, when he spoke with you, share any inquiries that had been made by users of Monsanto products?

A. Not that I recall. Once the Aroclor problem surfaced at Drinker, I received a lot of people's files that were happy to unload them on me.

Q. And when was that?

A. '37, '38.

Q. During the '37, '38 time frame, did Monsanto have a Medical Director?

A. No sir, they did not.

Q. Do you know a Jane -- a Jay Springgate?

A. Yes. He was, worked for the -- I don't know whether it's called the Organic Division at that time or the Monsanto Chemicals Company, but he was originally, I thought, a plant manager at one of their smaller plants, and then he came up to the general office as a, I don't know, a product manager or something of some group, I don't know which one.

Q. And what about T. Ford?

A. T. Ford? I vaguely remember the name. I don't know anything else about him.

Q. P. S. Park? Do you know an individual by that name?

A. Yes. He was a lawyer who is not with the company anymore, I don't know where he is, but he sort of gravitated into the environmental law aspect. What's the date of that memorandum?

Q. 1969.

A. '69?

Q. Right.

A. I think he was doing environmental aspect of law at that time.

Q. Do you know whether Park's first name?

A. Phocion, P-h-o-c-i-o-n.

Q. And how old a gentleman was he?

A. Younger than I. I would gather he's in his sixties, I suppose.

Q. Do you know where he is today?

A. I thought he was in the private practice of law someplace around. I don't -- I thought in St. Louis. I don't know. As I say, I have not seen him or talked to him since 1974.

Q. Did Monsanto have a task force with any of the companies for whom it produced PCB's?

MR. MALIN: Objection to the form of the question. I don't understand what that means.

If you think you understand that question, Doctor, go ahead.

A. I'm not so sure I understand. I thought a task force would have to have a particular objective, and I do know that

Monsanto cooperated with members of the electrical industry. I know there was one bulletin written by Monsanto people in conjunction with people from GE and Westinghouse on the generic term of Askaral, which is the generic term for transformer dielectric fluids, just as Aroclor was Monsanto's copyright name, and Pyranol was GE, and Inerteen was Westinghouse, and somebody else something else, Askaral was the generic term for all electric, dielectric fluids.

Q. And during what time period did Monsanto work with General Electric and Westinghouse on, report on Askaral?

A. I don't know. I mean, I'd been shown a bulletin at some of these depositions; I don't know if there was a date on it, but I don't know. I never worked with the group.

Q. Was there a group inside of Monsanto that dealt with the PCB issues?

A. Well, when the environmental aspect became prominent, Bill Papageorge was the point man on it, and he had input from

Research, Medical and Legal, and I guess you could call it a task force.

Q. Did you participate?

A. No, Wheeler did. I mean, I participated if they came and asked me about something, but Wheeler was the Medical Department person on it.

Q. Did representatives of the Medical Department or the Legal Department and Mr. Papageorge meet on a regular basis, to your knowledge?

A. I can't answer that. Will Papageorge be here tomorrow?

MR. MALIN: Yes.

BY MR. INELLI:

Q. Dr. Kelly, do you know a Mr. Dietrich?

A. Dietrich? How do you spell that? No, I don't know.

Q. D-i-e-t-r-i-c-h.

A. It does not ring a bell with me.

Q. How about a Mr. Emery? E-m-e-r-y.

A. I have a vague recollection of somebody whose name is close to Emery who was a chemist or something at Anniston, but I

don't know much more about it. What date is that one?

Q. Also the 1969 time period.

A. I can't hear you.

Q. Also the 1969 time period.

A. But I really can't be sure of Emery, or Dietrich, either.

Q. Mr. J. R. Eck, E-c-k?

A. Yes. He originally was a plant manager at the Trenton, Michigan, plant, which just made detergents; nothing to do with PCB's, but he eventually became Director of Manufacturing and a vice-president of the company. He retired from the company, I guess, pretty close to the time I retired, although he was younger, and is living someplace in Florida. I have not spoken to him since 1974.

Q. How about Mr. John Mason?

A. John who?

Q. Mason, M-a-s-o-n.

A. Yes, he was a man originally from our Great Britain subsidiary who came to work, I think, as a manufacturer and director of the chemical company or the industrial

chemical company, whatever they called it in those days.

Q. And Mr. Cumming Paton, C-u-m-m-i-n-g, Paton, P-a-t-o-n?

A. I remember the name, but I forget what he did. I thought he was in marketing.

MR. INNELLI: Okay, why don't we take a five-minute break. I think we're pretty close to being done.

(Recess)

MR. COHEN: That's all we have for today.

MR. INNELLI: Dr. Kelly, thanks. I have no further questions.

Anybody else have any questions?

MR. McMANUS: Dr. Kelly, I don't have any questions for you.

MR. COX: No questions.

MR. McLAUGHLIN: No questions.

MS. GROSS: No questions.

MS. COONELLY: No questions.

MR. MALIN: No questions.

MR. COHEN: Do you have any questions, Doctor?

(Whereupon, at 4:00 p.m., the

deposition was concluded.)

COMES NOW THE WITNESS, EMMET KELLY, and having read the foregoing transcript of the deposition taken on the 16th day of July, 1991, acknowledges by signature hereto that it is a true and accurate transcript of the testimony given on the date hereinabove mentioned.

_____

Subscribed and sworn to before me this _____ day of _____, 1991.

My Commission expires: _____

_____
Notary Public

STATE OF MISSOURI)
SS:)
CITY OF ST. LOUIS)

I J. Bryan Jordan, notary public in and for the State of Missouri, duly commissioned, qualified and authorized to administer oaths and to certify depositions, do hereby certify that pursuant to agreement in the civil cause now pending and undetermined in the Court of Common Pleas of Philadelphia County, State of Pennsylvania,

and in the United States District Court for the Eastern District of Pennsylvania, to be used in the trial of said cause in said court, I was attended at the offices of Brown & James, in the City of St. Louis, State of Missouri, by the aforesaid witness and by the aforesaid attorneys, on the 16thday of July, 1991.

The said witness, being of sound mind and being by me first carefully examined and duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the case aforesaid, thereupon testified as is shown in the foregoing transcript, said testimony being by me reported in shorthand and caused to be transcribed into typewriting, and that the foregoing pages correctly set forth the testimony of the aforementioned witness, together with the questions propounded by counsel and remarks and objections thereto, and is in all respects a full, true, correct and complete transcript of the questions propounded to and the answers given by said witness; that signature of the deponent was

not waived by agreement of counsel.

I further certify that I am not of counsel or attorney for either of the parties to said suit, not related to nor interested in any of the parties or their attorneys.

Witness my hand and notarial seal at St. Louis, Missouri, this 21st day of August, 1991.

My commission expires July 20, 1994.

J. Bryan Jordan

Notary Public in and for the

State of Missouri