COPY

IN THE DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF KENTUCKY
PIKEVILLE DIVISION

EQUITABLE RESOURCES ENERGY COMPANY, a West Virginia Corporation,	)	
Plaintiff,	)	
VS.	)	No. 91-441
MONSANTO COMPANY, a Delaware Corporation,	)	
Defendant.	)	

DEPOSITION OF R. EMMET KELLY, M.D.
TAKEN ON BEHALF OF THE PLAINTIFF.

October 6, 1992

RICHARD E. SCHROEDER

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October 21, 1992

R. Emmet Kelly, M.D.
665 S. Skinker Blvd.
St. Louis, MO 63105

IN RE: EQUITABLE RESOURCES ENERGY CO.
VS. MONSANTO COMPANY

Dear Doctor:

Your deposition given on Oct. 6, 1992, has been transcribed, and is now ready to be read and signed by you. Please call and make an appointment at your earliest convenience to come downtown to this office to handle this matter.

If you have not called us within thirty days, your deposition will be filed absent your signature.

I am enclosing correction sheets for your convenience in case you have been furnished a copy of your testimony by counsel. Please return them to my attention at the address shown on this letter, along with a notarized signature page found at the end of the transcript.

Yours very truly,

Richard L. Saunders

cc: Gregory L. Monge, Esq.

IN THE DISTRICT COURT OF THE UNITED STATES
EASTERN DISTRICT OF MISSOURI
EASTERN DIVISION

EQUITABLE RESOURCES ENERGY COMPANY, a West Virginia Corporation,

Plaintiff,

VS. No. 91-441

MONSANTO COMPANY, a Delaware Corporation,

Defendant.

DEPOSITION OF R. EMMET KELLY, M.D., produced, sworn, and examined on the part of the PLAINTIFF, used in an action pending in the United States District Court within and for the Eastern Division of the Eastern Judicial District of Missouri, in re: EQUITABLE RESOURCES ENERGY COMPANY, a West Virginia Corporation, VS. MONSANTO COMPANY, a Delaware Corporation, on October 6, 1992, at the office of Husch, Eppenberger, Donohue, Cornfeld & Jenkins, 100 North Broadway, St. Louis, Missouri, before Richard L. Saunders, a Notary Public within and for the City of St. Louis, State of Missouri.

A P P E A R A N C E S:

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By: Michael D. Baker, Esq.
And Charles E. Beal, II, Esq.
For The Plaintiff.

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For The Defendant.

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R. EMMET KELLY, M.D.,

of lawful age, produced, sworn, and examined on behalf of the PLAINTIFF, deposes and says:

DIRECT EXAMINATION

BY MR. BAKER:

Q. Dr. Kelly, my name is Michael Baker and Mr. Beal and I are attorneys from Kentucky. We represent a company that has a plant in Kentucky that used Pydraul AC as a lubricant back in the '60's and early '70's and we have a lawsuit against Monsanto. We've been required by various agencies to do some remediation in our plant facility and we claim that part of the blame or all of the blame goes to Monsanto and we have a lawsuit pending in federal court in Kentucky over that.

We are here to try to gain some information from you about what was done at Monsanto with regard to PCB's, particularly Aroclors, and later the Pydraul products while you worked with them. Our purpose today is not to try to outfox you or trick you into saying something you don't mean but we're merely here to get information. So if I ask you anything and you don't understand what I'm asking at any time, feel free to stop and ask me to

restate it or rephrase it, or if you went to take a break and confer with counsel for Monsanto, feel free to do so.

A. Yes, sir.

Q. Have you given your deposition before?

A. Yes, sir.

Q. Approximately how many times?

A. 20 times.

Q. State your name, please?

A. Robert Emmet Kelly, K-E-L-L-Y.

Q. And where do you live?

A. 665 South Skinker, S-K-I-N-K-E-R, St. Louis, Missouri, 63105.

Q. What is your educational background?

A. Following high school I went to St. Louis University. I received a Bachelor of Science Degree in 1930. It was a combined course. And an M. D. Degree in 1932.

Q. After you got your M. D. Degree in 1932, what did you do?

A. I spent three years at St. Louis City Hospital as Intern, Assistant Resident and Resident in general medicine.

Q. Did you obtain any board certification or any other evidence of specialty in internal medicine

or in any other field?

A. Yes, I'm certified in internal medicine, recertified in internal medicine and certified in occupational medicine under the general blanket of preventive medicine. It's a subspecialty under preventive medicine but they are both recognized boards.

Q. After your three years at City Hospital, what did you do?

A. I started practice at St. Louis, Missouri, and after about six months I became a part time physician at the Monsanto Plant in St. Louis.

Q. Would that have been in about 1935 or '36?

A. 1936 I started with Monsanto.

Q. You said you were part time with Monsanto. Did you continue to practice in your own practice also?

A. Yes.

Q. I'll try not to interrupt you unless I'm confused about something. Just tell us what you did with Monsanto, starting in 1936 through the present time.

A. When I went with Monsanto in 1936 I was a plant physician at the Queeny Plant, and that was called Plant A in St. Louis. There I took care of

the occupational injuries, any occupational illnesses. I carried out a preventive medical program of preemployment examinations and routine reexaminations. I stayed there at the Queeny Plant -- at the Plant A at that time, they changed their name -- until January of 19 -- no, March of 1942, when I went in the service. I stayed there until 1946 when I returned from the service.

During the latter years of the '30's I visited some of the other plants on more or less spot occasions. In other words, I was the only doctor within hailing distance of the general offices so when they had some problems in other plants they would call me and I went there. I didn't have any direct responsibility but I was sort of the Medical Director without portfolio as you might say.

When I came back from the service in 1946 I set up a central medical department, a Corporate Medical Department, which was a staffed department at which I was given authority and responsibility over the other plants and laboratories the company had as far as their medical program was concerned.

I stayed in that position until I

retired in 1974. November '74, although, of course, the scope in the department enlarged during those 30 years or so, I was with Monsanto for a year on a consulting basis on a retainer. And then following 1975 I am treated just as any other client on a fee-for-service basis.

Q. From 1936 until you went into the service you were at the Queeny Plant or Plant A?

A. That's correct.

Q. During that period did you work at any other plants or visit any of the other plants?

A. Well, geographically, the Queeny Plant was situated right next to the general office, so the company enlarged and they went in the phosphorus business and other chemicals, so there were medical problems that were either actual or potential, so they looked around and said, well, what do we do? We've got a doctor next door, let's talk to him. So I started doing sort of fire fighting jobs during those years until '48 -- I mean until '42. By about 1940 I was going around to all the plants rather than wait for them to call me, but I was not officially a part of the Medical Director but they knew I was next door to the boss so, in essence, I had the authority, although it wasn't written down.

Q. Was this still a part time job at that time?

A. Yes, it was.

Q. And you still had a practice of internal medicine?

A. Private practice, that's correct.

Q. From 1936 until you went in the service in '42, approximately what percentage of your time was spent working for Monsanto?

A. Probably 50 percent I would imagine. I was out of town about 30 days or something of that sort.

Q. Were you the only physician employed by Monsanto during that time period?

A. Well, of the various plant physicians I was the only one employed in the St. Louis area. Most of the plants -- some were real small, 40 people, had a doctor on call, but other ones had either a doctor part time or a doctor under retainer.

Q. I believe they had a plant in Anniston, Alabama?

A. That's correct.

Q. During that time period?

A. Yes.

Q. Did you have occasion to visit that plant?

A. Yes, I did.

Q. Do you recall what it was that caused you to go to Alabama or caused Monsanto to ask you to go to Alabama?

A. Yes, that's -- this plant was bought from the Swann Chemical Company by Monsanto in 1935 or so before I came -- was associated with Monsanto. During the middle '30's or '34 or '35 the Swann people had a -- I don't want to say a rash, they had several cases of chloracne, which is a dermatitis, and that was rather unusual for the plant. It turned out though it came from an off-specification benzene they had bought for several batches where they were making PCB's. And that was in the files, it wasn't -- and I saw it there. And one of our company customers had -- they were using chlorinated naphthalene and using 10 percent of one of our materials. It wasn't PCB. Instead of chlorinated biphenyls it was chlorinated biphenyl benzene and they developed some chloracne, so to get a firm picture of the whole affair I went down to Anniston to see if they were having any trouble.

Q. Approximately when was that?

A. Beg your pardon?

Q. About what year was that?

A. Probably early '37.

Q. So Monsanto knew and you knew by 1937 that chlorinated hydrocarbons under certain circumstances caused chloracne?

A. Oh, yes. Well, it was pretty well known that chlorinated naphthalenes since 1900 had caused chloracne, so it was a pretty well known thing there was a thing such as chloracne from chlorinated hydrocarbons.

Q. You went away to the service. Were you a physician in the service or did you have some other --

A. No, I was with the Medical Corps but I was attached to chemical warfare installations. I was at Pine Bluff Arsenal at Pine Bluff, Arkansas, and then Edgewood Medical Center at Edgewood, Maryland.

Q. Did you in any way come into contact with chlorinated hydrocarbons during your time in the service?

A. Might have been some solvents but no PCB's, certainly. We had enough problems with the war gasses and things of that sort.

Q. So you came back to St. Louis then and you were discharged in 1946?

A. That's correct.

Q. And that was when the Corporate Medical

Department at Monsanto was formed?

A. That's correct.

Q. Were you placed in charge of that department?

A. Yes.

Q. Were there other physicians who worked with you?

A. Not then, but we gained a part time physician who was a Professor at Washington University. I think we did that in probably '48 or something like that. Eventually we ended up with a full time associate and three part time physicians in the general offices.

Q. Was your position a full time position at this time?

A. Yes.

Q. Did you have any private practice on the side?

A. No, I might have had an occasional consultation or something like that, but --

Q. But you didn't have an office and staff?

A. No.

Q. At any time between 1946 and 1974 did you have a private practice or practice other than your job at Monsanto?

A. Other than what?

Q. Your job at Monsanto.

A. No.

Q. Since 1974 when you retired or 1975 when your retainer expired have you had a private practice?

A. No, I was associated with the Barnes-Sutter Occupational Clinic in St. Louis for about -- to answer your question, I did not have a private practice but I was associated with Barnes-Sutter Clinic for three days a week when I would see their occupational cases three and a half days a week.

I was Medical Director of what was really a part time basis of Consolidated Aluminum Company in St. Louis and they had about 12 plants throughout the country and I spent probably 30 days a year with that, but no private practice.

Q. You said in the beginning that you had given your deposition approximately 20 times?

A. Yes, give or take.

Q. I'm not going to ask you to identify each of those. Have those primarily dealt with PCB's or have you been deposed on other topics also?

A. I would say that 80 percent were PCB's.

Q. Have you testified previously in trials

involving PCB's?

A. Yes.

Q. Can you, to the best of your recollection, tell us what trials you've testified in or where they were or give us some identification of those cases?

A. One was in Broken Ax, Minnesota. I don't recall the name of the -- Broken Ax is 60 miles north of Saginaw, Michigan.

Q. Approximately when was that?

A. Six years ago. Then there was a case in Texas at Beaumont, Texas. I think that was Scott if I'm not mistaken.

I testified in the Stroh Diecasting Company in Milwaukee probably three years ago I believe, I'm not sure. And there was one downtown in St. Louis but I forget the name of it. That was about a year and a half ago.

Q. Did you testify in the case in Bloomington, Indiana?

A. No, I gave a deposition.

Q. To the best of your recollection what product was involved in the Minnesota case?

MR. CHAMBERS: Just make an objection for the record on the relevancy on the inquiry that

doesn't involve Pydraul AC.

A. It was one of the Aroclors. I don't know whether it was 1254 or 1242. It was in paint that went in silos that flaked off.

Q. (By Mr. Baker) And to the best of your recollection what product was involved with the Texas case?

MR. CHAMBERS: If you remember.

A. I don't remember. It was -- I just don't remember. It was not a Pydraul though.

Q. (By Mr. Baker) And to the best of your recollection what product was involved in the Stroh case?

A. The Stroh might have been a Pydraul.

Q. And the St. Louis case?

A. That was an electrical PCB, probably 1248, but I'm not certain.

Q. You said you had given your deposition in a number of cases and that about 80 percent of those involved PCB's. To the best of your recollection can you tell us what cases you've given depositions in that involve any of the Pydraul line of products?

A. Well, I would say the Stroh was one. You know, some Pydrauls are PCB's and some Pydrauls are not PCB's. I mean, are you familiar with the

nomenclature of these things?

Q. I'm becoming more and more so. We would be interested in finding out cases you testified in involving Pydraul PCB's or PCT's and, hopefully, we will not have to become interested in any of the later Pydrauls.

A. Okay, I know the Stroh case. I can't recall any others over the years that I may very well have testified.

Q. You said that after your retainer for one year, after that period ended you did some work for Monsanto on a fee-for-service basis and, frankly, I'm not interested in how much, exactly how much they pay you, but do you bill that on an hourly rate or is it for a particular job or what is your arrangement?

A. No, it's not an hourly rate, and if I were out of town it was a different rate and if it's a deposition, it's one rate. If it's a trial, it's another rate. It started off I think back in 1975 at $100 an hour. Now it's $200 an hour.

Q. Do you bill that directly to Monsanto?

A. Yes. Although there may have been a case where I billed it to the plaintiff's attorney but I don't think I ever got paid by them.

Q. I would recommend that you send the bill to Monsanto. We'll work it out with them.

I assume you're being paid by Monsanto for the time you're devoting to this case?

A. I will be, yes, sir.

Q. Do they pay you for all the time that you spend preparing for depositions and giving depositions?

A. Will you repeat that, please?

Q. Yes, does Monsanto pay you for all the time that you spend preparing for depositions and giving depositions?

A. Well, "preparing" might be reading over some of the records and consultation with the defense counsel the day before the deposition. Yes, they do that.

Q. Do you maintain in your possession or control any records, copies of records or copies of correspondence pertaining to PCB's produced by Monsanto?

A. If there were exhibits at the time of a deposition, I would. I have none other than that.

Q. When did you first become familiar with PCB's?

A. 1936, end of '36 or the first part of '37.

Q. And what caused you to become familiar with PCB's at that time?

A. We had a customer called the Bakelite Corporation, which is a subsidiary of Union Carbon & Carbide, C & C they called themselves at that time. They are the ones that had it mixed in half a dozen Bakelite formulations mostly, various blends of chlorinated naphthalenes, and they sold this as a dielectric to cable, to wire cables, electrical insulation, and the workers who applied this insulation were developing chloracne and some were developing liver failures, so they were going to have the whole deal investigated by people at Harvard University. So they approached us for some money to carry out part of the investigation, even though the relative amount we ever sold them was a small amount, just, the best of my recollection, one product, which was not a PCB but was a chlorinated biphenyl benzene, which was like a PCB but it's got another benzene ring hooked on someplace.

Q. Did that ultimately lead to what I might describe as the Drinker study?

A. Yes, that was it.

Q. We'll get to that in a moment then.

Up to this time did you know anything

at all about PCB's or chlorinated hydrocarbons?

A. Well, there's a big difference.

Q. Let me ask you PCB's first.

A. Yes. Well, as I said, in the file are the records, old records, of the Swann cases down at Anniston. I seen that because I inherited the files. I had seen that but I don't know what I saw. And then, of course, at medical school we talked about chloracne from chlorinated naphthalene.

Q. In medical school was there any talk of PCB's?

A. No.

Q. Were you, in the 1930's, involved in any way with product testing for Monsanto to determine whether the product was safe or whether it had potential health hazards?

A. I might have been -- well, yes, I was involved in two ways. One, when Drinker came out and said our 1260 was toxic according to his testing, I called him and said, "Look, this is pretty strange to us. We don't really believe it. Where did you get the 1260? We've got no record of selling you this." He said, "I got it from Halo Wax and Bakelite."

I said, "I'm going to send you some

honest to goodness 1260." We didn't have a 1260, we had a 1262 you realize in the '60's '50's, the amount of chlorine hooked on to these benzene rings.

Q. Yes, I've been told that by a couple people. Why don't you briefly, so it will be on the record here, tell us what 1260 means and 1254 and 1248, et cetera?

A. It means that biphenyl benzene is chlorinated for an average of 54 percent chlorine. That doesn't mean that all the isomers in there are 54 percent. Some might be 58, some might be 48. And also, conversely, 1260 is chlorinated an average of 60 percent chlorine.

Q. And is that by weight?

A. Yes.

Q. To get the higher numbered Aroclor does that require more and more of the isomers with five, six, seven or even eight chlorines?

A. Yes.

Q. Just briefly explain for us.

A. In other words, you chlorinate it longer. You chlorinate at higher temperatures and you distill off the lower chlorinated ones, so you end up with the higher chlorinated 1262, 1268.

Q. What is the highest level of chlorine, by

weight, that Monsanto ever produced to your knowledge?

A. I know they produced 1268 in commercial amounts. I've seen some literature about a 1260 but I don't recall ever seeing it in bulletins.

Q. Would it be a fair statement that -- I know this isn't a direct proportion but may increase more than a direct proportion. Would it be a fair statement that a higher percentage by weight of chlorine would correspond with a lower degree of biodegradability?

MR. CHAMBERS: Let me just for the record again just object that I'm not sure that we've established what Dr. Kelly's involvement with biodegradability is. I know we've talked about toxicity aspects, but to the extent he can answer, he can.

A. Yes. I believe the lower chlorinated PCB's are more biodegradable than the higher chlorinated ones. The lower rings are more volatile, they are less viscous. The higher ones are resin like a piece of tar. They are much less biodegradable.

Q. (By Mr. Baker) Now, before I interrupted you, you were talking about sending some Aroclor to Dr. Drinker.

A. Sent some 1262 up to Drinker and he duplicated a test on what he ran on what he had called chlorinated, that he called PCB's, that he received from Bakelite and he was surprised that there was a magnitude difference, I mean a tenth of the toxicity of material we sent up there, so he corrected his statement about the toxicity in a subsequently article published in either 1937 or 1939.

Q. Do you know where that article was published?

A. Journal Of Industrial Hygiene & Toxicology. That's a defunct magazine right now.

Q. Do you know where I could go to find a copy of that if I wanted one?

A. Yes, sure. Call Tom Bistlline at Monsanto.

Q. I expected there would be somebody there who could direct me to one.

MR. CHAMBERS: Let's go off the record just a second.

(Discussion was had off the record.)

THE WITNESS: Drinker had three articles. The first one I think was in 1937. The second was more or less an analytical one that didn't mean too much toxilogical-wise. And the third one was either

in '38 or '39, but Bistlline's got them.

Q. (By Mr. Baker) Would it have been the third one that you referred to previously?

A. Third one, that's correct.

Q. I believe my question that led to this discussion of the Drinker articles was similar to this: In your position at Monsanto in the 1930's were you involved in testing of products to determine whether they were safe or whether they caused potential health hazards? And I believe part of your answer to that question was that you provided Drinker with some material after his first article; is that correct so far?

A. Yes.

Q. Did you have any other involvement in testing of products in the 1930's for Monsanto?

A. Yes. I'm not sure it was in the '30's or the first part of the '40's, we tested Pentaclor phenol which was a wood preservative, and we had that tested at our a consulting laboratory in Cincinnati and we probably were doing it in the late '30's. We may have been doing what we called our basic toxicology testing of acute package of testing. That would be testing for acute lethal dose, eye irritation, skin irritation and inhalation

of saturated atmosphere if the material could be volatilized without heating.

Q. Did you do that testing with PCB's or with just some of these other products?

MR. CHAMBERS: Object to the form. For purposes of clarification, you're focusing on the '30's time frame for that type of thing as opposed to some of the later --

MR. BAKER: Yes.

A. I can't remember.

Q. (By Mr. Baker) Do you recall any testing by Monsanto of PCB's for possible health hazards prior to the first Drinker article?

A. Quite sure we didn't.

Q. Other than sending Dr. Drinker a sample of Aroclor 1262 sometime after his first article, do you recall any testing by Monsanto of PCB's for health or safety hazards during the 1930's?

A. I don't recall.

Q. So let's start in the 1940's now. Do you recall any testing by Monsanto of PCB's for potential health or safety hazards during the 1940's?

A. I can't remember whether it was the '40's or the '50's. I'd have to see the reports. I just

don't remember. Remember, I was gone for four years so I don't think they did any testing, because I never saw any reports when I came back, so whether from 1946 to 1950 we did any testing, I can't recall.

Q. I'm not trying to tie you down to any particular year. I was just using the decades as a frame of reference. So you don't recall any other testing other than sending this material to Dr. Drinker before you went to the Army in '42; is that correct?

A. Yes, I believe so, although I said they may very well have done what we called our package testing as one of the local laboratories in St. Louis. There were two laboratories in St. Louis, Younger Laboratory and Scientific Associates, and we did acute testing there of various products, and I do not know if we included PCB's in that, I don't know.

Q. But you did some acute testing of several other products during that time?

A. That's correct.

Q. During that time frame to the best of your recollection who decided, or how was it decided, what products to do acute testing on?

A. I did.

Q. To the best you can enlighten us, on what did you base your decision of which products to do acute testing on?

A. Well, first, let me -- if it's a new product at that time we wanted to know some basic toxicological findings and we called a new product something that we either advertised in a technical bulletin, say we've got this product X, here is the characteristics, can you use it, or we suggested to be used this, this, this, that we wanted toxicological, basic toxicological information on.

Old products, we would test it in response to either a customer inquiry or worker inquiry. In other words, a union representative may say, well, this man says he's got a diabetes or something and he's working around product Y. What do you know about it? Well, if we didn't have any toxicological testing on it we would run the basic toxicity on it.

Q. Were there products that you did acute testing on before workers or unions or customers complained or raised questions about the safety of the products?

A. At what time?

Q. Okay, again, we're talking about the period right now up before 1942.

A. Yes, I think -- oh, yes, I'm certain. In other words, we were a relatively small company at that time. We had a central research department. They worked right across from the same building as we did and there was quite a good informal rapport between the people at Research and myself, and if they say, We're working on this batch of compounds; what do you know about it? And I said, Well, I don't know. Who else makes it? If they say, Well, DuPont makes it, I would write to DuPont and say, What do you know about this type of compound? Do you have any toxicological data on it? There was a free interchange of toxicological data, and there still is I presume.

Then we would look at the literature and see if there was anything in the literature. If there wasn't anything there, we would decide let's find something out about it.

Q. If you decided you wanted to find something out about it and in, again, this period 1936 to 1942, what would you do?

MR. CHAMBERS: Let me object just again to the form. When you say "it," you're just referring

in a broad general category to whatever it was that would be tested?

MR. BAKER: Right. I was just using his words.

MR. CHAMBERS: That's fair enough.

A. What was the question again?

Q. (By Mr. Baker) In your previous answer you said you might contact DuPont or another manufacturer, might review the literature, and if we couldn't find what we wanted there, might do some testing. And my question is: If you decided to do some testing of a product during this time period 1936 to 1942, what kind of a testing of that product would you have done?

A. That would be we would test it to see how it would damage the eyes if we dropped it full strength. We would test it on the skin to see if it could be absorbed through the skin to find out the action of the skin. We would test it orally to see -- those days we called it the minimum lethal dose. That was changed to the lethal dose for 50 percent of the animals. And then if it were a liquid we would bubble air through it into a cage containing some animals to see what the pulmonary response was.

Q. What kind of animals did you use during this period 1936 to 1942?

A. Rabbits for skin, rats for oral testing, rabbits for eyes.

Q. Do you recall whether Monsanto or any labs under Monsanto's direction did any such testing of PCB's during 1936 to 1942?

A. No, I don't recall, but Younger may very well have.

Q. How could you or how could we determine whether that was done between 1936 and 1942?

A. I guess ask Monsanto if they've got any records of any testing done on it.

Q. Do you know of any particular person other than yourself who would be familiar with that?

A. Joie Diblock. I mean she's the administrator, paralegal, she's the one that always runs down stuff for me.

MR. CHAMBERS: She's the one who works for Mr. Bistlline?

A. Yes.

Q. (By Mr. Baker) But personally you don't recall having done anything else specifically? You can't specifically state there wasn't any done; is that a fair summary?

A. That's correct.

Q. Then you were gone to the service between 1942 and 1946. From what you saw when you returned can you identify or recall any testing of PCB's by Monsanto or a lab under Monsanto's direction between 1942 and 1946?

A. I can't recall of any.

Q. Then you returned to Monsanto full time after you were discharged from the service in 1946. Why don't we take from 1946 up through the end of the 1950's, and if you can't recall specific dates or years, I'm not trying to hold you to that, but tell us in general what you recall about testing by Monsanto or laboratories or others under Monsanto's direction between 1946 and 1960 as it relates to PCB's.

A. Well, I know that we did what would be called subacute inhalation testing of PCB's at the Kettering, K-E-T-T-E-R-I-N-G, Laboratory, University of Cincinnati, that was published by a Dr. Treon, T-R-E-O-N, and I believe the American Industrial Hygiene Association Journal which he tested I think in '48 and '54.

I know we did basic toxicity testing at various times on various Aroclors or PCB's during

that time.

Q. To your knowledge, between 1946 and 1960 was there any chronic testing of PCB's?

A. No, sir. Remember, in those days there were no illnesses reported here. We were making this in hundreds of millions of pounds and we had no complaints from any of our customers. None, zero.

There were two acute episodes sometime in the '50's or '60's where two times a jury-rigged heat transfer unit leaked and two workers got a chemical hepatitis with jaundice. And then there was another time where people also -- the heat transfer unit where there was some leaking, developed a very mild chloracne. Those were the only cases reported during that decade. There were no other illnesses reported on any workers.

Q. We're talking the decade of the '50's?

A. And up to '60, yes. I could go farther and say up to the '80's there haven't been, but --

Q. You will get a good opportunity to do that before the day is over I'm sure.

A. Okay.

Q. But let's concentrate for the moment from 1946 to 1960 because I'm trying to separate this into time frames to help your recollection.

You referred to two reports of workers having some kind of illness or injury. Tell me what you can recall specifically about those.

A. There were two cases -- one case in Brazil, Indiana, man by the name of Spolyar, S-P-O-L-Y-A-R, wrote -- he said they had this makeshift heat transfer unit that leaked and the stuff dropped out. I don't know which Pydraul they were using. I don't know if they were using Pydraul or what they were using, but they were using PCB's as a heat transfer unit and they developed jaundice. And he called me about it and I said, "Well, I wouldn't be surprised, because from the action from our work in 1954 we did target the liver." So I said, "Keep me posted."

And he did. He said the bottom line was they recovered. He did write an article but I've never been able to find it. You see it once and it's gone, and I don't know how he described it. It was a relative obscure journal like the Journal Of The Indiana Medical Society or something like that and I never did get one.

The other was a case -- I think it was Crown Chemical Company in New York. I don't know exactly the name of it. The man said, "We've had a

couple of people exposed to leaks from a heat transfer unit and they're nauseated." He said, "What about it?" And I said, "Well, obviously, correct the leaks, take them away from there and watch out for the development of jaundice."

And he called me a couple of weeks later and said, "Well, they did get jaundice and we are following up and they are doing all right." And I called him a month later and he said they were recovered. That was never written up by anybody.

The other was a case by a Dr. Meigs, M-E-I-G-S, who also had a heat transfer unit that was outside and it got -- he was an occupational physician for one of the smaller New England states. I don't know whether it was Connecticut or one of those, and one of the physicians reported a case of chloracne, so they were very happy to go down and look it over and they looked over everybody and they found about five cases of chloracne, which three of the people didn't know they had it. Said, "You got chloracne." He said, "What's that?" They said, "Yeah, I had stuff like that all my life."

So, anyway, that was a case of another leaking. Those are were the only cases that ever occurred.

Q. The first one you referred to you said was in Indiana. To the best you can recall -- if you can't, just tell me you can't. But to the best you can recall, when did that occur?

A. I think in the '50's.

Q. You know whether it was early '50's, late '50's?

A. No.

Q. And that was the one that did lead to some article being written but you don't know where that article was and you don't have a copy of it?

A. I don't have a copy. I think I had it at one time but I've never seen it, but looked at all these cases. It always comes up at these depositions and I've looked but I don't have it.

Q. How did you first find out about this case? Did the person there call you?

A. Spolyar called me.

Q. Was he a physician?

A. He was a physician and he was head of the Department of Occupational Health or something like that in Indiana.

Q. So he was some state official in Indiana?

A. That's correct.

Q. Was there any correspondence to you, from

you or to anyone else at Monsanto concerning that situation?

A. I don't recall -- I don't recall if there was. I mean, I know there was at least one and probably two telephone conversations but I don't recall whether we wrote about it or not. I don't know.

Q. Did you go to Indiana to do any investigation?

A. No.

Q. Did you see any of the workers or patients who developed jaundice?

A. No.

Q. To your recollection did you see any medical reports concerning these patients?

A. No, sir, all I had was Spolyar. The last conversation I had with him he said they had recovered, were back at work.

MR. BAKER: I will ask that counsel for Monsanto produce any correspondence, memoranda or other records in Monsanto's possession or control concerning this incident in the 1950's in Indiana.

MR. CHAMBERS: Okay, that would be correspondence with this Dr. Spolyar, other Indiana authorities relating to this I assume.

MR. BAKER: Indiana authorities or any persons employed by or assisting the facility there that had the workers, or if there were anything directed to the workers, I couldn't expect that, but any correspondence to or from Monsanto concerning this incident in Indiana.

(Discussion was had off the record.)

Q. (By Mr. Baker) It's your testimony that when this doctor employed by the State of Indiana called you and said -- and if I misstate what you said, stop me, I'm trying to paraphrase this from my recollection; said, "We've had a leak and this stuff has come out and some workers had developed jaundice," your reaction to that was you weren't surprised that they got jaundice from contact with this stuff; is that a fair statement?

A. Yes, if they had as much exposure as they said they had.

Q. How much exposure did he say they had?

A. Well, it leaked for three days and you could smell the stuff fairly strong. He didn't measure it.

Q. Was it exposure received through the air or did the liquid pour out on to their clothes, or to the best you can recall what kind of exposure did

they have?

A. It was through the air. In other words, they had these pipes running in this relative small room and it leaked and dripped on the floor. They didn't pay too much attention to it.

Q. So you know of no evidence that their clothes were saturated or that they had skin contact with the liquid?

A. No, sir.

Q. Okay. You said that in part of your response to this line of questions you said that work that you had done in 1954 had targeted the liver. Tell us about that work and what caused it and what you did in 1954.

A. Well, in 1954 we were using this material as a diecasting hydraulic fluid and, of course, that's at elevated temperatures. These dies are hot, or the metal is hot, and when you get contact with this at elevated temperatures you get volatilization. So we wanted to know what happens if there was a big leak and a lot of this came down and hit hot metal. Could the man have time to turn off the machine to close the valves and get out?

So we ran this, what was fairly extensive repeated inhalation test on a variety of

animals; dogs, cats, guinea pigs, rabbits at the University of Cincinnati and came out with a couple of safe levels that workers could be exposed to, and these levels were eventually chosen or selected by the American Conference Of Governmental Industrial Hygiene as safe levels for using 1254 and 1248.

Q. When were these levels selected by that organization?

A. I guess it would be the late '50's.

Q. Now, you began this work in 1954. Was that before Pydraul was marketed?

A. Well, it may have been marketed for other purposes. I don't know if this was done simultaneously, whether it was used or not, I don't know.

Q. Was it the marketing of Pydraul as a fire-resistant lubricant that led you to conduct this study?

A. Sorry, what did you say?

Q. Was it the plan to market Pydraul as a fire-resistant lubricant that caused you to do this study?

A. No, not a fire-resistant lubricant. That was a hydraulic fluid that was pushing the dies back and forth. I don't know if the lubricants are --

it's my impression it's not subjected to that type of heat.

Q. Was the product that was being used, is it a hydraulic die, a hydraulic fluid to push the dies?

A. That's correct.

Q. Was that product Pydraul?

A. Well, I don't know what they used at that time. I think so.

Q. Before we go on, was there anything published from your work in 1954 concerning PCB's and the liver?

A. What, the --

Q. The liver.

A. Well, in the paper by Treon he talked about what the effects of the animals were. He talked about the liver.

Q. You referred to a second incident at the Crown Chemical Company in New York. In a little more detail, tell us what you can recall about that incident.

A. Well, this started as a letter I believe. This man wrote a letter and said, "I've got some people, couple of workers, who were exposed to leaks at a heat transfer agent apparatus and they've been nauseated and they aren't feeling so well. What can

you tell me about them?" I said, "Well, first of all, stop the exposure. If they got leaks, get them out of there and fix the leaks. Secondly, be sure and check the liver and be sure that -- they may very well have developed a chemical hepatitis which shows up with jaundice."

So he either called me back or wrote me back, said, "You were right. These people did show up with jaundice. We hospitalized them for four or five days and now they are back to work and they are doing fine."

That's about all there was. I think there was correspondence on them but I don't -- I don't know where it is. I don't have it.

Q. Did you ever see any of these patients?

A. No.

Q. Did you ever visit the Crown Chemical Company in New York concerning this incident?

A. No, not I. Whether or not a salesman or marketing representative went over there or not, I don't know.

Q. Was this similar to the situation in Indiana where they were exposed to PCB's through the air?

A. Yes, there was no mention made of dermal

contact.

Q. And then you referred to a third incident. First, the one in New York, do you have any idea what part of the 1950's that would have occurred in?

A. No, but there is a letter someplace.

MR. BAKER: We will ask counsel for Monsanto to produce all copies of correspondence, memoranda or other documentation to or from Monsanto concerning the Crown Chemical incident described by the witness, and we will put that in written form also.

MR. CHAMBERS: Appreciate that.

Q. (By Mr. Baker) You referred to a third incident with Dr. Meigs I believe somewhere in New England?

A. I think it's Connecticut. Joseph Meigs, M-E-I-G-S.

Q. Did Dr. Meigs contact you personally?

A. Yes.

Q. To the best of your recollection what did he tell you?

A. He said, "We've got this heat transfer thing up here, it's outside, and we've got some people that have got chloracne. It's a very mild type of chloracne, and what do you know about it?"

I said, "Well, that's the first chloracne I've heard for a long time that occurred." And that's about it.

They tightened up the leaks or whatever it was, it was a temporary deal, but he wrote it up anyway, so it's in the literature someplace.

Q. I think I know the answer to this, but did you see any of these persons?

A. No, I did not.

Q. Did you visit the facility to inspect?

A. No, I did not.

Q. Was there any mention from Dr. Meigs about the possibility of jaundice or liver damage in this instance?

A. Well, I'm sure I asked them if they have anything else, and by this time, I thought this was probably the late '50's, he was also associated with Yale or something. He was an academic man as well as -- I'm sure he ran everything on it because he couldn't find anything except this chloracne.

As I said, some of the people, the chloracne was not recognized either by the plant doctor or by themselves until a dermatologist came over and found these few pimples and said, "Well,

that's chloracne." It wasn't a very big deal, frankly.

Q. Were these persons exposed via the air or did they have any skin contact?

A. The air, presumably. I can't answer that but I don't recall them saying anything about skin contact.

Q. Do you recall any correspondence to or from this doctor?

A. I think there was a letter there someplace.

MR. BAKER: I will again ask for the same documents concerning this instance from counsel for Monsanto.

MR. CHAMBERS: No problem.

Q. (By Mr. Baker) Doctor, we've been going a little bit over an hour. Would you like to take a short break or you want to keep on going?

A. I'm all right.

Q. I don't know if I can hold out as long as you can but I'll keep trudging through for a while.

A. Just ask me.

Q. Was there any other testing? You mentioned the testing in 1954. Was there any other testing of PCB products by Monsanto before 1960?

A. With the exception of I did say that we

might very well, and probably did, run our basic toxicological package on several of the PCB's. I'm sure we did that.

Q. Do you have any specific recollection of doing that on any particular one?

A. No, sir, I don't.

Q. So you don't recall doing it but you believe you would have done it on some of them?

A. Yes, I feel quite sure we did.

Q. From the period 1960 through 1966 do you recall doing any PCB testing at Monsanto?

A. No, sir, not specifically. We may, but I don't recall any.

Q. Do you recall any customer complaints or customer inquiries concerning the safety of PCB products during that period?

A. Through '66?

Q. Through '66.

A. No, none.

MR. CHAMBERS: Let me ask this for purposes of clarification: Your last question was about customer complaints or inquiries?

MR. BAKER: Yes.

MR. CHAMBERS: And by "inquiries" were you asking about just a letter where somebody wrote and

said we're buying this product, what can you tell us about it? Or were you thinking of inquiries in the sense of more specific situations like Dr. Kelly told us about?

Q. (By Mr. Baker) Just so we're clear on that then, during the period 1960 to 1966 do you recall any inquiries from customers asking you about the safety of any of the PCB products?

A. Well, I don't recall any, but we might very well have gotten them. We got 20 letters a week on various products, you know. A new customer would buy any one of our products and they have the bulletins and all that, but somebody down the line would write in and say, Can you tell me something about this product? And we answer it. So that might very well have occurred but that doesn't stand out in my mind because we did not have very many inquiries at all. I mean it was pretty low on the amount of inquiries we got from customers on PCB's up until '66.

Q. There was a reason I used '66 and we'll get to that in a moment, but during the period before 1966 -- I hate to keep using these different time periods for you but there's a reason for this. Let's say for the ten years prior to 1966 -- and our

company began purchasing Pydraul about 10 years before that. '56 or '57 was the first purchase. But, say, in that decade from 1956 to 1966, if someone wrote to Monsanto and said, We're considering using Pydraul AC. What can you tell me about the safety health aspects of that? What would your response have been?

MR. CHAMBERS: Just object to the form to the extent it calls for speculation the way it's framed.

A. I'd write them back and say what we knew about Pydrauls. We would write them back, we would send them our bulletins on it where there was safe handling data in it and we would tell them how to protect the worker from any chemical hazard by avoiding -- two obvious methods were to avoid repeated or prolonged skin contact and do not inhale the material in confined spaces or at elevated temperatures. Sure, we would tell them whatever we knew about it.

Q. (By Mr. Baker) Why don't you tell us right now to the best of your recollection what you knew about the health and safety aspects of Pydraul AC between 1956 and 1966?

A. Well, we knew that it was a compound, an

industrial chemical, which, obviously, it's not supposed to be taken internally. We knew that there was a relatively low order of toxicity for a compound, an industrial chemical. It was something like 2 1/2 to 4 grams per kilogram for an LD_{50} for animals, and that's relatively low for an industrial compound. It's much lower than, say, ethylene glycol that you use for radiator fluid. It's really comparable from an acute point of view to salt I must say, but you can take 4 grams per kilograms of salt and you've got troubles.

So we knew that if you volatilize the stuff and breathe it in a confined space, we knew that you could have a level of half a milligram per cubic meter of the air and breathe that for eight hours a day without trouble, but if you got up to 3 or 4 milligrams per day, you would probably have to watch it.

Now, we also did say we had no reports of any ill effects in our workers manufacturing material in our customers we have been selling to for whatever years we might have been selling it, and that's about what I told them.

Q. So between 1956 and 1966 -- I'll try to summarize this, but correct me if I'm wrong -- you

would have essentially told them not to have prolonged skin contact?

A. Or repeated.

Q. Prolonged or repeated skin contact and not to breathe it in large quantities in small spaces?

A. At elevated temperatures.

Q. And elevated temperatures.

A. Yes, the material does not volatilize at room temperature.

Q. And other than that, you wouldn't have told them of any potential health hazards during that period 1956 to 1966?

A. Well, if they did that, there were no health hazards.

Q. Let's move on then from 1966 through 1970. What did you learn in 1966 or 1967 that might have changed your thinking concerning PCB's?

MR. CHAMBERS: Object to the form to the extent it refers to a change in thinking. I guess you're just working to lay that foundation, but go ahead and answer, if you can.

MR. BAKER: Let me rephrase the question then.

Q. (By Mr. Baker) Did you learn anything in 1966 or 1967 that did change your thinking

concerning PCB's?

A. Yes.

Q. Okay, what was that?

A. We learned that the material was -- I want to phrase this correctly. Previous to that time we believed that here is a material that is not really active, it is insoluble in water, it resists alkalies. We thought when it was discarded in a landfill or in some cases in a body of water it would lie there like a lump of coal or piece of gravel for then on.

In 1966 or '7 Swedish work occurred that showed the material was showing up in the aquatic environment around the waters of Sweden. Later on it was showed that it was picked up by -- they found it in birds and they traced it back to the rivers and they found out that the material was metabolized by the minute marine organisms like plankton and algae, and then the shrimp would eat the algae and the fish would eat the shrimp and the birds would eat the fish and it would end up in the bald eagle or the peregrine falcon that caused metabolic problems with their egg laying.

So we found that out, it was -- I say we found it out, it was found out by workers of

Sweden that were working with DDT, and DDT and PCB have a very close analytical spectrum. I'm not an analytical chemist so I won't go into that, but for a while there was quite a -- not a hassle but quite a discussion of what are we finding here? Is it DDT or PCB's? Well, eventually it was shown it was both and it was PCB's, and that PCB's could be responsible for the disturbance in calcium metabolism in birds. So we recognized it as an environmental pollution agent.

We also found out it was present in the food chain, that it was present in game fish and it was present in milk, because I don't know whether this came because of contact with the forage that the cows ate or how they got it, but we then -- what was the question now?

Q. The question was --

A. Have I answered it yet? What did we do or what did you ask me?

Q. We haven't gotten that far yet. Question was, first: Did something happen in 1967 and 1960? Did you do something in relation to PCB's? The answer was yes. And the question was: What was that? That's how we got on this subject. Let me ask you a few questions about it.

Had you suspected before 1966 that PCB's might be similar to DDT, that they might show up in some of these birds or fish?

MR. CHAMBERS: Object to the form of the question, but go ahead and answer, if you can.

A. No, I didn't suggest it. I mean I didn't suspect it. No government body suspected it. Nobody at Monsanto suspected it.

Q. (By Mr. Baker) I'm just asking you about you personally.

A. Me personally, no, I didn't.

Q. You didn't suspect that. Were you familiar prior to 1966 of evidence of a DDT problem in birds?

A. Just what I read in the newspapers. I mean here we have DDT that's really broadcast widely I mean and there was all the opportunity in the world for it to be spread into the environment as PCB's we thought were -- well, DDT was a very active compound, it is an insecticide, so that means it's not like a lump of coal. We thought PCB's were a nonreactive compound and, as I said, it would lie in a landfill or bottom of a river like a piece of gravel. So, no, I didn't suspect it.

Q. When did you first learn that PCB's were being found in these DDT studies?

A. Well, there you really have to differentiate when I first heard it, which might be in the newspapers, which is not a very scientific --

Q. Well, the first time you had any indication that this might be, when was that?

A. Might be?

Q. Yes.

A. I think it was at the end of '66 or the first part of '67.

Q. Was that in a newspaper story?

A. Yes, in Sweden.

Q. A Swedish newspaper or --

A. That's correct.

Q. Where were you when you saw this?

A. I didn't see it. I mean I was in St. Louis, but I mean we had a plant office at Brussels and somehow they got word of it. I don't know whether it was picked up by any other newspapers that were published in English but, in fact, we didn't really know whose PCB's are we talking about because we were a relatively minor force in PCB's in Europe. We were the only PCB manufacturer in the United States but I don't think we had 10 percent of the market in Europe. There was Prodelac, P-R-O-D-E-L-A-C, in France. There was

Bayer, B-A-Y-E-R, in Germany. These were the big hitters, big manufacturers. There was one in Italy and we had a plant in the United Kingdom, so we weren't big in it over in Europe compared to the French and the Germans were the big ones.

So at first they said, Well, okay, we find it in the environment. Where do you find it in the environment? Well, we found it in the waters around the bays, the estuaries, around Sweden. Then later on they found it in some feathers of birds in a museum in Switzerland. I don't know why, but these people kept stuffed birds for the past hundred years and they pulled out some of the feathers going back to -- I don't know how far back they went and found it there. Well, at first we had to -- as I had said, there was considerable discussion, are they finding it or not? Eventually we came to the conclusion, yes, they've got some equipment we don't have that they go down to trace levels that we didn't have the capability of doing, and, yes, they are right.

Q. The first you heard of this Swedish study was someone from your Brussels plant had seen it in a Swedish newspaper and called you; is that the way you first heard about it?

A. No, I don't think he saw it in a Swedish newspaper. Whether it was picked up by other newspapers on the continent or not, I don't know how he got it.

Q. Did he call you personally?

A. No, I think he wrote, "What do you know about this?" And I wrote back and said, "I don't know anything. So why don't you go over and talk to the fella and find out, or talk to the other manufacturers and see what they know about it." I mean that's about -- I'm a little hazy about what happened about 1967, first part of 1967.

Q. Okay. So you got -- I believe you got a letter from someone from your Brussels facility and you wrote back to him?

A. That's correct.

Q. Did you call your superiors here and say, We have a terrible problem, we need to deal with this, or did you inform them of it or what was your reaction?

A. First of all, we didn't think it was a terrible problem. So we found some in the environment, but no problem existed at that time. So I mean, so it's out there and we still think it's not water soluble. We didn't believe it was going

to be picked up or cause any harm to any of the fish or anything else. We didn't know, so no, I didn't call the superiors. It didn't sound like a crisis. I talked to the research people in the department that manufactured the material and said let's keep following this and see what's happening. We didn't ignore it but we didn't think it was a three-alarm fire.

Q. I couldn't understand you. Did you say you did report that to your superior or you did not?

A. Did not.

Q. You did not, okay, but you talked to some subordinates or co-workers?

A. Well, co-workers that were -- I talked to the manufacturing people, I talked with the marketing people, I talked with the research people of the division of which PCB's were manufactured and I said, "What do we know about it?" And they said, "That's news to us too. We'll keep after it and see what happens, see what we can find out."

Q. So you wrote back to this person from Brussels, and what did you ask him or tell him to do?

A. "Go over and talk to this Swede, go over and talk to Dr. Jensen and see what the score is."

Q. Do you know whether that happened?

A. Oh, yes, he went over there several times.

Q. Did he write back to you or did he call you or what do you recall happened next?

A. I don't know if -- I had one telephone call with him but I don't know when it was. But whether he wrote to the research people over here -- I think he was sort of a research man over there, handled it like a research man.

The big discussion at that time was: Is this PCB or isn't it? So I think his feelings were pretty much with the research people during those early months of '67. I'm not that sure of the exact time frame of it.

Q. At some point did you decide that there was a problem that had to be dealt with?

A. Yes.

Q. Do you recall at what point you decided that?

A. Well, I can't tell you the frame, the time frame, but once we found it was getting in the food chain, that was a problem. That occurred later than evidence showed up that it was found in fish and the other. I decided it's a problem when it was definitely established that it was PCB out there

with a possibility of hurting the birds.

I mean we have two problems. One, if the material is causing damage to wildlife and in such a manner that you could wipe out a species; in other words, if enough of these eagles got enough PCB in them so when the females would lay eggs they wouldn't have any calcium coating on it, you could wipe out the whole species, and we certainly didn't want to have any part of doing that. So that was one, the damage to wildlife, which eventually was the reason we got out of the business.

The other one was: Does the material get into the food chain so it's liable to be ingested in small amounts by people over a prolonged period of time? And that was a problem because we did not know the chronic toxicity of the material over a lifetime.

Q. To the best you can recall, when did you determine that this was PCB in the eagles and in the other birds?

A. Be the late '60's. I don't think you I could put a year or date on it. It was probably '69, end of '69. I'm not sure because there's a man in California, that Riseborough, that was the one that found it in some of the aquatic animals and

avians, the birds, and we had our people talk to him and we were pretty convinced I believe that he had the right information.

Q. To the best you can recall, when did you determine that PCB was in the food chain?

A. I guess either '68 or '69. I can't be sure of the date.

Q. Do you know what circumstances caused you to determine that?

A. When our analytical people told me that in their opinion Riseborough was correct.

Q. Who were the analytical people from Monsanto who were involved in that?

A. A Dr. Robert Keller, K-E-L-L-E-R, a Dr. Scott Tucker, T-U-C-K-E-R, and there was -- William Richards of the analytical people, who was a research chemist that was involved too in it.

Q. Which of those persons are still alive to your knowledge?

A. They are all younger than me, they ought to all be alive.

Q. Some of us may not have your longevity though. To your knowledge you think all those are still alive?

A. Yes, I think so.

Q. Do you know if they are still working for Monsanto?

A. Gosh, I don't know. I've been gone from Monsanto for 18 years so I don't think Bob Keller is. But Scott Tucker may, but I don't know.

Q. That's fine. What other contact did you or people at your direction have with the Swede?

A. Well --

MR. CHAMBERS: Just for purposes of clarification, is this still looking at that '66-'67 time frame?

MR. BAKER: Between '66 and 1970.

A. Well, we sent a task force over -- when I say "we," that was someone with the Organic Division under which whose responsibility the manufacturing and marketing of PCB was. They sent over this Dr. Richards and Dr. Keller and Elmer Wheeler, who was our industrial hygienist, who was sort of our environmentalist at that particular time.

Q. You know approximately when they went over?

A. My guess is early '70 I believe. I believe, I'm not sure.

Q. So other than your worker in Brussels you don't know of any contact between '67 and '70?

A. Oh, no. You mean personal contact? No,

I'm sure they had people that talked to Jensen or Widmark. I know that research people in England talked to them and I do not know if anybody besides this man in Brussels went, I don't know that.

Q. Who were the research people in England who would have been involved in it?

A. I don't remember their names.

Q. Did you know a Dr. Garrett?

A. Who?

Q. Dr. Garrett?

A. Would you spell that?

Q. Dr. Barrett?

A. Yes, J. W. Barrett I think. He was a research man. He may have been very well one of them.

Q. He was a research man in England?

A. Well, he was research and development, and I don't know his exact position but I think he was higher in the chain of command than Wood was.

Q. Do you know if he is still alive or still works for Monsanto?

A. I don't know anything about him.

Q. Who was the person in Brussels who first contacted you about this?

A. David Wood.

Q. Do you know if he is still alive?

A. I don't know.

Q. Do you know if he still works for Monsanto?

A. I don't know anything about him.

Q. Tell us what Monsanto did in response to the news that Jensen had found PCB's. You said you thought you heard about this in '66 or early '67 and that you became convinced in -- you believe it was the late '60's that it really was PCB's.

Between the time that you first heard about it and the time that you became convinced that it was true in that two to three-year period there, what --

A. First of all, it wasn't two or three years. Let's get the dates --

Q. Okay.

A. We first heard about it -- Jensen did his work in '66, late '66. I don't know what month. I think the first time Wood had information or the first time we got information was sometime in 1967. I'm not sure of these dates, remember.

Q. I understand.

A. So between that time and 1960 --

Q. I don't want to trick you on the dates. I believe you said you couldn't remember exactly when

you became convinced that this was PCB found in birds and the eagles but you thought it was sometime in '69?

A. I said either late '68 or early '69.

Q. So between the time in 1966 or '67 when you first heard about the Jensen reports and in '68 or '69 when you became convinced they were true, what all did Monsanto do to investigate?

A. Well, I'm not sure I could say everything they did because all of it didn't emanate from the Medical Department.

Q. Everything that you were involved in or are familiar with.

A. They did several things. One, they had a lot of discussions with the European manufacturers of PCB's to find out what their action was or what they knew about it or what they were doing. That did not have anything to do with the Medical Department. Most of the work was analytical, trying to find out, are we correct in stating that this is really PCB, and I think I told you that along about sometime in '68 we became pretty convinced that it was. We collaborated with Riseborough in the United States, in California, who was the one that found it resident in fish. We sent him samples for his

analytical work. In fact, I think a member of our department went out on Christmas Eve in '68 and met him at the airport with the samples. We cooperated with the government, who at that time was beginning to get interested in it from the analytical point of view.

I don't know when we decided to start our two-year toxicity. I think we started it around -- we started discussing it sometime around in 1968. We wanted to do prolonged toxicity and you have to first get some -- you got to decide on what you're going to do, so we did that by going up to Chicago and talking to our consulting laboratory, Industrial Biotest, which did the work for us. We talked to the government about it and the Food & Drug Administration and said, "Here's what we're doing. Do you have any suggestions? This is what we're going to do." And they said, "No, that looks fine to us."

Then to run a two-year test takes three years I mean, because first you got to run range findings. In other words, in a two-year test you give a dose that you know will be positive and you want to give a dose that you hope will be negative and you want to get one in between and you

hope that will be negative too. But to find out what an animal can take over two years you have to do this in dogs and rats, you give them various amounts over a three-month period to see if they can handle it. If they can handle it pretty well for three months without any problem, you think, well, this is a safe level and won't kill them. There's no sense in having a two-year test if you're going to kill the animals in 18 months by too big a dose, so that shoots six months right off the bat. Then you're set with a dose, you give it for two years, then you sacrifice the animals at the end of two years.

Then you've got to run the pathology reports on it, and that's another -- pathologist are relatively rare specialists and they are relatively slow. That's another three to six months, or three months at least. Then you write the report. So it's three years are shot. So I think if you look at when we get the final -- we get quarterly reports in between, but I think if we -- I don't know when our reports are dated. If they are dated 1971, that means we really started in '68, so we started sometime around that.

Then I do not know what the marketing

people did about the customers at this time. I know what they did in the '70's, in the early '70's, but I don't know what they did in '68.

Q. Why don't you tell us what you understand or believe they did in the early '70's?

A. Well, that was -- yes, I know about that pretty well because Elmer Wheeler was spending almost all his time on this conference with government people, conference with Riseborough. He went over to Sweden once, he went to The Hague once about something, and we also brought it up to the Corporate Development Committee of the Corporate Executive Committee, which is the same thing. These are the brass that runs the company.

We had five different meetings with them from -- I think it was four or five from 1970 to '71. I'm not exactly sure when the first one was. I thought it was early '70. And the upshot was that we had to set up a program and they would put a man in charge of the whole affair and it ended up with Bill Papageorge.

We would write a letter to our customers telling them about how to avoid discharging the material to the atmosphere, I mean to the environment. We would look at our own plants

where they were using it. To be sure, we would cut down outflow from our plants. Then they would decide whether or not some materials could not be controlled, if there were open uses such as carbon paper, which was just discarded and then thrown out, and that had PCB's in it and went into a landfill or was burned or something like that.

We had plasticizers, which there is no way to control it. We would start eventually stopping selling that for those uses. All the way up until 1975 or -- I think it was '75 when we decided we were not going to manufacture it for any uses at all except -- well, it was about '73 I think we said we were not going to use it for anything except closed systems, and then I think then we just said we would only manufacture it for electrical uses and then we stopped that when a substitute became available. It wasn't one of our substitutes, it was somebody else's, but we kept on with the use for electrical work when they didn't have a substitute. In fact, the government said, Don't stop manufacturing it because the subways won't run because you needed a fire-resistant fluid in the transformer or generators, whatever cars, the subway cars. In The White House, for example, there are

PCB transformers there.

And so eventually then we got out of it. I'm not exactly sure when we made the decision to get out but we got out before the Europeans stopped manufacturing it, but they didn't. I don't think anybody imported it into this country.

Q. Okay, so sometime in '68 or '69 you began your three-year, two-year toxicity study?

A. That's correct.

Q. Prior to that date had you done any chronic testing or subchronic testing of PCB's?

A. No, sir, not except that inhalation study, because there's an industrial chemical, that we did not think it was going to get into the food chain at all. You didn't do two-year testing on detergents, you know, or on radiator fluids and things like brake fluids. You don't do that.

Q. But you didn't do any three-year testing prior to 1968 or '69, did you?

A. That's correct.

Q. You did testing to determine what a toxic dose was in that period prior to '68 or '69?

A. No, and to also determine what the levels were that a worker could be exposed to from the inhalation point of view, we did that.

Q. But in any event, only for acute toxicity?

A. Well, no. The one that Kettering did in '54 or the middle '50's, that was sort of a subacute thing. They weren't doing -- nobody was doing a two-year testing on an industrial chemical. They weren't doing it. They still don't do it.

MR. BAKER: We've been going an hour and 45 minutes now. You mind if I take a break?

(A brief recess was taken.)

Q. (By Mr. Baker) Dr. Kelly, before we took our break you were talking about actions that Monsanto took after learning of the Jensen study. Do you recall the ones that you mentioned?

A. Yes, we mentioned a point man for the whole problem, which was Mr. Papageorge; tell our customers about the problem of environmental pollution, and also start our toxicological work, clean up our own outflows. Also, arrange for incineration of used PCB's at no profit to us. There may be some others also.

Q. Okay.

A. And also decide which products would have to be eliminated from manufacture if it had open uses that could not possibly be controlled.

Q. You mentioned meetings with corporate

representatives. I think you said there were four or five of them?

A. That's correct.

Q. In 1970, 1971?

A. Yes, sir.

Q. Is that correct? We have already begun the deposition of Mr. Papageorge and he indicated, if I recall, that he started in his position that you referred to here January 1st 1970. Does that sound about right to you?

A. I don't know if it was January the 1st, but he started one of the first meetings we had. One of the recommendations was to get somebody, so we had one before Papageorge started.

Q. I guess what I'm trying to zero in on here is: Did any of these things you referred to occur before Mr. Papageorge started? You said you had one meeting before that and decided to bring him into that position, although he already worked for Monsanto. But of the other things you've mentioned, did those all come after Mr. Papageorge started?

A. No, no, I don't think so.

Q. To the extent you can, tell us which of those were begun before Mr. Papageorge came into that position in early 1970?

A. Well, of my own knowledge, I can't say that this occurred, but it's my impression that the plant started looking at their outflow possibility of contamination before Papageorge came aboard. I don't know what the marketing people may have told our customers before that. I don't know if there were widespread letters sent before Papageorge came, but my impression is information was given to customers about the environmental problem before that.

Q. Do you have any personal knowledge concerning the information that was given to customers before 1970?

A. No, sir.

Q. Do you have in your possession or control any documentation that would demonstrate that information was given to the customers concerning this subject before 1970?

MR. CHAMBERS: Let me object to the form just to clarify the reference to this subject being the PCB environmental situation.

MR. BAKER: Well, we're referring to -- he said information may have been given to customers after 1970 concerning potential environmental damage from PCB's.

A. After 1970? I said before Papageorge came.

Q. (By Mr. Baker) Right. My question is: Concerning that subject, environmental damage from PCB's, do you have any documentation of any such information being given to customers prior to 1970?

A. No, sir, I do not.

Q. Do you recall having seen any correspondence, memoranda or other documentation of information being given to customers on that subject prior to 1970?

A. No, but I don't think that would, in the normal course of business, come across my desk.

Q. Let's go back now for a moment on some of the things that were known prior to the 1966 or early 1967 discoveries by Mr. Jensen.

First, you've testified about work that Monsanto did in 1954. To the best of your recollection, can you summarize what was found in that study?

A. Yes, what was found was that the safety level for the breathing environment for a worker for an 8-hour day was .5 milligrams of 1254 per cubic meter of air. For 1248 it was 1 milligram. It was found that the target organ was the liver.

Q. What do you mean by that last statement,

that the target organ was the liver?

A. Well, that was where the focus of the toxic effect of the compound was.

Q. To your knowledge, between the 1954 study and 1966 did Monsanto communicate to customers the supposedly safe levels of 1254 or 1248 or any information concerning possible liver damage?

A. Well, I don't know -- it's a dual question.

Q. Then let's take the first half first then.

A. The first half, in our bulletins, we did, in some of the bulletins, mention the accepted levels by the Government Industrial Hygiene Association. That's some of our bulletins.

Certainly, in letters and communications from me to anybody that called asking about the toxicity, we told them that, we told them what the safe levels were. As far as saying it will be able to cause liver trouble, if it were, we may have. If it was a purchasing agent, I wouldn't know. I mean if you go to a gasoline pump they all say don't smoke, it's liable to blow you into the next county. They just tell you what not to do.

We did say these are the safe levels and these are the ways you handle it. Handle it safely.

Q. Do you recall whether any of the literature regarding Pydraul referred to the safe levels for ambient air limitations?

A. I don't recall. I mean -- I don't recall.

Q. Can you tell us in your opinion why that literature should or should not have referred to this for Pydraul used as a fire-resistant lubricant?

A. Well, one of the reasons would be we did not expect the use of it as a fire-resistant lubricant to reach any significant levels in the atmosphere. We -- what was the question again?

Q. In your opinion, why should or should not your literature have mentioned the safe ambient air levels with regard to Pydraul being used as a fire-resistant lubricant?

A. Well, one, we told the people how to work under any possible hazard level.

Two, we knew that the average customer that got the material was not in a position to run analytical levels around his air compressor. Let's face it, they wouldn't do it or would not be capable of it.

Three, we had no history at all of ill effects of Pydraul on any of the workers, both in any operation using PCB's with any ill effects, with

the exception of the acute episodes that I talked to you about. It just wasn't any. That's not only my opinion, it's Dr. Kimbrel's opinion, who was a PCB expert for the government. She stated twice in publications, environmental publications, that with the exception of an occasional case of chloracne, there were no systemic illnesses attributed to workers using PCB's.

Q. Now, let's go back to the Drinker studies and, frankly, the first I've heard of a subsequent Drinker publication came from you today, so maybe you could enlighten me a little bit more on this.

First, to the best of your recollection, what was it that Drinker first reported about PCB's and what was it that he later said after communications and exchange of examples with you?

A. We're talking about one PCB which he claimed was a PCB. He tested something that he said was 1262 which he claimed was a PCB. It was either 1262 or 1260. I think it was in 1260 he said that he found considerable toxicity in the material.

Upon inquiry by me as to where he obtained the sample, he said he got it from Halo Wax Corporation, so I sent him a sample, I don't know --

I think he said he had a 1260, and the closest we had to a 1260 was a 1262, and he was quite surprised to find that the toxicity was less than a tenth of what he had reported previously, so in a subsequent paper in 1939 he stated that fact. In fact, I think I'm almost quoting him directly when he said, "We were surprised to find its toxicity was enormously less than what we previously reported."

Q. Did he also find that the target organ was the liver, that there was liver damage?

A. Yes.

Q. Are you familiar with a study done by Mr. VonWeidle and others entitled "Observations of Toxic Effects Resulting From Exposure to Chlorinated Naphthalene and Chlorinated Phenyls With Suggestions For Prevention" in about 1943?

A. Not familiar with it. I'm sure I've seen it, but he, again, is coupling chlorinated naphthalene -- did he say chlorinated biphenyls?

Q. Yes.

A. Well, really, it's tarred with the same brush. That was really chlorinated biphenyl benzene. There was 10 percent of chlorinated biphenyl benzene into the Halo Wax that was sold. There was 10 percent chlorinated biphenyl benzene

and 90 percent chlorinated naphthalene, and they had problems, no question about it.

Q. Okay, as I understand it, this was published in a publication called the Rubber Age in 1943. Are you familiar with that?

A. Well, I've -- am I familiar with the publication or with the paper?

Q. Both.

A. Well, first of all, Rubber Age is not a highly scientific peer-reviewed journal, and so I have seen the article but I'm not familiar with it right today. But if you give me the article I'll be happy to comment on it.

Q. Let me just ask you this: Do you know whether Monsanto did any -- you testified about the Drinker article or the Drinker study and said you had communications with Dr. Drinker and that you sent him a sample.

Do you know whether you or anyone from Monsanto had any communications with Mr. or Dr. VonWeidle concerning his report in 1943?

A. No, sir, I do not.

Q. You don't recall whether you did or you did not have any?

A. Well, I didn't, and I don't know if anyone

from Monsanto did, but I do not recall seeing any such correspondence.

Q. How did you determine that for Aroclor 1254, 0.5 milligrams per cubic meter of area was a safe level?

A. Treon's work at the Kettering Institute where he ran these inhalation studies on it.

Q. Briefly describe the kind of study that you did on it, or they did for you.

A. That they did.

Q. Right.

A. You heat the material, put these animals in a closed system, in a closed box, I don't know how -- it's pretty good-sized chamber rather than a box, and you heat the material outside the chamber and you blow a current of air through it, over it, and you blow these fumes into the chamber and you analyze the air in the chamber until you get a steady level of PCB in the atmosphere of the chamber and you keep the animals in there for eight hours a day for two or three weeks and then you see what happens. You use different levels and you find out what level doesn't bother the animals. You sacrifice them at the end. If there's no pathology or no obvious distress to the animals, why you come

out with a level that you think is safe.

Q. That's where I'm having the difficulty understanding this. You said a level that you think is safe. Now I've heard about toxicity studies where you would tell us a level that would kill half of the animals.

What, precisely, did you use to determine or to judge what level was safe?

A. Well, I'd have to look at his report, and I'm sure if you got it there I'll be happy to comment on it because it was published. And not only I decided, the government industrial hygienist group which are a non -- no company representative was on it, and the fact that OSHA people took this same level, .5 milligrams per cubic meter, and said this is a safe level.

So they analyzed Treon's work, they analyzed what happened to the animals at higher levels and what happened to them at this level and level below, so I guess you just analyze the report that the fella did.

Q. Do you recall after that report having communications with people in factories or facilities using Pydraul where they ask you what are safe levels?

A. Yes, if anybody ever asked us, we sent out the material to them. It was written up in our bulletins and when we approached a new account the marketing man would carry this bulletin with him.

Q. Do you recall any internal correspondence concerning what are safe levels in the 1950's?

A. Internal Monsanto?

Q. Monsanto, yes.

A. Well, I don't know the exact details. I'm sure we just didn't take this report and file it. I mean we wrote to the Organic Division and said here's the results of a test at Kettering that it's okay to use this as a diecasting fluid at elevated temperatures. This gives you an idea of the amount that the person could be exposed to without any harm.

Q. Do you recall any oral or written communications with Dr. Barrett in England concerning safe levels?

A. I don't recall them.

Q. Dr. Kelly, was the question raised at Monsanto concerning workers eating around the production facilities with PCB's?

A. There was one plant in East St. Louis where the workers wanted to eat around the plant and Jack

Garrett, who was an industrial hygienist of ours, was drawn into the discussion and I think he was sort of a patsy for the guys saying it was the Medical Department's opinion they shouldn't eat around it. Well, that's certainly true. I don't think you ought to eat your lunch in a place where they are making industrial chemicals, but he came out with a couple of statements saying that they are liable to get some Aroclor or PCB on your ham sandwich or something like that, which was nonsense.

That's the only case that ever came up. These people wanted to brown-bag it and then go over and play cards for the rest of their lunch hour rather than going to their designated lunch room. That's the only one that ever came up.

Q. Were you involved in that decision or discussion at all?

A. No, I didn't see it until it surfaced in one of these trials.

Q. Were you involved in an attempt by Monsanto to obtain approval to use Aroclor as an adhesive in food packaging?

MR. CHAMBERS: For the record, object to the relevancy of questions about using Aroclor as an

adhesive when this case is obviously a much different application.

If you can answer that, Dr. Kelly, you're welcome to.

A. Yes.

Q. (By Mr. Baker) Okay, approximately when was that?

A. Gosh! Sometime after the food and drug amendment was passed, which I thought was sometime in the '60's or something like that, I'm not certain.

Q. What was your involvement in that effort?

A. Well, they had a lot of that material and they used some of the acute toxicity work that we had carried out and we submitted it to the food and drug for use of theirs.

Q. Were you asked to give an opinion as to whether this would be safe?

A. Yes, or we wouldn't have proposed it if we didn't think it was safe.

Q. Do you know if this was before or after the Jensen report, the first Jensen report in '66?

A. I don't remember.

Q. What was the result of this effort?

A. They turned it down.

Q. Do you recall approximately when it was turned down?

A. Probably six months after it was sent in, but I don't recall when it was sent in.

Q. Did you ever try it again?

A. Well, they did some more work on it but I don't know whether they did more elaborate extracting work or not. We may have done a little more toxicity, but at any rate, it was turned down the second time, so we gave it up.

Q. And your personal opinion was it was safe to use as an adhesive in food packaging?

A. Certainly, yes.

Q. Were you involved at any time in advising Monsanto as to what should be included on labels of products that contained PCB's?

A. Yes, sir.

Q. When did you first begin advising Monsanto on that?

A. Probably sometime after 1946.

Q. Do you recall after 1946, what the containers of PCB products said?

A. What they said as far as what? The whole label?

Q. Can you, in general terms first, tell us

what kinds of information was on the labels of PCB products starting in 1946?

A. Well, it said what the Monsanto trademark -- trade name for the compound was. It said how much was in it. It said -- the only part the Medical Department had to do with it was to put down the safe handling procedures to avoid any ill effects.

Q. Between 1946 and 1970 do you recall at any time changing the safe handling information on labels for PCB products?

A. At one time there was either some state directive or government directive that mandated for any compound. If it was a chlorinated hydrocarbon you had to have certain data on the label, and we put that on the PCB's because it was a chlorinated hydrocarbon.

Q. Do you recall approximately when that would have been?

A. No, I don't.

Q. Do you know whether it was before or after 1970?

A. Before or after 1970?

Q. Yes.

A. I thought it was before.

Q. Other than the change you referred to that was required by the governmental agency, do you recall any changes between 1946 and 1970 in the safe handling language on PCB product labels?

A. I don't think there were any basic changes.

Q. I want to show you a set of documents that have been collectively marked as Plaintiff's Exhibit 12. I will tell you that these were produced to us by Monsanto in response to a request for labeling from Pydraul AC products, and ask you just briefly to look through this and then I'll ask you a couple of questions about it.

A. Yes, sir, I looked through.

Q. Let me ask you these questions backwards. Do you recall any other safe handling information that was at any time to your knowledge on Pydraul AC containers?

MR. CHAMBERS: Just for purposes of clarification, are you referring to any period of time or --

MR. BAKER: From the time Pydraul AC was first produced in the '50's until production was ceased in the early 1970's, at any time at all.

A. There may have been environmental warnings, but as far as safe handling for the workers

concerned, with the exception there may have been some editorial changes, but the basic information was the same.

Q. (By Mr. Baker) Do you recall any environmental warnings that were ever included on the Pydraul AC containers?

A. No, but if the material was still manufactured after 1970 or '71, I would have thought -- well, it was my impression that the environmental stickers or environmental labels were put on all compounds containing PCB's.

Q. Do you think that would have been after 1970 or 1971?

A. Yes, I think so.

Q. Prior to 1970 are you aware of any labeling on Pydraul AC that would have mentioned PCB at all?

A. You mean the acronym PCB?

Q. Either PCB or polychlorinated biphenyls.

A. No, I don't think so.

Q. Now, these labels did say chlorinated hydrocarbons but did not refer in any way to polychlorinated biphenyls; is that correct?

A. No, but you must remember that before 1970 PCB's was not a household word, or polychlorinated biphenyls was not a household word, so that adding

that to Pydraul AC would have added nothing of information to the label.

Q. Let's refer to the first page here in Plaintiff's Exhibit 12. It has the production generated by Monsanto, the information at the bottom, EQU, which refers to this case, page number 13757. Do you have that in front of you?

A. Yes.

Q. To your recollection is this a label that was on a can or container of Pydraul AC?

A. Yes.

Q. Could you read the label from after the caution and tell us exactly what it says?

A. "Contains chlorinated hydrocarbons. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. If clothing becomes soaked with fluid, launder before wearing again."

Q. Were you, in part, responsible for that language?

A. Yes, sir.

Q. How big a role did you play in that?

A. I'd say 90 percent.

Q. Did you or anyone else at Monsanto consider including any additional wording after the word "caution"?

A. No, sir.

Q. Did you consider including any instructions about washing clothing other than clothing that has become soaked?

A. No, I don't know how you could quantify -- I mean maybe soaked may not be the best term in the world but I think we give the American workers enough -- we have enough belief in the common sense that he knows when your clothes get wet with industrial compound you take them off and have them laundered.

Q. I agree with you that I think most workers would have them laundered if they become soaked with fluid or wet with the product.

Did you consider having any suggestion or instruction that they should be laundered even if they did not become wet with the fluid?

A. You mean if the man is wearing a pair of coveralls and does it have any fluid on them, on the coveralls? They should be laundered anyway.

Q. My question is: At any point did you consider issuing a warning on that?

A. No, sir, we didn't.

Q. Did you consider issuing a warning on breathing of vapors or mists without the word "prolonged"?

A. Say that over. Did we --

Q. Your first statement here says, "Avoid prolonged breathing of vapors or mists."

Did you consider a warning or a statement on the label that would have deleted the word "prolonged" or to the effect of avoid breathing of vapors or mists?

A. No, sir, because we didn't think it was necessary. Not talking about hydrogen cyanide when you take one whiff and you drop dead. If you have a spill you can smell the stuff but, certainly, you can clean it up. You don't have to avoid breathing in vapors for that period of time.

Q. You've also said avoid any contact with eyes or prolonged -- or avoid contact with eyes. I Added the word "any," but avoid contact with eyes or prolonged contact with skin.

Did you at any point consider advising the avoidance with any contact with skin?

A. No, sir, because if a man gets some on his hands, he washes it off. The answer is no.

Q. Did you at any point consider whether the label should refer to PCB's or polychlorinated biphenyls?

A. I think I answered that. I said that we didn't think saying Pydraul AC present, that if they advertise polychlorinated biphenyls, phosphate ester, adds anything to a workman's knowledge about the product.

Q. And for the period 1966 to 1970 you did not consider that the word "PCB" added anything to the customer's knowledge?

A. Well, remember -- the answer is no, with an explanation. The reason --

Q. Feel free to explain any answer you want to give.

A. Fine. In a label you are talking about preventing harm to the user of a product. The danger after around '69 and '70 was to the environment, it was not to the worker, so we didn't see -- until we put our environmental cautions on the labels we didn't think it was necessary to add anything such as you have suggested.

Q. Did you consider at any point with regard to the Pydraul AC label any mention of potential liver damage?

A. No, sir.

Q. Did you, prior to 1970 or '71, when a state or federal agency may have required you to do that, did you consider any labeling concerning potential environmental damage?

A. What dates?

Q. Prior to '70 or '71. The reason I picked those out, I think you had testified earlier that in 1970 or 1971 a governmental agency required that you put an environmental sticker on certain containers.

A. They didn't require it. We put it on ourselves.

Q. I may have misunderstood that, but prior to that time did you consider putting on the label any information concerning potential environmental damage?

A. I think you would have to ask the manufacturing people that. I'm not in a position to answer that.

I believe as far as the Medical Department was concerned, we knew that the customers were getting some information from the marketing people, although it was not formalized until Bill Papageorge came on board. But he came on you said the first part of January of '70 --

Q. His testimony was January 1st 1970.

A. Well, before that I don't know how information got out to the customers. I know there certainly were inquiries because Elmer Wheeler had inquiries. People would read the stuff in the newspaper and say, What about this?

Q. I will ask you to turn -- the easy way would be go to the very back page and work forward three pages. There's a label there for Pydraul AC A. Are you familiar with this label?

A. No, sir, I don't recall much about this label.

Q. I believe the wording after "caution" on this one is -- while it's in a different kind of print I believe it is exactly the same as the AC label. Is there anything that you see there that you believe is different?

A. No, sir, I don't see anything different.

Q. Are you familiar with the product Pydraul AC A?

A. Vaguely, not --

Q. Let me try to refresh your recollection. Mr. Papageorge testified previously in this case that this was a product that was made for a period of about a year between -- and don't hold me to the

months -- but between mid '70 and mid 1971, and said that the product did not contain PCB's but contained PCT's. Does that in any way refresh your recollection of the product?

A. Vaguely, but I do not know too much about it.

Q. Were you consulted at all concerning the labeling for this product?

MR. CHAMBERS: Let me object for the record to the relevancy of inquiring about Pydraul AC labels, but go ahead and answer, if you can, Dr. Kelly.

A. Well, I'm sure that somebody in the Medical Department was, whether it was Elmer Wheeler or myself or doctor -- at that time maybe Dr. Rausch was there then, I'm not sure, but all safe handling data on labels -- all labels were submitted to the Medical Department, so somebody in our department saw it.

Q. (By Mr. Baker) Do you recall any discussions concerning the Pydraul AC A label?

A. No, sir, I don't.

Q. Did Monsanto manufacture other chlorinated hydrocarbons besides PCB's and PCT's?

MR. CHAMBERS: Let me object to the

relevancy of that line of questioning as well, but go ahead and answer, if you can, Dr. Kelly.

A. Oh, gosh, yes, they manufactured a bunch of them.

Q. (By Mr. Baker) Just for my information, understanding the objection as to the admissibility at trial of the information, can you give me some of the examples of chlorinated bicarbons?

A. Petroferclon. 245T. Dichloro benzene. There's a bunch of them.

Q. Were you involved in advising Monsanto as to what should be contained on the labels for some of these other products?

A. Yes.

Q. To your recollection were there any material differences in the labeling of PCB products and other chlorinated hydrocarbon products?

A. I can't recall. We may have had more -- I can't recall whether there was any.

Q. Going to show you a document that has been premarked Plaintiff's Exhibit 13, and this is not a really good copy. If you need any help in reading it, we'll try to help. Ask you first to review that document.

MR. CHAMBERS: Can we go off the record for

a second?

MR. BAKER: Sure.

(Discussion off the record.)

Q. (By Mr. Baker) Dr. Kelly, I probably should have just told you to review the first two pages of this document. Have you done that?

A. Yes, I have.

Q. And I will state for the record that there are four pages here that were produced to us by Monsanto we believe stapled together in this form and they are numbered chronologically. I don't personally know why the last two pages are included with this and I don't intend to ask you any questions about the last two pages, so we will focus on the first two pages.

A. Thank you.

Q. Can you identify this first two pages of this document?

A. Yes, it's a United States Department of Labor Material Safety Data Sheet, Form Approved, OMB, No. 44-R1387.

Q. Have you seen this document prior to today?

A. I'm sure I have. I have no recollection of when.

Q. As part of your position at Monsanto in

1971 would you have been involved in the completion of this form?

A. Either I or some member of my department would have been.

Q. What was the purpose of this form?

A. Government sent it out and said you should send this to any customer who asks for it. I'm not sure whether or not it was supposed to accompany shipment or not, I don't recall that.

Q. But any customer who asked for it, you would send this to any customer who requested the MSDS form?

A. Yes. But as I said, I don't know the purpose of the Department of Labor had in making this form. I mean I'm sure that they just didn't send us a form and say fill it out. They must have told us what to do with it. I don't recall what their purpose was at that time. But we sent out hundreds of these.

Q. On the front page there, Section I refers to Aroclor 1254, and that was the PCB product that was contained in Pydraul AC I believe, was it not?

A. Yes.

Q. Section II says "Hazardous Ingredients," and it appears this form is blank. I assume that

the reason that section was blank is that none of these items were included in Aroclor 1254, or is there a different reason?

A. I wouldn't know why it was left blank. I mean -- but they made catalysts, solvents, additives, alloys, base metal, metallic coatings are all left out.

Q. Should some of these have had an entry for Aroclor 1254?

A. Beg your pardon?

Q. In your opinion should there be entries in Section II for this product?

A. Well -- no, I don't think so.

Q. If you'll turn to the second page, up at the very top there, and I'll read the small print here, it's difficult. I believe it says "Threshold Limit Value." This is not a good copy. But right after that it has 0.5 milligrams I believe per cubic meter of air?

A. Correct.

Q. Is that correct?

A. Correct.

Q. Now, that's the same limit that you testified earlier you concluded was a safe amount after the 1954 study?

A. Yes, sir.

Q. Were there any studies between 1954 and 1971 when this form was filled out to investigate that further?

A. No, we had a pretty thorough investigation of it in 1954.

Q. "Effects of Overexposure" is the next line, and it refers to skin irritation in the form of chloracne, systematic intoxication leads to nausea, vomiting, loss of weight -- is that edema?

A. Edema.

Q. And abdominal pain I believe?

A. Pain.

Q. Again, some of it is difficult to read, but do you agree that's what that entry says?

A. That's what it says.

Q. Would you or someone in your department have been responsible for that entry?

A. Yes, sir.

Q. Can you tell us why this does not refer to either jaundice or any other liver damage?

A. No, but I guess they are really talking about symptoms that you get from overexposure, and you get nausea, vomiting, loss of weight, edema and abdominal pain which you get from an enlarged liver,

so that anybody in any medical group would know, looking at this, that the liver is the thing that's doing this. I think you are putting this in the hands of lay people, and if you say "causes liver damage," it would say, What symptoms do you get from liver damage? Well, maybe we could have said jaundice, but that might be two weeks down the road, so the earlier symptoms are nausea, vomiting, abdominal pain. So I think that's more important than putting down jaundice.

Q. Do you recall whether there was discussion about that wording?

A. No, I don't recall any.

Q. Do you believe reading this would have caused a customer to have more concern if it referred to liver damage than to vomiting or nausea?

A. I can't answer what might be in a customer's mind, I don't know.

Q. But you don't remember any discussion about the effect this would have on a customer?

A. No, sir.

Q. The term "edema," can you tell us what that means?

A. Edema means swelling of the subcutaneous tissues. I don't know why that was in there.

Q. I won't ask you any more about that. Section VII refers to spill or leak procedures.

Were you or someone in your department responsible for the wording under this section?

A. No, that would have been Mr. Papageorge's department in May of '71.

Q. If it's agreeable with you, I'll show you one more exhibit and then we'll take a break.

A. That's all right with me.

Q. This one I believe is four pages, all the same thing, and it's been marked as Plaintiff's Exhibit 14. I'll ask you to take a look at that.

A. Yes, sir.

Q. And I will say, I believe this may have been prepared after you left employment with Monsanto.

A. Six years afterwards.

Q. You've testified previously about governmental required stickers and labels?

A. No, I said at the time when I was concerned, working with Monsanto, the government did not require any. I don't know when they started it.

Q. Would the labels shown on the first page of this be the kinds of labeling you referred to that was required by the government at a later date?

A. Say that over?

Q. That's a very bad question.

A. It is.

Q. You testified previously, if I recall correctly, that at some date, at some point, you weren't sure of the date, the government required labels in the late '60's or -- that they did not require certain kinds of labels.

MR. CHAMBERS: Let me object again just to form because I think that mischaracterizes what the earlier testimony was. I'm not -- maybe we need to go all the way back there and see if there has been testimony that the government required labels.

MR. BAKER: Okay, let me just try to start over because I don't want to mischaracterize the testimony at all.

Q. (By Mr. Baker) To your knowledge, at some point did the government require labeling of PCB products?

A. Yes, sir.

Q. Do you know at what point that occurred?

A. After the Toxic Substance Control Act was passed, TSCA, and I do not know when TSCA was passed. It was passed sometime after 1974.

Q. Prior to that point do you know whether

Monsanto included the term "PCB" or "polychlorinated biphenyls" on any of its labels?

A. I do not know. They may have, and I do not know.

Q. Were you in any way responsible for the information contained on this newer Material Safety Data Sheet that is marked as Plaintiff's Exhibit 14?

A. No, sir. You say -- the last phrase is --

Q. Marked as Plaintiff's Exhibit 14.

A. Oh, no.

MR. BAKER: Well, I have no further questions concerning this exhibit. It is almost 1:00 o'clock our time.

MR. CHAMBERS: That's right.

MR. BAKER: But it's just before noon prevailing local time so I would propose that we take.

(The lunch recess was taken, after which the proceedings resumed as follows.)

Q. (By Mr. Baker) Dr. Kelly, I'm going to, over the next hour or two, go through a number of documents with you.

A. All right.

Q. Some of these I expect you have seen

before, maybe some of them that you haven't. If at any time you want to go off the record to review one that may be lengthy, just say so and we'll take a break.

A. Yes, sir.

Q. I'm going to start with a document here that was marked as Plaintiff's Exhibit 15. It's called the Pydraul AC Fact Finder. It's a copy of a brochure that we believe Monsanto supplied to certain customers of Pydraul AC.

A. Yes, sir, I've read it.

Q. Okay, have you seen this document before today, doctor?

A. Yes, I have.

Q. I asked a couple of other witnesses this question and we haven't been able to find an answer yet, so I will ask you.

Do you know roughly when this document would have been prepared?

A. What?

Q. Prepared?

A. When it would have been prepared?

Q. When, yes.

A. No, sir, I do not.

Q. Do you know whether there was more than one

edition of this document?

A. No, sir, I do not.

Q. Do you know whether there were any other brochures or similar documents that would have been sent to customers of Pydraul AC?

A. No, sir, I do not.

Q. I'll ask you to turn to page 1457 in the numbering system from the production of documents. It's the third page from the back.

A. Yes, sir.

Q. That is just a cover sheet for the section that says "Safe Handling"?

A. Yes, sir.

Q. If you turn to the next page I will ask you a few questions about this page.

First, were you involved in any way in determining what information went into this brochure under the heading "Safe Handling"?

A. I can't be sure. I do not know whether this was written during my tenure there. If it was, I certainly was. If it occurred after December of 1974, I wasn't.

Q. I will tell you that I believe that we all agree this was sent out well before December of '74.

A. Then I was.

Q. Have you read this one-page section on safe handling?

A. Yes, sir.

Q. Is there any reference in there to possible liver damage?

A. No, sir.

Q. Is there any reference here to means of disposal of Pydraul AC?

A. No, sir. Well, not on that page. I don't know if it were in any of the previous ones. I didn't see them.

Q. Would your department have been responsible for determining whether to include disposal instructions in a brochure such as this or would that have come from some other department?

A. It would have come from someone else. Elmer Wheeler or I may have seen it because he was very close to governmental authorities on environmental aspects and the Manufacturing Group in other companies.

Q. Can you identify what department within Monsanto would have been responsible for determining what information concerning disposal to include in a brochure such as this?

A. It depends on what time you're talking about. If it were after 1970, it was Papageorge. It was in the Organic Division all the time. They changed the names of the company about every seven years. It was Organic Division once, then it was Monsanto Chemical Company some other time.

Q. From the period 1956 through 1970 what information can you provide us concerning the name of the department and the personnel involved and the decisions --

A. Well, the name of the department was Functional Fluids and it was under the responsibility of, I believe, what they call the Organic Division at that time.

Q. What persons would have been responsible for that between 1956 and 1970?

MR. CHAMBERS: Just for purposes of clarification, by "that" are you referring to the disposal instructions or --

MR. BAKER: Determining what instructions were to be provided to customers regarding disposal of Pydraul AC or similar fluids.

A. When was the upper limit?

Q. (By Mr. Baker) I believe you said after 1970 Papageorge would have been responsible?

A. Yes, before '70 --

Q. I picked 1956 as an arbitrary date, but from the mid-'50's through 1970.

A. I think it was sort of like responsibility by committee. I would say the people who were in charge were the research, development and marketing group and manufacturing group of the Organic Division. I don't know if they reported to a product director, if that was the term they used at that time.

They broke their products down into several main groups. The product director of the Functional Fluids Group was a fella who was ultimately responsible but he used all those ancillary people to help him.

Q. Is it a fair statement that your concern during this period was primarily toward toxicity in persons and not toward potential environmental damage?

A. Yes, sir, we had no idea that there was an environmental problem until the late '60's.

Q. I mean your personal responsibility in your position with Monsanto.

A. No, that isn't true, because Elmer Wheeler was almost a point man before -- he was a member of

our department before Papageorge was selected. In fact, he was doing so much work on it that I said to the Organic Division, "Look, I'll either send you him and you keep him full time or get a full time man yourself."

Q. So responsibility for environmental matters was within your department before 1970?

A. No, it was still in the Manufacturing Group, the people who made it, but they used us as a staffed department, quite frequently, for our input and for our knowledge of government people, government agencies. In fact, sometime quite a ways back the Executive Committee made a statement saying that the Medical Department would review all new plants, the flow sheets of new plants, to decide whether or not the disposal was in accord with the state of the art and any state regulations that may occur, that maybe in existence at that time, so the Medical Department did have considerable input into the environmental aspects.

Q. And that was Monsanto plants that you reviewed; is that correct?

A. Yes.

Q. Did the Medical Department play any role in advising customers or causing Monsanto to advise

customers concerning disposal of any products?

A. We may not have advised them, but I'm thinking of insecticides. When you said "any product," insecticides, which are toxic things, we advise the Manufacturing Group, the Agricultural Chemical Division, what the dangers were of having a drum with a little bit of Parathion in it. So we advised them on that, but the actual carrying out of the instructions to the customer were carried out by the Manufacturing Group.

Q. Did you advise the Manufacturing Group that they should inform customers of this risk with regard to pesticides?

A. Yes.

Q. If you had known at the time this brochure was printed, whenever that was -- we haven't identified the date, but we are certain it was before 1970. If you had known before this brochure was printed that PCB's were accumulating in the environment and that there was the environmental problem that you have testified to previously, would you have advised Monsanto to include instructions as to disposal in this brochure?

MR. CHAMBERS: Objection, objection, just to the extent it calls for speculation, assumes

facts that aren't in evidence yet.

But go ahead and answer, if you can, Dr. Kelly.

A. Two parts to that question. We certainly knew they were accumulating in the environment but we didn't think they were causing any harm because, after all, they were being discarded by people, they were going into landfills, they were going into large bodies of water, and we assumed, it was our belief, that it was inert, insoluble in water, would not leach out of a landfill and stayed like a piece of gravel or a lump of coal, so that's one half of it.

We saw no reason to warn our customers about that because we didn't think they were causing any environmental problem. If we had known that there was an environmental problem, we certainly would have put it in, yes.

Q. (By Mr. Baker) Would you, in your position with the Medical Department, have advised Monsanto to put it in if you had known there was an environmental problem?

A. Yes.

Q. That would have been part of your job?

A. Yes.

Q. Do you know how Monsanto disposed of PCB products in its possession that it wished to dispose of in the 1950's and 1960's?

A. No, I do not know that. We had Elmer Wheeler and Jack Garrett, two people who were in our department that knew that. I can't quote you the gospel and verse of it but I know that they were either disposed of in landfills or by dilution or approved methods. Some of the states may have had regulations, I don't know. That's a long way of getting around to say I don't know definitely.

Q. Do you recall ever being consulted as to how Monsanto itself should dispose of PCB products?

A. I think they would have gone to Garrett or Wheeler. I, myself, was not asked.

Q. Before we leave this particular exhibit, toward the bottom of page 1458 is a reference to air masks, air line masks.

Did you not believe in the 1950's and '60's that there was a risk of liver damage from breathing PCB products?

A. Well, sure, we said, Do not breathe the vapors.

Q. Did you know or suspect that PCB vapors were being contained in air, in the compressed air,

that would be used in this airline mask?

A. Well, there was a possibility. I mean suppose there's a leak someplace in there, but that's why we suggested that a filter be put in.

Q. Was there in the 1950's and 1960's a commercial filter cartridge that would filter all the PCB vapors out of the air?

A. I don't know. I'm sure if this was written in the '50's, that we recommended it, if there was one. I don't know when this was written and I don't know when. As far as back as I remember, air lines going to an air line mask from a compressed air source had a filter in.

Q. And do you have any knowledge as to whether these filters could filter PCB products out of the air?

A. I'm sure they did because we wouldn't have recommended it.

Q. But you don't know?

A. No, I don't know.

Q. I want to show you a document that has been marked as Plaintiff's Exhibit 17. It's an unsigned copy but appears to be a letter from you dated July 9, 1957, and ask you to review this, please.

A. Yes, sir, I wrote this.

Q. Was this a common inquiry that customers raised?

A. Is it -- see, "common" is a quantitative term and I really don't know if it was five customers or ten or two, I just don't know. Obviously, there must have been this one, certainly, whoever Singleton was, if he was a Monsanto person. I don't know who the heading of this -- they are quoting my letter but they aren't quoting whom -- I wrote it, so I don't recall a big bunch of them. I mean maybe three, four at the most.

Q. I'll refer you to the first paragraph of this, says, "As Pydraul AC gains greater use in the compressor field, more questions are being raised. One of these which has shown up with relative frequency concerns Pydraul AC's use in air systems supplying air breathing masks."

Does that refresh your recollection?

A. No, I didn't write that part. See, this is Plummer, that's his -- that first paragraph was his.

Q. And the enclosed letter from you?

A. Huh?

Q. And then the indented letter was your writing; is that correct?

A. Well, it starts with "Mr. Singleton." The

quotes are my letter, so I don't know where Plummer got -- what he meant by "relative frequency," I don't know.

Q. But your advice was, if I may summarize it, that you didn't see any risk in using these air masks where Pydraul was used in the air systems spraying the air.

MR. CHAMBERS: I'll object to the form. I'd rather just stick with what he says as opposed to summarizing.

Q. (By Mr. Baker) Did you mention anywhere in this letter using filters to filter out PCB's?

A. Well, I said, "I would imagine also that a further safeguard would exist in the traps that probably are installed in conjunction with air going to an air mask."

Q. You meant the trap there to be a filter?

A. Yes, I said compressed, a way of saying lines, but I'm saying cannisters with filters in there.

Q. Did you refer at all in this letter to possible liver damage?

A. No, because I said there wasn't any hazard.

Q. But you referred to a low acute oral toxicity?

A. Yes.

Q. But you didn't mention any other potential damage, did you?

A. No, because I said -- I'm implying that if there is a break in there, if something happens, even if it happens, this is a relatively low order of acute toxicity, the amount that is picked up -- I mean at normal ambient temperatures. So no, I didn't. And I believe I was right then. I believe I'm right now, because we haven't had any case reports any time from '57 to '92 of people being injured by Pydraul in an air compressor.

Q. I want to show you a document labeled Plaintiff's Exhibit 28, and this, again, is an unsigned copy but I'm convinced it's a letter that you sent to Kentucky Hydrocarbon, my client?

A. Yes, sir.

Q. Review this, please.

A. Beg your pardon?

Q. Have you reviewed this document?

A. This is the same letter that's quoted in the previous exhibit.

Q. This one is addressed to Kentucky Hydrocarbon and doesn't contain the statements from Mr. Plummer there. It has a copy of your -- has

your letter typed in it.

A. Yes, this was written six weeks before Plummer sent mine to somebody else.

Q. Do you recall anything about this inquiry from Kentucky Hydrocarbon?

A. Do I do what?

Q. Do you recall anything about this inquiry from Kentucky Hydrocarbon, and your response?

A. No, sir, but let me tell you that Monsanto had a policy that if any customer asked a sales representative about toxicity of a product, that was referred to me. If anybody called up Monsanto and said, I want to inquire about the toxicity or safe handling of a product, that was referred to the Medical Department. So, obviously, that Singleton must have been in the Marketing Department, got this inquiry from Roberts and talked to me about it, so I answered Mr. Roberts.

Q. And, again, this letter did not mention any potential liver damage?

A. No, sir, because I said there was no hazard. If you got no hazard, you don't get any liver trouble.

Q. And is it your testimony then that you did not intend for this letter to indicate that PCB's

don't cause damage but, rather, intended it to indicate that you did not expect a leakage of PCB's from the use of Pydraul AC?

A. Say that again?

Q. Do I understand then that your meaning in this letter was not that PCB's don't cause damage, but that you didn't expect any exposure to PCB's from the use of Pydraul AC?

A. Well, yes, by -- well, I would phrase it a little differently. Mr. Roberts obviously said, "What's the possible hazard of using Pydraul AC in a compressor which will furnish compressed air for, among other things, an air mask?" And I wrote back. After explaining my reasons, I said, "I'm sure there is no hazard involved."

I didn't have to talk about any potential toxicity of PCB, I just said there was no hazard involved in this operation.

Q. Do you recall personally any oral or written contact with Kentucky Hydrocarbon?

A. No, sir, I didn't recall that until somebody showed me that memorandum.

Q. And other than that, you don't recall any communications to or from Kentucky Hydrocarbon?

A. No, sir. There may but I don't recall it.

Q. Do you recall any communications to or from Equitable Resources?

A. I didn't remember the name before last week.

Q. Let me ask you another question. I expect the same answer. How about Equitable Gas Company?

A. No, sir, I do not remember any contact.

Q. I'm going to show you a document that's marked as Plaintiff's Exhibit 20 and ask you first to take a moment and review this.

A. Yes.

Q. Have you previously seen this document?

A. Yes, sir.

Q. Were you involved in drafting this document?

A. I don't recall that. This was a member of our department, may have been, but it looks like this was -- this occurred after Papageorge came on board and I would imagine Papageorge was the number one person responsible for sending this out. I don't recall whether --

Q. My question wasn't who was the number one person responsible, but whether you had played any role in the drafting of the document.

MR. CHAMBERS: Just for clarification, you

mean Dr. Kelly personally I take it as opposed to his department?

MR. BAKER: No, sir, I'm going to --

A. No, sir, I do not recall being personally involved.

Q. (By Mr. Baker) Do you know whether anyone in your department was involved in the drafting of this document?

A. I don't recollect that. If it were anyone, it would be Elmer Wheeler.

Q. Do you recall an ad hoc committee that was formed in late '69 or sometime I believe in 1969 --

A. Yes, sir.

Q. -- concerning the PCB situation?

A. Yes, sir.

Q. Did your department have a representative on that committee?

A. Yes, Wheeler was on that committee.

Q. Were you personally involved in drafting any of the letters that followed the warning letters or the letters containing information on PCB's that followed this February 9, 1970, letter?

A. Are they here?

Q. We'll be getting to those.

A. I mean I can't say I'm involved unless I

see the letters.

Q. I was going to ask you first if you recalled a series of letters that followed this February 9, 1970, letter.

A. Well, I know there were some but I don't know what they were or what the time frame was.

Q. Do you recall being involved in the drafting of any of those letters?

A. I may have had some input if there were toxicological statements in there, but without seeing the letters, I can't tell you.

Q. But if you just said you knew you weren't, I wouldn't have to go through this further, but I'll go through each of them and we'll see.

A. I didn't follow the asides.

Q. That's fine.

MR. CHAMBERS: I think the point is, if you don't know, if you'll say you don't know, that may help everybody determine exactly where to go.

MR. BAKER: If you were certain that you weren't involved in the drafting of those letters, we would skip that and go on to the next topic, but if you like, it's probably safer just to go through each one of them.

MR. CHAMBERS: It may be.

Q. (By Mr. Baker) I'll show you what's marked Plaintiff's Exhibit 21.

A. No, sir, I have no recollection of being involved in this at all, in that letter, Plaintiff's Exhibit 000021.

Q. I'll ask you the same question for Plaintiff's Exhibit 22.

A. No, sir, I have no recollection of being involved in Plaintiff's Exhibit 000022.

Q. I'll ask you the same question with regard to Plaintiff's Exhibit 23.

A. No, sir, I have no recollection of being involved at all with Plaintiff's Exhibit 000023.

Q. Same question with regard to Plaintiff's Exhibit 24.

A. Same answer.

Q. We're getting a system here I believe. Same question with regard to Plaintiff's Exhibit 25.

A. No, sir, I have no recollection of being involved with Plaintiff's Exhibit 000025.

Q. And, finally, the same question with regard to Plaintiff's Exhibit 26.

A. I have no recollection of being involved in the formulation of the letter of August the 3rd

1973, Plaintiff's Exhibit 000026.

Q. Now, to perhaps close up one area of questioning, I'll show you the document marked Plaintiff's Exhibit 27. Previously we just looked at Plaintiff's Exhibit 28, which was your letter to Mr. Roberts at Kentucky Hydrocarbon, and I believe that Plaintiff's Exhibit 27 may have been a writing on a Monsanto form that would have caused you to write that letter, but if you will just review this, please, and tell us.

A. What is the question?

Q. Maybe I should ask you a question, first. Have you seen this document before?

A. Yes, but I don't know when.

Q. Is this an internal Monsanto form?

A. Yes.

Q. And I can't read the top of it. I think it says something, call report?

A. Salesman's call report.

Q. There's some handwritten language about the middle of this page. Says, "Dr. Kelly, will you please write letter as requested with copy to Atlanta? Thank you." And I think it says H-A-L. Is HAL Mr. Lovejoy?

A. Gosh, I don't -- I don't know who he is, or

was.

Q. You know what the "copy to Atlanta" means?

A. Must have been -- yes, down at the bottom it says "District Office, Atlanta. Salesman, Singleton."

Q. Do you know who the salesman, Mr. Singleton, was? Do you know anything at all about him?

A. Outside of the fact he was a salesman out of the Atlanta office, I don't remember anything about him.

Q. Okay. This morning we briefly touched on the subject of the use of PCB's in adhesives. I'll show you a document marked Plaintiff's Exhibit 70.

MR. CHAMBERS: Objection to the relevancy, same as we raised earlier.

Q. (By Mr. Baker) I'll ask you to take just a moment to review this.

A. I'll start off on the first page, sir. We're not talking about PCB's here. This is a chlorinated terphenyl.

Q. I'm sorry, let me rephrase the question then.

Is this your signature on the second page? Do you recall seeing this document?

A. Yes, I have.

Q. Were you responsible for preparing or supervising the preparation of this?

A. Well, I was certainly responsible for reviewing it before I signed it. My department did not go through the mechanics of getting this petition in shape.

Q. Is this an application to the FDA for approval to use terphenyls in adhesives?

A. Yes, sir.

Q. In what manner were you proposing to use these terphenyls?

A. Outside of there was going to be an ingredient in the adhesive, I don't know anything more about it.

Q. Do you know what types of adhesives?

A. Yes, for vinyl acetate and ethylene/vinyl acetate, ethylene acetate and poly vinyl acetate.

Q. In what manner were you proposing to use these adhesives?

A. I don't want to be facetious but I think they put up both sides of the film stuck together, but I don't know.

Q. Let me ask a simpler question then, if I can. Do you plan to use this in packaging of foods?

A. Yes, sir.

Q. That's what I was trying to get at. What are the similarities and differences between PCB's and PCT's?

A. Well, similarities, they are both hydrocarbons, they both possess a certain amount of toxicity, not remarkable for an industrial chemical.

The dissimilarities are that these are much more viscous. Some of the terphenyls may even be solid resins, the others may be tar-like compounds. They are dissimilar because they have different uses. They are not used in electrical applications. The tonnage or the amount of pounds we manufactured were much more for PCB's than for polychlorinated terphenyls.

Q. I know you aren't a chemist but you're probably closer to one than I am. Chemically, how are they related, PCB's and PCT's?

A. Well, one is two benzene radicals, the other one is three, and they are both chlorinated.

Q. When did Monsanto first begin producing PCT's to your knowledge?

A. I don't recall.

Q. Would it have been long before 1966 or were

they relatively new in 1966?

A. I don't recall that either.

Q. Were you involved in any way in testing of PCT's for potential human health and safety problems?

A. With exception of the acute toxicity package that I explained that we did on our industrial chemicals, I do not -- at some time -- we did not do any up to 1966, but at some time I think subsequently, while this particular application was on file at the FDA, we may have done some work on it. I have some recollection of that and I'm sure if you show me another one of these that are a later one, that I'll be able to talk about it.

MR. CHAMBERS: For purposes of the record, I just want to restate an ongoing objection to all the questions on PCT's.

MR. BAKER: I will, for purposes of the record also, in case this is raised before a judge, we are asking a few questions about PCT's primarily because in our last deposition Mr. Papageorge gave us information that may indicate we may have bought PCT's from Monsanto without knowing it and we're investigating that. Now, so as long as we have Dr. Kelly here I want to ask him a few questions

about PCT's in case you instruct him not to answer.

MR. CHAMBERS: No, I have no problem with him answering, I just want to make sure our record is clear on our objection.

A. Let me say, even on this we did a subacute dermal toxicity of terphenyls. Was there a question?

Q. (By Mr. Baker) No, I was waiting. You seemed to be reading through there.

A. Yes, sir.

Q. Okay, to the best of your recollection, prior to the filing of this petition in 1966 what kinds of studies had you done, you personally or Monsanto as a company, done to determine potential safety and health problems with PCT's?

A. Well, in March of 1963 we ran subacute dermal toxicity on the material of a 60 percent terphenyl and we did our basic toxicity testing showing that the oral LD_{50} for rats was around 20 grams per kilogram, which is quite innocuous from an oral point of view. We did skin sensitization to see if it was a skin sensitizer. This was incorporated in an -- that's what we did on them.

Q. Do you recall between 1966 and 1970 doing any additional testing on PCT's?

A. Well, I don't know if this is the first one or the second one. They bounced that first report. We may have done some, I don't know, I don't recall, but if it's there, it's in that general file.

Q. I don't have another such petition. Let me show you a couple of other letters that may help you decide whether this was the first or second.

But first, I'll show you what has been marked as Plaintiff's Exhibit 98, December 1st 1966 letter which came about 12 days after the date of this petition, and ask you if you can quickly review that and identify it for the record, and then tell us whether that helps you in any way to determine which petition this was.

A. Well, this refers to Plaintiff's Exhibit 000070 in which the food and drug requested further -- that they had reservations concerning the use of this material, would be happy to discuss the material in detail and see if there was any other data that they might ask us about --

Q. And that is a letter to you from someone at Food & Drug Administration?

A. Yes.

Q. I'll show what you appears to be a follow-up letter from you back to Mr. Randolph at

the Food & Drug Administration. That is marked as Plaintiff's Exhibit 99. I'll ask you to review it and please identify it.

A. Well, yes, this is a letter that we sent to him and saying we're withdrawing this petition.

Q. Now, does that help you determine in any way whether this was your first or second petition?

A. I think it was the first. I'm not certain, but my impression is that it was the first.

Q. Now, let me go back to what I was asking before. Do you recall between the time this petition was submitted in approximately October of 1966 and 1970 any additional testing that you or anyone else at Monsanto did with regard to PCT's?

A. I don't recall, but we may have. I have some sort of a recollection of seeing some additional information in a subsequent petition but I do not know the details.

Q. Other than testing that would have been done with regard to this petition for use in adhesives, do you recall any other testing done on PCT's between 1966 and 1970?

A. No, sir, I do not recall.

Q. Now, from the end of 1966 through 1970 was the period that Monsanto was investigating this

Jensen report from Sweden and some of the other indications that PCB's were causing an environmental problem; is that correct?

A. Yes, sir.

Q. Were you not also during that period attempting to develop replacement products for products such as Pydraul AC that had contained PCB's and that you were not attempting to develop replacements products that did not contain PCB's?

A. I can't answer that. I was not involved with any replacement products.

Q. Was the Medical Department involved in any way in testing for potential environmental harm or potential health and safety risk of any replacements products for Pydraul?

A. We were not -- that's two questions. We were not involved in the environmental aspects of any replacement products. We were involved in the acute testing of possible replacement products. It may very well be that some of the replacement products had extensive toxicological information in existence already. I'm not sure which replacement products they were talking about, but some of the phosphate ester had considerable toxicological information.

Q. Let's talk about two particular replacement products then. I will tell you that to the best of my recollection Mr. Papageorge testified that Pydraul AC was manufactured until sometime in 1970.

A. Was manufactured what?

Q. Pydraul AC, until sometime in 1970, and for a period of about a year, and it may have been 18 months of a relatively brief period of 1970 into 1971 that a product called Pydraul AC A was manufactured as a replacement for Pydraul AC and that that product contained PCT's rather than PCB's.

Then subsequent to 1971 or maybe beginning in 1971 a newer product with phosphate esters in it called Pydraul 90 E was produced and marketed as a replacement for the Pydraul AC and Pydraul AC A, and that Pydraul 90 E contained neither PCB's or PCT's.

Now, assuming that's true, were you involved or was your department involved in any way in the testing of Pydraul AC A or in the testing of Pydraul 90 E?

A. Let's take one at a time.

Q. Certainly.

A. Pydraul AC A, we did acute testing on it.

It was also my recollection that the material was not PC -- that terphenyls were not found in the environment. I have no recollection of the data on that but it's my general impression that they were not found in the environment, so we only did acute testing on it.

Pydraul 90 E, I don't know what that was. I got a bulletin on 90 E and I'll tell you what they did on it, if anything. I don't know what it is.

Q. I don't believe we have a bulletin on it. I can tell you about all I know about is just what came from Mr. Papageorge, which was that he testified it was a replacement for AC A, contained phosphate esters, did not contain PCT's or PCB's, and it was marketed first about sometime in 1971. And if that can't enhance your recollection, there's nothing I can do to help you today.

A. That may be a me-too product that was manufactured by other people for years and we just started using it as a replacement. I don't know anything more about it. In fact, I don't know if it was a me-too product, "me-too" meaning it was somebody else's product and we decided to make it also.

Q. You did testify I believe that you had, "you," I mean collectively, your department, had done some testing of phosphate esters.

A. Yes, sir.

Q. When did that begin?

A. Beg your pardon?

Q. Approximately when did that begin?

A. I don't remember. We tested some for plasticizer and I don't know how long ago that was.

Q. Do you remember ever testing phosphate esters for use in lubricants?

A. No, sir, because I'd have to know which phosphate ester we're talking about. There may be toxicological information that was developed for other uses of it. I don't know which phosphate ester we're talking about.

Q. I can't help you any more with that now. We may have to come back at some point, but I'll try to avoid that if possible.

A. I'm available.

Q. I understand. On the subject of PCT's, you stated that as you recalled, there were not any PCT's found in the environment.

A. That is my impression.

Q. Is that your impression in the 1960's or

early '70's or is that your impression as of today?

A. Well, it was my impression sometime between the 60's and today, but I don't know when I gathered that impression.

Q. Do you know why Monsanto ceased producing Pydraul with PCT's in it?

A. No, sir, I don't.

Q. Do you know what kind of information that Monsanto had concerning potential health and safety issues with regard to PCT's or environmental damage with PCT's?

MR. CHAMBERS: Let me object to the form. May be easier to just take them one at a time.

A. I'll take the health one. Monsanto had negative information that there were no reports of any illnesses in the workers or users of PCT, but I do not know how large a market that was. We certainly didn't have any in our own workers. We had the basic toxicological acute data on it, on the material, we had that data. As far as the environmental aspects, I don't know anything about it.

Q. (By Mr. Baker) Does Monsanto produce PCT's at all today?

A. I don't know. I've been gone 18 years. I

didn't even know they were producing it in 1974 when I left.

MR. BAKER: Probably some of these questions should wait until Thursday.

MR. CHAMBERS: That's probably true.

MR. BAKER: I don't mean to put you on the spot. It's a new area that's just come up we didn't realize was an issue until just recently.

THE WITNESS: I've never heard about PCT's.

Q. (By Mr. Baker) On the question of the 90 E and the phosphate ester, from Mr. Papageorge's deposition, and I'm not sure I can pronounce this correctly, but he said he thought the ingredient was a phosphate, tricresyl phosphate. Does that in any way assist you?

A. Could be, yes, sir, it could be. Tricresyl phosphate has a subtoxicity of its own. It's been used as a gasoline additive. It is certainly not intended to be taken orally. That's about all I could tell you.

Q. Do you recall, first, whether that would have been a me-too kind of product?

A. It was an old time product, yes, it was an old time product.

Q. Do you know whether Monsanto, under your

direction, did any testing of this product?

A. I'm sure we did our basic acute toxicity package, but as far as I recall, I do not recall any further testing.

Q. In response to questions about several different substances, you've talked about your basic package of testing. Can you tell us -- and if you answered this this morning, I apologize for asking again, but can you tell us precisely what was involved in that basic package of testing and how long it took on a product?

A. How long it took was about three days, probably a week, before we got the report back. It involved in testing whether it was an eye irritant or damage to the eye. We determined whether it caused local action on the skin, whether it could be absorbed through the skin and cause systemic action.

We fed the material to develop LD_{50}, which was the benchmark for oral toxicity, and if it were a liquid we blew air through it to see what vapors could be picked up by -- what breathing air saturated with the material would cause to an animal over an 8-hour period.

Q. And that took about three days of testing?

A. Yeah. We observed the animals for some time.

Q. Show you a document marked Plaintiff's Exhibit 76 and ask you to review this and tell us if you've seen it before.

MR. BEAL: Once again, that is the way that we received the documents. That's how they were attached.

MR. CHAMBERS: That's fine.

A. Yes, sir, I've seen it.

MR. CHAMBERS: I want to take a couple minutes and look at the other pages too.

(A brief recess was taken.)

Q. (By Mr. Baker) Dr. Kelly, have you reviewed all the documents that are stapled together here labeled as Plaintiff's Exhibit No. 76?

A. Yes, I have.

Q. Let's start with the first page. Have you seen this before?

A. Yes, sir.

Q. It has been represented to us as being a page out of The New Scientist of December 1966. Does that appear to you to be accurate?

A. What was the last statement?

Q. Does it appear to you that that is correct?

A. The date is correct, yes, sir. I mean it's written in there. I presume it is correct, I don't know. I presume it is.

Q. When you first saw it was it an article in The New Scientist?

A. No, sir, it must have been something like this.

MR. CHAMBERS: When he says "like this," just let the record show he's referring to some of the later pages in the exhibit.

THE WITNESS: To Exhibit No. 0076.

MR. CHAMBERS: Thank you.

Q. (By Mr. Baker) So you did not see it as a page in The New Scientist; you saw it as a page that had been copied from something for your review?

A. Yes, sir, and I don't know who wrote it, I mean what the expertise of the man who wrote it was.

Q. If you'll turn to the next page, appears to be a letter from a Mr. Wood to a George, perhaps Mr. Buchanan?

A. Yes, sir.

Q. From Brussels to St. Louis. Are you familiar with this document?

A. Well, not too familiar. I think I have seen it, but, first, this has nothing to do with,

first, this exhibit. I mean this letter was written December the 1st and presumably The New Scientist thing was December 15th.

Q. I don't want to argue with you because I don't know if there's any connection at all. Although I would note or ask you if you would agree that often magazines are published well before the date on the magazine? I get Sports Illustrated sometimes three or four weeks before it comes out, but I don't know that that one came before the other or not.

But I'll just ask you, on this letter dated December 1st 1966, you have seen that before, have you not?

A. Yes, sir.

Q. Would it have been approximately the first part of December 1966 when you first saw this?

A. Yes, sir.

Q. Prior to your seeing a copy of this letter from Mr. Wood to Mr. Buchanan, had you had any communications concerning the possible buildup of PCB's in birds or other creatures?

A. No, sir, I do not believe so.

MR. CHAMBERS: Let me object to the form as well, to the extent that I don't think any of this

talks about buildup in birds, although it does talk about PCB's showing up in birds in Sweden.

Q. (By Mr. Baker) But when you testified earlier today that your first information concerning the Jensen study in Sweden came from a communication from someone in Brussels that was passed on to you, is this what you were referring to?

A. I don't think so. I think there was a newspaper article that I saw. I don't know when those crossed my desk.

Q. I'll ask you then to turn to the third page of this, which appears to be a three-page letter to Mr. Wood from, I believe, Henry Strand, and I will ask you, first, if you have previously seen this document?

A. I have seen it. I do not recall the first time I've seen it.

Q. This appears to be a November 28, 1966, letter and it refers to newspaper articles in Sweden. Would these perhaps be the articles that you have mentioned?

A. Well, this is something to do with the confusion I mentioned because he's speaking about polychlorinated bi-phenols, which is an entirely different horse than polychlorinated biphenyls, so

whether that's a typographical error, whether the Swedes -- something got lost or picked up in the translation, I don't know, but there are some of the statements in here that I don't know where he picked these out of the air. They are said to be related to DDT and equally poisonous. Well, I don't agree with that at all.

Q. I'm not asking you to agree with anything in here. I'm asking if perhaps this was the notice you referred to in your earlier testimony concerning the Jensen study.

A. No, sir, because the first ones I saw were newspaper articles that concerned just being in the environment rather than in the human body, the hair, or the bodies of fish, so this is a somewhat later one that I've seen.

Q. So if you saw this in late 1966, then sometime prior to this you would have had your first notice?

A. Newspaper work, yes.

Q. Prior to this time you and the other people at Monsanto knew that PCB's did not readily biodegrade; is that a fair statement?

A. Yes, sir. Which time are you saying?

Q. Prior to 1966.

A. Yes, sir.

Q. How early did you know that? As early as the 1930's?

A. I don't know. I don't -- I don't know how you prove a negative. I mean, I don't think we went around looking to see if there -- we found PCB's -- well, I don't know, I just don't know how we found that out. But it was our impression, due to the lack of solubility of water, the lack of response to alkali treatment and the nonreactivity of the product that we thought it would not biodegrade.

Q. And you also knew in the 1930's that exposure to a certain level of PCB's caused liver damage in humans, did you not?

A. Yes, sir.

Q. Did you consider at any --

A. May I repeat on that last statement?

Q. Certainly.

A. We knew that some -- we didn't know that PCB's caused liver damage in humans in the 1930's. We knew that chlorinated biphenyl benzene, when associated with chlorinated naphthalene, caused liver damage in workers. There was no PCB's at this particular time that we believed were even used in conjunction with chlorinated naphthalenes. It was a

chlorinated biphenyl benzene, so the answer to that other one was no instead of yes.

Q. Let me rephrase it then.

At what point did you learn that exposure to PCB's could cause liver damage in humans?

A. Well, I cannot put a first date on it. We knew when we had a product that could cause liver damage by inhalation in humans and animals that it could cause, by inference, if exposure were sufficient, liver damage in people. We knew that from the acute point of view and the episodes that I mentioned this morning that it did cause liver damage in these two acute exposure cases.

Q. And that was --

A. Sometime in the '50's.

Q. Sometime in the '50's?

A. Right.

Q. And I believe your testimony was that when you were told that these workers in Indiana had been exposed and that they had jaundice, then you weren't surprised because you knew that the affected organ would be the liver; is that correct?

A. Well, I knew -- I wasn't surprised because I knew there was a possibility of getting enough

exposure from breathing hot materials in a confined space.

Q. So if you didn't know by the 1930's that exposure to PCB's could cause liver damage in humans, at least by the 1950's you knew it had happened in the case in Indiana and you weren't surprised by it; is that a fair statement?

A. That's correct.

Q. Considering that by the 1950's you knew that there was a potential for causing liver damage in humans and you believed that PCB's did not easily biodegrade, did you not at any point prior to 1966 consider doing any studies to determine whether these PCB's were out in the environment where they could cause damage?

MR. CHAMBERS: Just object to the form, and partly because I got lost in that question. We can either read it back or if you want to rephrase it, either one, I don't mind.

Q. (By Mr. Baker) Do you understand the question?

A. Well, he's got two premises there and I'll have to take them one at a time. These have nothing to do with each other.

You talk about PCB's being out in the

environment and the possibility that that would cause harm or liver damage, and you are also tying that in with acute episodes of inhaling the material at elevated temperatures in high exposures. There's no relevancy between those two types of situation.

Now what was the question?

Q. (By Mr. Baker) My question was: Did you not at any point before 1966 consider the need to do a study to determine whether there was potential harm from having these PCB's in the environment?

MR. CHAMBERS: I'll object because he's talked about studies that -- are you referring like to the chronic type of feeding studies? Because he's already testified about a number of studies that were done on toxicity and PCB's.

Q. (By Mr. Baker) Do you understand the question?

A. Frankly, no.

Q. Then I'll be happy to repeat. Your testimony is, you've testified concerning toxicity studies of PCB's. You testified that by the late '60's you had begun a two-year study and that you did no chronic testing before that, and I believe that's a fair summary; is it not?

A. Yes, sir.

Q. And you testified in late '66 you discovered or were told that PCB's were found in birds?

A. Yes, sir.

Q. And shortly thereafter you heard about PCB's being found in babies' hair and in other things.

Didn't you consider at any point prior to 1966 that you should do any kind of additional testing to determine whether these PCB's were in the environment in a situation where they could cause damage?

A. We didn't really have the -- the answer is no, we did not have the advantage of hindsight. We could not foretell and did not even assume that PCB's which we thought were nonreactive and would not be broken down in either landfills or in bodies of water would cause any harm, so there was no necessity for doing any testing. When we found out that those conclusions were wrong and the material was present in food that people were eating, were liable to eat, then we started our testing.

Q. Did you at any point before 1966 consider the possibility that these materials could break down and escape the pebbles on the beach?

A. No, sir, we did not.

Q. Did you do any testing to determine under what circumstances the PCB's would break down?

A. Not that I have a recollection of. We may have but I did not know about it. I do not recall it.

Q. I'm going to change the subject now.

A. To what?

Q. To Plaintiff's Exhibit 000088, and ask you to look at this and tell me if you have seen this before.

A. No, sir, I don't recollect having seen this at any time.

Q. Who was Mr. Stark, do you know?

A. No, sir, I don't.

Q. And you've already identified Mr. Wheeler. I assume this is the same Mr. Wheeler we talked about earlier?

A. Yes, the same one.

Q. Do you know if there was --

A. I'll tell you who I know. I know W. A. Hunt. He was a toxicologist in the Medical Department. George Levinskas was also a toxicologist in the Medical Department. W. R. Richard was the research man who was involved in the

PCB situation. Scott Tucker, E. S. Tucker, was the analytical expert in the same matter.

Q. This document is dated February 7, 1972, and it says the subject is New Pydraul Blends, Medical Approval.

To your knowledge, in 1972 was there a standard process within Monsanto to obtain medical approval for new products?

A. Yes, sir, there was.

Q. What was involved in that process?

A. We had what we called our 201 form, EC-201. I forgot what the "EC" meant, but they said what it was, what they knew about it, where it was going to be used, any other manufacturers, and as you see, these included all our Santicizers; 140, 141, 148 and 711. Of those, we had an awful lot of information on them, so I would imagine that Wheeler bucked this to Levinskas until he answered it. I don't recall seeing it.

Q. What was the form you said?

A. He mentions it in the second paragraph, EC-201.

Q. Now, was that a form that was required for all new products?

A. Required.

Q. For all new products by Monsanto?

A. Yes, sir, even in the development stage, yes.

Q. When did Monsanto first start requiring the EC-201 form?

A. I think sometime after Levinskas came he added new strength to our Toxicology Department and my recollection is that it was sometime in '71, but I'm not sure when. It wasn't long before this memorandum was written, 12 months or so, because I don't think Levinskas was there in 1970. He may have been there in '71.

Q. Prior to Mr. Levinskas, prior to his arrival, what kind of medical approval was required for new products?

A. Well, it was a sort of -- it wasn't formalized in a form but we had to give approval before anything was advertised in a development bulletin we had toxicity information on. If the second sample was sent out to a customer, we would have to have toxicity information on it. If there were any reports of ill effects in any stages of research or pilot plant operation, we would have to have information on it.

You realize there are about 10,000

products come off a bunch of chemists' benches and only a few of them reach those states that I'm talking about.

Q. Assuming that the accuracy of Mr. Papageorge's statement concerning the timing of Pydraul AC, AC A and 90 E said that 90 E was introduced sometime in '71 or '72 the best I can recall, that AC A was a rather short-term substitute for Pydraul AC, first introduced sometime in 1970, and that Pydraul AC was introduced in the '50's; can you tell us what kind of medical approval would have been required by Monsanto prior to marketing the product for Pydraul 90 E in '71 or '72, for Pydraul AC A in 1970 and for Pydraul AC in the mid-'50's?

A. Would you take these one at a time?

Q. I'd love to.

MR. CHAMBERS: Yeah, I think he's just trying to help get it all out, but maybe if we break this down it would go easier.

A. Let's take them one at a time.

Q. Would you like to start in the '50's or the '70's?

A. '50's.

Q. Okay, Pydraul AC, I believe it was first

marketed in the mid '50's.

A. The Medical Department would have to know the use of a material and what was in it. We would have to then decide whether we had enough toxicological information to satisfy our warning labels and satisfy our bulletins so that the people could use it without ill effect. Now, in that compound in the '50's we only needed our basic toxicological package of eye, skin, inhalation and oral dose.

Q. How did that change by 1970 when Pydraul AC A apparently was first marketed?

A. I don't believe that we changed it in any way by the time because -- no, the answer is no, we didn't change it.

Q. Then in 1971 or '72 when Pydraul 90 E would have first been marketed, how had it changed?

A. If we had 201, EC-201, in existence at that time we would have that form from the people that manufactured it. And, again, there was information in the literature about the tricresyl phosphates that we had enough information on that from the literature, we didn't have to run tests ourselves. We probably did the basic package to be sure we're in the same ballpark as the published literature.

Q. What kind of information would you have required in 1971 or '72 that wasn't required earlier prior to giving medical approval for a new product?

A. Well, that varied a great deal with the product. I think we were paying a great deal more attention in '71 or '72 to the biodegradability of products. I would say that would be the only major change that we might have made.

Q. Okay, for a product first marketed in 1972, what kind of information would you have assisted on concerning the biodegradability?

A. Well, my only -- we wouldn't run the biodegradability tests ourselves. We would have to know how the material is going to be used, was it going to be used up in the process or was there going to be effluents there so it wasn't present in the effluents? And we would want to know whether that was broken down or not by the various areas it went into, so I would say that degradation, biodegradation testing, would be carried out by the manufacturing group or the research group rather than the Medical Department. We did not do that.

Q. But did you require or ask them to provide you the information?

A. To the best of my knowledge, yes, but I'm

not certain about that. I think we did. I'm not certain.

Q. What information would you have been interested in in 1972 concerning biodegradability?

A. Well, does it biodegrade?

Q. Okay, well, if it does, how does that effect your medical approval? Don't you need to know more information than just does it biodegrade?

A. Well, no. If it biodegrades you really don't have that product any more, it may be broken down to CO_2 and water or some innocuous compound. We would probably want to know what it biodegrades to, if you have the analytical method to find out.

But, remember, the analytical expertise was sort of a moving target in those days. You went from looking at parts per million to parts per billion and parts per trillion, and we did not have the expertise of looking for parts per billions and trillions in the '60's and '70's. I don't know when that expertise was developed.

Q. Okay, and what if it does not biodegrade? What does that tell you about whether you should give your medical approval?

A. If it doesn't biodegrade and it's not soluble in water and it does not react to other

chemicals such as alkalis and acids, you believe it would be safe to be discarded in approved methods which were in existence at that time in accord with state and federal regulations.

Q. I'm going to give you a hypothetical and wait for the objection. If we could wipe out a few years of history and I came to you with a product today and said this is PCB and it's wonderful, it does all these things that need to be done, we want to sell it, what would you ask me about the biodegradability of that product before you decided whether to give your medical approval?

THE WITNESS: I will interpose the objection for the record.

Go ahead and answer, if you can, Dr. Kelly.

A. I don't think -- I'd have to be assuming something. I don't think I can answer a hypothetical like that because I'd have to know a lot of things.

What's the state of the art at present? We're talking now about the state of thinking of a populace at large in 1992 versus 1968 or '70 when we had -- so there are an awful lot of conditions that make it honestly impossible for me

to answer that statement.

Q. (By Mr. Baker) If you had the benefit of hindsight would you have stopped the production of PCB's prior to 1966?

MR. CHAMBERS: Object to that question on the same basis.

A. No, we wouldn't have. We would have been much more serious about cutting down the outflow of the PCB residue into the environment. There were some operations that you had to weigh the benefits and the possible ill effects. After all, here we have compounds that prevented enormous fires. The PCB's and hydraulic fluids got their biggest impetus when the GE plant, General Motors plant, burned with $74 million damage and I don't know how many fatalities because they did not have a fire-resistant diecasting fluid.

We know that the electrical operations could not continue in the United States. There was no substitute for PCB's for a flame-retardant transformer. We wouldn't have stopped it.

Q. (By Mr. Baker) If federal and state governments allowed you to, would you recommend resuming manufacture of PCB's today?

MR. CHAMBERS: Object to that question as

well.

A. No, because we have substitutes now, they are not quite as good. The transformers are bulky, they are not quite as fire-resistant, but there are substitutes. But we didn't have substitutes in the '60's, '70's, '75, we did not have substitutes for dielectrics that were flame-resistant. And when I say "we," it doesn't mean Monsanto products. The industry had substitutes.

Q. (By Mr. Baker) Let me ask you one more hypothetical, and for my own personal information I want to know the answer to this.

If you were given the authority to decide whether to clean up areas where PCB's are found now or just to leave them alone, would you recommend or require the spending of the resource necessary to clean them up or would you just leave them alone or would you clean up in some circumstances and not in others? How would you decide that?

MR. CHAMBERS: I'd just object and just raise the point that the response to that question may depend on what the circumstances are, but subject to that, Dr. Kelly can sure answer, if he's able.

A. I can't answer that because I don't know. I don't believe the government can answer that because they spent $300 million trying to clean up Times Beach here and after about eight years they said, Whoops, we really didn't need to do this at all, so if these experts can't make their mind up, I sure can't. So I can't answer your question. And they cleaned up what's not PCB's, by the way, at Times Beach.

MR. BAKER: I expected you to jump on that question.

MR. CHAMBERS: Well, but that's fine. I mean I have no problem with your exploring further if you feel the need to, but --

Q. (By Mr. Baker) I assume you have little or no personal knowledge concerning the situation at the Kentucky Hydrocarbon Plant; is that a fair assumption?

A. Not at all, no.

Q. I'll proceed. Show you a document that is marked as Plaintiff's Exhibit 92. Appears to be a letter from you in February 1968 to a Mr. Blickenstaff. Ask you to look at this and see if you can identify it.

A. Yes, sir. I can identify it, yes.

Q. What led you to write this letter?

A. Well, it appears he must have written me asking for a technical bulletin and he wanted samples of these materials, so I wrote back and said, "Why are you interested?"

Q. Were Aroclors used at all then in insecticides, fungicides, et cetera?

A. Well, this is an involved story on that. I do not know if they were in -- they were recommended first by the Department of Agriculture. That came out in one of the technical bulletins saying they are an extender of Lindane, an extender of -- I don't know, DDT and something else. As far as we're concerned, it did not appear to be a big item to us and I don't know when these things came out. That recommendation was something in 1966. I think there was a slight small mention of this in one of our application bulletins, but to the best of my knowledge it was never widely used. That's about all I know about it.

Q. There's a reference at the top of this page to C. Paton is the way --

A. C. Paton.

Q. C. Paton. I assume that is Cumming Paton?

A. Cumming Paton.

Q. What was his relationship to this particular issue?

A. Well, that issue would be the Aroclors. I think he was in the Functional Fluids Department or the PCB Department and the marketing, and I -- I guess I said it to him, maybe Blickenstaff wrote to Paton. I mean I got -- I don't recall Blickenstaff writing to me, I don't know. Bill Richards was the research man.

Q. I'll show you a subsequent letter from you to Mr. Blickenstaff. It's dated March 12th 1968.

MR. CHAMBERS: This is Plaintiff's Exhibit 93.

Q. (By Mr. Baker) Plaintiff's Exhibit 93. Ask you if you can identify that.

A. Yes, sir. I wrote it, yes, a letter from me to the Department of Agriculture.

Q. I don't have any further questions about that.

Then in 1970 apparently you sent a letter to Mr. Blumenthal. This is marked as Plaintiff's Exhibit 95. I'll ask you if you can identify this document.

A. Yes, sir, I wrote this to Dr. Blumenthal of the Food & Drug Administration.

Q. What, to the best of your knowledge, caused you to write this letter at this time?

A. Well, I don't know if in April 1970 we had said we were going to go out of the business of -- where they could get into the environment. I was a good friend of Herb's and I thought I'd tell him before he read it in the newspaper.

As far as the second paragraph was concerned, well, that was just of interest. I said we're trying to get substitutes but there's already two users who have switched to substitutes from other companies. I don't know what this business of any widespread announcement of what -- I am not sure what I was talking about at that time.

Q. That's what I was going to ask you about next. In the second paragraph you refer to the two large users switching to other companies. It doesn't say other companies, but that was what you meant; they switched to other companies, wasn't it?

A. Yes.

Q. Then you say, "Obviously, Herb, you can recognize the competitive aspects of developing and phasing into sales such type of substitutes, so at present we're not making any widespread announcement. On the other hand, if the publicity

gets as red hot as it did in the case of DDT, we may be forced to make such an announcement at any time."

A. Yes, sir.

Q. Now, did that not indicate that you were not making a public announcement about looking for substitute products or ceasing the production of PCB's?

A. No, I don't think so, because I think we certainly were -- you got another two questions in there.

Q. I have a habit of doing that. You have to watch it.

A. I will.

Q. I believe you.

A. What were those two questions?

Q. I forgot.

MR. CHAMBERS: We can read it back if that will help.

A. Well, I said to Herb we were going to make an announcement, I thought. In essence, I will let you know before you read it in the paper, so we weren't going to make the announcement.

(The pending question was read by the reporter as above recorded.)

A. Well, on that, we didn't have one, so I believe that they -- I think the marketing people felt there's no sense making an announcement saying we're looking for one, for a substitute, we're getting out of this. Hold your breath until we come out with a substitute. I don't think that -- I don't know what that announcement would do.

Q. (By Mr. Baker) Your concern was that you didn't want your customers to switch over to some other product?

A. Oh, no, that wasn't at all, because I was telling him we're not going to manufacture for those uses. How are they going to -- they've got to switch, be no more stuff coming from us.

Q. But you didn't want -- well, it says what it says, but you said you were not going to make a widespread announcement. Can you tell us what announcement you were not going to make?

A. To the best of my recollection we did not want to make a statement saying we are looking for a substitute for these products which we are going to discontinue. I mean, that is the best of my recollection on it. We were certainly announcing to everybody we were getting out. I don't know what time it was in relationship to April the 8th, but at

that particular time we were telling people we were getting out of the plasticizer business, we were getting out of the carbonless carbon paper business, we were getting out of the paint business and any number of open operations. We were certainly going to make that and we weren't hiding that from anybody.

Q. But you did not want to make this widespread announcement because you were afraid you would lose customers; isn't that the whole gist of this paragraph?

A. Which is the widespread announcement I just said I was going to make.

Q. The ones you said you were not making. Listen to this and see if you can give me some other interpretation.

"Obviously, Herb, you can recognize the competitive aspects of developing and phasing into sales such type of substitutes, so at present we are not making any widespread announcements."

Now, that widespread announcement, whatever it was, related to the competitive aspects in your previous phrase?

A. Sure, but we didn't have a substitute, so we were going to make an announcement saying we're

looking for a substitute when we don't have it?

Q. Okay now, in the next sentence then you say, "On the other hand, if the publicity gets as red hot as it did in the case of DDT, we may be forced to make such announcement at any time."

Now, what announcement is that referring to?

A. I don't know what I was saying back in 1970 about that.

Q. That's fair enough.

Show you a document marked Plaintiff's Exhibit 96. This appears to be a July 1970 letter from you to a Mr. Cueto.

A. I never met him. I just know him as a name on this.

Q. Can you first review this and identify it for us?

A. Beg your pardon?

Q. Review this and please identify the letter for us.

A. Yes, sir, this is a letter from me to a gentleman that is in the Safety Evaluation Staff with the Department of Agriculture, Pesticides Regulation Division, dated July 24th 1970.

Q. Do you know what caused you to send this

letter at this time?

A. Well, he must have written me a letter because I start off saying, "In reply to your recent letter concerning our recommendation that the use of polychlorinated biphenyls in pesticide formulations be discontinued." So he must have written a letter saying, Why did you do this, to us, because the Department of Agriculture were the people responsible for fostering the use of it in pesticide formulations.

Q. In the last paragraph you refer to chloracne in workers or users and say there were two reports in the last 15 years.

Are these cases you've discussed already today or were they additional cases?

A. No, they are the ones -- well, the only one I discussed today was the one by Meigs, and I think there was an European report that I saw.

Q. So you believe the second chloracne report was from literature from Europe?

A. A capacitator factory in England.

Q. We don't have his letter, or I don't believe we have it, and you don't certainly have it in front of you. Can you give us a reason that there is no mention of possible liver damage in

this?

A. Well, no. The reason we wanted this thing discontinued is we didn't believe you ought to be throwing the material out in the atmosphere, out in the environment. And at that particular time everybody was saying you don't want it out in the environment, and we agreed with them, so he wrote these people and said, Look, stop beating the drum for putting this thing out in the environment.

Q. Let me try to rephrase the question then. Your last paragraph I believe was meant to assure him that you didn't see any human toxicity problems?

A. That's very true.

Q. And you refer to chloracne but you did not refer to any of the instances of liver damage.

Do you now recall a reason for not doing that?

A. Here we have two acute episodes involving misuse of the product; that it's been used for 40 years in hundreds of millions of pounds that has really no relationship to any toxicity that might result from disbursing of this in the environment.

The whole problem with PCB's in the environment with the other agencies of the government outside of the Department of Agriculture

was the effect on wildlife. They didn't like it in the environment, we didn't like it in the environment. The Department of Agriculture seemed to take an opposite point of view. This is our baby. We discovered the fact if you put this in Lindane it will kill 40 percent more cockroaches than without it, something like that, so I said we're stopping it, and they asked me why and I told them.

Q. My only question is, and it probably isn't a very important one, but do you recall why you mentioned chloracne? Because you've testified you had only one report of chloracne, then you read about another one in a journal, but you didn't mention liver damage.

A. He may have mentioned chloracne in his letter.

Q. I want to show you a document that appears to be a March 1971 letter from you to a Mr. Derr. It's marked as Plaintiff's Exhibit 97. And I'll ask you to review this and please identify it for us.

A. Yes, sir. I read it.

Q. Did you prepare this letter?

A. Beg your pardon?

Q. Did you prepare this letter?

A. Yes, I did.

Q. And this was in response to a request from Mr. Engstrom I believe?

A. Yes, sir.

Q. What was Aroclor 5460?

A. That's chlorinated biphenyl benzene. It is not a PCB, it's a solid.

Q. I'm glad to hear that. I didn't realize that was not a PCB, so I don't think I have anything else to ask you about that one.

I've asked a number of questions today about potential liver damage and why certain letters may or may not have referred to it and all that. One topic we haven't discussed at all yet is the potential for causing cancer, and I have just a few questions as we're trying to conclude today.

MR. CHAMBERS: Let me go ahead and interpose an objection just for the record on a line of questioning relating to this subject since this isn't a personal injury case or there's no claim of cancer involved, but subject to that, he's certainly welcome to answer your questions.

Q. (By Mr. Baker) Let me try to start at the end and work backwards here, Dr. Kelly.

Do you believe that exposure to PCB's

can cause cancer in humans?

A. There's a possibility that 1260 might. It's my belief that the other ones would not, and I base that on 40 years of experience with workers who have been exposed to PCB's, of reports of the negative information in the literature, the negative information from customers, and the fact that the National Cancer Institute ran a two-year test on 1254 and stated it was not a carcinogenic agent in rats.

Q. First, just from your experience in the literature, why would you say that 1260 might and you don't believe 1254 or any of the other lower ones would?

A. Well, 1260 has caused cancer in rats according to Dr. Kimbrel, who I quoted before as saying that she had -- her statement was that PCB's have caused no injury in workers, outside of chloracne.

Kimbrel ran a bunch of rats with 1260. We also ran a bunch of rats for 1260. She found what she claimed was a lot of cancers of the liver in her rats. We didn't find any. We had a meeting with Kimbrel and we said, "Look, here are our slides. You give me your slides." So she took

our slides. Our meeting occurred in late '74 or sometime in '74 and all this exchange of slides took place after I left.

But, anyway, we sent her slides up to the Eppling Cancer Institute in Omaha, Nebraska, and they came back and said, "We don't agree with the government pathologist." I don't recall seeing any letter from Kimbrel saying that she did or didn't agree with our finding of no cancers in our rats that we fed the same doses.

There also was some Japanese work that said that 1260 was carcinogenic in rats, so I go along with probably it is an animal carcinogen and, thus, might be considered a possible human carcinogen, but there's a big jump from an animal carcinogen to a human carcinogen, especially when you aren't feeding this stuff every day for a lifetime to humans.

Q. If we were to assume that 1260 could be a carcinogen and 1254 definitely was not, do you have an explanation for why 1260 might cause cancer if 1254 did not?

A. No, sir, I do not.

Q. Are you aware of any other persons, Dr. Kimbrel or anyone else, who have suggested

theories for why that might be?

A. No, sir.

Q. In the 1950's and 1960's did Monsanto conduct any studies to determine whether PCB's might be carcinogens?

A. No, sir, we did have a cancer -- not on animals. '50's and '60's?

Q. Yes, sir.

A. No, we did not. We did have a cancer index where we charted all our cancers in our workers, and there was no clustering of cancers in our PCB employees.

Q. Just so I have it covered, I assume you did not conduct any such studies prior to 1950 either, did you?

A. No, sir.

Q. Did you conduct any after 1970?

A. Well, when you do a two-year testing on rats, that's a cancer study. I mean it's an extra dividend. You get your testing, the toxicology, but you're also testing the lifetime of a rat.

Q. Did you, in your study in the late '60's, early 1970's, your two-year study --

A. Did what?

Q. In your two-year study that took three

years to do, did you find any evidence that any of the Aroclors were carcinogens?

A. We didn't, no, sir.

Q. Like to go back for just a moment and I will tell you I'm confident we will finish you today, though there are some topics that have been raised it could be become necessary in the future --

A. A little louder, please.

Q. I'm sorry, I'm backing away from you and my voice is softer. I will tell you, I'm confident we will finish you today. There could be some things that will arise that will cause us to call you again. I hope we don't have to.

A. I'm available.

Q. I have just a couple of more areas to review. First, let's go back to Anniston, Alabama, in 1937. I would like for you to give me some detail about what happened there, what you found there and what you believe caused the problem there.

A. Again now, you've gone from double questions to three questions.

Q. I was thinking about adding a fourth and decided to stop. Let's start with the first one. What happened?

A. We start with what happened. What happened in 1934 and 1935 before Monsanto bought it while it was still Swann, S-W-A-N-N, two N's in Swann, Chemical Company, they had a series of about 13 or 14 workers who developed chloracne.

There were other things occurring in the product at that time. It was then a different dielectric, different dielectric product. It was off-color as far as the color was concerned and eventually -- I have to jump forward. They found that they were getting this benzene from a new supplier and the specifications were off. They were really looking for what's causing the failure in the dielectric properties as well as the chloracne, but they were putting out a poor dielectric, so they went back to find out. And, incidentally, they found that they had contaminants in the biphenyl benzene.

Anyway, we sent these 13 people over to Dr. Jones in Atlanta. He examined them, treated them, and came out with a bunch of theories that going on the history of Swann making it for X number of years beforehand and making it after the episode stopped, he was still treating these people for six or eight months. He reported all this in the

Journal Of Dermatology or something like that, and that's what happened there.

As far as Monsanto was concerned, I first went to Anniston probably in '37. I saw some of these cases and they had no liver involvement, they had -- they were well, they were back at work and they had very little residual scarring on their face.

Since then, until I left, we had no chloracne occurring at either our plant in East St. Louis, also called Sauget, S-A-U-G-E-T, or the Krummrich Plant, is spelled K-R-U-M-M-E-R-I-C-H, Krummrich Plant.

As to the Krummrich Plant, we had no chloracne. We've had no chloracne in our customers with the exception of the Meigs article. And there was one time early in, I think, in the '30's or '40's where an outfit was making bellows thermometers for ovens where you got something about the size of an onion, sort of a leather pouch or something that's supposed to do something with the heat, hooks on to a thermostat. Well, these workers had two woman who dunked their hands in there and got chloracne, and on their arms, so I went up to see them. That's the only one I've ever gone to see

because I was interested because this was news to me. So I said, "Why don't you get some sort of a gimmick that they don't put their hands in it and pull these things out?" And they did and that was the end of that.

So with that one exception of these two girls, we've had no evidence of any chloracne anyplace. So as far as we're concerned, that Anniston thing was an aberration because of this overspec benzene, some contaminant at that time. The technology of looking for contaminants was pretty hard.

Now, what was the number two question?

MR. BAKER: The reason I asked them three at a time so you could answer the way you did is I think you already answered two and three. I was just trying to make it easier on you.

(A brief recess was taken.)

Q. (By Mr. Baker) Just a couple of quick areas to wrap up here. We talked about the Ad Hoc Committee that was formed sometime in 1969. What was your involvement with that committee?

A. Beg your pardon? Didn't hear the last.

Q. I'm sorry. What was your involvement with

the Ad Hoc Committee?

A. Well, Elmer Wheeler of our department was a member, but I don't know if he was the chairman or not, but he was very active on that committee.

Q. Were you involved in the decision to form that committee, personally?

A. Well, I don't know if it was my -- if I started it or Wheeler started it, but I said, "Wheeler, you got to spread this work around, you can't be doing all of it yourself." Well, no, I think it was -- no, he recognized the fact that he needed analytical people on it, he needed research people on it, he needed marketing people on it and maybe he needed a legal person on it, I don't know. I don't know the number of who was on the committee.

MR. CHAMBERS: And I think the question was about your personal --

Q. (By Mr. Baker) Whether you were personally involved.

A. No. Answer is no.

Q. I will ask, among the things we've asked for copies, Dr. Kelly has testified that he testified in a deposition and at trial in the Stroh case which involved Pydraul. I believe that was the only case that he recalled testifying concerning

Pydraul.

Let me ask you, Dr. Kelly, if you recall any other cases in which you testified on behalf of Monsanto where Pydraul was involved?

A. That's about the only one I recollect. I mean, I get mixed up in these cases, you know, in the last five, six or seven years, but that's the only one I remember.

MR. BAKER: Okay, I will ask if counsel is willing to produce to us, at a reasonable fee, copies of transcripts of his testimony in the Stroh case, both his deposition and his trial testimony. And if counsel is aware of any other cases in which he testified concerning Pydraul, we'd ask also for transcripts of that.

MR. CHAMBERS: All right, I understand there have been some previous discussions about doing that with others who have been involved and we certainly would do with Dr. Kelly the same thing that's been agreed to among the others.

MR. BAKER: I think what we agreed to on Papageorge was that Mr. Monge would give us a list of cases he testified in and we would submit a particular request for the ones that we wanted, rather than just trying to duplicate all of them.

THE WITNESS: Can I ask the defense counsel to send me a transcript of the trial? I've never -- I have the deposition. I read that.

MR. CHAMBERS: Sure, sure.

THE WITNESS: But I don't recall the trial.

MR. BAKER: So what I'm specifically asking this time is for his testimony in the Stroh case and asking if he can identify the other Pydraul cases in which he testified.

MR. CHAMBERS: I understand.

MR. BAKER: And I want to move here for admission of certain exhibits. Because of the way we've done it, you may want to go off the record and check if any of these I've mentioned, you have objections to admission at this time and I'll give you my list if you would like.

MR. CHAMBERS: If we could do it that way, that may just speed it up, if we go off the record.

(Discussion was had off the record.)

MR. BAKER: At this time we move admission of the following Plaintiff's Exhibits: Exhibit 12, 13, 15, 17, 27, 28, 70, 76, 92, 93, 95, 96, 98 and 99.

MR. CHAMBERS: And we have no objection to the exhibits except the following four exhibits.

Plaintiff's Exhibit 70, we would object that this exhibit is not relevant since it deals with a non-PCB product being used in an application other than for hydraulic fluid purposes or air compressor lubrication purposes.

We also object to Plaintiff's Exhibit 93 on the grounds that it is not relevant because it deals with an application for PCB's other than their use in air compressor lubricants or hydraulic fluids like the Pydrauls were.

The third exhibit that we object to is Plaintiff's Exhibit 98, and we object to this exhibit on the grounds of relevancy, since it deals with a non-PCB product in an application other than use as a component of an air compressor lubricant or a hydraulic fluid.

And the final exhibit that we object to is Plaintiff's Exhibit 99, and we object to that exhibit on the same grounds of relevance that we've discussed with others.

MR. BAKER: With that said, I believe we are finished with this witness at this time.

MR. CHAMBERS: Okay. I think we'll turn you loose then, Dr. Kelly.

MR. CHAMBERS: You prefer to read?

THE WITNESS: Oh, sure.

SIGNATURE OF WITNESS

R. Emmet Kelly, M.D.

Subscribed and sworn before me this 20th day of November, 1992.

Notary Public

My Commission Expires:

JOSEPHINE S. NIBLOCK
NOTARY PUBLIC STATE OF MISSOURI
ST. LOUIS COUNTY
MY COMMISSION EXP. JAN. 15,1995

STATE OF MISSOURI)
) SS
CITY OF ST. LOUIS)

I, Richard L. Saunders, a Notary Public within and for the State of Missouri, do hereby certify that on October 6, 1992, at the office of Husch, Eppenberger, Donohue, Cornfeld & Jenkins, 100 North Broadway, St. Louis, Missouri,

R. EMMET KELLY, M.D.,

who was by me first duly sworn to testify to the truth and nothing but the truth concerning the matters in controversy in this cause; that the witness was thereupon carefully examined under oath and said examination transcribed into computer-assisted transcription under my supervision.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal on October 20, 1992.

My commission expires August 26, 1996.

Richard L. Saunders
Notary Public.