MONS 202899

TRANSCRIPT OF PROCEEDINGS

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

In the matter of:	)	
	)	
TOXIC POLLUTANT EFFLUENT STANDARDS	)	Docket No. 1

Arlington, Virginia

8 May 1974

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UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

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EPA Conference Room
Room 1112
Building #2, Crystal Mall
Arlington, Virginia

Wednesday, 8 May 1974

The hearing in the above-entitled matter was reconvened, pursuant to adjournment, at 9:00 a.m.

BEFORE:

WILLIAM J. SWEENEY,
Administrative Law Judge.

APPEARANCES:

(As heretofore noted.)

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C O N T E N T S

WITNESSES:	DIRECT	CROSS	REDIRECT	RECROSS
James H. Wright		2625		
Thomas O. Munson	2678			
James H. Wright (Resumed)			2681	2683
Edward L. Simons		2686	2743	2745
W. B. Papageorge		2749		

EXHIBITS:	FOR IDENTIFICATION	IN EVIDENCE
80	2614	2614
81	2625	2684
82	2685	
83-1 through 43	2748	

P R O C E E D I N G S

JUDGE SWEENEY: Come to order, gentlemen.

There will be no smoking during the course of the hearing.

Before we proceed, the affidavit of Marshall T. White on behalf of Federal Paperboard Company, Inc. will be identified as Exhibit 80, and since you want no cross-examination, Mr. Eckert, that will be received in evidence.

XXXXX

(The document referred to was marked Exhibit No. 80 for identification, and was received in evidence.)

MR. ECKERT: Your Honor, before we commence with examination of the witnesses, I'd like briefly to address scheduling problems.

It now appears that it would be very difficult to get ready to go with EPA endrin witnesses by Friday and I believe Mr. Rogers is not going to take more than half a day to a day on cross-examination of industry endrin witnesses.

I will attempt to reach Mr. Miller today to see if we can start on EPA cadmium witnesses this Friday and perhaps get the EPA cadmium witnesses on and off the stand, but we'll have to see how that goes.

MR. LORANT: Mr. Eckert, I talked with Mr. Rogers

several days ago and pursuant to that conversation I've arranged for one witness to come today to be available possibly for tomorrow afternoon in the event you are finished with PCBs at that time. The other witness is scheduled to come on Thursday to be available on Friday.

Now, if I understood what you're saying, it's that you don't intend to get to any endrin witnesses this week?

MR. ECKERT: No, all I said was there was some difficulty with EPA endrin witnesses, not the industry witnesses.

MR. LORANT: Oh, I'm sorry. I misunderstood.

Yes, again, that was also a subject of conversation, and I agreed there would be some difficulty there, particularly since the entire affidavit has not been received for Dr. Parish. I thought there was another affidavit due from someone from Columbia. Would that be it?

MR. ECKERT: I'm not familiar with the subject matter area.

MR. LORANT: If your position is you're not getting to the endrin witnesses this week, I agree. I thought they were scheduled for June 3.

JUDGE SWEENEY: Well, if we can't get to them before, they will be heard on May 27.

MR. LORANT: That's a holiday of some kind, isn't it?

JUDGE SWEENEY: Not unless we have taken care of the

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endrin witnesses before then.

MR. LORANT: All right.

MR. WILLS: My name is Wills, for Westinghouse.

Before we get any further involved in PCBs, on behalf of Westinghouse I would like to move that EPA sometime before the end of the week formally advise us of the witnesses that they are planning to call in rebuttal, since on the 8th of April we were told one witness; last May 1, we were told one witness, Dr. Duke. Two days later we received some statements from people and weren't identified as to the references; and yesterday I understand from Mr. Eckert possibly there are four.

With respect to those statements, the one of Dr. Veith, it contains references to 41 exhibits, none of which are identified, or identified to us as to where we find them.

So I would request that you order EPA to identify the witnesses,to provide the data bases for the summaries that were-- the data from which they were extracted, to be furnished to us, plus all the unpublished articles or those in-press articles that EPA has within its control, since most of these documents are referring to EPA research laboratories.

MR. ECKERT: Let me say in response to that that EPA recognizes the problem here.

The witnesses are four: Dr. Duke, Mr. Wilson, Dr. Daneker, and Dr. Veith.

Those affidavits which are unpublished or otherwise unavailable are now being reproduced and will be distributed about noontime today.

MR. WILLS: Well, I ask you, what about the individual who called a Westinghouse individual, and said he was a consultant hired by EPA to determine -- yesterday I received information from one of our clients who was contacted by a consulting firm hired by EPA, apparently to find out the dollar amount and how our capacitors were used.

I assume that that is information that will be testimony. I want to know if this is correct.

MR. ECKERT: I don't know why you make that assumption. We've hired consultants to assist us with cross-examination on several witnesses.

MR. WILLS: He called us Monday to assist with cross-examination today? Okay.

The other motion I have, your Honor, deals with the Freedom of Information Act, the spirit of the publication of the rules of this procedure that were published in the Federal Register. With respect to other documentation or laboratory studies conducted by EPA people concerning PCBs, prior to this hearing we saw some unpublished data in the National Academy of Science Report.

The data in there more or less did not conform to other published data. From what information we have received i

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rebuttal testimony, we have seen a direction toward a particular point of view with EPA research data. Since we do not know what other reports or what other studies, what other literature that has been developed with respect to toxicity, degradability, or even treatment of effluent standards -- there apparently was some work done by a Dr. Price in this area -- we would request that EPA be required to produce this.

And also, since the review process under the statute requires other agency comments, any copies of written comments of other agencies prior to the promulgation of these rules.

MR. ECKERT: All I can say is, if you have a Freedom of Information request, there are regulations dealing with Freedom of Information Act requests. You're perfectly free to make one and we'll be glad to respond to it in time.

However, I think that's outside the scope of this hearing and we intend to put into the hearing record all the information on which we propose to rely.

MR. WILLS: In other words, you're going to preclude us from obtaining other scientific information within your control that deals with PCBs?

MR. ECKERT: Absolutely not. I said if you had a Freedom of Information Act request, then simply follow the procedures under the Freedom of Information Act. You're certainly free to get any data which we might have.

As for data on which we intend to rely, we are producing it in the form of testimony and we are going to make the men available for cross-examination who prepared it.

MR. WILLS: Are you going to make Mr. Stallings available, who published some unpublished data that we tried to get out of Columbia for the last three months and we can't?

MR. ECKERT: Well, if there have been some problems with unpublished data cited in EPA affidavits, as I say, we're going to bring chat by today, and if there's something missing, please let me know and I'll see that it's taken care of.

MR. WILLS: Well, take one example, Dr. Duke's statement that refers to some summaries of data. Are we going to get the data base or any explanation of the procedures by which that data was originally compiled so we can see the numbers that went into the data summary?

MR. ECKERT: Well, so far as I know, the only data that were ever published were the data summaries.

If you have questions on that, Dr. Duke will be able to answer those questions as far as the raw data is concerned. If you want us to produce the scientists' scratch papers, then I think you are really in the Freedom of Information Act area and not what we're talking about in this hearing.

JUDGE SWEENEY: Who's the first witness, Mr. Eckert?

MR. ECKERT: The first witness is Mr. Carlson,

Rudolph F. Carlson.

JUDGE SWEENEY: Who's he with?

MR. ECKERT: With Electric Utilities Company.

MR. RICHEL: I'm with General Electric. I have one brief point that I would like to discuss.

Industrial witnesses, including those at General Electric, addressed themselves to material provided by, and apparently relied on by EPA. Since that time, EPA has introduced the testimony of, I understand, four other witnesses who introduce -- who themselves introduce much new material.

Our witnesses have no opportunity to address themselves to what has become a moving target, and I'm asking for your assistance in determining how we may best respond to that new information in the form of testimony as opposed to cross-examination.

JUDGE SWEENEY: I don't know of any way under the Administrative Procedure Act for you to do that the way I look at the Administrative Procedure Act.

Now, if we follow EPA's theory of the procedure, you should all be given an opportunity to put in rebuttal testimony. However, as I understand it, the parties do not agree with EPA as to the proper procedure. In other words, the parties say the burden of proof is on EPA, so that would mean that you have no chance for rebuttal if your theory is

correct that EPA has the burden of proof.

MR. RICHEL: I think they are consistent. We addressed subject matter A; then given the introduction of testimony by four EPA witnesses, we are now in the area of some other subject matter, B.

Very specifically, no data was introduced, as you know, concerning 1016 in your original material, in large part because there just wasn't much.

EPA has now taken it upon itself to respond to that possible problem area and come up with data in the last few months and put that into their testimony.

I think it would be unfair and perhaps arbitrary to refuse to allow us the opportunity to directly address that question among others.

I'm willing to discuss this with EPA counsel off the record. I did want to raise the matter on the record because we've been placed in a bind.

JUDGE SWEENEY: All right. You talk to him off the record, but you know what the time factors are in this case. I don't know just when you would have time to do so.

MR. RICHEL: Well, the time factors as I understood them initially -- well, I understood initially that you intended to conclude hearings by at the very latest the first week in May.

JUDGE SWEENEY: Right.

MR. RICHEL: That, I guess, was a fantasy. So I don't know what the time factors are now.

JUDGE SWEENEY: It wasn't a fantasy until the Deputy Administrator said that he could get something out even though we ran through May.

MR. RICHEL: Did he intend to consider the testimony adduced at this hearing?

JUDGE SWEENEY: I don't know. I am sure he did.

MR. RICHEL: I could get something out, too.

Well, I will --

JUDGE SWEENEY: Well, in answer to your question, you talk with Mr. Eckert off the record.

MR. RICHEL: Yes, sir.

MR. ECKERT: Has Mr. Carlson been sworn?

JUDGE SWEENEY: No.

Now, Electric Utilities Company, as far as I know, is not a party to this proceeding. Why are you calling him?

MR. ECKERT: Well, I'm a little taken aback. I thought he came in under the aegis of one of the objectors.

JUDGE SWEENEY: Which one?

MR. ECKERT: To tell you the truth, I can't answer that. I didn't realize that -- as you see we keep a separate book for objections and for testimony, but I had not cross-checked to make sure that Mr. Carlson was a witness -- was a representative of a party.

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JUDGE SWEENEY: I don't have any objection myself. But if you want to allow someone who is not a party and hasn't met your rules of evidence to submit testimony and be cross-examined --

MR. ECKERT: We are willing to waive that in this case because we think Mr. Carlson may have some useful information to contribute.

MR. RICHEL: Your Honor, I'm not Mr. Carlson's attorney, but the question really is does he want to testify? Not whether EPA wants to waive any rules.

JUDGE SWEENEY: Well, the question is does he want to get his affidavit on the record, is the first question.

MR. RICHEL: Apparently, it has been submitted to EPA, though not in a way which would lead him to the status of a party. Is that correct?

MR. ECKERT: Well, what happened was, apparently, and I don't have the books in front of me, he submitted an affidavit by March 15, but he did not submit it, submit an objection by January 18. So, all I'm saying is in this case we think he may have information to contribute.

Are you objecting to this?

MR. RICHEL: No, I'm saying the witness should be given the privilege of deciding whether or not he wants to testify or just have his material submitted.

MR. ECKERT: Well, let's ask Mr. Carlson right now.

Do you wish to testify at this hearing, Mr. Carlson?

MR. CARLSON: Well, I'm not represented by counsel, I should point out. I think I would prefer to check with counsel on that, which I could do later in the day.

MR. ECKERT: Well, we could start out with another witness.

JUDGE SWEENEY: Why don't we do that.

MR. ECKERT: How quickly could you get back to us, Mr. Carlson?

MR. CARLSON: If I could reach my attorney, within an hour.

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MR. ECKERT: All right. Will you please do that?

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I would like to call Dr. James H. Wright.

JUDGE SWEENEY: What company is that, Mr. Eckert?

MR. ECKERT: Westinghouse.

Whereupon,

JAMES H. WRIGHT

was called as a witness by the Environmental Protection Agency and, having been first duly sworn, was examined and testified as follows:

JUDGE SWEENEY: Dr. Wright's statement will be identified as Exhibit 81.

(The document referred to was marked Exhibit 81 for identification.)

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CROSS-EXAMINATION

BY MR. ECKERT:

Q Good morning, Dr. Wright.

A Good morning.

Q In your testimony you attach a statement, "Qualifications of James H. Wright."

I understand that you're a chemical engineer with a doctor of philosophy degree; is that correct?

A Yes, sir.

Q Have you any training in the biological sciences?

A I've had considerable experience training in the last -- I would say five or six years. Reporting to me is a

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group of biologists, public health people, and a variety of other technologists dealing with terrestrial and aquatic biological problems.

Q When you say "practical experience," could you be more specific as to what types of experience you personally have had?

A Well, yes. I participated in the planning, for example, of field data-gathering programs. I participated in those and at present, on a continuing basis, I am on the analysis of data, the validity of results, the statistical confidence that can be developed from the data that the staff has provided in that area; in other words, in the review, audit and evaluation function.

And I have published summary articles on certain biological effects in national and international journals.

Q Have you ever conducted bioassays on marine organisms?

A I personally have not conducted bioassays on marine organisms.

Q Have you supervised studies in which bioassays were conducted?

A Yes, I have.

Q Were those long-term or short-term bioassays?

A In general they tend to be-- I would say the greatest frequency was very short-term; that is to say

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within a year.

Q But longer than 96 hours?

A Oh, yes.

Q Would these be statis or flow-through, or intermittant flow?

A Now when you call for bioassays, I would say that -- Well, for example, some of the tests that were-- I'm thinking now of one particular one that was conducted for a period of actually a week. I'm thinking of where we created test conditions similar to an intake and ran for a period of time.

Q How many facilities does Westinghouse operate in which PCB's are used?

A Used in what fashion, sir?

Q Well, let me rephrase the question:

From how many Westinghouse operations are PCB's discharged?

A I don't know the answer to that. I would take your first question, modify it somewhat, and say we have about half a dozen facilities involved in the manufacture where PCB is an input material to the manufacture.

We have some other facilities involved in the repair of equipment which may contain PCB's.

Q I want to get back to that in a minute but would like to skip over to some other matter.

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On page 2 of your statement you state that -- and this is in the middle of the page:

"The environmental impact of the PCB-containing discharge depends upon factors such as the types of the PCB in the effluent, the sedimentation rate of the receiving water, the types of biological food chains present, and the existing load of other toxic materials in the receiving water."

Could you tell me what data you have concerning the relationship between the sedimentation rate of the receiving water and the environmental impact of PCB discharges?

A The data that we have was obtained by our laboratory in Maryland, and it related rather substantially the inventory of PCB's in the environment as probably being influenced by the sedimentation rate more than any other single item.

Q Well, what was the effect of the sedimentation rate?

A Well, sedimentation, for example,-- The sediment in the water system acts as an absorbent material apparently, attracting and absorbing PCB's selectively and removing it from the water or biosphere into the sludge or into the bottom sediment of rivers and systems.

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Q Have you provided us any of the data upon which that conclusion is based?

A No, I have not.

Q Is there a report upon which that conclusion is based?

A Let's see, with regard to whether or not the report is written-- Is the report written on that?

VOICE: I think a qualified Yes.

BY MR. ECKERT:

Q Let me put it this way:

Once the PCB's get into the sediments, do you have any data on the relationship between the PCB's in the sediments and the PCB's in the receiving water adjacent to the sediments?

A Again, we find-- I would say we have a little bit of data. What we have does not indicate that we have any equilibrium established between these two concentrates. This I think is a part of a larger problem in which we try to assess the environmental lifetime of PCB's.

What we are saying is PCB's that are adsorbed and trapped in the sediment apparently remain there for a very long time;inasmuch as they are typically in a non-oxidizing atmosphere, they remain for quite a time in that role, and we do not have evidence that it is quickly reintroduced into the active biosphere, for example, as in the case of methyl

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mercury.

Q Well, now, let's talk about the PCB's in the sediments.

Once the PCB's do get into the sediments, are they then not available to bottom feeding and benthic organisms?

A One would say on a theoretical basis that they would be available. On a practical basis we have seen no evidence of equilibrating bottom sediment, either with the flora or the fauna or even the water quality, even in conjunction with areas of high volume sediment PCB.

I would have expected to have found higher concentrations of PCB's in the water and in the aquatic organisms than was found.

Q In the testimony submitted by Monsanto there was an article by Nimmo, Wilson, Blackman and Wilson. Have you read that article?

It's entitled "Polychlorinated Biphenyls Adsorbed from Sediments by Fiddler Crabs and Pink Shrimp."

A I think in the distant past, I did, yes. It is not current to my knowledge at this moment.

Q In that article the researchers state:

"We have demonstrated experimentally that Aroclor -1254 can enter the estuarine food chain from sediments."

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Do you agree with that statement?

A I mentioned earlier that I thought it could be theoretically possible and probable that this could occur.

Q He says "demonstrated experimentally," not theoretically possible.

A To me that's perfectly acceptable and I would find no great quarrel with that. The question is equilibrium and the quantity mass transfer. I think that's the issue, and the paper does not address itself to that.

Q What data do you have with respect to the relationship between the types of biological food chains present and the environmental impact of a PCB discharge?

A This is a general consideration that can be made of almost any environmental contaminant. We are concerned with its pathways, its reconcentration steps, and its vector back toward man. Without a consideration of the particular food web that's involved one is very hard pressed to make any scientifically valid estimate of the magnitude and direction of that vector.

Q Well, you mentioned man. Is man the only organism which we should be concerned about at the top of the food chain?

A No, there are other -- certainly other animals that we have a high concern for; high trophic creatures of all sorts have an excellent opportunity to reconcentrate these

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materials.

Again, the particular food web that's involved is imperative to understand what magnitude risk is involved.

Q When you refer to the existing loading of other toxic materials in the receiving water, do you have evidence that PCB's exhibit synergistic or additive effects with other pollutants?

A No, we haven't. We have studied the problem of other pollutants and in combination and noting synergistic effects which-- EPA I understand is quite familiar with these and it's a constant concern to any scientist working in the environment: are there going to be synergistic effects between this and other things.

We have noticed nothing in the PCB -- as far as PCB's are concerned.

Q Well, now you've raised the question here yourself of existing loading of other toxic materials, but you haven't provided us the data. Don't you think the data would be useful in setting a standard?

A My position here is to recognize that EPA's role is very broad, very important, and they will have to consider if there are synergistic effects that they should be included.

The purpose of this statement, sir, is not to suggest that PCB's, by any comparative basis, don't need

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regulating. It's just a case of saying are there other considerations that we have to combine with PCB's.

Q Well, I'm not arguing with that. I'm just asking why, if these things are not important-- I'm sorry, let me rephrase that.

I'm asking why, if these things are important and should be considered in setting the standard, you didn't provide us the data that you have been working up in your laboratories on these very points.

A With regard to the synergistic effects, we have absolutely no data that would either support or deny synergistic effects.

Q But you do have data on the sedimentation rate?

A When you say "rate," that question has not been raised before; on sedimentation, yes.

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Q On page 3 of your statement you refer to a 0.5 ppm level as unduly conservative because this limit, proposed by FDA, applies to feed stock levels only.

Could you explain to me what a feed stock level is and how this relates to the tolerances published by FDA?

A Yes.

My feeling, my understanding of it is, again, back to the reconcentration food web, the magnitude and direction of the vectors that would be associated therewith.

If, for example, if the purpose of the standard has various levels of importance, protecting man would be among the first considerations one would make. One would say, "Where do we have a 0.5 ppm source level that has a vector as a feed stock demand in water systems and may contain PCB?"

Alternatively, the same question would be asked if we have any other form of animal husbandry, any other creatures that are being raised. We have to take a good hard look at the 0.5 ppm level in that case, because where it's controlled feed stock, then you have something quite a bit different from just a statistical end variable PCB concentration pickup in the food chain.

Q When you refer to this limit proposed by FDA, are you refering to the tolerances, temporary tolerances, published on July 6, 1973, by FDA in the Federal Register?

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A I don't have that reference before me as to the exact date, but we are referring to FDA source material.

Q You state that other Federal agencies routinely incorporate consideration of the actual food chain consideration on a case by case basis in establishing and enforcing regulations.

First, which other Federal agencies are you referring to?

A The agency that has probably done more that this agency, than all the other agencies put together, is the Atomic Energy Commission, in which their concern, of course, is radioisotomic buildup and reconcentration; and without some knowledge of the specific food web involved one would never get a dose rate.

Q Do they do this type of analysis in establishing regulations or in issuing licenses?

A First of all, they require in the regulation that the total dose, they set a total dose level that is permissible.

Then, alternatively, because there are a great many different ways in which that dose might be rendered, each of those alternatives are examined on a real case by case basis for the facility in consideration for its license.

Q But doesn't AEC, in fact, have an effluent or an emmissions standard for nuclear reactors that limits the

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discharge that can come from any given reactor?

A Yes, of course. But that in itself constitutes an envelope.

Q It constitutes the maximum to which you could go?

A I believe it is issued as a guideline as opposed to a regulation.

Q Are you familiar with the studies that were conducted by Platonow on minks in the Lake Michigan area?

A Aware; but not intimately familiar.

Q You've referred here to the unduly conservative 0.5 ppm level.

A Yes.

Q Do you recall what the level of PCB's was in the that that was fed to the minks in the Platonow experiments, Doctor?

A I think it was on that order level. I also would identify the mink meat condition as clearly a feed stock condition.

In other words, I have no quarrel with that point by ppm when used in a feed stock, as in the case of the mink, no quarrel.

Q What if the feed stock were fed to humans instead of to minks?

A FDA has suggested a 5.0.

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Q Well, in light of the Platinoff experience, is that valid? Is that defensible?

A Well, I don't know. I don't behave like a mink in very many ways, and I'm not sure how statistically significant that is for the human population.

Q Now, still on page 3, you refer to carbon adsorption. You state you have no data nor have performed any experiments with carbon adsorption.

Have you tried any techniques for treatment of PCB's?

A The word "treatment" requires, I believe, some elaboration.

We have done extensive work in every one of our plants in process control to reduce the PCB's that might be escaping into the environment. This is postulating, and I believe the next page -- on this page there are hypothetical postulations of two possible ways of waste water treatment as opposed to process control treatment or process control management.

Q And those two are simply carbon adsorption and reverse osmosis?

A Yes.

Q But on neither of those have you done any tests.

A That is correct.

Q Could you identify the six Westinghouse facilities

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which use PCB's in process?

A Well, I gave you six because I know I could name four, and one is never sure in a large operation like Westinghouse that one has covered all of them.

I gave you the first four that I think I know the most about: the Sharon transformer plant in Pennsylvania, South Boston transformer plant in the State of Virginia, and the Bloomington, Indiana, capacitor plant, and there are PCB's involved in their Phoenix plant -- it's also in the production of transformers.

There are lesser and lesser quantities involved in other plants, such as the Lighting the Lamp division in Cleveland has PCB-containing capacitors and the like in the lighting fixtures for this type lights (Indicating).

Q Well, let's start with the Sharon transformer plant.

Do you have any figures on the levels of PCB's discharged from that plant?

A Yes, I have figures.

Q Could you give them to us, please?

A I think I would have to check and see if there is any reason why we cannot.

Q Are you alleging that this is a trade secret?

A No.

But I got the information, and the information then

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was for my use only, and before I can release it I have to provide some protection to my clients.

MR. ECKERT: I would like to get into this, your Honor. Could we have a five-minute recess?

JUDGE SWEENEY: We'll have a short recess.

(Short recess.)

JUDGE SWEENEY: Back on the record.

BY MR. ECKERT:

Q Let me repeat the question, if I can restate it.

Could you give the concentration and the weight of daily discharge and the homologue involved of discharges of PCB's from the Sharon transformer plant?

A I believe so.

The Sharon plant has, as most plants do, a multitude of discharges. That we would first assume we have no discharge from the Sharon plant for some reason, the process itself for the past some years has been -- that we would have fist presumed that Sharon had no discharges, because we had no knowing way in which PCB's got from the plant process into any of the water streams.

Q Before you continue, could you describe the steps that were taken to eliminate the discharge of process water?

A Yes. They're in my testimony. I'm going to have to refresh myself with it.

As a matter of fact, this is a bit of an interesti...

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history. May I take a couple of minutes on it?

Fine.

We were sort of running parallel courses, apparently, with FDA in 1970, and in some very broad examinations of fish from many parts of the United States that we had taken on other environmental studies, we asked our laboratory, analytical laboratory, to make a determination of the pesticide content in these fish in 1970.

And we were astonished at that time to find that in many cases we could not find the DDT content because the chromatographic spectrum for the pesticides was simply obscured by quantities of polychlorinated biphenyls, which we at that time did not know were in such widespread use in the environment.

We raised this question to the Westinghouse management, and we immediately became concerned, knowing that Westinghouse was also processing PCB's.

So following that time we said, "Boy, we'd better start looking up the sediments and the fish downstream of the Westinghouse plants as well."

Parallel with that the FDA made their proclamations, and our work was underway before they made theirs. Also parallel, or in the same year, Monsanto took steps to warn all its users that there was a problem here.

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So I would say 1970 was a very major turning point

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in the recognition by industry that we had a potentially dangerous substance here that we would have to deal with entirely differently than the way it had been dealt with in the past.

So among the things, and there are others who could give the chronology of the actions of the plants better than I, but I think we have most of the net results.

One is we went in and sealed all of the floor drains in all the PCB areas of the plant so that in no way any drippage could get joined with the process or sewage from the power plants.

Secondly, we modified substantially the spill procedures for PCB's in the plant, that from this point on we were using industrial adsorbance materials collected together and finally incinerated offsite by a contractor.

We have testified, I believe, as to several steps in the process, and I am going to have to look again at where this is in my testimony.

We stopped short of instigating clean-room procedures; they're very expensive, and as far as I'm concerned, not warranted. But we did not go that far, but we did consider it.

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The switch from 1254 to 1242 occurred in the late '60's and the rapid switch from 1242 to 1016 occurred in a subsequent time period and we predominantly use 1016 at the moment.

Again, part of the reason was the 1016 was more biodegradable and represented less, we felt, of an insult to the environment.

Various other steps in the process that were taken have been a large number of administrative procedures, for example, of when and how various processes are run. The process has been examined a number of times to look for even the remotest source of PCB's back in the waterways such as the vaporization of PCB's from vacuum systems discharging into the atmosphere, the potential falling out, plating from the roofs, washing out by rain water and in this sector getting back into the watershed.

I think my testimony is better than my memory on this point.

Q When you took these steps to prevent the discharge of PCB's, did you attempt to flush out or clean sewers and drains contaminated with PCB's from old operations?

A I would be the most frightened man in the world to recommend the flushing out of old lines and old drains. I would be very concerned to make that recommendation.

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Q You mean because you would be worried about the

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PCB's shock loading on the environment?

A Yes.

Q There wouldn't be any way that you could clean them out and then pond or otherwise dispose of them?

A I'm not prepared to say there wouldn't be any way; I'm prepared to say that I don't know a way right now. I am prepared to say that.

Q Now I gather that your testimony is that despite all these steps, there are still PCB's getting into the effluent. Is that correct?

A I think so.

Q Have you investigated to find out for the Sharon plant what those sources are?

A Yes, we have investigated. We do not know what the sources are.

Q Well, let me ask this:

For what purposes do you use water in the Sharon plant?

A We use it for cooling and we use it for makeup to the steam system. We use it for drinking, washing, sanitary sewers.

Q How many of these uses are direct discharges and how many go into municipal systems?

A Of course the washing and the sanitary sewers go into the municipal system. The process water -- eventual

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process water wastes would go into the river.

Q The two process waters that you have identified are cooling and makeup. Are there any others?

A Well, I'm sure there are. It's a very big plant and even those have a large number of subsets. That is to say there are a large number of independent cooling systems. There are a large number of systems in which water simply has to be removed as a contaminant from oil or other organic liquids of which separation is made.

We don't want the water there; it should not have been there but it's there and we have to get it out. As it comes out it becomes of course a waste product.

Q Now the process in which PCB's are actually used is a sulphur dry process -- is itself a dry process, is it not?

A It's a non-aqueous process.

Q Non-aqueous?

A Yes.

Q Is it physically--

A It's not dry in the sense of liquid.

Q I understand.

Is it physically separated from the other processes in the plant?

A From water processes?

Q From water-using processes?

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A Yes, it is. Again, this is one of the reasons for the floor drains. In other areas of the plant we may have water source from the floors or whatever but in this area, anything that is scrubbed does not go into the floor drains.

What I'm really trying to say is I don't know really what the source is.

Q Well, let's get to the bottom line, as they say in the White House.

What is the level of PCB's discharged?

A Well, the level in terms of concentration or in pounds-- The accuracy and the anomalties that I have on data of PCB contents in our various streams from the Sharon plant are not very satisfying, not very-- Well, I don't have an enormously high confidence level.

I can tell you I have data that range from a fraction of a part per billion up to several -- a few sets of data in the one to two parts per billion range, one data anomalty point at 27 parts per billion.

And I will maybe get to the very bottom line at this point and say that a mixture of judgment and horseback guesses suggest that in combination with our water flow the plant discharges around 45 grams, 40 to 45 grams of PCB per day. I would sure as hell hate to have to swear to all the parts and pieces because you have to make some tough interpretations to come up with that.

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Q Well, we will underscore the uncertainty.

I'd like to know what kind of treatment is used for the process water which is discharged.

A The process water itself, as far as I know, is not-- It's certainly not treated for any PCB removal. Again, we have no knowing point at which PCB's can enter the process or waste waters.

Q What is the receiving water for the Sharon plant?

A The Shenango River.

Q Do you know what the seven day, ten-year low flow of the Shenango River is?

A Well, I have a lot of data on the Shenango but I'm not sure that I have that particular piece.

The Shenango River, unlike maybe a lot of naturally sponsored streams, is fed from a lake and that river is a controlled flow from a lake. The average year-round flow, total quantity by day, is 700 cubic feet per second. In the November, December, January area it is controlled to a minimum flow of 100 cubic feet per second.

I did not answer your question about the ten-year low flow because it is my understanding it has been run according to these specifications, but I cannot say precisely that there was never any deviation.

Q Can you quantify the effluent flow from the facility, how many gallons per day?

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A Yes, I have that data.

Q Would you please give me that data?

A All right.

Let's see, the sanitary sewers, 124,000 gallons per day.

Q Do these go into a publicly owned treatment work?

A Yes.

Q I'm interested only in the direct discharge to the river.

A Okay.

I'll have to ask a question. Do che storm sewers go into the sanitary sewer system?

VOICE: No.

THE WITNESS: Do they go into the river?

VOICE: Yes.

THE WITNESS: Okay.

The daily storm sewer water is about 158,000 cubic feet.

There is a Y building outlet, 87 gallons per minute.

And the A and B building outlet, about 263 gallons per minute.

A power house outlet-- This would be blowdown from cooling towers and other things, 175 gallons per minute.

I have several points in the plant, sir, that I /

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could give you but all in all, if I add up the total process I think that's really what we're talking about, isn't it?

A Well, that is, but you've raised an interesting point.

Of these various flows, do all of them contain PCB's, or do some of them contain no detectible PCB's? How are the measurements taken?

A Well, let me say first that I don't know. All the effluents have not been looked at.

Secondly, those that have been looked at, I cannot tell you whether or not they all contain PCB's. If I get a number, .13 parts per billion, I don't know whether that has got PCB's in it or not.

Q You mean you think it is below the level of detection for analytical procedures?

A Well, the anomalty of results I've obtained to date on this particular kind of sampling is far broader than that. I think the analysts would generally talk about an error limit but I look at lots of data and wonder how it makes sense, and I would have my troubles.

Q Well, when you see a data point like that are you saying that it is no good from a quantitative or from a qualitative standpoint?

A Both. Again the analyst would say, "Gee, he's not going to see PCB's where there aren't any PCB's."

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And you know what? I would agree with him. But the difference is where do the PCB's come from, from the laboratory apparatus or from the sampling?

These are very practical matters and we're down in the range of really splitting drops, you might say.

Q Have you any evidence to support your statement on page 4 that PCB homologs with four chlorine atoms or less per molecule are biodegradable?

A I have none, but we do-- Well, on the other hand I think I have some.

Our work, work that we have sponsored, has shown in the environment a shift to the heavier homologs in some general proportion to the time of exposure to an oxidizing atmosphere. It suggests that a material that might start off as 1042 could, in a period of time, associated with weathering and natural processes, beginning to look like K-54 and so forth -- excuse me, 1254 and so forth, appear to move up the scale of heavy isomers with time, if-- The only way that could be accounted for would be the shorter environmental half lives of the lower homologs.

There was other data which we did not develop but which we are aware of and which was done by one of the people that will be testifying here today. If you like, I can tell you my understanding of it, or you can address your questions to the expert who generated the data, as you choose.

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Q Well, the problem we have here is that we don't have before us the study that you appear to be relying on. You stated that there's a shift to heavier homologs after exposure to an oxidizing environment.

Is there a written study or report that documents the shift?

A Again, is it written?

VOICE: I don't know if it specifically deals with that particular problem.

THE WITNESS: There is not a report written that deals with that data. What we are saying is that data exists from which that conclusion might be, on a preliminary basis, drawn.

I think more fundamentally it's the work that Monsanto did in looking at the biodegradable forms of the various chlorine content and chlorine isomers.

Q So you think you would be relying in this statement primarily on Monsanto data rather than on data that you are referring to?

A I think so. I think that the other argument is probably valid, but I don't feel that it's a point that I care to make of proof. I think it's a very reasonable assumption.

Q Getting back to the Westinghouse PCB facilities, what is the source of PCB's in the South Boston facility?

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Is it similar to the Sharon facility?

A Well, I never did know what they were in the Sharon facility.

Q I mean in what processes are they used?

A They are used in the production of capacitors.

Q Capacitors?

A Yes.

No, South Boston: I'm sorry. I read Bloomington.

Right, transformers, South Boston.

Q And have the levels of PCB's discharged been measured?

A Well, discharged where? In this particular case we have no discharge into navigable waters, which I understand is the subject of this particular hearing.

Q The total effluent is taken by a municipal treatment works?

A That's my understanding, yes.

Q Have levels of PCB's from that treatment work been measured?

MR. WILLS: Excuse me, your Honor, but previously-- We're talking about navigable waters and you didn't want that information with respect to the Sharon plant, so it is sort of objectionable at this point. Where are we going?

MR. ECKERT: I'll withdraw the question.

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BY MR. ECKERT:

Q Let's discuss the Bloomington facility. That's a capacitor manufacturing plant.

Is that all they do at Bloomington?

A Well, I'm sure they do lots of things in Bloomington. As far as I know, that's the only thing they do relating to PCB's.

Q Well, what proportion, say, of the sales volume from that facility is represented by the PCB-using capacitors?

A It's my understanding that a very large percent of the capacitors is -- what is that; 95 percent?

VOICE: Very nearly 100.

THE WITNESS: For all practical purposes, 100 percent of the capacitors are PCB-containing capacitors; essentially 100 percent.

BY MR. ECKERT:

Q Could you characterize the discharges from the facility in terms of how many there are, and into what receiving water?

A Yes.

There are no discharges into receiving waters at the Bloomington capacitor plant.

Q And in Phoenix?

A The same.

Q No discharge?

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A No.

Q How about the Cleveland lighting plant?

A Well, I suppose if people wash their hands there might be some; it's a very small type operation.

No. There are no discharges into the water system.

Q So, in essence, the only plant that Westinghouse operates that does have a direct discharge is the Sharon facility.

Is that correct?

A That's my understanding. I would like to see a few heads nod if I am wrong.

Okay, fine. Thank you.

Q Have you estimated what the standard would require for the Sharon facility?

A Yes. Yes, I have.

I have calculated it, and I'm going to have to get refreshed whether it was two grams per day or four drops per day; but it was in that order. I'm sure I could make the calculation here very quickly.

I can get it from my notes while we are moving, if you like.

Q Well, let me ask this.

In your qualifications statement you state that you hold numerous patents on pollution abatement processes. Have you ever utilized or studied activated carbon as a

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treatment process?

A Sure.

Q Have you ever utilized it for the control of cholorinated hydrocarbons?

A No.

Q In what types of wastes have you used it?

A Well, your first question did not pertain to wastes, but, for example, in separation of hydrocarbons.

Q Is this a laboratory operation?

A Both laboratory and large plants, large industrial plants; charcoal adsorption.

Q In the process?

A Sure. In the process.

Q Have you ever used it for waste control?

A Well, we are using it in waste control for iodine in our nuclear plants.

Q What is the volume of -- strike that.

Have you investigated for the control of PCB's, what levels would probably be achievable with activated carbon?

A No.

I have no way of anticipating the relative adsorption coefficients of PCB's which would doubtless be diluted with mineral oil, which would doubtless be soluble in minute quantities in a water stream that might be used in the process.

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I have a tough time being able to predict anything about how well activated charcoal would do.

Q When you say PCB's would undoubtedly be diluted with mineral water, do PCB's coexist -- are they used with mineral oil in the transformers?

A Not at the outset, no.

But there are wastes. For example, all the wastes -- a point I didn't make -- all the waste PCB's that are collected in everything from rags to waste to buckets to drums and finally placed in a tank: if it's any good at all it's processed and reused. If it is not good, it's shipped off the site for disposal.

In that process of recollecting what we call the waste material, it will be contaminated with everything that we have in the plant, including oil and the like, so I'm just extrapolating from that data in saying that any PCB's that happen to be in water would also be contaminated with oil.

Q The materials that are shipped offsite for disposal, are they incinerated, did you say?

A Yes. At high temperature, and , as we understand it, in conformance with regulations that insure their total combustion and destruction.

Q Now, reviewing here: could you give me the total effluent flow from the Sharon plant? You've given me figures for several outfalls. Can you give me the total?

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A If I can add quick enough.

I'd say apparently it is on the order of five to six hundred gallons per minute.

Q And is it true that you do not know what portion of that would have to be treated for PCB removal in order to comply with the standard?

A Yes.

This business of complying with the standard raises a very much different question. For example, it's not apparent to me that if we quit making PCB transformers in Sharon we could comply with the standard.

Q Is this because of residues from old operations, Doctor?

A Yes, it is.

Q Have you made any estimate of what it would cost you to put in activated carbon at the Sharon plant?

A No, because we would not know how big to make them and whether or not they would do -- you know, what size unit it would take to effect any improvement at all. We would not know what size would be required to make any improvement in the input-output PCB content.

I'd like to add that the activated charcoal and reverse osmosis are simply among the first thing that an engineer would think of as a method for trying to remove small trace quantities from an effluent stream, that it was

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presented in my testimony in hopes of being somewhat helpful, but purely on a postulative or purely speculative basis.

Q On page 11 of your statement you go into alternatives, and you state that:

"Controls on the manufacturing process and/or new manufacturing techniques are not available to meet the proposed standard."

What controls have been investigated to substantiate this statement?

A Well, for example, for the leakage rates at some of our plants which would be, according to the standard, measured against, I suppose, the eventual stream that they're flowing to, or in the case of those going to sewage plants, we are in the orders of numbers of drops per day.

There is simply no process that I know of in which people can handle several million pounds of product a year and be accountable for it within a few drops a day.

There are many places in which the product is extremely high value, where there is every economic inducement you could dream of to try to recover this product; but that's stretching the limits, I think, of our ability to do the job.

Q Well, if the process were run in such a way that there were no discharge of process waste water at all, then you can be certain there would be none getting into the water,

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wouldn't you?

A Oh, no, not at all. No way.

Q You would just be certain there was no point source discharge?

A I think I'm confident that we have no point source discharge now.

Q If you have no point source discharge, then why are you here?

A Because you're setting regulations on PCB and we're trying to share with you all the information we have, sir.

Q Well, let me put it this way:

It's your opinion, then, since there is no point source discharge of PCB's from the Sharon plant, that Westinghouse would be in compliance with the standard tomorrow were it promulgated today?

A I'm not an attorney. I don't know how that would be interpreted. My guess is your interpretation would be a hell of a lot more important than mine.

Q Well, let me ask the question a different way, then. I can see Mr. Richel is upset.

MR. RICHEL: You're just talking on two different levels, that's all. Each one has a different interpretation of point source discharge.

BY MR. ECKERT:

Q When the effluent comes out of the pipe at the end

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of the process, does it contain PCB's?

A Ah, so. Oh, yes.

I see. That's your point source. I'm thinking about in the process. Thank you for that clarification.

Q Now, in any of your alternatives here, have you discussed existing plant, existing product, end of pipe treatment as an alternative?

A Yes.

I think this (a) on page 11 dealt precisely with that alternative.

Q Well, you haven't run, as I understood your earlier testimony, any experiments or tests on the use of activated carbon; isn't that right?

A Right.

Q Then on what basis do you say that "controls on the manufacturing process and/or new manufacturing techniques are not available to meet the proposed standard"?

A My understanding of your question was: what could we think about doing at the present plant? One of the alternatives is to refurbish the manufacturing process, to invent, to develop, and to eventually install, when that success became apparent, effluent treatment processes.

But the remark that is made at the end of that paragraph is, however, an accurate description of the present status of that alternative; namely, we have technical limitations

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in that we can't even define it, so it is not even of economic concern.

Q Well, as I understand it Monsanto began around 1970, according to your testimony, to inform its customers that there might be a problem with PCB's.

Did you make any effort between 1970 and the present date to investigate what treatment processes might be used for the removal of PCB's?

A No.

We felt that our first and most profound effect that we needed to do was, we saw many ways which we could and did improve our process control of PCB's, that we think this was substantially improved at every single one of the Westinghouse plants.

This looked to be a far greater way to reach a reasonable -- I must say at some particular cost; you do not do these things cheaply, either -- but it was just that our interpretation was that we needed to fix up the process itself.

Q Now, on page 13, you say that:

"Development efforts indicate a silicone-based fluid may be an alternative to PCB."

Whose development efforts are these?

A At this point I have a lot of trouble making any literature references. This is part of the story we got back

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from what may be going on in Japan, I believe it is. This is in reference to capacitors.

Q Is Westinghouse doing any research to develop alternative fluids for PCB's?

A Yes, we are.

Q And have you developed any promising alternatives, sir?

A Well, the world always abounds with promising alternatives.

The matter is a substitute which -- but if we make a definition now and say a substitute which will have the same or equally efficient properties for capacitor performance, the answer is not only have we not, but to our knowledge no one -- within our knowledge no one has developed a substitute for PCB having the same desirable characteristics. That includes silicone, of course.

Q Well, I guess my question would be wouldn't it be conceivable that some of these might be acceptable as substitutes even though they might not have every property that PCB's have?

A I'm confident that industry-wide contingency planning is in a very high state right now because of these hearings, and we have some units going out on test, I believe it is this summer, that will have a new fluid in it. And research, I guess, has been going on for quite a time. We have

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have someone with us today who has been in research along these lines for quite a time.

Q Well, I won't try to get into any proprietary information, but can you describe the new fluid which you have developed?

A Well, I could not. There are those here in this room that could, if you would like to have it.

MR. WILLS: I would object to any testimony on that information at this point as being totally proprietary until it is marketed.

MR. ECKERT: It's up to you; I'm not going to insist on it.

BY MR. ECKERT:

Q On page 17 you're referring to the social consequences of the proposed regulations.

In the third paragraph you state:

"This would not accomplish a reduction in the PCB background and could result in the movement of 2000-5000 workers."

Are these all Westinghouse workers you are referring to?

A Yes.

Q Are all of these workers employed at the Sharon plant?

A No.

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Q How many workers are employed at the Sharon plant?

A Well, I think the question is how many workers are employed at the Sharon plant that are involved in PCB manufacturing?

Q Thank you for restating it. Would you answer that question?

A I'll try.

At Sharon I believe we have a little less than 200, at Sharon.

By the way, that must have been --

Q I will ask you to assume for the time being that discharges into publicly-owned treatment works are out of this regulation entirely and are not covered.

Would it be correct then to state that those 200 would be the only 200 whose jobs might be threatened by the promulgation of the regulations?

A Within Westinghouse?

Q Within Westinghouse.

A I see no reason to doubt that.

Q Could any or those workers, in your opinion, be shifted to production of non-PCB-containing products?

A I could give you my opinion, sir. I don't think it is worth very much in terms of how they would operate the labor force within the constraints of union contracts at the

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Sharon plant.

Q. Well, we have some testimony in here on social consequences, the number of workers that would be displaced.

Is this your work?

A Yes.

But your question is could we reassign them? That's a different question. In theory, yes. In practice, I don't know.

Q Now, let's talk about the figure of 3400-8500 workers --

MR. ECKERT: Your Honor, I don't think Counsel should be coaching the witness while he's on the stand.

BY MR. ECKERT:

Q You referred to 3400-8500 workers that would be affected.

Are these industry-wide?

A Yes.

Q Now, out of those there would be, as I understand it, 200 from Westinghouse. On what basis were these figures derived?

A They were derived on the basis that the regulations for discharge into navigable waters would be extended to pretreatment for sewage in a very short time thereafter. It's an assumption.

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Q So that these figures assume that not only the

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Sharon plant but all of the other plants which manufacture or use PCB's in the process would be affected?

A Yes. That's correct.

Q Do you know what the dollar figure is of annual sales of transformers and capacitors containing PCB's?

A I don't know what it is. I have heard what it is, and this is hearsay.

Q It's perfectly admissible.

A All right.

Between 35 and 45 million dollars a year of PCB-containing transformers; capacitors would, I suspect, be significantly lower.

Q Is this figure the basis for the $68-170 million figure given on the bottom of page 17?

A Yes.

The capacitors plus the transformers would add to be that kind of number.

Q I want to return to the Sharon plant and ask some questions about how the PCB's are handled.

When the PCB's come in, how are they shipped? In what types of containers?

A They're shipped in railroad tank cars. They have no bottom access; they have to be top-unloaded. We extend pipe down into the tank and the material is pumped to one of two major storage tanks.

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Q Is there any possibility of drainage or drippage from this unloading process?

A Yes, there is.

Q Is there water used in washing down around the areas where the tank car is unloaded?

A As far as I know, there is not.

Q How much -- and you can give it to me in tons or pounds -- PCB's are used per day at the plant?

A Well, let me ask you to divide by 365, okay?

Q All right. Pounds per year will be fine.

A About 700,000 pounds per year; and I guess that's about 2000 pounds per day.

Q Are all of the PCB's which you utilize purchased from domestic suppliers?

A Yes.

Q What percentage of this 700,000 pounds is Aroclor - 1254?

A I think it depends on the year. This year, I suspect, none.

Q None this year.

What is the homologue which is purchased in the largest quantity?

A 1016.

Q Which others are purchased?

A Well, 1242 is in the process of being phased out,

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and I believe it has been phased out. But if it isn't, it's in much smaller supply. But it would be the other homologue.

Q So that these would be the only two which would be purchased by Westinghouse?

A Yes.

Q What happens to the tank cars after the PCB's are transfered?

A They're hauled off.

Q They're sent back to the manufacturer without further processing?

A Oh, yes.

Q Is there a direct connection between the pipes which unload the tank cars and the vessels in which it is stored, in which the PCB's are stored in the plant?

A They are stored in tanks outside; but there is -- yes, a direct permanent connection between the unloading pumps and the tanks.

Q Are impervious sumps used in the unloading operation to catch the spills and drips?

A We have sumps around the pumps, and the material that is collected in the pump sump is normally placed in our waste or slop PCB.

Q Is this so designed as to catch all the drippage that might result from the unloading operation?

A Well, all and zero are tough words to engineers.

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Yes, it's designed to collect all the drippage, yes.

Q Have any measurements been conducted of spillage and leakage?

A Any measurements of the quantity spilled or leaked?

Q Yes, which can be accounted for by the sump pumps.

A No.

Q How many drops or what quantities drip off in the unloading process?

A I think about ten times the standard, but it's conceivable -- that's a facetious answer.

Let me take a look.

I don't know. Like, any drop starts using up a large fraction of our standard, and I couldn't tell you how many drops might come off in the unloading process.

Q Are the unloading operations conducted in a covered facility?

A No.

Q So it is open to rainwater?

A Yes.

Q How large an area would have to be enclosed to permit sheltered unloading?

A I don't know. I guess about somewhere between 50 and 30, 50 by 30. I'm not sure we're thinking about the same thing.

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Q Well, you stated, as I understand it, that the

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JUDGE SWEENEY: Back on the record.

Who will be next?

MR. ECKERT: Next I would like to call Mr. W. B. Papageorge.

Whereupon,

W. B. PAPAGEORGE

was called as a witness by the Environmental Protection Agency and, having been first duly sworn, was examined and testified as follows:

JUDGE SWEENEY: Mr. Papageorge's affidavit will be identified as Exhibit 83.

xzxzx (The document referred to was marked Exhibit 83-1 thru 4 for identification.)

JUDGE SWEENEY: How many attachments are there? They are not identified in any way.

MR. PARK: They are listed on the last three pages of the affidavit. They're identified by number.

JUDGE SWEENEY: I see. So we can put our own numbers on there. They would be 83 and then subnumbered 1 through 43; is that correct?

MR. PARK: Yes, sir.

JUDGE SWEENEY: Mr. Eckert.

MR. ECKERT: Thank you.

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CROSS-EXAMINATION

BY MR. ECKERT:

Q Good afternoon, Mr. Papageorge.

In your first paragraph you list your credentials. You're a chemical engineer. Is that correct?

A That is correct.

Q Have you ever performed any bioassay work?

A No, sir.

Q Have you any training in biology, toxicology, or related fields?

A No, sir.

Q Has Monsanto done any work to ascertain the toxicity of PCB's?

A Yes, we have.

Q Could you briefly describe the work that has been done, and by whom it has been carried out?

A We have sponsored work dealing with laboratory mammals, more specifically the white rat, beagle dogs, and worked with leghorn chickens. This work is being performed in the Industrial Biotest Laboratories in Chicago, Illinois.

We have also sponsored some fish toxicity studies by that same laboratory, and also by Bionomics Laboratory in Wareham, Massachusetts.

That's all I can recall at the present.

Q Were the fish toxicity studies 96-hour tests or

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were they or were any of them of longer duration?

A No, they were the short-term.

Q Have you cited the results of these tests at any point in your affidavit or in the exhibits?

A I don't-- No, sir.

Q Now on page 2, number 3, you propose a definition of PCB's, and you propose to restrict it to those which have been shown to persist and rapidly bioaccumulate in the aquatic environment.

Why is it necessary to restrict PCB's to those which persist and rapidly bioaccumulate?

A From my personal long exposure to the PCB environmental problem there is no question in my mind that what we're all talking about in the final essence are those isomers which appear to resist degradation and the problem seems to be one primarily of presence in the vast majority of the recorded literature.

And if true then we should concentrate our attention to those isomers that are identified in the environment.

Q Now on page 3, you describe PCB's in general and there, at aboutthe third paragraph you state the properties of PCB's, and you list inertness as one of the properties.

Now a material is inert because generally it resists decomposition and degradation; isn't that correct?

A That is correct.

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Q And you have not distinguished in your statement between various isomers of PCB's.

Would it be a fair statement that all of them are relatively inert chemicals?

A No, it would not be.

Q Which ones are not inert?

A The lower chlorinated isomers of chlorinated biphenols are fairly active, reactive.

Q What is an isomer?

A I don't know if I can come up with the correct scientific definition but it is a chemical entity which contains the -- in this instance the same biphenol configuration and the location of the chlorine at a specific point in this configuration.

And as I say that, I recognize it is not very clear.

Q Well, I would like to define our terms early. If we are talking about two PCB's that have three chlorine atoms apiece but at different points, are those isomers?

A Each one is an isomer.

Q Each one is an isomer.

A Together they are referred to as homologs.

Q Now, is a PCB which contains three chlorine atoms and a PCB which contains four chlorine atoms, is one an isomer of the other?

A No.

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Q So that these are referred to a homologs, are they not?

A They are not isomers of each other; they are isomers of chlorinated biphenols.

Q So that you use isomer to refer to any particular chlorinated biphenol?

A I use isomers to refer to the chlorinated biphenol which contains a given number of chlorine atoms which are fixed to the biphenol grouping in a fixed position.

Q Well, perhaps we can clarify this as we go along.

Have you figures on the total production of PCB's for the years -- for approximately the last four years?

A I don't have the exact figures with me, but they range-- The last four years?

One of my attachments is a copy, though I don't know if I even attached it. The PCB Task Force, the interdepartmental task force report on PCB's had, in the early part of that report, a two-page table of the production of polychlorinated biphenols by Monsanto in the years 19 -- I forget, the 1950's on.

Q Is that Exhibit No. 33 to your affidavit?

A Yes.

Q Would you identify where in this exhibit the figures appear?

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A This is the exhibit we are talking about.

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(Witness displaying document.)

On pages 6 and 7-- I think I may have misled you, sir. Just a moment, please.

(Pause.)

I did mislead you. 33 is not the reference. It's reference No. 1. My apologies.

Q I see.

I'm not sure I have a copy of reference No. 1. In fact I don't think I do.

In any event,--

MR. RICHEL: Would you like to see my copy?

MR. ECKERT: Yes, I would.

JUDGE SWEENEY: I don't believe that the official record has a copy of it.

MR. PARK: Judge Sweeney, it was not included because this of course was sent out by the Task Force of which I believe EPA was a member. Would it be possible for you to include it by judicial notice or by reference?

JUDGE SWEENEY: Well, just so the record is straigh and has everything in it it should have.

You statedat the beginning that there were 43 attachments and if there are not 43 we ought to correct it.

MR. PARK: Yes, that is an error.

JUDGE SWEENEY: I think there are considerably less than 43.

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Do you have a copy to give to the reporter so at least the official record will be correct?

MR. PARK: We don't have one here. We could certainly obtain one. It being a government publication, we didn't include it. We felt every party already had a copy.

JUDGE SWEENEY: Well, but there's a difference between references cited and exhibits of record.

MR. PARK: Yes, sir.

JUDGE SWEENEY: Now if you just want to refer to it, Mr. Eckert, as a government record rather than an exhibit of record, then we won't get the transcript fouled up and in error.

BY MR. ECKERT:

Q Well, if we look at the figures for sales of Aroclor 1254 for the period roughly 1968 through '72, we find that it ranges from a low of 5800 -- that is say 5,800,000 pounds in 1971 -- Is that figure correct?

A Yes.

Q -- to a high of 12,421,000 pounds in 1970. Is that correct?

A That's correct.

Q And the prospect for 1972 was six million pounds.

Do you know what the actual figure was for 1972?

A I don't have that with me, no, sir.

Q Well, in Monsanto's original objection which was

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filed on January 18th-- Do you have a copy of that that you can refer to?

A I believe you're referring to the November 29th presentation to the Effluent Standards and Water Quality Information Committee?

Q Yes, that's correct.

A I have that.

Q Now on page -- I believe it is page 6, there's a bar chart. Do you have that bar chart?

A Yes.

Q Now that appears to show that in 1972-- Am I reading the chart correctly -- between nine and ten million pounds of Aroclor 1254 were produced.

A That is correct. Yes, sir.

Q And roughly the same level for 1973?

A That is the projected for '73.

Q Are actual data available for 1973?

A I just received that this past week. I don't have it with me.

Q Do you recall what the figure was for total production?

A Not exactly; about 40 million pounds total production but I don't remember the breakdown as to type of Aroclor.

Q Now this chart is labelled "Aroclor Production at the William G. Crummrich Plant." Are there other plants at

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which Aroclors are produced?

A Not in Monsanto.

Q Not in Monsanto.

Would these data, in your opinion, tend to show that Aroclor production has been relatively steady over the last three or four years?

If you can't answer that question, I rephrase it:

These data do not confirm to date that Aroclor 1254 production is decreasing?

A That is correct.

Q Now Monsanto's concern is amply documented here about PCB's. Has this concern led Monsanto to work on the development of substitutes for PCB's?

A Yes, it has.

Q And what is the status of the research which has been carried out?

A Research of course continues. We have succeeded in finding some alternatives with some trade-off in some properties, some sacrifice in some properties.

Examples include the reformulation of hydraulic fluids for industrial purposes.

Q Well, PCB's are not now used for hydraulic fluids, are they?

A That is correct.

Q I'm referring to the capacitor and transformer

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applications which are alleged to be non-substitute.

A Oh, I thought you meant the total market.

Research continues in finding alternatives for dielectric fluids. So far we have not succeeded in finding any material that possesses the properties we are told by our customers are essential to the application, primarily those properties of resistance to fire and resistance to formation of explosive gases when these fluids undergo stresses in service.

Q On page 6 of your affidavit you state that, "We object to this definition. . ." that is, the EPA-proposed definition of PCB's, "because it implies that all polychlorinated biphenol isomers are of equal environmental concern; i.e., that they all persist and bioaccumulate in the same manner in our environment. It has been well established by academic, government and industrial researchers that this is simply not true."

Now, with respect to this statement, is this supported entirely by the exhibits which you have attached to your affidavit?

A The exhibits I have attached and this particular reference, Nos. 2 through 13, were intended only as typical examples of the kind of reports that are available. I did not intend to imply that I have access to all possible reports generated throughout the world relating to this subject.

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I just cannot get my hands on all reports.

Q Well, let's take a look then at Exhibit 2.

Now as I understand it, it is your position that the lower chlorinated homologs are selectively degraded. Is that correct?

A That is correct.

Q The author of Exhibit 2 states on page 353 and 354 that:

"It might be expected, therefore, that biphenols with fewer chlorine atoms would predominate in planktonic samples unless these compounds were selectively degraded."

And that, I understand it, is the position of Monsanto. Is that correct?

A That's correct.

Q But in the next sentence the author states:

"Alternatively, since the solubilities and partition coefficients with organisms of the individual PCB compounds in a complex mixture present in an aqueous system can be expected to show considerable variation, the compounds detected in plankton would preferentially be those with lower solubilities in water and higher partition coefficients."

Could this not account for the lack of detection of

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lower chlorinated homologs in the environment?

A Will you give me some time to think about that?

(Pause.)

Q Well, let me ask the question differently.

Do you know what the solubility of Aroclor 1016 is?

A I can give you an approximation.

Q Approximately?

A About 200 parts per billion in tap water at 25 degrees Centigrade.

Q And the solubility of Aroclor 1254, approximately?

A Approximately 50 parts per billion.

Q And the solubility of 1260?

A About 25 parts per billion.

Q So is it a fair statement that the more chlorine atoms, the lower the solubility?

A Yes, that is correct.

Q So that you would expect, if what the author here states is true, to find more of the higher chlorinated homologs because their solubilities are lower. Is that not correct?

A I don't quite understand your question. It would seem to me that the more soluble the material, the more easily it would get into the water systems of the world, and therefore more easily detected.

Q Well, the author here states that:

". . .the compounds detected in plankton

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would preferentially be those with lower solubilities in water and higher partition coefficients."

Do you agree or disagree with that statement?

A I know nothing about plankton, so I cannot comment.

Q To your knowledge, have the lower chlorinated homologs been detected in the environment?

A My answer to your question specifically is yes, but I'm wondering if we're talking about the same thing.

Q Well, perhaps you had better explain your answer in somewhat more detail.

A There have been many reports of a material identified as Aroclor 1254 being identified in environmental samples In this material referred to as Aroclor 1254 there are chlorinated biphenols which properly are referred to as the lower chlorinated homologs.

So in answer to your question, have the lower chlorinated homologs been identified in nature, the answer has to be Yes.

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Q Well, you have stated here on page 6 that:

"Environmental monitoring programs have clearly demonstrated that with the exception of direct high-level controllable release near points of manufacture or use, the PCB's found in our environment are the more highly chlorinated ones, i.e., those containing predominantly five or more chlorine atoms per biphenyl molecule."

Do I understand the statement you just made to be a modification of this statement?

A No, sir.

Q In other words, the only time that lower chlorinated homologues are found are where they can be associated with direct, high-level controllable release.

Is that correct?

A Not the only times, no.

There are situations in which living creatures have been found to contain the lower chlorinated mixtures and in those cases it can be demonstrated that the source of the lower chlorinated material was known, identifiable, and of a given type.

Q Do you know what a partition coefficient is?

A I believe I do, yes.

Q Could you tell me what it means?

A I believe it's a measure of the ratio of the ability

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of a material to be present in one media as compared to another.

Q Would it be a measure of the rate of uptake in animal fatty tissue?

A It could be one of them, yes.

Q Do you know what the rate of uptake in animal tissue is for the various -- how the rate of uptake for, for example, Aroclor 1254 relates to the uptake for Aroclor 1016?

A No, I do not.

Q How are PCB's measured in the parts-per-billion range? What analytical technique is used?

A Electron capture gas chromotography.

Q Does the sensitivity -- or is the sensitivity of that technique higher for higher chlorinated homologues?

A I have never heard that. I do not know.

Q Does the technique depend upon the detection of chlorine atoms?

A No.

Q How does it work?

A As I understand it, it is based on the characteristic of many materials in which their ability to adsorb on certain kinds of surfaces or materials varies with their chemical structure.

And there are devices that have been developed

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in which the material being studied is introduced under certai: conditions -- of temperature, primarily.

This material is then, under these conditions of temperature involved, is trapped on this adsorbed material and these other devices are there to help us identify and quantify this material.

Q How precisely is the material quantified?

A I'm not an analytical chemist, so I can't answer.

Q Is salicylic acid cleanup used in the GLC process?

A Mr. Eckert, not being an analytical chemist, I cannot comment.

However, I have with me Dr. Scott Tucker, and if you wish we can consult with him to provide appropriate answers.

MR. PARK: Is that all right?

MR. ECKERT: I would rather, if Dr. Tucker is capable of answering this question and Mr. Papageorge is not, I would prefer to question Dr. Tucker directly. But we can do that later.

BY MR. ECKERT:

Q You have referred in the next paragraph to the lower polychlorinated biphenyls degrading rapidly enough to prevent bioaccumulation.

What is degradation? What do you mean by "They degrade"? What happens to them?

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A As I understand your question, it consists of two parts: what do I mean by degradation?

To me, degradation means that the material has lost its initial chemical identity after undergoing changes brought about by any one of several influences.

Now,what happens: I don't quite know how to answer that except that the chemistry of the final material differs from the chemistry of the initial material.

Q And your statement, with respect to degradation, is based upon papers 17 through 21, and 37.

Is that correct?

A Yes, sir.

Q Do any of those papers deal with PCB's having more than three chlorine atoms?

A Oh, yes.

Q Which ones?

A They all do.

Q Well, let's take a look, first, at 17: that's Evans and Lunt.

How many chlorine atoms are in the PCB's that were involved in this experiment?

A We are looking here at a summary of a paper, and as I read this summary it refers in the last paragraph to chlorinated biphenyls. That is the only reference I see to the chlorinated biphenyls, so I have no way of knowing from this

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summary the scope of this work.

Q How about the next one: "Metabolism of Biphenyl by Psuedomonas Putida"?

In this paper there are no chlorine atoms in the biphenyls.

Isn't that correct?

A I see no reference to the chlorobiphenyls: that is correct.

Q Now, reference 19 is --

MR. PARK: Could I raise one question here?

I have a feeling, just as in Dr. Thompson's original testimony that was presented some time ago where we found out that he did not put it all together himself, Mr. Papageorge has done the same thing here.

A great deal of this -- or certainly some of it -- was provided by our Dr. Tucker, who is here. Is it possible, or would there be any objection to letting Dr. Tucker and Mr. Papageorge confer on the questions that you're asking?

MR. ECKERT: Yes, I think there would be an objection.

I don't see any point in having Mr. Papageorge testify to something that he knows nothing about. Now, if that's your position, that Mr. Papageorge is not competent to answer this question we will hold it for Dr. Tucker later on.

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MR. PARK: That's not the point I thought I was making here.

Again, assuming we're after the truth, let's keep in mind that Monsanto is not directly affected by the toxic pollutants regulations that are the subject of the hearing. We're here simply to try to provide what we feel is some reason to the standards that will be promulgated by the EPA.

We are a manufacturer of a product. We have some experience in dealing with it. We're trying to assist in finding the truth.

I thought that I -- at least, I certainly received the impression in the early days of the hearings, when the EPA witness was on the stand, that he made clear that a number of people came together to put forth and to prepare and develop the documentation that the EPA had relied on at that time.

I fail to see why you would object to allowing two people here to respond to the question.

MR. ECKERT: I'm just trying to keep the proceedings from getting confused. I would like to talk to people who are knowledgeable on the subject matter, that's all.

MR. PARK: Well, let's let the record indicate that we have another man here who might well be able to answer the questions raised.

MR. ECKERT: I will pass over this for the time

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being.

BY MR. ECKERT:

Q I would like to turn to reference 4.

That, I believe, is the Jensen paper.

On page 248, the authors state:

"We found that the principle PCB components were PCB numbers 7 through 14 (low number is equal to a low chlorination degree), but the mussels also contained the lower numbers."

Does this not lead to the conclusion that PCB's with lower numbers also accumulate in aquatic organisms?

A Yes.

But it tells us nothing about the source of that PCB and the proximity of the mussels, in this instance, to that source.

Q That's true; it doesn't.

Does it tell us anything about whether the PCB's degrade?

A Not in this instance.

Q In reference 17 -- and I'm going to be referring now to your statement that the chlorinated biphenyl isomers readily undergo bacterial degradat on; the rate is dependent on the number of chlorines per biphenyl molecule.

The first exhibit to substantiate this is Exhibit 17.

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Now, Exhibit 17, as we have already established -- I believe we were going to hold this for later questioning.

Exhibit 18, as I recall, is unchlorinated biphenyls, so we come to Exhibit 19, "Degradation of Polychlorinated Biphenyls".

I think on this one I had better hold that for Dr. Tucker.

What I would really like to ask you about is the study that was carried out by Monsanto -- Oh, this is another study by Dr. Tucker. I really think all of these questions had better be held for Dr. Tucker.

In the next paragraph it's stated that:

> "The rapid metabolism of these chlorinated isomers, and their lack of importance as contributors to the chlorinated biphenyl tissue is evidenced in the results of numerous studies."

Now, to your knowledge, have metabolites of PCB's ever been identified?

A I do recall reading reports in which some attempts have been made to identify the metabolites of chlorinated biphenyls.

Q Which reports?

A I do not remember. I don't recall them now.

Q Nothing you have supplied us here?

A I don't believe so.

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Q Can you state with any certainty that metabolism has occurred, unless you have identified a metabolite?

A No.

Q In other words, you would agree that the data which you have provided us here don't support the rapid metabolism set forth in the bottom paragraph on page 6?

A I note, in that one paragraph, when I start the paragraph I do refer to rapid metabolism. Later, if you will read further, I also use the expression "and/or excretion", as I remember.

Q Rapid metabolism or excetion?

A Or excretion.

My intent here was to show that there was a disappearance of that material.

Q Where does the material go? Has that been identified?

A In this instance here?

Q Yes.

A I do not know.

Q In Exhibit 28 -- this is the study by Mr. Ryter at Woods Hole -- on page 9 a series of concentration factors are given.

Do you have that before you?

A Yes, sir.

Q There it says that for isomers with two chlorines

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the concentration factor is 1000.

Is that right?

A Yes.

Q And for three chlorines it was 7500?

A Yes.

Q And for four chlorines, symmetrical, 8000?

A Yes.

Q And four chlorines, asymmetrical, would be 12,000?

A Correct.

Q Do these data, in your opinion, support a conclusion that the lower-chlorinated homologues cannot accumulate?

A I sense here some confusion, either in my understanding or in your understanding, Mr. Eckert, and I don't quite know at the moment how to clarify it.

Q Well, why don't you answer my question first, and then you can clarify the misunderstanding?

A Your question, as I understand it, says that I made a contention that the lower-chlorinated isomers do not accumulate, and I don't know that I ever said that.

Q It states here on page 6, and I am quoting you now, sir:

"The lower polychlorinated biphenyls degrade rapidly enough to prevent bioaccumulation."

A Again, we've got to look at this with the proper perspective. Are we talking about the oyster that's exposed

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to this material at the source of discharge, or are we talking about a creature in the environment remote from any immediate discharge of these materials and eventually exposed to these materials we call chlorinated biphenyls?

Q Well, let's talk about the latter type for the time being, since that seems to be what you're stating won't accumulate any biphenyls.

Is it your position that organisms which are not directly at the point of discharge will not accumulate lower-chlorinated homologues?

A My position is that the creatures in the environment are not apt to accumulate lower-chlorinated isomers of chlorinated biphenyls to a degree that would be expected from the amount of chlorinated biphenyls that have been introduced into the environment, which would indicate that some of these isomers have been made inactive or have been chemically changed to the point where they are no longer identifiable in these creatures as isomers with low chlorine content of chlorinated biphenyls.

Q Well, couldn't the lack of finding of the lower-chlorinated homologues in the environment be equally attributable to the difference in concentration factors between lower chlorinated and higher chlorinated homologues?

For example, in this Ryter paper it appears that isomers with six chlorine atoms accumulated at a rate 48 times

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as much as those with two atoms.

Couldn't that account for the lower incidence in the environment of tissues containing PCB's of lower chlorinated homologues?

A I don't understand your question.

Q Do you have any evidence that degradation of the PCB's is responsible for the lower residues of lower-chlorinat homologues, as opposed to simple differences in the bioconcentration factors between the homologues?

A What's the question?

Q Do you have any data to show that degradation is responsible for the lower incidence of lower chlorinated homologues, as opposed to the differences in concentration factors between higher chlorinated and lower chlorinated homologues?

A There are some exhibits which I suspect you wish to talk to Dr. Tucker about, or question. Dr. Tucker about, in which there is evidence that the lower chlorinated isomers of biphenyls, chlorinated biphenyls, degrade.

There's also other evidence in the exhibits attached I believe it is reference number 33 -- there's a section in that presentation to the task force in May of 1972 in which we compiled some information that we had in terms of what we know about the amount of chlorinated biphenyl we have sold through the years and the amount that appears to be identified

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in samples from the environment.

There is an inconsistency in terms of the amounts represented in that information of the higher-chlorinated isomers as compared to the lower-chlorinated isomers.

Q Are the environmental samples ambient samples or tissue samples?

A What is your definition of ambient, sir?

Q Samples from the water or the sediments, analyzed directly.

A The samples I have referred to were primarily tissue samples.

Q So I ask once again: couldn't that difference be accounted for by the difference in the degree to which these homologues accumulate?

A I don't know.

Q You don't know.

MR. PARK: Do you understand the question?

THE WITNESS: I don't understand the question.

MR. PARK: I think the witness is looking at a table here that shows there are fewer lower chlorine isomers concentrating in the environment, and is thinking that that indicates that they degrade, since more are manufactured than the higher chlorine isomers.

MR. ECKERT: Well, perhaps the witness can direct me to the table he's looking at.

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THE WITNESS: This is the article by John Ryther which I have listed as Exhibit 28. On page 9 there is a table and let me refresh my memory again on this.

(Pause.)

As I understand his work, Ryther's work goes to Aroclor 1254 and the investigator then determined the amount of dichloro, trichloro, pentachloro, and so on, diphenol that they found in the tissues of these mussels and from that he calculated a concentration factor.

I don't know that that tells me anything about degradation.

MR. ECKERT: Well, I think that's what we wanted to say, too. I'm glad to hear you say that.

THE WITNESS: This does not tell us anything about the elimination of the material without degrading it. That's the point I'm trying to make.

BY MR. ECKERT:

Q Now on page 7 you state that:

"Similar findings in fresh water and marine fishes were reported by Zitko and Jensen. . ."

When you say "similar findings" what do you mean?

A By using the word "similar" I'm referring to the previous reference, Risebrough No. 2, in which Dr. Risebrough referred to the fact that more Aroclor 1232 had been produced than Aroclor 1254, yet invariably samples taken in the

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environment, other than those taken near an outfall or material identified in tissue, is referred to as being most similar to Aroclor 1254.

Q The Jensen paper you cite is entitled "DDT and PCB in Marine Animals in Swedish Waters." Is that correct?

A That is correct.

Q Do you have any data on the relative discharges of high and low chlorinated biphenols into Swedish waters?

A No, sir.

Q So that there is no basis for concluding then that the levels which were found are higher than would have been predicted because you don't know what to predict, based on the quantity discharged. Isn't that correct?

A That is correct.

Q Now you stated in the next sentence:

"The disappearance of the lower chlorinated homologs in extracts of tissues from birds and mammals indicate rapid metabolism or excretion of the lower chlorinated homologs."

Are there any data on aquatic organisms as opposed to birds on such excretions?

A I'm not aware of any.

Q Even if materials are excreted, can they not exert direct toxicity?

A I'm not qualified to answer.

eb3

Q I'd like to refer now to the Bagley and Reichel, et al. paper, Exhibit 12, I believe.

Now on page 254 of that paper there are some mass spectrographs.

Am I getting into an area where I should ask Dr. Tucker about the interpretation of these charts?

A I would suggest that, yes.

Q Very well. We'll hold these questions.

On page 8 you state:

". . .there is a definite difference in the toxicity and availability for bioaccumulation of dissolved and adsorbed chlorinated hydrocarbons."

And you cite three exhibits.

I'd like to turn first to Exhibit 24. There it states that-- The authors state in the second sentence of the article that:

"Both organochlorine insecticides and --"

A Let me find it first.

Q Greichus, Greichus, and Emerick.

A All right.

And page which?

Q The first page of the article.

The authors state that:

"Both organochlorine insecticides and polychlorinated biphenyls are stored in the fat

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of birds and are difficult to eliminate from the body. Therefore, it could be expected that PCB's would also be concentrated in the food chain of carnivorous birds."

Do you agree with that statement?

A I find no quarrel with it.

Q Does this lead to the conclusion that PCB's are rapidly eliminated or excreted?

A This does't tell me which PCB's he's referring to.

Q Now you cited this paper on the difference in toxicity and availability for bioaccumulation of dissolved and adsorbed chlorinated hydrocarbons. Could you point out to me where in this paper the difference in availability of dissolved and adsorbed PCB's is discussed?

A Let me refresh my memory. I haven't read it for some time.

(Pause.)

MR. PARK: Judge Sweeney, would it be permissible to let the record show, in deference to the witness, that these materials were submitted just about two months ago, and at that time the witness was much more familiar with all of the attachments and citations than now.

MR. ECKERT: Well, I would expect your witness, just as our witnesses, to be ready to be cross-examined on any of the materials they have submitted. I certainly would

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not expect any less from our witnesses when they are on the stand, Mr. Park.

MR. PARK: Well, Mr. Eckert, let the record indicate that some of the materials that I understand are coming from your witnesses have yet to be received by us.

MR. ECKERT: That's not the issue. The issue is whether or not our witnesses will be prepared to answer questions from industry Counsel.

MR. PARK: I was just pointing out that the time period between preparation of your witnesses' testimony and their cross-examination and that between our witnesses' preparation and his cross-examination is widely different.

BY MR. ECKERT:

Q With all due deference I think we should try to move along here and not delay any longer. If you come up with something-

A I can't find it. When it was initially put in I thought it was relevant. At this moment I just can't find the specific paragraph or statement which at the time I thought was relevant.

Q When PCB's appear in sediments, in your opinion are they then removed from availability for uptake into organisms or do they remain available?

A The availability of the PCB's to adsorb on particulate matter to organisms will vary on many conditions such

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as the type of organism, its proximity to the sediment, its ability to -- let's call it digest the sediment if you will, or extract the PCB from the sediments.

Q Could you not have a situation in which the sediments in the ambient water were in equilibrium and in fact there was an interchange, an exchange of PCB's between the two media?

A Yes. The answer to your question is Yes.

Q You also cited Exhibit 35 for this same proposition and I would like to ask you to turn to Exhibit 35.

Exhibit 35 deals with Endrin. Isn't that correct? And isn't it true that Exhibit 35 does not directly deal with PCB's at all?

A That is right, but the reference is to chlorinated hydrocarbons and this was introduced as an example of the types of things that investigators are finding with chlorinated hydrocarbons.

Q Well, now, this paper-- Let's take it on its own merits. Does it say anything with respect to the difference in the toxicity and availability for bioaccumulation of dissolved and adsorbed chlorinated hydrocarbons?

A As I understand this paper, it attempts to demonstrate that a chlorinated hydrocarbon is available to the particular species of fish referred to there, primarily through its gills rather than through the digestive system.

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Q Does that have anything to do with the difference between dissolved and adsorbed chlorinated hydrocarbons with respect to their bioaccumulation potential?

A I would think so.

Q What conclusion do you think can be drawn from this paper?

A The conclusion I drew from this paper is that this particular material, Endrin, accumulated in the fish that were studied to a high degree, primarily through the gill.

Q But does the paper specify whether the accumulation was through the taking in of dissolved or adsorbed material?

A I assumed it was dissolved material.

Q But the paper doesn't say that?

A It doesn't say it is on particulate matter either.

Q It doesn't say either one so there is no basis for a conclusion; isn't that right?

A Okay.

MR. LORANT: Mr. Eckert, before you leave that, could you give me the citation of that paper since I don't have a copy of it here?

MR. ECKERT: The paper I'm referring to here is "The Pathway of Endrin, Entry in Black Bullheads, Ictalurus melas," and it's by Ferguson and Goodyear and Copeia, 1967, pages 467 to 468.

BY MR. ECKERT:

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Q Finally, we come to Exhibit 36, Polychlorinated Biphenyls Adsorbed from Sediments by Fiddler Crabs and Pink Shrimp."

Is there any data here with respect to the difference between dissolved and adsorbed chlorinated hydrocarbons?

A If I recall the question, you said "Is there any data" in this article that refers to the availability of dissolved or adsorbed chlorinated hydrocarbons.

Q The difference in availability between the two forms.

No, this article just shows that fiddler crabs were found to contain Aroclor 1254 after being exposed to sediments containing Aroclor 1254, it does not attempt to show difference between that and any other type of exposure.

Q This paper does show that even after Arocolor 1254 is -- has entered the sediments, it still remains available for biological uptake, does it not?

A That's right.

Q Further up on page 8, you have stated, "We have found if waste water streams are not sampled properly, the PCB levels found depend on the sampling procedure employed and bear no relationship to the amount of PCBs discharged."

Now what would be the effect upon the levels detected of improper sampling procedures? If your procedures were improper, would you expect to find more or less PCBs than are actually there?

A It could go either way.

Q What would be the effect of an improper sampling procedure? What are the improper sampling procedures? Could you describe the difference between a proper and an improper sampling procedure?

MR. PARK: Mr. Eckert, let him go ahead and answer the question, but I just wanted to say that this is something Dr. Tucker could answer much more ably, if you would wish.

MR. ECKERT: All right. We could hold that.

Is the same true of the discussion on page 9, testing by other laboratories?

MR. PARK: Yes.

BY MR. ECKERT:

Q On page 10, you state in the last paragraph on the page that cumulative sales of PCBs have been estimated to be about 500,000 tons.

Has anyone, or has Monsanto made an attempt to ascertain where those PCBs are today? How much of those PCBs can be accounted for?

A The only attempt to answer that question was made by Dr. Serafim from the Massachusetts Institute of Technology and he included a summary of his thoughts in that Exhibit No. 1 that we were looking for earlier.

Q And I hope we will be provided with a copy of that, too.

MR. ECKERT: Will we be provided a copy of that before the close of today?

MR. PARK: It's an EPA publication, Mr. Eckert.

THE WITNESS: No, it is not.

MR. PARK: I'm sorry.

THE WITNESS: We assumed something, that everybody interested in PCBs had this. It has become the bible.

MR. PARK: It's a governmental publication. I recognize it's our responsibility to bring the thing in.

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JUDGE SWEENEY: Well, could he borrow your copy overnight?

MR. ECKERT: My consultant has a copy which he has just handed to me, so I think the problem is solved.

THE WITNESS: We apologize.

JUDGE SWEENEY: You will supply one for the Reporter

MR. PARK: Yes, sir.

BY MR. ECKERT:

Q About one-half of the PCB's, you state, were used in an application where containment was difficult and losses into the environment were common.

Is it your opinion that all of these PCB's were lost to the environment, or are some of them still out of the environment uncontained?

A When you say "all", do you mean the half?

Q The half, yes.

A It's my opinion that they went out to the environment fairly rapidly.

Q It states that:

"Extensive harm predicted by some theories has not been found and documented."

Can you tell me what theories you are referring to here?

A I can give you some examples that come to mind. The demise of bird populations due to thin eggshells: that

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has been disproven following the initial emotions that arose in the late '60s and the early '70s.

Q Who predicted this would happen due to PCB's?

A I'm trying to remember some of the articles.

Dr. Risebrough was one of the proponents of the theory covered very emotionally in the San Francisco Chronicle in '69.

I don't have all of those articles with me. There was, I believe an article in the Environmental Reporter. I don't recall all of them.

Q Are you familiar with the work done by Platonow on minks?

A I have read the reference to the Platonow work; I have not been able to get a copy of that paper.

Q That would be an example where some harm evidently did result.

Isn't that correct?

A Not having seen the paper, I do not know.

Q Are you familiar with the term "Yusho disease"?
A Yes.
Q To what does it refer?

A It's the expression used to describe an epidemic that occurred -- at least, it was referred to as an epidemic: symptoms that occurred among a group of about 1000 people in Japan and is attributed to the presence of PCB's in rice soil used for human consumption.

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Q Do you recall what symptoms these people experienced?

A Yes.

I recall such symptoms as headaches, dizziness, and running of the eyes, nausea, loss of appetite, skin eruptions, infants born with pigmentation problems that cleared after three months, as I recall.

Q Of the adults who were afflicted: did the problem go away quickly or did it seem to linger on for a long time?

A I believe it varied from person to person; at the last I read there were still some of those people that exhibited some of the symptoms.

Q And how long ago was their exposure?

A The late '60s, about 1968.

Q Are you familiar with any data on damage to cows in England that was attributed to PCB's?

A No.

Q On page 11, you state that the lack of extensive harm, or the lack of evidence of extensive harm, indicates that -- and I am paraphrasing you; correct me if I do so incorrectly --

A Would you give me the paragraph? I find when I'm looking for it I can't listen to you.

Q The top of the page, page 11.

A All right.

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Q "This lack of evidence indicates that all of the PCB's do not persist in the environment as a result of factors such as the biodegradation we have discussed previously."

Isn't it equally possible that the total amount which has been discharged has not yet, on a world-wide basis, reached harmful quantities?

A No, I can't accept that.

From my understanding of the uses of polychlorinated biphenyls, the amounts introduced into commerce, I find it very difficult to conceive that this material has not been introduced into the environment by now.

Q Not that it has not been introduced, but if you spread all of the PCB's that have been introduced into the environment evenly over the world, what sort of concentrations would you expect to find, for example, in the aquatic environment?

A Very low.

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Q In fact it might well be below the limit of detection, might it not?

A Yes.

Q And so the fact that you do not find them doesn't necessarily mean that they are not there. Isn't that also true?

A That's true, but when I say lack of evidence I'm talking about effects rather than presence. It would seem to me that the effects, if any, were to be--

Q It seems to me this sentence does not talk about effects. It talks about persistence. Can you draw any inferences at all with respect to persistence from the lack of effects?

A Did you say resistance or persistence?

Q Persistence.

A Well, when I worded this, the word "evidence"-- I had intended it to refer to the last sentence on page 10. I was referring to evidence of extensive harm.

Q Well, the evidence of extensive harm-- Let me ask you this:

Just because harm has not been found has nothing to do with persistence or non-persistence; true or false?

A I can't answer that.

Q You stated that the lack of evidence of harm, as I understand your testimony, indicates that PCB's do not

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persist. But couldn't it just as easily indicate that PCB's world-wide have not reached quantities -- and I'm talking of the lower chlorinated homologs -- have not yet reached harmful quantities?

A You're talking about reaching harmful quantities world-wide--

Q That's right.

A -- but before they reach harmful quantities world-wide they must have reached harmful quantities locally, and since nothing happened locally, how could we expect it to happen world-wide later?

Q Well, I think we've established that some local harm has occurred or perhaps we haven't established that with you, but even passing that on, can you draw any inferences at all with respect to persistence from evidence of harm?

A Would the Reporter repeat the question?

(Whereupon, the Reporter read from the record as requested.)

THE WITNESS: No.

BY MR. ECKERT:

Q Now on page 11 you state:

"The PCB's that do persist may not be available because of some factors not clearly understood at present."

Do you see that?

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A Yes. sir.

Q Do you have any data to substantiate this statement?

A Well, there is this evidence that I referred to earlier in Exhibit 33, in which we attempted to show that the amount of material that was sold and presumably introduced eventually into the environment differs from the kind of material being identified.

Q But in fact you don't know why this is; isn't that correct? There could be any number of--

A That was the intent of that sentence. There are factors that you and I -- or let me say that I don't quite understand that could conceivably effect the availability of these materials and subsequent effects if any.

MR. ECKERT: Your Honor, we have come to 4:30 and I have a good deal more examination. I would like to read Exhibit 1 before I go any further, and I would also like to examine Dr. Tucker. I think it is going to take considerable more time. Could we adjourn until tomorrow?

JUDGE SWEENEY: All right. We'll adjourn until nine o'clock tomorrow.

MR. RICHEL: Your Honor, before you adjourn, one or two brief comments.

Dr. Lauer is to be available. Do you now perceive any difficulty in cross-examining him tomorrow as opposed

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to some future date?

MR. ECKERT: Not at all. I'll be through with him tomorrow.

MR. RICHEL: Second of all, earlier in the day I addressed myself to the problem of EPA's introduction of new materials upon which we did not base -- upon which our witnesses did not base their initial response.

I indicated earlier that I would discuss with EPA Counsel whether or not EPA is considering authorizing or countenancing introduction of new materials by industrial objectors.

I had a very brief discussion on the subject and Mr. Eckert indicated he would take no position. I am asking for your ruling, your Honor, that industrial objectors be allowed additional time to respond to new issues raised by EPA's rebuttal testimony.

JUDGE SWEENEY: I don't think there is time for that.

MR. RICHEL: Is there any requirement, your Honor, that there be cross-examination? If we found the time to submit the evidence, is there any requirement that anything further be done on your part?

I recognize the problems inherent with that. I recognize that material such as that is not ordinarily entitled the weight of materials submitted and subjected to

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cross-examination, but I submit that that approach would not in any way affect your ability to give the Administrator his record so that three or four days later he could make a decision.

JUDGE SWEENEY: He's going to need more than three or four days I think.

MR. RICHEL: I would think so.

MR. LORANT: Your Honor, extending that comment just a bit, the rebuttal affidavits of EPA, to the extent that they are not truly rebuttal but in fact reflect new matter, are they, in your view, admissible? I think this is another way of saying what Counsel has just said. I find it difficult to consider adequate response merely by cross-examining EPA's witnesses on new matter not necessarily raised in the original objections and support thereof.

JUDGE SWEENEY: You can object to it when the time arises.

MR. LORANT: Okay. Thank you, sir.

MR. RICHEL: Do I have a negative ruling on my motion?

JUDGE SWEENEY: Yes. There is no time for further receipt of evidence from the objectors and it is their position that they don't have the burden of proof, so they don't have any right to answer the rebuttal of EPA.

MR. WILLS: Your Honor, are you saying the time

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that EPA has to finally submit all these documents in rebuttal to tha evidence with respect to my motion this morning?

It was my understanding we would get copies of the unpublished data of Dr. Veigh and a few other individuals.

JUDGE SWEENEY: I thought that was to be given to you at noontime.

MR. ECKERT: That data is here right now. It's available for you right now.

MR. RICHEL: If an exception to your negative ruling is needed it's done.

JUDGE SWEENEY: All right.

Well, there is no rebuttal to rebuttal.

MR. LORANT: Well, when there's new matter there is no way of responding to it.

JUDGE SWEENEY: Well, they call it rebuttal. I haven't seen it myself.

We will recess until nine o'clock tomorrow.

(Whereupon, at 4:37 p.m., the hearing in the above-entitled matter was recessed to reconvene at 9:00 a.m. the following day.)

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