STATE OF WISCONSIN : CIRCUIT COURT : MILWAUKEE COUNTY
BRANCH 8

STROH DIE CASTING COMPANY,

Plaintiff,

VOLUME XIV (p.m.)

v.

Case No. 639-887

MONSANTO COMPANY,

Defendant.

May 2, 1991

Honorable Michael J. Barron
Circuit Judge Presiding

A-P-P-E-A-R-A-N-C-E-S

RIORDAN, DRIVELLO, CARLSON, MENTKOWSKI, STEEVES by DONALD CARLSON AND JOHN PENDERGAST, appeared on behalf of the Plaintiff.

BORGELT, POWELL, PETERSON, FRAUEN by JOSEPH McDEVITT and KIRKLAND AND ELLIS by ANDREW RUNNING appeared on behalf of the Defendant.

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I N D E X

you?

A More probable than not is not a statistical concept.

Q I understand that. But if that is -- If it's a concept that we are trying to find; that is, what is the outcome of an exposure more probable than not related to that exposure, that's different than your 95 percent confidence level, isn't it?

A Yes.

MR. CARLSON: That's all. Thank you very much, sir.

THE COURT: Thank you, Doctor.

THE WITNESS: Certainly.

(The witness is excused.)

MR. RUNNING: Defense calls Mr. William Papageorge.

WILLIAM PAPAGEORGE, called as a witness herein, being first duly sworn, was examined and testified as follows:

THE CLERK: Okay. Would you state your name, please?

THE WITNESS: William B, Papageorge.

THE CLERK: Spell your last name.

THE WITNESS: P-a-p-a-g-e-o-r-g-e.

THE CLERK: Thanks. Have you a seat.

MR. RUNNING: Your Honor, during this

examination, we'll be using the tranparencies off and on. I prefer to keep the lights on. Your Honor, if we could just leave them on throughout unless the jury can't see.

THE COURT: Okay.

MR. RUNNING: Just so we don't have the disruptions of turning them on and off.

DIRECT EXAMINATION

BY MR. RUNNING:

Q Good afternoon, Mr. Papageorge.

A Good afternoon.

Q Were you the manager of the environmental control for the organic chemicals division of Monsanto from 1970 to 1976?

A Yes.

Q And was this the time period in which Pydraul fluid was converted from a PCB based product to a non-PCB based product?

A Yes.

Q Were you involved in the decision to convert the Pydraul product from a PCB based product to a non-PCB based product?

A Yes, I was.

Q Why was that decision made?

A We -- Monsanto was receiving and had itself found

information that led to the strong belief that PCBs were being found in the environment. And this being the case -- And in some instances some effects on wildlife were being reported.

Monsanto chose then to do what it could to control the release of PCBs into the environment, and one of those programs included the reformulation of their industrial hydraulic fluids to remove the presence of PCBs in them.

Q What, if any, outside pressure was being exerted on Monsanto once the decision was made to convert Pydraul hydraulic fluid from a PCB based product to a non-PCB based product, what outside pressure was there?

A There was no pressure. This was Monsanto's idea.

Q Was Monsanto being pressured by its customers to make this change?

A No.

Q Was Monsanto being pressured by state governments to make this change?

A No.

Q Was Monsanto being pressured by the Federal Government to make this change?

A No.

Q What about other producers of PCBs throughout the

world, were they pressuring Monsanto to make this change?

A No. In fact, they were asking us not to do what we had planned to do.

Q Did Monsanto --

A They didn't agree with Monsanto.

Q Did Monsanto make the change anyway?

A Yes.

Q Was the US Environmental Protection Agency in existence at the time these decisions began to be made at Monsanto?

A It was approved by Congress as I recall in '69 and they had selected a few people, but organizationally it wasn't functioning in early 1970s when these decisions were made.

Q When Pydrauls were reformulated without polychlorinated biphenyls, why didn't Monsanto go out to customers like Stroh and advise them to drain the fluid out of their machines immediately and ship it back to Monsanto? Why wasn't that advice given?

MR. CARLSON: Your Honor, I'm going to object for lack of foundation at this time. I'd like to know if he's testifying from personal knowledge or from review of records or whatever it happens to be.

MR. RUNNING: He was the manager of the environmental --

MR. CARLSON: I'd like to know how he arrived at this information.

THE COURT: You can ask that on cross-examination.

MR. CARLSON: Okay.

MR. RUNNING:

Q Do you have the question in mind, Mr. Papageorge?

A I forgot the question.

Q I'll restate it for you. Now, we've gone over the fact that the decision was made to take the PCBs out of the Pydraul fluid. And my question to you is, why didn't Monsanto at that time go to customers such as Stroh Die Casting Company and advise them to drain the old fluid that contained PCBs out of their die casting machines, put it in drums, and ship it back to Monsanto for disposal? Why wasn't that advice given?

A It wasn't given because for several reasons. They all add up to what I think is a responsible approach. One is the material was an excellent material for the purpose for which it was designed.

Q You're referring to the old material?

A The PCBs in the units. Number two, when properly

handled, carefully handled and it's not allowed to get into the environment or not allowed to get out to expose the worker, no harm is going to be done with it.

At the same time if the customer could not control it such that it didn't escape to the environment or leak out and effect his workers, he had the option really of going for some other material including the competitors' material who were anxious to get the business.

So it's really the fact that it was a material that did the job in an excellent manner and when properly controlled there was no reason to drain and change the whole system.

Q Now, was Monsanto being pressured -- We've talked about whether there was pressure to reformulate the product. In 1971 and 1972, when the two reformulations that the Court has heard testimony on -- And we'll cover it more detail.

During that time period, was there any outside pressure on Monsanto to go to a company like Stroh Die Casting and advise them to drain the old fluid from their machines and send it back to Monsanto, was anyone advocating outside of the company?

A There was no pressure from any one or any agency or any authority, no.
Q Did the US Environmental Protection Agency say to Monsanto in 1972 that they should be going to companies like Stroh Die Casting Company telling them to drain the fluid from their machines and return it to Monsanto?
A No, they were not.
Q Now, after Monsanto took the PCBs out of the hydraulic fluid, Monsanto continued to sell other products containing PCBs, is that true, such as dielectic fluids?
A That is true, yes.
Q That's a term that's been used a little bit in this trial. Would you explain what a dielectric fluid is?
A A dielectric fluid is a liquid that does not conduct electricity. That's where the expression dielectric comes from, and is used in electrical equipment for insulating purposes as well as cooling purposes.
Q What's a capacitor, Mr. Papageorge?
A Capacitor is a device that is used to in essence store electrical energy and release it in bursts with more amperage -- it's a called in the electrical business -- than was originally

introduced into it. I hope that's clear.

Q Are capacitors the boxes that you often see on the electrical polls?

A Well, both capacitors and transformers can be seen on electrical polls.

Q Okay. Why don't you explain what a transformer is.

A A transformer is an electrical device that takes electrical energy from one voltage and either raises it to a higher voltage or lowers it to a voltage.

Q Is is known as stepping down or stepping up the current?

A That's a common expression, yes.

(Whereupon, there was a change of reporters.)

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Q And why does that take place? Why do electrical companies need to step down or step up the current?
A Well, in order to get enough electricity, let's say, into our homes, you have to start with very high voltages to travel the distance they must travel from the generating plant to the home, so it's conceivable where it starts out as thousands of volts, and by the time it gets to several transformers, and finally the one hanging behind our home on a post, it drops down then, let's say, from 400 volts at that point down to 210, which it then enters our homes and we then see it as 110 or 210 for our dryers and electric ranges and other things.
Q And in order to step down or step up the fluid in the case of a transformer, is it necessary to have an insulating fluid inside the transformer?
A Well, most of them have an insulating fluid to help dissipate the heat that is generated as electricity flows through the unit. I hesitate because there are some transformers that are dry transformers that just depend on the cooling air around them to cool them.
Q But a common use is to have an insulating fluid in a transformer?
A That's correct.

MR. CARLSON: I object. I think it's irrelevant.

MR. RUNNING: I just have a few more questions.

THE COURT: Go ahead.

MR. RUNNING:

Q What attributes of the fluid were necessary?

A Of course, the principal attribute is the fact that it must not conduct electricity, so electricity doesn't go across the fluid to the next electrical part of the unit. It must also be compatible. It must not harm the inside of the transformer, dissolve the insulation and what have you that might be in it.

Another very important feature in many transformers is the desirability that the material not catch fire. When the unit for some reason explodes, because of too much voltage, for example, we try to avoid the spreading of fires by having a fluid that doesn't burn.

Q Did PCBs meet those attributes, those requirements?

A Yes.

Q And were they continued to be -- did Monsanto continue to sell PCB dielectric fluids for some period of time after it ceased selling PCB based

hydraulic fluids?

MR. CARLSON: Object, leading.

MR. RUNNING: It's not in dispute, Your Honor.

THE COURT: No.

THE WITNESS: It did.

THE COURT: It's more repetitive than anything.

MR. RUNNING:

Q Who are some of the customers? For example, was the government a customer of PCB dielectric fluids after 1972?

A Yes.

Q Let's go into your background before we go back to hydraulic fluids. Could you describe to the Court and to the jury your educational background?

A I received a bachelor of science degree in 1943 and a master of science degree in 1947 from Washington University in St. Louis, I earned 12 hours towards a doctor of science degree from Oklahoma, which is now called Oklahoma State University. That covers my formal education.

Q Did you serve in the military?

A Yes. Between the two degrees, I served in the army and in the Pacific theater. I went in as a private,

came out a captain in the corps of engineers.
Q Did you serve as an engineer in the occupation of Japan?
A Yes.
Q Then were you employed after you returned to the United States?
A I went and got my master's degree after I returned.
Q And then who were you first employed by?
A Then I worked for Phillips Petroleum Company in Oklahoma.
Q Could you briefly describe your positions with Phillips?
A I was a research engineer in their research department, working with research problems that had to do with getting oil out of the ground. Such things as providing the proper kinds of water to push the oil through so they come up to the surface or drilling methods that were used to drill the wells, that type of activity.

Then I became a design engineer in their department that was associated with the refining of petroleum, the making of the various types of gas lines and so on.

Q And did you then go to Monsanto Company?
A I did.

Q What was your first job at Monsanto? Just so we know the date of your first employment by Monsanto, could you state that as well?
A November, 1951 I joined Monsanto as a design engineer at their St. Louis plant.
Q Is that the Queeny plant?
A The John F. Queeny plant in St. Louis.
Q What were your duties and responsibilities in that first position?
A Designing equipment for the manufacture of a chemical.
Q Were you subsequently promoted to production supervisor at the Queeny plant in 1956?
A Yes.
Q What were your duties and responsibilities as production supervisor of the Queeny plant, again, very briefly?
A I was responsible for the operation of a department that made a chemical.
Q And then were you transferred to maintenance superintendent of the Queeny plant?
A Yes.
Q What were your duties and responsibilities in that position, briefly?
A I was responsible for the maintenance work force of

Q What was your first job at Monsanto? Just so we know the date of your first employment by Monsanto, could you state that as well?
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Q What were your duties and responsibilities as production supervisor of the Queeny plant, again, very briefly?
A I was responsible for the operation of a department that made a chemical.
Q And then were you transferred to maintenance superintendent of the Queeny plant?
A Yes.
Q What were your duties and responsibilities in that position, briefly?
A I was responsible for the maintenance work force of

about 400 or 500 mechanics and foremen and supervisors that took care of the plant, kept it maintained and built small projects and so on.

Q Were you then transferred to the position of technical services superintendent at the Queeny plant?

A Yes.

Q And that was from 1960 to 1962?

A That's correct, yes.

Q Could you briefly describe your duties and responsibilities in that position?

A I supervised the activities of oh, anywhere from 10 to 20 engineers who were designing equipment for the manufacture of chemicals.

Q And then were you promoted to the position of general superintendent, distribution, warehousing and utilities at the Queeny plant?

A I was.

Q From 1962 to '64?

A Yes.

Q Could you briefly describe the duties and responsibilities of that position?

A I was the general superintendent of the group that supplied services to the departments that made the chemicals. We took care of their shipping, we took

care of their receiving, their raw materials, hauled out their trash and gave them the steam, electricity, sort of a services department.

Q Did you have any responsibilities in connection with Pydraul fluids at the Queeny plant during that two-year time period?

A I did.

Q Could you describe those responsibilities?

A One of the departments in that responsibility was a department that did all of the blending and drumming at the plant, and one of the product lines that we produced in that unit was the Pydraul fluid.

Q Were you then promoted to general superintendent of manufacturing at the Krummrich plant in Sauget, Illinois?

A I was.

Q Was that in '64?

A Yes.

Q And you held that position for two years?

A Roughly so, yes.

Q Can you briefly describe your responsibilities in that position?

A I was responsible for the manufacture of a group of chemical products that we made at that plant.

Q Is that a large facility?

A Yes. There were six general superintendents. I was one of six, so that gives you an idea how big a plant it was.
Q Is it one of the larger chemical plants in the country?
A I would think so, yes, at the time.
Q And you were then promoted to plant manager in the plant at Anniston, Alabama, in 1965?
A Yes.
Q And you held that position until December of '69?
A Yes.
Q What were your duties and responsibilities in that position?
A Well, I was responsible, to put it simply, everything that went on in the plant was my responsibility, from hiring of workers, training of workers, the maintaining of the facilities, the production of the products, the shipping of the products.
Q Were PCBs produced at any of the plants you worked at?
A They were produced in the Sauget, Illinois plant and in the Anniston, Alabama plant.
Q Otherwise known as the Krummrich plant and the Anniston plant?

A Correct.
Q And what job position were you appointed to in January of 1970?
A I was appointed as manager, environmental control, addressing the then PCB issue that kept coming up and required special attention.
Q Mr. Papageorge, when did you retire from Monsanto?
A The end of 1986.
Q Have you testified for Monsanto in other cases involving polychlorinated biphenyls?
A I have.
Q Are you compensated for the time you spend away from your home testifying in these cases?
A I am.
Q Do you have any other employment, or are you retired at this point?
A I have no other employment. I am retired.
Q What was your assignment in the position that you assumed in January of 1970 as manager of environmental control? Could you generally describe your assignment?
A I was responsible for coordinating the information that was coming from many, many sources. Some within Monsanto, much of it from the outside, regarding PCBs in the environment and trying to let

those that I felt should know, keep them up to date, and that included not only the Monsanto people, but those that I got to know on the outside, the university, researchers, the government agency representatives, industry people, customers.

Anybody that had an interest in PCBs, I tried to fill that need of what is the latest news on PCBs. That was in essence the role I played.

In addition, I was expected to advise the managers in Monsanto as to what approach, in my opinion, would be appropriate to handle the situations as they would come up.

Q Were you given a plan to carry out or an agenda to carry out by senior management of Monsanto?

A Yes, I was.

Q Mr. Papageorge, I'm going to show you Defendant's Trial Exhibit No. 1082. Can you identify this document?

A Yes. This is a copy of portions of minutes of a meeting held in St. Louis in November of 1969 by the Monsanto committee.

Q It's titled "Minutes of meeting at the corporate development committee." What is the corporate development committee, or what was it in 1969?

A At that time the corporate development committee was

a committee consisting of the president of Monsanto, who is also the chairman of the board, and his key vice president.

In other words, the top managers of Monsanto formed that committee and they met monthly to discuss important matters concerning Monsanto.

Q Was this also known as the corporate management committee, on occasion?

A On occasion, it would have that title. It also had another, corporate administration committee, so it had three different titles through the years.

Q Is this a business record of Monsanto company?

A Yes.

MR. RUNNING: I move for the admission of Defendant's Trial Exhibit 1082, Your Honor.

MR. CARLSON: No objection.

THE COURT: So received.

MR. RUNNING:

Q Mr. Papageorge, do these minutes indicate that the meeting was held on November 17th of '69?

A They do.

Q And the individuals that are indicated that are present is -- is the chairman the president of Monsanto Company?

A Yes.

Q Mr. Bock?
A Yes.
Q And the individuals below him? I take it the president gets top billing?
A Well, that is Mr. Bible.
Q That was a joke. I'm sorry. The other individuals are vice presidents, generally?
A They are.
Q And there is a reference at the start. We have redacted information that does not pertain to this case, Your Honor, but beginning, the start, there is a reference to the organic division, reports on polychlorinated biphenyls. Do you see that, Mr. Papageorge?
A I do.
Q And then go to the next page. Is this part of the report on Page 78?
A It is.
Q Let's go down to the bottom here, plan of action. Do you see a reference to the recommended plan of action in the bottom paragraph?
A I do.
Q And does the sentence that I've highlighted indicate the goal of the recommended plan of action?
A Yes. I do see that. That is the overall goal, yes.

Q To assure that the loss of PCBs in the environment, if any, is minimal?
A Correct.
Q Now, just so we don't all have to stare at this screen. The next page, Mr. Papageorge, have I blown it up on this foam board? Can you just confirm?
A Yes, you have.
Q Mr. Papageorge, could you identify this blow-up, state what these four points are, first of all?
A I'm sorry. That is a copy of the page of this document, yes, and those 12 points listed are the objectives or the points of the plan which were expected to be pursued, and that was in essence, what I was supposed to be doing, looking into these 12 points or reading the 11 points. The first one appoints me to the job.
Q Okay. Mr. Papageorge, if you could come down, what I would like you to do is basically to explain what the 12 points are, and then I'm going to ask you to go back and almost have a flashback.

We'll go through some of the documents leading up to this plan. Just so we have the benefit of your assignment initially. If you could just describe what the 12-point plan was in general terms, and we'll go back to it later in your

examination.

MR. CARLSON: I'm going to object. I don't think there was any testimony if this was an assignment given to him at this time. I think he's just reciting the document. I don't see his name on the document.

THE COURT: He just testified to that.

MR. CARLSON: Okay, but -- okay. We'll go through it on Cross.

MR. RUNNING:

Q Go ahead, Mr. Papageorge.

A The first item there, in which the appointment of a project manager is mentioned, that created the job that I was given in January of 1970. You will note that I was to be assisted by a group called the task force.

Well, when I showed up on the job, there were, I don't remember the exact numbers, something like 15 or 20 people who were involved with PCBs. They made up this task force, representing the medical, law, engineering, manufacturing, as well as the business marketing people.

Following that first item, there are 11 other items that were highlighted at the time, that were supposed to be looked into.

No. 2 refers to notifying our customers about the PCB situation as we knew it.

No. 3 talks about the control of losses of PCBs from the Monsanto plant. No. 3 -- I'm sorry.

No. 4 refers to not only are we going to try to influence what comes out of our plant, but we are going to talk to our customers and tell them the need for reducing PCBs leaving their plant.

No. 5 here refers to a packaging system for the PCBs that were at that time being found in the environment. The higher chlorinated types and the packaging system at that time was really not too sophisticated. It was primitive, it was a pipe over in the corner of the building with a scale, and you put a drum on it, and the operator would fill it. Sometimes you'd overfit it, and it would spill on the floor.

What we wanted to do was improve the system, such that no spills occurred, that any fumes that came up from the package as it was being filled would be caught, wouldn't go out into the air, so that was the purpose of No. 5.

No. 6, we would try to find the products, other materials that would replace those PCBs that were actually being found in the environment. Something,

what was a non-PCB, but would do the job almost as well, if not better, hopefully. We had a program going, and we wanted to expand it on determining whether the PCBs would biodegrade out in the environment.

Then we had, of course, a section here that says continuing your testing program to determine if PCBs harm any living creatures. We had an animal testing program underway at the time. Also, accelerate, in other words, hurry up your program that has to do with better and better ways to analyze for PCBs, so that you can find very, very low quantities and do it with a lot of confidence, that when the analytical course gives you a number, that that is a good number, that it won't be different the next time he looks at that sample.

No. 10 refers to the removal of the PCBs found in the environment from two popular types of PCBs, the 1242 and the 1248. See if we can make something that works as well without the five and six chlorines.

No. 11 refers to studies to determine what materials are formed when you incinerate PCBs. Are they bad actors, are they worse than the material you start with. The whole idea here is to prove, if

we could, that in spite of their fire resistance, there are ways to incinerate them and do it safely, and No. 12, we were to look into a plan for reclaiming and recovering PCBs, so that we can recycle them, and therefore, not have to generate more PCBs, and at the same time, keep him out of the environment.

Q Those are the 12 points?

A Those are the 12 points.

Q There is a reference to Findett, reclamation already underway at Findett?

A Findett was a small company that specialized in recycling chemicals. They had a program ongoing, looking at PCB recycling.

Q Mr. Papageorge, I'd like to use a demonstrative exhibit from a later Monsanto document just to help explain some of the concepts. I'm going to show you Defendant's Trial Exhibit 1075, titled "PCB Environmental Pollution Abatement Plan." Can you identify this as a Monsanto business record?

A This is a copy of a Monsanto business record.

(Switch in Reporters.)

MR. RUNNING: I move for the admission of this document, Your Honor.

MR. CARLSON: No objection.

THE COURT: So received.

MR. RUNNING:

Q Mr. Papageorge, we are going to show you a blowup of a page from that document. I'll ask you questions about the document later on. But before we start talking about the various types of Aroclors in detail, could you explain what is represented on this document, in terms of the first column is "PCB Homolog," the next column is titled "Aroclor Having Highest Concentration Of This Homolog," and the third column is, "Nature Of Material At Ambient Temperature"? Could you briefly explain what is depicted on this chart and explain how it relates to the line of Aroclors as Monsanto marketed them in 1969?

A I'll try. On the right-hand column is shown graphically the way the chemist shows it when he wants to describe the materials graphically, the types of chlorinated biphenyls that exist from one chlorine to ten chlorines. The center column shows the trademark, the name of Monsanto's product.

You have to keep in mind the products

were always mixtures of these, the various combinations, and the material sold, for example, as Aroclor 1221 was predominantly this material, and it had a few of the others with it. Another example, Aroclor 1242 was predominantly the trichloro, but it had some of the di and mono and some of the four, five and a few of the sixes in it.

So that's the purpose of these two columns. And this right-hand column here, it tries to describe what it looked like physically, was it a thick oil or thin oil, finally, down to the solid material. Looked like table salt down here. It's white and crystals. Does that help?

Q Yes. Just -- In other words, we have been referring to these chemicals as PCBs throughout this case, but did they have different physical properties, the various Aroclors? Could you just describe that in more graphic terms?

A They all had, of course, different physical properties, as you can see, from a thin type A-B oil down to the salt or sugarlike material, the solid material. And in between they had various flowing properties. Some were very, very thick, some were tarry looking. They -- I don't know how else to describe their differences.

Q Well, in other words, if I -- if I had a jar containing Aroclor 1232 in one hand and a jar containing Aroclor 1260, would I need a trained analytical chemist to tell the difference?

A No. You could just tilt the jar, and the 1232 would flow easily, the 1260 would hang -- it would take a while before it started to flow. It takes a long time. Very, very viscous, very thick.

Q Okay. Thank you, Mr. Papageorge. Mr. Papageorge, upon assuming your assignment or new job responsibility, Manager of Environmental Control, in January of 1970, did you do anything to familiarize yourself with the history of the PCB problem as it was involved at Monsanto and what actions had been taken by the company prior to your appointment in connection with the PCB problem?

A I did.

Q And how did you go about doing that?

A I arranged for sessions with the key individuals within Monsanto who knew an awful lot about PCBs, and their history, and their properties, and all other characteristics. And it's like having a private tutor.

I sat down with a member of the Medical Department, for example, and looked through some

documents that he had prepared for me and he put in a big three-ring notebook for me to take home and read at night. He showed me the kinds of journals that articles of this nature appear in and offered to have them copied for me when new articles arrived in his medical library. He also brought me up-to-date on the status of the animal testing program that was underway at the time. And also, while we were talking, he made arrangements to have me join him on a visit to the laboratory that was doing the study. I then --

Q Is the person you're referring to Mr. Wheeler?

A Mr. Wheeler, yes, sir.

Q And did Mr. Wheeler report to the gentleman in the first row?

A Yes.

Q Dr. --

A Dr. Emmet Kelly's department, yes. I then talked to the Director of Research, Dr. Richard, who represented the fluids products, and --

Q Just -- We're going to be see Dr. Richard's name. Was Dr. Richard like Dr. Kelly, a medical doctor, or what was his background?

A Dr. Richard was a research chemist, a doctor of science -- doctor of philosophy in chemistry.

Q And what was his job position at Monsanto in 1969?
A He was the -- the leading research chemist of the group that did the research work on Monsanto products used for fluids purposes, the functional fluids applications, uses. I also talked to a Dr. Ferrar, who was the equivalent type of position in the plasticizers group, where they use the PCBs in plastic applications and in coatings, and so on.

I talked with members from the Engineering Department as to where they were regarding incineration studies. I talked with the manufacturing managers, who were responsible for making sure that the projects regarding how do you keep material from going down the sewer, or up the stack, or into the wrong landfill -- where do their projects stand.

Q And you had personal experience with the manufacturing and engineering end of the company; didn't you?
A I knew that, yes. And more specifically for the Anniston plant, but I had to catch up with what was going on at the Krummrich plant.
Q Where you had been gone for five years?
A Yes. And I also talked to Dr. Keller, Robert Keller, who was the lead research chemist, regarding

analytical methods, and his program for making certain that the methodologies that -- the methods that they were developing were -- their target was the best in the world, and that was what I was wanting to find out, how far along are you, what do you need more in terms of people or equipment or time, and where are we headed. I think that covers most of the key people I talked to.

Q Okay. And did you review documents to familiarize yourself with the PCB problem as it existed in January of 1970?

A Oh, yes. Yes.

MR. RUNNING: These are your Exhibits 10 and 11.

MR. CARLSON: Okay.

MR. RUNNING:

Q Here is 10, here is 11. Mr. Papageorge, I refer you now to Plaintiff's Exhibits 10 and 11. Do you have those in front of you?

A I do.

MR. RUNNING: Your Honor, these are in evidence.

MR. RUNNING:

Q Is Plaintiff's Exhibit 10 a December 1st, 1966, letter from Brussels, Belgium, to a Mr. J.B. Buchanan

in St. Louis?
A It is.
Q Is this one of the documents you reviewed to familiarize yourself with your responsibilities in 1970?
A Yes.
Q And there is a reference to an attachment being sent with this letter from Ola Palm in Stockholm?
A There is, yes.
Q And can you identify Plaintiff's Exhibit 11? Is it that attachment?
A It is that attachment.
Q Before we get into this letter, Mr. Papageorge, can you briefly summarize what you learned about the reports coming out of Sweden from a study by Mr. Jensen and Dr. Widmark, later Dr. Jensen?
A The reports that were coming out of Sweden indicated that the two researchers mentioned, while looking for DDT in environmental samples, kept noticing on their -- the graphs that the instruments generate some strange peaks and valleys that they could not identify as a DDT. They thought after some time that these could be chlorinated biphenyls. But they weren't certain. It was still new technology that had yet to be developed and fully understood. And

Monsanto's first report received in '66 was even further confused by the reference -- instead of to "chlorinated biphenyls," the reference was made to "chlorinated biphenols."

Q Have I highlighted that reference?

A Yes, you have.

Q What --

A That is an example of the kind of information that was available at that time, and it was confusing. Confusing in that Monsanto did not make anything that they called chlorinated biphenols. And we were confused as to just what is this material.

Q Let me go to the cover letter from Brussels, Belgium, to St. Louis enclosing the report from Sweden in December of 1966. Have I highlighted a passage that refers to the confusion that you just testified to?

A Yes, you have.

Q It reads, "Is it likely that the chlorinated phenols show similar chromatographic traces to the chlorinated biphenols?" I think it should have said phenyls. I know I butchered that sentence, Mr. Papageorge, but is that -- could you explain what that question -- what the significance of that question would be?

A The reference to the chlorinated phenols refers to

chemicals that are used for wood treating. It's the kind of chemical that's in this telephone pole we talked about earlier, or in fence posts, to prevent wood from rotting easily in the environment.

Q Is that known as pentachlorophenol?

A Yes, that's one of them.

Q That's a wood preservative?

A That's a wood preservative. And the author there is saying -- he's raising the question whether those materials in the analytical instruments would behave like the chlorinated -- and he uses the word "biphenols" there. We don't know if he meant biphenols or if he should have had a Y there instead of an O, biphenyls.

Q Mr. Pendergast has asked that I spell out when I am referring to phenols versus phenyls.

MR. PENDERGAST: I want to point out the fact, when this is taken down -- appreciating the fact that the court reporter is going to have to register O-L in one case and Y-L in the other, I think it should be clear when it's phenols and phenyl.

MR. RUNNING: We'll do our best.

MR. RUNNING:

Q Let me just read the postscript. "Thinking of the

total quantity of Aroclor used in Sweden compared with the much larger volumes of pentachlorophenol and sodium pentachlorophenate, for water treatment in the paper industry and" -- I can't read that word -- blank "control in the timber industry. Is it likely that the chlorinated phenols show similar chromatographic traces as the chlorinated biphenols?" Have I read that correctly, Mr. Papageorge?

A Yes, sir. The word there is "sapstain."

Q Okay. And what does that mean?

A I am not a tree expert, but I understand that some trees, the sap does stain the timbers such that later, when they try to make furniture and finish it, it doesn't look good, and these chemicals tend to treat that defect in the appearance.

Q What is Sweden better known for, bi -- Is it better known for phenols or phenyls?

A Sweden? The phenols used in their timber and paper industry.

Q Now, did this report -- You know, recognizing the confusion you referred to about the identification, did this report raise any concerns on the part of Monsanto?

A Certainly.

Q Were there questions raised concerning the source of

this contaminant, whether it was phenols or phenyls?
A Yes, there were.
Q And does this letter address such a question as that? Does this letter address the question of the source of the phenol or phenyl contamination?
A Yes, it does.
Q Referring to the first paragraph, it says, "No special industry can so far be accused of being the source of contamination." Was that -- Was that a point of inquiry or investigation on the part of Monsanto?
A Yes.
Q Can you explain why that was a question?
A Well, it's almost a foregone conclusion that if a particular chemical is being suspected of being present in the environment, and that chemical could well be a product that Monsanto manufactured, that they should be more knowledgeable if they can and should make every effort to learn more about what's going on, and that's what led to that.
Q At the bottom of the page I've highlighted this sentence. "The use of PCB in Sweden is not established in detail." Can you explain what is referred to in that question?
A It refers really to the lack of knowledge on

Monsanto's part as to how much PCB is shipped into Sweden, since they don't manufacture any themselves, and for what purposes is it used in Sweden. That had not -- That was not known to Monsanto because the Swedish industry could buy PCBs from half a dozen or more producers in western europe as well as eastern europe and Japan.

Q Since you've touched on that subject, who were the international producers of PCBs in the mid to late '60s that you know of?

A I don't think I remember all of them. There was the Bayer Company in Germany, B-A-Y-E-R.

Q Otherwise known as Bayer?

A In the United States it's Bayer Aspirin, but that's the original source.

Q Okay.

A There's a company called Rhone-Poulanc, R-H-O-N-E dash P-O-U-L-A-N-C; and Prodelac, P-R-O-D-E-L-A-C, from France; Cafarro, C-A-F-A-R-R-O, Italy; and I -- as I remember, there was a Flick, F-L-I-C-K, in Spain, and I have never been able to confirm, but I am told there were at least three in Russia and the eastern european countries, Czechoslovakia, Poland and Hungary.

Q Was there any skepticism initially about the

identification of this contaminant as either phenols or phenyls?

A Yes, there was some skepticism on everybody's part that knew anything about it.

Q And were the uses of PCBs as they were understood in the '60s one of the causes for that skepticism? Let me put the question differently. Was PCB generally used as a broadcast chemical, broadcast pesticide in the mid-'60s?

A No. No. No.

Q You indicated that Jensen and Widmark were looking for DDT when they came upon their identification of phenyls or phenols. Was DDT used as a broadcast chemical in the '60s?

A Yes.

Q Was that distinction significant? The distinction between DDT and PCB?

A In terms of presence?

Q Yes.

A It was significant. This would account for the presence of those types of materials in remote areas, the PCBs not being the type that was broadcast. And the allegations made that it was being found in such things as pine needles was very troublesome, and we couldn't figure out how in the world did it get to

the pine needles.
Q I have highlighted another sentence from the third page of the report from Mr. Strand in Sweden. He writes, "Nothing is known as to the way in which it reaches the water and the air." Was that a question in Monsanto's mind in the late '60s as to the source of this contamination?
A Yes. Yes.
Q I take it, because Monsanto had these questions, it didn't do anything about this report?
A Oh, quite the opposite.
Q What did Monsanto do?
A We asked Mr. Wood to get copies of Mr. Jensen's analytical procedure, and he did do this, and he sent the procedure to St. Louis, to Dr. Robert Keller, who I mentioned earlier, and Monsanto started on its own research program to find out what does it take to properly analyze for these materials and to identify them to make sure exactly what they are.
Q Mr. Papageorge, in 1966, at the time of this letter to St. Louis, December 1st, '66, was Monsanto under any pressure to react to the report from Sweden?
A No.
Q Outside pressure?
A No.

Q Were governmental agencies demanding action from Monsanto?
A No. They didn't even know about this.
Q Mr. Papageorge, I am going to show you Defendant's Trial Exhibit No. 1074. Can you identify this document, Mr. Papageorge?
A Yes, it's -- it's a Monsanto --
Q Go ahead.
A It's a Monsanto memorandum authored by Dr. Richard and addressed to Mr. Kuhn, manufacturing manager.
Q Is this a Monsanto business record?
A Yes.

MR. RUNNING: I move for the admission of this exhibit, Your Honor.

MR. CARLSON: It's a duplicate of one that's in evidence, but I can't tell you which one.

MR. RUNNING: Neither can I.

THE COURT: It's received without objection.

MR. CARLSON: It's a duplicate of 13.

MR. RUNNING:

Q Mr. Papageorge, you've explained that Dr. Richard was the head of the research group. He's identified here as being from the Research Center. Who was Mr. Kuhn?
A Mr. Kuhn was a manager of manufacturing who was

responsible for the technology -- manufacturing technology required for the manufacture of PCBs at the two plants.

Q There is a reference here, I think Mr. Carlson has already read this, to the following sentence. "We are taking three steps to protect ourselves."

THE COURT: What's the date on there?

THE WITNESS: December 30, '68.

MR. RUNNING:

Q Mr. Papageorge, after you had familiarized yourself with the history of the PCBs, and you saw that sentence, did you uncover some sign of a Watergate cover-up, or something else in that regard, of Monsanto protecting itself?

A Not at all. I didn't sense any such impression, no.

Q What were the three steps that are referred to in this memorandum? Let's take them one by one. Read you the next sentence. "Scott Tucker and R. Keller are to repeat some of the analytical identification work feeding Aroclor to chickens and seeing if Aroclor is really present as 'shown' by the literature. I hope we have been falsely accused but maybe Aroclor is present." Would you describe what that first step was?

A That first step is an attempt on the part of the

analytical chemist to repeat in the laboratory approach what we thought might be happening in wildlife. Where the birds were found with PCBs, we thought that we could duplicate that by feeding chickens PCBs and seeing if there are any PCBs in the chicken flesh that was later analyzed. That's the purpose of that study.

Q So the first step wasn't a step to hire a lobbyist, or somebody, to do dirty tricks?

A No. No.

MR. CARLSON: Your Honor, I object. That's leading.

THE COURT: Sustained.

MR. RUNNING:

Q The second step, is that described in the next paragraph? Elmer Wheeler?

A Yes. This is part of the -- to answer the question, if PCBs are truly out there, what harm are they doing to living creatures? This is the beginning of that animal testing program.

Q Okay. Part of the first step, referring in the paragraph where I have got the blue marks and the other green marks, was that a continuation of the analytical research program?

MR. CARLSON: Objection. It's leading.

THE COURT: Sustained.

MR. RUNNING:

Q How did that first paragraph, that first step, relate to the analytical research program that you have identified Dr. Keller was responsible for?

A Well, it's -- part of the program was to develop analytical methods that could be used on many different types of samples. For example, you use a certain method when you're looking for PCBs in water; you'd modify that method a little bit when you're looking for PCBs in air or, further, you might even change it again when you're looking for PCBs in animal tissue. So looking for PCBs in chicken tissue is -- involved fine tuning your analytical method to the point where it can detect PCBs that are still in the tissue. So that is a continuation of the analytical research program.

Q Refinement of technology?

A Yes.

Q How common was it in 1968 for an industrial company or a chemical company to be performing chronic testing to determine the possible effects of its products on wildlife?

MR. CARLSON: Objection. Lack of foundation.

THE COURT: Well, he can testify if he knows.

THE WITNESS: This is, to my knowledge, a first, the conducting of this kind of study for an industrial chemical.

MR. RUNNING:

Q How do you know it's a first?

A This is part of my tutorial with the representatives of Monsanto's Medical Department.

Q Did your interviews with Mr. Wheeler give you information confirming that this was a first, for an industrial company to be doing this kind of test?

MR. CARLSON: Objection as leading, Your Honor.

THE COURT: It is.

MR. RUNNING:

Q Did Mr. Wheeler describe information that's relevant to that question?

A Yes, he did.

Q Can you describe what Mr. Wheeler told you about the formulation of this testing program?

A Yes. Should I describe it, you say?

Q Yes. And in particular his conversations with the government.

A Mr. Wheeler informed me that he had made contact with

the representatives in government, primarily Department of Agriculture, which at that time was responsible for registering pesticides, insecticides, and so on, and with representatives of the Food & Drug Administration, who were responsible for approving drugs and cosmetics and the like. He was seeking guidance regarding the type of tests that these governmental experts would consider as being appropriate for an industrial chemical and the environment.

MR. CARLSON: Your Honor, before he goes on, and I apologize for the interruption, I don't have any objection to him testifying as to what Mr. Wheeler told Mr. Papageorge that Mr. Wheeler did. I do have an objection to anything that Mr. Wheeler said that someone else told him as being hearsay.

THE COURT: So you're only objecting to double hearsay, not single?

MR. CARLSON: That's right. At this point that's right.

MR. RUNNING: Your Honor, what I am going to try to get at is he didn't tell him anything, not the substance of conversation. I am not going to be offering statements for the truth of the matter certainly.

MR. RUNNING:

Q Continuing with Mr. Wheeler's trip to Washington, did he get specific guidance from either the FDA or the Department of Agriculture about how to set up a feeding program such as this? Were they able to give him that guidance?

MR. CARLSON: Objected to as hearsay.

THE COURT: Well, I am not sure because -- I guess it is double hearsay. He can -- According to the way Mr. Carlson is limiting his objection, I guess the gentleman here can tell us what Mr. Wheeler did or did not do as a result of those visits.

MR. CARLSON: I would like the Court --

THE COURT: Not what he was told by the government.

MR. CARLSON: I would like the Court also to be aware that the fact I have no objection on hearsay grounds does not mean I'm waiving my hearsay objection for future testimony if I think it's appropriate.

THE COURT: It's probably a good time anyway to take a break.

MR. CARLSON: Okay.

THE COURT: The jury has been out here

about an hour and 40 minutes.

(Recess Had.)

(Discussion off the Record.)

(Switch in Reporters.)

MR. RUNNING:

Q Did Monsanto have to write up its own protocols with the help of a consulting firm?

MR. CARLSON: Lack of foundation.

THE COURT: He can testify that he knows.

THE WITNESS: The protocol that was followed was the established protocol used for chemicals which were intended for use in food. This was determined to be as rigid a testing procedure as existed at the time. Although there was no intention of using PCBs in fluids, it was felt that these tests would be most helpful.

MR. RUNNING:

Q You say there was no intention of using PCB as a food additive. Are the standards for food testing higher or lower than the standards for industrial products?

A Much higher.

Q Now, we covered the first two steps of the three steps referred to in the memorandum. Is the third step discussed on the next page, Mr. Papageorge?

The first paragraph on the second page? Do you have that?

A I do.

Q Does that describe the third of the three steps that Dr. Richard was proposing?

A It does.

Q And it reads, "The third step to minimize exposure of Aroclor to reduce air and water pollution, to restrict Aroclor to uses which can be controlled." Can you describe what that third step was, as you were given to understand it?

A It consisted basically of two approaches, for those uses which we believe could be controlled with reasonable measures and available measures. The emphasis would be placed on keeping it from escaping to the environment, and when it was no longer useful, to properly dispose of it.

On the other hand, those uses for which we did not feel that we could keep it from the environment, such as traffic lane paint, the intent there was to discontinue the use of PCBs in that kind of application.

Q Now, does the next paragraph refer to steps taken regarding Monsanto's plans?

A It's still in the top paragraph?

Q Second paragraph down on Page 2. "I believe we should."

A I see it.

Q Let me just read it so the record is clear. "I believe we should make sure that our plants have minimum air or stream pollution." It describes Anniston and Krummrich. Does this relate to Monsanto's plant?

A Yes, it does.

Q This program of minimizing exposure of Aroclor for the air and the water, did that pertain to Monsanto's plant?

A Yes.

Q The next paragraph relates to incineration. You described the incineration part of the 12-point program as it existed in November of 1969. Is that the same as the incineration program described by Dr. Richard in '68?

A Yes.

Q Now, he writes, "I believe we should demonstrate that Aroclor can be incinerated to harmless products for disposal." What was the state of technology concerning the incineration of PCBs in December of '68?

A There was no known commercial piece of equipment

that could take PCBs and destroy them to the ultimate, which would be water, carbon dioxide, and hydrogen chloride.

Q Were demonstration projects, therefore, necessary?

A Yes, they were.

Q The next paragraph refers to, "I believe we should help our customers dispose of offgrade or non-reworkable Aroclor, either by incinerating or by toxic dump." Can you explain what is described here?

A The intent there was to assist the customers with PCB containing material that could no longer be recycled or used in any way to offer them a responsible way for disposing of this unuseful material, and the two approaches that were known at the time, or at least it was hoped that they would be responsible, was incinerating, total destruction, or where that couldn't be achieved by placing it in a proper landfill.

Q And again, at the end, Dr. Richard writes, and this is something that Mr. Carlson pointed out before, referring to six months to a year while the DDT situation is being fought out. He says, "I want to use this time to minimize our exposure." How did Dr. Richard propose to minimize Monsanto's exposure

during that period of time?

MR. CARLSON: Objection, hearsay. It's based on what he was told.

THE COURT: That is sustained.

MR. RUNNING:

Q Mr. Papageorge, did your understanding of Monsanto's program, PCB program, in particular, impact the way you conducted your activities beginning in January, 1970?

A Yes.

Q Was it a predicate for your actions?

A Yes.

MR. RUNNING: Your Honor, I submit that this witness' understanding of Monsanto's program, the year before he assumed the position of manager of environmental control is relevant to this case.

MR. CARLSON: It's still hearsay.

MR. RUNNING: It's not being offered for the truth of what Dr. Richard believes. It's being offered for the truth of what Mr. Papageorge understood the company policy to be.

THE COURT: I have no problem. As long as there is an objection, I have to rule on it, which I have. There is no problem about having this witness tell what he did as a result of what somebody else

might have told them, but you can't have him testify as to what somebody else told him. That is the problem.

MR. RUNNING:

Q Mr. Papageorge, did you assume in conducting your activities beginning in January, 1970, that Monsanto had had a corporate policy of stalling or delaying in 1969?

MR. CARLSON: Object to as leading.

THE COURT: It is.

MR. RUNNING:

Q Mr. Papageorge, you were the plant manager at Anniston in December of '68, weren't you?

A I was.

Q Were you aware of any policy on the part of Monsanto to stall or to delay with regard to the PCB problem?

MR. CARLSON: Object to as misleading, Your Honor.

THE COURT: It is. There is nothing wrong with the subject. It's the form of the question.

MR. RUNNING: Your Honor, I don't know how to broach the subject without identifying it.

MR. CARLSON: I'm not going to tell you how to do it.

THE COURT: What was the policy in '68, in

reference to stalling, if any?

MR. RUNNING: All right. I'll adopt the question.

THE COURT: That is a non-leading question. We know lawyers. The jury ought to be aware that lawyers love, in every question, to ask a leading question, but they're not allowed on Direct, only on Cross-examination. There is nothing wrong with the subject, at all.

MR. RUNNING:

Q Mr. Papageorge, I've just adopted the Court's version of the question. Can you answer it?

A The policy regarding stalling, if I understood the question correctly, was there would be no stalling regarding any of Monsanto's businesses, on any matters.

Q Was Monsanto under pressure in December of '68 to take the three steps identified in Dr. Richard's memorandum, as you understood it, from Anniston?

A Absolutely not.

Q Mr. Papageorge, I'm going to hand you Defendant's Trial Exhibit No. 1232. Can you identify this document, Mr. Papageorge?

A It's a Monsanto memorandum.

THE COURT: Dated?

THE WITNESS: Dated March 6, 1969. The title is "Aroclor Wildlife Accusations," authored by Dr. W.R. Richard and addressed to Mr. E. Wheeler.

MR. RUNNING:

Q Is this one of the documents you reviewed when you assumed the position of manager of environmental control?

A It is.

Q Is this a Monsanto business record?

A Yes.

MR. RUNNING: Move for its admission.

MR. CARLSON: No objection.

THE COURT: So received.

MR. RUNNING:

Q Mr. Papageorge, this memo begins by referring to a recent paper in "Nature Magazine" by Mr. Risebrough. Do you see that reference?

A I do.

Q Are you familiar with the article?

A Yes, I read it.

Q Did you read it on or shortly after the time you assumed the position of manager of environmental control?

A I certainly read it at that time, as I recall. I may well have read it a few months before that.

Q When you were the plant manager at Anniston?
A Yes.
Q What was the significance of the Risebrough article at the time?
A This was the first published paper in which effects on wildlife were documented, alleged as resulting from a PCB exposure.
Q Didn't Jensen and Widmark identify that PCBs, they believe were present in wildlife? What is the difference?

MR. CARLSON: Well -- never mind. Go ahead.

THE WITNESS: Dr. Widmark and Mr. Jensen reported the presence of a material they suspected of being a PCB in many different kinds of samples. Dr. Risebrough's paper not only reports the presence, but he also indicates that he perceives a harm because of that presence.

MR. RUNNING:

Q Was this the first article to allege a harm due to the presence of PCBs?
A That is the first that I'm aware of, yes.
Q It's the first you were aware of at the time?
A Yes.
Q And what harm was Dr. Risebrough identifying in this

article?
A Primarily the effect on birds, wildlife, wild birds, and their ability to reproduce. Their eggshells were too thin, and they would break.
Q Did Dr. Risebrough have a theory at the time as to how this eggshell problem was occurring?
A Yes, he did.
Q Could you explain the theory?
A I'll have to give you a layman's understanding. It has something to do with enzymes produced by the bird and its effect on calcium metabolism and the use of that calcium in building a firm shell.
Q Does Dr. Richard describe that theory in a little more detail in Paragraph 2?
A Well, he uses some terms there that I suspect would explain it, the expression, "induced hepatic enzymes."
Q Does this memorandum give Dr. Richard's initial evaluation of Dr. Risebrough's claims?
A Yes.
Q Let's turn to Page 2. See the reference to empty and false claims by Risebrough? Was that Dr. Richard's evaluation, initial evaluation?
A I don't see it yet here.
Q I'm sorry. The very bottom of the last full

paragraph on Page 2.

A Oh, very bottom. That is Dr. Richard's statement. The use of the word "could" in there indicates --

Q It was an initial view?

MR. CARLSON: That is leading, Your Honor. I don't mind --

THE COURT: Correct. It is.

MR. RUNNING:

Q Go ahead then.

A That last sentence is Dr. Richard's opinion based on his understanding of the situation at that time.

Q Was Dr. Richard ultimately proved to be right or wrong?

A In this case, I don't know that there is so much right or wrong. In this particular instance, it was later, several years later demonstrated that DDT was causing the egg problem and not PCBs.

Q Whether or not Dr. Richard or Dr. Risebrough were right or wrong, does Dr. Richard comment or identify steps that Monsanto was taking at the time with regard to the PCB problem in this memo?

A Yes.

Q Do you see Paragraph A at the very bottom of Page 1?

A I see it.

Q "Monsanto is preparing itself to identify trace

parts per billion quantities of chlorinated biphenyls in water samples in concentrated collected air samples and in animal tissues. We'll know whether we have been falsely identified and accused or not. We'll eventually know whether any pollution is taking place and the extent of the pollution."

Can you describe what this is referring to?

A This is referring to the research program by the analytical chemists to develop methods for analyzing for PCBs that were accurate, could detect very, very low quantities of PCBs and could do it with high credibility, so when the number was developed by the chemist, it was believable.

Q And what scientist at Monsanto was responsible for this program?

A Dr. Keller was the lead scientist.

Q And does the second page next to Item C also refer to work that was underway at the time? I'm on Page 2, Mr. Papageorge, second paragraph from the top, Item C?

A I see it.

Q Could you explain what that is in reference to?

A This is in reference to Monsanto's testing program using birds as represented by the chicken and animals, as represented by the laboratory rats and

fish to determine the effect of PCBs on living creatures.

Q Is this the program that Mr. Wheeler was involved in?

A Yes.

Q Does Dr. Richard's memorandum address the subject of controlling future releases of PCBs into the environment?

A Yes, it does.

Q And is it this paragraph right here, beginning, "we can take"? Do you see that?

A Yes. "We take steps to minimize pollution, yes."

Q "We can take steps to minimize pollution from our own chlorinated biphenyl plant." It goes on. I want to address this point by point. Would you just identify, put it in a box? I want to deal with these separately. We'll call it Box 1 and Box 2, Mr. Papageorge. Could you describe what is referred to in Box 1, the steps to be taken to minimize pollution for various facilities?

A It refers there, of course, to Monsanto's plant that made the PCBs, and he's also referring there to the large users of PCBs in all of the applications.

Q Go on.

A I'm sorry. That is what is described in that

paragraph.

Q "We can continue to set up disposal and reclaiming operations. We can work for minimum disposal in manufacture and disposal of capacitors, transformers, and heat transfer systems, and minimize losses for large hydraulic users."

A Yes. This paragraph covers Monsanto's plant where all of the PCBs were made, and it covers the big users, capacitors, transformers, heat transfer system, and hydraulic users. The idea there being to, if you control the big ones, you've taken a big step forward in preventing material entering the environment.

Q Now, in Box 2, and this is something Mr. Carlson has read already. Box 2 reads, "but we can't easily control hydraulic fluid losses in small plants." Do you see that, Mr. Papageorge?

A I do.

Q Why couldn't such losses be easily controlled?

A It's primarily because of the many, many plants involved. It's a matter of numbers and communicating with them. It's thousands of plants, which is much more difficult than working with, say, 12 or 15 big plants. That makes it more difficult. That doesn't mean it can't be done.

Q Were there different distribution arrangements for the large customers as opposed to some of the smaller customers?
A Certainly.
Q How did that impact the ease of control on the part of Monsanto?
A Well, of course, the large users would buy the material in truckloads, if they bought it in drums, or they would buy it in tank cars, the big initial fills and so on. The smaller users could buy it from distributors that were located near his plant.
Q Are these Monsanto Company distributors or somebody else?
A No, they are selected by Monsanto to sell their products, very much like you walk into the supermarket and you buy an item that is available from that particular store. That is the way these distributors work.
Q What happened to that distribution arrangement in subsequent years?
A Oh, we discontinued it quickly in 1970.
Q Why did you do that?
A Primarily because most of the uses of materials sold by distributors were what we call the open-end uses, the paint use, the carbonless copy paper, that sort

of use, and we were discontinuing those anyway, and really, the primary reason was that we felt that using a distributor, we lost control.

We didn't know where the material was going. We didn't have the customer on any customer list, for example, so we couldn't communicate, so we decided that we'd better fill those orders directly from Monsanto supply warehouses, rather than using a third party.

Q If you didn't use an independent distributor to contact the customer after the independent distributors were terminated, who did contact the customer?

A Well, we attempted to get from the distributor any customer list he may have generated, but it was not a total success, because many of them didn't keep good records.

Q Would Stroh Die Casting Company be considered to be a small plant?

A Certainly they're not as big as General Motors or a Ford or General Electric, no. They're not big. They're not very, very small. I would say towards the small size. They're not medium size.

Q Now, was there a difference between small plants and big plants, in terms of their spill containment,

collection, and disposal capabilities?

MR. CARLSON: I object. Lack of foundation. I don't know if this gentleman has been qualified to know how the die cast companies handle it. He may be. I just don't know.

THE COURT: I don't know, okay. I don't know if he's ever been to one.

MR. RUNNING:

Q Mr. Papageorge, did you become familiar with the die casting application along with the other applications for PCB fluids?

A To a degree, I did, yes.

Q And were you involved in decisions on that subject?

A I was.

MR. RUNNING: I resubmit the question, Your Honor.

MR. CARLSON: I still object. I think there is a lack of foundation. I don't know how we got any information at this point.

THE COURT: Well, I guess you'll have to ask him that on Cross-examination.

THE WITNESS: Would you help me with the question again?

MR. RUNNING:

Q Okay. What was the difference between small plants

and big plants in terms of their capability to control losses of fluids, in this case, hydraulic fluids into the environment.

MR. CARLSON: Just for the record, I'm going to continue my objection on lack of foundation. I understand the Court's ruling.

THE COURT: It's overruled.

MR. RUNNING:

Q If you can generalize, Mr. Papageorge.

A I'll try. The size of the operation is not the critical consideration in my opinion. It's a combination of the age of the facility. The newer plants, of course, had more modern facilities, the old plants that were put in old textile plants with oak beams soaked in oil and all, they're much more difficult to keep clean.

It's also a matter of the attitude of the management of the plant. How do they perceive the problem, what are they willing to do to do it properly, so size is really not the key factor here.

Q Mr. Papageorge, what contact, if any, did Monsanto have with governments and universities in regard to the PCB issue in 1969?

A In 1969, it was a growing kind of activity. More and more laboratories were becoming interested.

Monsanto was from the very beginning, willing to cooperate.

MR. CARLSON: Your Honor. I'm going to object at this point. I think it's hearsay and lack of foundation.

MR. RUNNING:

Q I'll ask another question. I'm satisfied with the answer. I show you Defendant's Exhibit 1077. Mr. Papageorge, can you identify this as the letter that you reviewed in the course of familiarizing yourself with your job responsibilities in January, 1970?

A I can. I remember it.

Q Is this a business record of Monsanto company?

A Yes.

MR. RUNNING: I move for its admission, Your Honor.

MR. CARLSON: No objection.

THE COURT: So received.

MR. RUNNING:

Q What was Monsanto's policy in 1969 and 1968, concerning cooperation with the government or universities in respect to the PCB problem?

A It was one of total cooperation and free exchange of information between laboratories.

Q What does that mean?

A Well, it includes such things as the chemist talking to the chemist, using their own language to describe their procedures, to describe their instruments, to describe their findings. It also includes sharing samples, each laboratory sending its sample to the other laboratory, the two laboratories analyzing, then comparing the answers. It was one of encouraging that kind of continuing dialog.

Q Now, we've been discussing Dr. Risebrough's article in December of '68. You indicated that was the first indication of harm to wildlife from PCBs. Was there any evidence made known to Monsanto, as of September, 1969, of PCBs being present in aquatic water -- that is redundant by definition, in water causing harm to fish?

A Yes. I didn't want to mislead you. Previously Dr. Risebrough's paper was the first published evidence of harm to the environment. There were other indications of not only suspected, but some results from some testing.

One of the tests that comes to mind was in the Gulf of Mexico, a Florida laboratory conducted some tests of PCBs and determined that baby shrimp were very, very sensitive to PCBs, and it killed them, the little juvenile shrimp, as they called it, so

that was a piece of evidence that indicated that some species are very susceptible to PCBs.

Q And what was Monsanto's response to that information?

A Well, of course, we were concerned, and we of course included it in all of our thinking, about there is another reason why we shouldn't let it escape to the environment. We cooperated with our laboratory in terms of conducting more studies, and we visited the laboratory. I personally was there, so that was the beginning of a good relationship with a federal government laboratory.

Q What was the status of the analytical research program at Monsanto in September of 1969?

A In September of '69? They had come a long way to try to describe it in terms of numbers. We were about 90 percent of where we finally ended up in terms of sophistication and developing of methods.

Q Was Monsanto at a position where it could help out other laboratories outside the company?

A Yes.

Q This letter from the State of Wisconsin, dated September 9th, 1969 reads, "We have observed what appears to be polychlorinated bi and triphenyl compounds in fish taken from Lake Michigan and the

rivers draining into this body of water. Many of these, as compared with commercial grade products, give the same gas liquid chromatograms as your Aroclor plasticizers." Let's stop there.

What is being referred to by the reference, "Aroclor Plasticizers"?

A This refers to the PCB product mixture that Monsanto sold under the Aroclor label to be used as plasticizers.

Q Was non-contact carbon paper considered to be a plasticizer or the plasticizer group?

A In Monsanto's organization, yes.

Q What about the highway paint?

A That also was in that group.

Q It goes on. "We do not at present imply that these are the compounds present, nor do we have data which implicates them as detrimental to fish stocks."

Had Monsanto or any other agency identified PCBs as detrimental to fish stocks, as of September, '69?

A No.

Q Does that mean that Monsanto was not concerned?

A No.

Q What was Monsanto's response to the request in the third paragraph? I won't read it all, but it

requests reference samples, and "we'll be pleased to receive your comments in reference to how we can obtain samples and further appreciate any other information you may be able to give us regarding these compounds in the environment."

Do you recall what Monsanto's response was, Mr. Papageorge?

MR. CARLSON: I object. Lack of foundation. Possible hearsay.

MR. RUNNING: Just transition.

THE COURT: I don't know if he knows or not.

MR. RUNNING:

Q Do you know, Mr. Papageorge?

A Yes. Samples were sent and a dialog was started between the two laboratories.

Q Let me show you --

MR. CARLSON: I'm going to have to move to strike it. That has to be hearsay, Your Honor.

THE COURT: This gentleman was the head -- oh, no, he wasn't the head.

MR. RUNNING: Your Honor, I'll establish the basis for how he knows it.

MR. CARLSON: If you establish it, that's fine.

MR. RUNNING:

Q Transition, Mr. Carlson. Defendant's Trial Exhibit 1080. Can you identify this document, Mr. Papageorge?

THE COURT: 1080?

MR. RUNNING:

Q Yes.

A Yes, I can identify it. It's a letter dated October 14th, 1969, addressed to Dr. Paul E. Degurse. He's with the Bureau of Fish Management, State of Wisconsin, and it's authored by Elmer Wheeler, Monsanto, and attached to that letter is a copy of a letter by Elmer Wheeler to Dr. Fred Lee, University of Wisconsin, along with, attached to that letter is a copy of a working paper on "Mass Spectrometry of Organo Chlorine Compounds" read by Dr. Widmark of Sweden.

Q Is this a business record of Monsanto company?

A Yes.

MR. RUNNING: I move for its admission.

MR. CARLSON: No objection.

THE COURT: So received.

MR. RUNNING:

Q Is this one of the records you reviewed in January of '70, when you familiarized yourself with your job

responsibilities?
A It is.
Q Did Mr. Wheeler respond to Mr. Degurse's request, based on this letter?
A Yes.
Q And does this letter indicate that, quote, "I've taken the liberty of enclosing a copy of my letter of yesterday to Dr. Lee, which relates to analysis"?
A Yes.
Q "I have also requested that one-pound samples of Aroclor 1221, 1254, 1268, and 5460 be forwarded to you. If you do not receive these by Friday, October 24th, please call me collect" at the number indicated.

Is that the basis for your testimony that the request was responded to?
A Yes.
Q Let's look at the attachments, Mr. Papageorge. The second page, October 13, 1969 letter to Professor Fred Lee at the University of Wisconsin.
A I have it.
Q Do you have that, Mr. Papageorge?
A I do.
Q I'm sorry, I didn't hear your answer.
A I have it.

Q Can you just so identify it on the record? Is it a letter to Professor Lee?
A Yes. This is the one I described earlier.
Q Okay, and then in identifying this document, is this one of the papers that was sent to both the State of Wisconsin and to Professor Lee? Is this one of the papers? Can you identify it?
A Yes, it is.
Q And were there additional papers sent in this package?
A Yes.
Q Okay. Let's look at the first paper. I'm sorry. Does this paper explain the method of analysis used by the Swedish researchers in identifying PCBs in the environment?
A Yes.
Q Is this another paper that was submitted to the State of Wisconsin and to Professor Lee at the University of Wisconsin in response to their request for information, another paper by Professor Widmark?
A It is.
Q And this is on "Organo Mercury Residue Analysis?"
A Yes, it is.
Q And is this another paper that was submitted in that package, entitled "The OECD Study of Analysis of

PCBs?"

A I can't seem to find my copy here.

Q I'll give you the Bates number. It's a thick package. It's SDR 25148. Do you see where the SDR numbers are, Mr. Papageorge?

A Yes, I have it.

Q Can you confirm that this is one of the papers that was sent to the University of Wisconsin and to the State of Wisconsin?

A It is.

Q Okay. I've got some subsequent questions on this paper. Now, this was written by who? Can you tell?

A It's written by Jensen, Nucci, and Widmark.

Q Two of the three scientists who at first identified PCBs in the environment?

A Yes.

Q Now, the sentence I've highlighted reads, "If these limitations are born in mind, it is clear that quantitative residue analysis of PCB cannot yet be very accurate," unquote.

What was your understanding of the accuracy of quantitative residue analysis of PCB as of 1968 or 1969, Mr. Papageorge?

A I don't recall any specific numbers to describe the accuracy. I do recall that at the time any

quantities that were mentioned or written were looked at with a lot of skepticism, because it was -- the methods had not been refined enough to give the necessary confidence that was developed much later.

Q Let's turn to the next page of the same paper. Do you see the table that is titled "Analysis of Industrially Used PCB Mixture?"

A I do.

Q This is again from the Jensen, Nucci, and Widmark paper?

A It is.

Q And the first column is peak number. Is that just an identification of the peaks on the gas chromatogram?

A Yes.

Q What is indicated in the middle column? What does that mean, number of chlorines per molecule?

A This is the author's opinion on how many chlorines could be associated with the biphenyl to form the peak, as listed in the left-hand column.

Q Is this -- when we refer to number of chlorines, are we talking about the one through ten?

A Yes, we are.

Q Chlorines that can be on a PCB chromatogram?

A Yes.
Q What is the significance of this table? What is it showing?
A This is an attempt to show that for this particular sample, when analyzed by the methods known at the time and quantified by the methods known to them at the time, the authors here are telling us that over in the right-hand column, of the total mixture that percent is represented by the numbers in the right-hand column.

For example, Peak No. 1, they say represents a biphenyl with four chlorines, and in their calculations, they say this is 7.4 percent of the total sample, and so on, down the page.

Q Peak No. 1 was four chlorines, according to their analysis?
A Yes, that's what they said.
Q Peak No. 14 was eight chlorines, according to their analysis?
A Yes.
Q Are there any, one, two, or three chlorine molecules shown on this table?
A No.
Q Does the table add up to a hundred percent? This is according to their math. Mr. Papageorge, I'm just

asking you to refer to the table. I wasn't asking you the math, to confirm the math.

A I don't get a hundred, but they show a hundred.

Q Okay. What is the significance of the report, of this report indicating environmental samples have from four to eight chlorine molecules -- I'm sorry, four to eight chlorines on the PCB molecules?

A Significance?

(Switch in Reporters.)

Q Yes.
A First it establishes that these mixtures are just that, they are mixtures. They are not single chemicals, that they are made up of members of that family of chemicals, all of which differ from each other in terms of not only their chemical makeup but also their properties. They are different.
Q Okay. Mr. Papageorge, as you understood it in 1969, what was the predominant homolog or what was the predominant number of chlorine atoms on the typical PCB molecule in Aroclor 42?
A The three-chlorine.
Q Would you turn next to Page 25153.
A I have it.
Q Do you see that this is another paper included in the package from the University of Wisconsin to the State of Wisconsin, the date of the paper being 4-11-68? You are going to have to help me out. Is that an european annotation for dates?
A Yes, it is. I read that as November the 4th, 1968.
Q Americans put the month first when they abbreviate dates, and europeans put the day first?
A That's my understanding, yes, sir.
Q Okay. So this would have been dated November 4th, 1968. And does this -- This paper is -- What is the

subject of this paper?
A Subject?
Q Yes.
A "Determination of the number of compounds which can result from the chlorination of biphenyl, and development of a simple system by which these may be codified."
Q Would you turn to the next page of this paper, Mr. Papageorge. Does the top of this page give a calculation of the theoretically possible number of combinations of chlorobenzenes?
A That's what it says, yes.
Q And does the bottom refer to chlorinated biphenyls? Do you see the last paragraph that I have highlighted on the screen? It's, "Among these 210 theoretically possible biphenyls"; do you see that?
A I do, um-hum.
Q What does that pertain to?
A That refers to the number of chlorinated biphenyls that are possible.
Q Let me read part of that paragraph. Quote. "Among these 210 theoretically possible biphenyls the most interesting for us are those that are the most likely products of a degree of chlorination corresponding to a mean of five chlorine atoms per molecule, the most

usual in industrial products. Molecules with fewer than four and more than eight chlorines have not been documented by mass-spectrometric analysis." Stop there. What's "mass-spectrometric analysis"?

A That refers to a procedure, and I am not an analytical chemist, so I can't describe the instrument -- but the instrument is capable of determining the mass of a molecule, how big it is, and by that the chemist can determine the molecular structure -- how many carbons, how many chlorines, how many hydrogens are involved, so this becomes a very valuable way to confirm what type of material is represented by the peaks and valleys that we talked about earlier.

Q Now, this reference to the -- for us the possible biphenyl -- the one that was most interesting to them being the products of a degree of chlorination corresponding to a mean of five chlorine atoms per molecule, did Monsanto have any Aroclor product with a mean that corresponded to five chlorine atoms per molecule?

A Yes, sir.

Q Is it shown on this table?

A Monsanto referred to it as Aroclor 1254.

Q Aroclor 1254. And on the table it's indicated

pentachlorobiphenyl. What does that mean, pentachloro?

A Means five.

Q Did Monsanto have a product whose mean degree of chlorination corresponded to three chlorine atoms per molecule?

A Yes, Aroclor 1242.

Q Or trichlorobiphenyl?

A That is correct.

Q Mr. Papageorge, I would next like to show you Defendant's Trial Exhibit 1078. Can you identify this document, Mr. Papageorge?

A Yes. It's a Monsanto memorandum dated September 11, 1969, authored by Mr. Elmer Wheeler, addressed to Howard L. Minckler, and the subject, "Invoice for WARF Institute Study."

Q Is this a Monsanto business record?

A Yes, sir.

MR. RUNNING: I move for its admission.

MR. CARLSON: May I just have a moment on that?

MR. RUNNING: Sure. Your Honor --

MR. CARLSON: Wait. Wait.

MR. RUNNING: -- do you show Defendant's Trial Exhibit 1080 as being admitted?

THE COURT: Yep.

MR. CARLSON: I have no objection, Your Honor, on 1078 to the letter itself -- the memorandum, I guess, of September 11th, 1969. I would object to the report, I think, as I perceive it to be a report, at this time on the grounds it is hearsay, and I don't believe it's part of the learned treatises, although if it is, I can certainly stand to be corrected.

THE COURT: Can I see it?

MR. RUNNING: Mr. Papageorge?

THE WITNESS: Sure.

MR. RUNNING: Your Honor --

THE COURT: The objection is overruled. This is received over objection. On the third -- no, actually, fourth paragraph it indicates, "A very preliminary report of the...water samples is attached." That indicates that this was part of the business record. Therefore, it's received over objection.

MR. RUNNING:

Q The first paragraph of this document refers to the Wisconsin Alumni Research Foundation Study of Lake Michigan, Mr. Papageorge. Could you describe what that study was?

A This was a study which attempted to determine the presence and concentrations of chemicals in Lake Michigan that were chlorinated hydrocarbons. And that included DDT, dieldrin and included also, of course, PCBs.

Q Was the study originally a study focusing on pesticides?

A Yes.

Q And then was it expanded?

A Yes.

Q How was it expanded?

A It's almost by happenstance. They -- In looking for these pesticides, they experienced the same findings that the Swedish researchers did. They found peaks and valleys on their charts that they identified as PCBs, and, therefore, they became very interested in PCB analysis in itself.

Q Did they ask Monsanto to participate in that study?

A Yes, they did.

Q What was Monsanto's response?

A We -- We funded some of the study.

Q Did Monsanto do anything else aside from providing funding for the study?

A We sent them samples again, we had the Monsanto laboratory and the WARF laboratory communicating

freely in both directions, and Monsanto representatives visited the WARF laboratory, and representatives from WARF visited Monsanto and worked in each other's laboratories shoulder to shoulder.

Q The fourth paragraph indicates that, "More than 500 samples were collected by the project study team in June. A very preliminary report of the analysis of 61 of the water samples is attached and shows in parts per trillion the level of contaminants found."

Continuing with the quote. "In eight of the samples, Aroclor 1254 was identified. In an additional nine samples there was such a spectrum of interfering substances that the original analyses were somewhat confused."

What was the significance of the identification of Aroclor 1254 in eight of the samples?

A It indicated that PCBs with five chlorines or more were the types that were being found in Lake Michigan samples.

Q Aroclor 1254, again, is the product whose most common molecule is five chlorines -- has five chlorine atoms on it?

A Yes.

Q Is that the same molecule that Messrs. Jensen and

Widmark were finding in their environmental samples?
A That's right, the two laboratories were essentially seeing the same kind of phenomena.
Q And does this map, which is the third page of the exhibit, show the locations of where the samplings had been conducted in June of 1969?
A Yes.
Q Mr. Papageorge, what Aroclor was used to make Pydraul 312?
A Aroclor 1242.
Q And that's the Aroclor with three chlorine atoms per molecule being the most common?
A That is correct.
Q I show you Defendant's Trial Exhibit 1081. Can you identify this document, Mr. Papageorge?
A Yes. It's dated October 29, 1969, and it's an "Executive Summary" entitled "PCB Pollution."
Q Is this a Monsanto business record?
A Yes.

MR. RUNNING: I move for its admission, Your Honor.

MR. CARLSON: It's already in evidence. No objection. I am sorry. It's not in evidence. No objection.

THE COURT: It's so received.

MR. RUNNING:

Q Mr. Papageorge, what relationship did the group that wrote the memo you have in front of you have to this 12-point program that you've testified to already that was developed a month later, a few weeks later?

THE COURT: Talking about the task force now?

MR. RUNNING: Yes. I am sorry. I will identify for the record 1082, being the 12-point program.

MR. RUNNING:

Q What relationship did the two groups have?

A The group referred to in that display you just held up, referred to as a task force --

Q If I said "task force," I didn't mean to.

A Well, it -- That group is the one that prepared this executive summary for the individuals that went before the Corporate Management Committee and made the presentation covered by the minutes from which that page came from.

Q Are Corporate Management Committee minutes taken seriously? Or, were they taken seriously in 1969?

A Certainly.

Q Was there a lot of preparation for the meetings?

A Yes.

Q Would drafts of presentations be made?
A Yes.
Q Would the drafts be changed on occasion?
A Yeah. Occasionally.
Q Would you turn to the page that ends in Bates number 91. It's the first page. It wasn't that hard to find. This is the document -- It's hard to see the date, but it's 10-29-69. It's titled "Executive Summary, PCB Pollution."
A I have it.
Q Mr. Papageorge, I have highlighted two sentences in the third section of the first page titled, "Confirmation of Findings." It reads, "Analysis indicates presence of five and higher chlorinated biphenyls," parentheses, "similar to Aroclor 1254 and 1260," close parentheses. "Other Aroclors may contribute, but have not been identified yet," end quote. What significance if any did that finding have to the preparations for the November Corporate Management Committee meeting?
A Well, this --
MR. CARLSON: Wait. I am going to object at this time. I don't know if he's one of the people that participated in this or if it's something that's been told to him. I just don't have enough

information. I am going to object at this time on hearsay or lack of foundation.

THE COURT: That's what it sounds like. I don't know. I mean, this gentleman was not in that position at the time. He didn't go into that for another few months. I don't know if he was there or he was told by the man on the street.

MR. RUNNING:

Q Mr. Papageorge, did you review the records relating to the November, 1969, Corporate Management Committee, which was the committee meeting that formed the mandate for your assignment in January of 1970?

A I reviewed documents relating to that. I don't know if I saw all of them.

Q Did you see this one?

A Yes.

Q And did your review of the preparation documents help to form your understanding of your mandate in January, 1970?

A Yes.

Q And did you discuss the preparation for the Corporate Management Committee meeting with the people who were actually involved in the preparations?

A Yes.

Q And did your discussions with those individuals help to form your understanding of what your role was to be beginning in January, 1970?
A Definitely, yes.
Q Beginning in January of 1970 what was your understanding concerning the analysis of samples containing PCBs taken from the environment as of the fall of 1969?
A The material was being identified as having five chlorines or more per biphenyl and to the chemist resembled Monsanto's Aroclor 1254 and 1260.
Q What was your understanding of the significance of that finding? Did it have significance to the environment?
A It was certainly significant in that it was there, and since it's a manmade material, it must have come from activities by man. It's not a natural chemical. The fact that it's there also indicated that it wasn't degrading or changing its chemistry in nature.
Q Was this -- the finding of the higher chlorinated PCBs in the environment, Aroclor 1254 as you have identified it, was that considered by you to be a serious problem?
A Yes, as it related to specific creatures that were known to be affected.

Q You have already mentioned sensitive marine life, shrimp, we have talked about predatory species. Were those all concerns that you had in January, 1970?
A At that time, yes.
Q Did you have concerns about human health effects of the presence of higher chlorinated PCBs in the environment as of January, 1970?
A Not at that time.
Q Why not?
A Well, there was no information, no evidence at all that would indicate that there should be concern.
Q How long had PCBs been in use as of 1969?
A 40 years.
Q Did you have an understanding as to what the main sources of pollution were when you assumed your job responsibilities in 1970, January?
A Well, I did have an understanding, yes.
Q Let me read to you part of this section from Page 3 of the plan.

THE COURT: Is this --

MR. RUNNING: I am sorry, the Executive Summary. I am sorry. The same document, Your Honor.

MR. RUNNING:

Q "Main Sources Of Pollution. Difficult to define, but Aroclor 1254 and 1260 are used in electrical devices,

heat transfer, plastics, adhesives, coatings, and industrial fluids. Other Aroclors contain minor percentages of five and six-chlorine ring structures." And it goes on to discuss manufacturing plants. What was your understanding of the main sources of pollution for the PCBs, the types of PCBs that had been identified in the environment as of fall, 1969?

A My understanding centered primarily on the uses that lend themselves to easy entry into the environment. That included the paints we referred to earlier, caulking materials, the plasticizer use.

Q Did you differentiate between the degrees of chlorination of those products, as to which were more persistent?

A Certainly.

Q And what was your -- what was your opinion on that subject?

A Well, the more chlorine, the more persistent.

Q And just to be clear, is Aroclor 1254 and Aroclor 1260 a high or low-chlorine product?

A They're considered the higher chlorinated types.

Q Higher than Aroclor 1242?

A Certainly.

Q Mr. Carlson has read this statement. "Industrial

fluids, plastics, coatings and adhesives are very difficult, if not impossible to control. Substitute products needed." Mr. Papageorge, are all the products referred to in that paragraph very difficult if not impossible to control?

A There are degrees of difficulty involved here. There is a range described in that particular category.

Q Well, let's take them one by one. What about adhesives? How difficult were they to control?

A Extremely so.

Q Why is that?

A Well, they appear on tapes and cartons and boxes and packaging of all kinds. Once it's used and discarded, it's difficult, extremely difficult, to control.

Q What about coatings?

A Coatings. They fall in that same category, the paints, the lacquers, the varnishes, they -- the coating on that carbonless copy paper that was on all business forms that are tossed into the trash can and go to the local incinerator, and up the stack it went when it was burned improperly. So that was considered impossible to control.

Q What about plastics?

A Plastics. There again, many plastic uses, as we

know, end up in the trash heap and easy entry into the environment.

Q What about, finally, industrial fluids?

A Industrial fluids. I would suggest that there the difficulty is one of communications. The numbers of installations, throughout the world almost, that Monsanto sold to makes the control difficult. But as I said earlier, it was never perceived to be impossible, just takes a lot more to get it done.

Q Let's be specific. This case is about hydraulic fluids.

A Um-hum.

Q Explain to me, if it's your opinion, why hydraulic fluids are not impossible to control?

MR. CARLSON: I object as leading.

THE COURT: No.

MR. RUNNING: I am not suggesting the answer.

THE COURT: He is not suggesting the answer.

THE WITNESS: Why are they -- What did you say?

MR. RUNNING:

Q Why are they not -- I'm using a double negative purposely. Why are they not impossible to control?

MR. CARLSON: I object at this point. I don't know if the man has been in a die cast plant, Your Honor, so I object on foundation.

THE COURT: He may testify what he knows. You can cross-examine him on that.

MR. CARLSON: Okay.

THE WITNESS: The use in that type of equipment is such that if a leakage does occur, there are ways to contain it, and it doesn't require sophisticated engineering or the like. All it requires is an attention maybe to good maintenance. Don't let the leak continue longer than necessary. If it does leak, make sure that there is a pan under the pump to trap it. Or if it does get on the floor, make certain it doesn't get into the sewer. Those are just a few examples that come to mind. But it doesn't take high-powered engineering to achieve the control methods that are necessary to keep that material under control.

MR. CARLSON: Your Honor, this is a logical stopping point.

THE COURT: I was just going to ask. It's a little after 5:00. Monday morning I have got ten matters, I have an eviction at 1:00 o'clock, a scheduling conference at 1:15, and two other matters

at 1:30. So why don't you come in at 2:00 o'clock. You all have a good weekend.

THE CLERK: All rise.

A JUROR: We were wondering just how long we are going to be at it.

THE COURT: I don't know. I am getting more pessimistic by the day.

A JUROR: Monday morning --

A JUROR: Longer than four weeks?

THE COURT: It looks like it. It looks like we're going into the fifth week.

A JUROR: Okay. Thank you.

(Whereupon, at 5:07 p.m. the proceedings were adjourned.)