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tank cars may drip while they're being unloaded, or there may be some drippage or spillage, and that this operation is open to the weather.

A. Yes.

Q. Now, I'm asking if this were covered over, wouldn't that reduce the discharge of PCB's?

A. Oh.

I think another way -- and it slipped my mind whether we were thinking about this or whether we were doing this -- is just to put the spout in a drip-catcher. We have been thinking about things to make sure that any drip simply went into a glove.

Q. Well, the question I asked was if the unloading area were covered and protected from the rain, couldn't that have the effect of reducing the amount of PCB's that leak out into the effluent?

A. I don't know.

I think it's a kind of a hard thing to say because you could say, "Well, in any one trip it might," but in the overall sense that material is going to move. It transports from a variety of ways -- dust, vapor -- and I could not guarantee it would be negative.

Q. What precautions are taken to avoid accidental spills during unloading operations?

A. Well, of course, there is very strong administrative

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control in the process, but I think the process itself, with it's top-loading arrangement, goes a very, very long way to eliminate practically-conceivable spillage accidents.

Q. How about on the storage tanks themselves? Are there high liquid level alarms on the storage tanks?

A. I doubt that there are high liquid level alarms. People, again from good administrative control, know the quantity of PCB in that plant in these tanks at all times.

Q. What type of control at the transfer lines and the tank drain valves is employed?

A. Tank drain valves?

Q. As you drain from the storage tanks.

A. Well, yes. Okay.

We put from there into the process. I was thinking about drain on the basis of removing undesirable contents from the thing, and there is no such system.

Q. Is that done also?

A. No. That's why I wanted a definition of your drain.

The transfer line that goes from the tank to the process is, of course, a closed pipe that is manifolded through valves to be sent to whatever portion of the Sharon plant the PCB's are used in.

JUDGE SWEENEY: Let's take a fifteen minute recess now.

(Recess.)

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JUDGE SWEENEY: Back on the record.

Mr. Eckert?

BY MR. ECKERT:

Q Dr. Wright, you have discussed some of the levels of PCB's being discharged from the Sharon facility.

Have you investigated what types of PCB's are present in those discharges?

A Yes.

It is my recollection that our analysis of the homologs present reflect that there is quantities of 1254 and other material that was used in the distant past.

In relation to this I should like to make a correction to the record. At the Sharon plant and our transformer plants, we use 1242, not 1016. I was relating to the capacitor plants.

Q So then the capacitor plants use 1016 primarily; is that correct?

A Yes. That's correct.

Q Do the capacitor plants use any 1242?

A This is where I say it's in the process of phase-out; whether it's completed or not, I don't know.

MR. MC LAIN: No Aroclor 1254 is in current use in the capacitor manufacturing plant in Bloomington.

JUDGE SWEENEY: Do you accept that correction, Dr. Wright?

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A. Yes, of course.

BY MR. ECKERT:

Q. So we're still talking about two homologs, 1216 and 1016, and 1242; is that correct?

A. At the capacitor plants.

Q. Well, but at the transformer plant --

A. No 1016.

Q. Only one, 1242. Isn't that right?

A. Yes.

Q. Were you able to quantify how much of the discharge from the Sharon plant was 1254?

A. It is my recollection all the material looked like 1254, more nearly like 1254

Q. Do workers in the plant who work around PCB areas apply protective clothing?

A. Yes, they have protective clothing, administrative procedures, and warning signs.

Q. Is the protective clothing laundered on the site?

A. No, it is not. They don't wear total protective clothing as we would use, for example, in the nuclear areas -- areas of radiation waste. We don't use cleanroom techniques from the standpoint of total coverage -- shoe covers, and that sort of thing.

Q. What happens to leaking capacitors, rejects, and leaking transformers in these plants?

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What's done with them?

A. Well, in the case of the transformers, the material is pumped back into good storage; and then the material that remains, if it has to be cleaned, it is cleaned. And the waste material goes into the PCB waste tank, as described before, and sent eventually to oxide incineration.

Q. How much time would be necessary to conduct laboratory and pilot scale studies to see if activated carbon or some other treatment process could be used to control PCB discharges?

A. Well, there are several levels that one would have to undertake.

If one would amend one's question to say, how much time would be required to develop the design for a cleanup of all of these systems, then that's a fairly major chore. I would anticipate it to be somewhere in the range of two to eight years, depending on how successful you were.

Q. Well, assuming, hypothetically, you decided to go with activated carbon:

How long would it take for you to get that on line?

A. What size? I mean, I don't know how to design it.

Q. In other words, you'd have to know whether it was required to treat the entire waste stream, or part of the waste stream; is that right?

A Well, I'd have to know at least some of all things. That's only part of it. I would have to know how large to make the through-put.

I would have to know at what velocities I could have through the charcoal, assuming that it worked at all, before I got channeling; and if it didn't work I'd have to know what residual volume to have there so I would have some idea of the frequency with which it should be changed, and to get the change procedures worked out.

From the laboratory to the -- the laboratory work has not been done. After the laboratory work, the problem of engineering design development work is where really the crucial work would be required. You would simply have to have scientific information to make the design.

Q Well, you referred to the lab. But aren't there several industrial installations in which activated carbon is now used? So that there are full scale data?

A Oh, sure, but for removing of different components from a different stream. Oh, sure.

And their variation in performance is enormous. It depends strictly on what's to be removed, and from what stream.

Please understand that I don't even know if there would be any separation occur by moving PCB containing water through a charcoal adsorber. It may come out the outlet

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in exactly the same content that it went in the inlet.

Q. You've suggested that effluent limitations for PCB should be one percent of the quantity of PCB processed.

Under such a limitation, what would be the concentration of PCB in the effluent from the Sharon facility?

A. Well, first, let's go back and rephrase -- reunderstand the proposal.

The one percent would constitute the upper envelope. It would have two additional criteria to meet.

One is that the bioconcentration of any element destined for edibility by man would be maintained at or below the .5 ppm level specified by FDA.

Secondly, if there were a particular situation where this PCB-containing water was used in a feed stock preparation, then that limit would be dropped by another factor of ten.

Now, both those constraints, then, are working within the envelope of the one percent release. In other words, this is site-dependent, requiring on-site environmental data to substantiate compliance.

Q. Has Westinghouse attempted to measure the PCB residue levels in the tissues of aquatic organisms in receiving waters for its facilities?

A. Yes, it has.

Q. Can you be specific about the levels which were

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found and the facilities which were involved?

A. Yes, I can; certainly in the case of the Sharon plant.

In the Sharon plant, we found PCB levels on the order of 2 ppm and less in fish flesh.

Q. Some were as high as 2 ppm?

A. Yes.

Q. And this is based on whole fish measurement?

A. I believe the key is, the fatty tissue is the principal concern. I believe this particular test was on the whole fish.

Q. In which organisms were these levels found?

A. My memory is already shown to be defective in terms of what the sample was based on. If you would like to pursue this particular line of questioning, we have Dr. Munson here, who can supply this data to you directly.

MR. ECKERT: Your Honor, this is a bit irregular, but under the circumstances, I would like to call Dr. Munson to examine him on this line of questioning.

JUDGE SWEENEY: Have you finished questioning Dr. Wright?

MR. ECKERT: Yes. As a matter of fact, I am through with Dr. Wright.

And if there is no objection from Westinghouse, I would like to -- let me say this: I'm through with Dr. Wright

if Dr. Munson can be available to answer these questions. If not, then I'm going to have to pursue this with Dr. Wright to the extent he can answer them.

JUDGE SWEENEY: Do you have any questions?

MR. WILLS: I have some redirect.

JUDGE SWEENEY: All right, then you are just excused temporarily, Dr. Wright.

(Witness temporarily excused.)

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Whereupon,

THOMAS O. MUNSON

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

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DIRECT EXAMINATION

BY MR. ECKERT:

Q Would you state your name for the record?

A Thomas O. Munson. I'm a biochemist.

Q You're a biochemist?

A I'm a biochemist, yes.

Q And you're employed by Westinghouse?

A Yes.

Q Could you describe the efforts which were made to measure PCB residues in aquatic organisms in the receiving waters of the Sharon plant, please?

A Yes.

We electroshocked some fish downstream from the Sharon plant. The stream is not a very clean stream. There's quite a bit of other industrial effluent in the stream, so the only fish we got for our shocking were fairly good-sized carp. So the number which Dr. Wright referred to is based upon wet weight in fillets of the carp.

And the number he mentioned was-- I think the highest value we did find was about two parts per million.

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This would have been-- Aroclor 1254 was the closest standard.

Q Were any other homologs found?

A I don't believe so. It has been some time since-- This work was done more than a year ago.

Q Are there any other industrial dischargers or any dischargers at all of PCB's on this river, to your knowledge, other than the Westinghouse plant?

A To my knowledge, and my best guess would be that nobody would be discharging at levels in our order of magnitude. Our plant is very close to the source of the water. We're downstream from the dam just a short ways.

Q Did you measure the ambient concentration of PCB's?

A In the water?

Q In the water.

A No, we did not. At that time we didn't have the technical capability of doing so.

Q At that time was the level of PCB's discharged from the Sharon facility roughly the same, greater, or lower than the numbers cited by Dr. Wright?

A Okay. Let me explain to you.

The sequence of events was that we became concerned about the possible impact that we might be having on the environment around our manufacturing sites. This was several years ago, and at that time we initiated an environmental survey which I performed around the plants.

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We were mainly interested in looking at sediments and at samples of the biota. It was a limited plan, so that in most cases we could not do a very extensive sampling of all levels in the food web. And at that time we were not sampling the effluent discharge or the receiving water, mainly due to technical problems involved in doing this.

So the answer to your question is at the time the biota were sampled, we did not have data on the effluent discharged. That data has only been generated in the recent past.

Q So you're saying that the data on effluent quality which Dr. Wright gave us is data which was taken at some point in time considerably after the study was made. Is that correct?

A Yes, that's correct.

Q To your knowledge, have control measures been instituted between the time the study was made and the time that the measurements of effluent quality were taken that might account for lowering of PCB's in the effluent?

A Yes. My guess would be that if we sampled again today, the conditions would be lower. I should not expect them to be worse.

Q Thank you very much, Dr. Munson.

(Witness excused.)

Whereupon,

JAMES H. WRIGHT

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resumed the stand and, having been previously duly sworn, was examined and testified further as follows:

MR. WILLS: Could we have about a two-minute recess?

JUDGE SWEENEY: You have no further questions of Dr. Wright?

MR. ECKERT: We have no further questions of Dr. Wright.

JUDGE SWEENEY: We'll take a very short recess.

(Brief recess.)

JUDGE SWEENEY: Back on the record.

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REDIRECT EXAMINATION

BY MR. WILLS:

Q Dr. Wright, to clear up one thing about silicon, I believe you said silicon was used in capacitors?

A I'm sorry, if I did and if the record shows that, I should have said in transformers. As far as I know, silicons have never been used in capacitors.

Q Also, you indicated that the discharge into the waters of Sharon was either two grams or four drops. Have you recalculated that?

A Yes. It turns out to be 40 drops or basically two grams per day.

Q Now in response to one of Mr. Eckert's questions, looking at page 17 of your testimony, the 3400 to 8500 figure of workers involved was reduced down to 200. How did you

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arrive or what standard were you looking at to get the 200 people?

A I believe, Mr. Examiner, this is a very key point in these PCB's. I believe that it will come up again in the course of these hearings, that what we are basically convinced of is that much, probably 90 percent of our PCB discharges at the present time are the result of PCB that is saturated in the ground, in sewer pipes that may have been sealed but are still leaking to combine with ground and surface water to reappear.

I think we have-- At the Sharon plant, for example, I think we have a problem that if we terminate all production, all use of PCB on that site, we would not terminate, by any means, the release of PCB's to the environment down to the level of the proposed standard.

Now this poses, I believe, a very major problem. To say if the standard were instigated it is accurate to say that 200 people, workers at Sharon, would be affected, but we must say if we interpret the standard to apply to ongoing operations only, the active releases from current operations.

If on the other hand the standard is to say from all sources including those which are saturated in the ground from time past and from other sources that we simply cannot identify at the present time, then our only alternative

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would be to shut down the entire Sharon operation and all the people that are employed therein and terminate our relationships with it, because we would never, in our opinion, be able to meet the standard for emissions from the former spills in the area.

And I think this is where we go very quickly in that one plant from a matter of 200 people, with one interpretation of how the standard would be enforced, to a matter of 45,000 in the alternative of saying that the plant, whether it's binding or not, is discharging it and hence would be liable.

MR. WILLS: No further questions, your Honor.

JUDGE SWEENEY: Do you have any questions, Mr. Eckert?

MR. ECKERT: Just one.

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RECROSS-EXAMINATION

BY MR. ECKERT:

Q You stated that the PCB's would still be discharged if your plant shut down tomorrow. Would one source of those discharges be runoff from the land on which old spills occurred?

A Yes, that would be one source; yes.

Q So that for such lands at least it is your opinion that PCB's in the sediments might still become available to the environment through runoff; is that correct?

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A Yes. I think principally I am worried about what is under that big plant. One of the first questions raised was what about flushing out all of the old lines and everything else like that.

MR. ECKERT: I have no further questions.

JUDGE SWEENEY: Can I ask one question, please?

How long would you have to close the plant down to prove the scientific correctness of your thesis?

THE WITNESS: Well, we are thinking now of doing it. If the plant takes a mass vacation this summer, we will at least have two weeks of opportunity to make these tests, and I have certainly recommended that we do just that very thing.

JUDGE SWEENEY: Exhibit 81 is received in evidence.

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(Exhibit 31, previously marked for identification, was received in evidence.)

(Witness excused.)

MR. ECKERT: Your Honor, I would like to ask at this time if Mr. Carlson has conferred with his Counsel?

MR. CARLSON: I'm sorry to tell you that I was unable to reach him.

MR. ECKERT: Well, at this point I guess we can defer it. We are very short on time today, your Honor,

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and we have two more witnesses to get through, and I suggest that we move on to Dr. Simons at this time.

JUDGE SWEENEY: Very well.

Whereupon,

EDWARD L. SIMONS

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

JUDGE SWEENEY: The written testimony on behalf of General Electric is in four sections. Which ones are you going to examine on, Mr. Eckert?

MR. ECKERT: Well, today I'm going to examine Dr. Simons on Section 2, and perhaps one or two questions on Section 4, which are the two sections of his material.

JUDGE SWEENEY: Will you be examining the other two witnesses.

MR. ECKERT: I'll be examining Dr. Lauer tomorrow morning, and I have no questions for Mr. Farnsworth.

JUDGE SWEENEY: The entire written testimony, all four sections, will be identified as Exhibit 82.

(The document referred to was marked Exhibit 82 for identification.)

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CROSS-EXAMINATION

BY MR. ECKERT:

Q Dr. Simons, I will refer you to Section 2.

A I have it. Thank you.

Q On the second page you give the low flow of the Housatonic River as 14 cfs.

Do you have data on the average seven-day, ten-year low flow for the Housatonic?

A It is approximately I believe about 40, but I do not have the specific data with me. It has been compiled and published by the State of Massachusetts and is available.

Q On the top of the page you say "Application of Section 129.09(c) to a GE plant."

Roughly how many GE plants manufacture products containing PCB's?

A Four.

Q And which plants are they?

A Transformers are manufactured at Pittsfield, Massachusetts, and Rome, Georgia.

Capacitors are manufactured at two closely-related plants, one in Hudson Falls, New York, and the other at Fort Edward, New York.

Q Which of these plants discharge into receiving waters directly and which discharge into publicly owned treatment works?

A All four discharge directly into navigable waterways.

Q Now as to the Rome facility, what is the receiving water?

A There are drainage ditches from the plant, one of which goes to the Oostanaula River which eventually flows into the Coosa River.

The other drainage ditch goes directly to the Coosa River.

Q Do you have flow figures for those rivers?

A I do.

Q Would you give them to me, please?

A Yes.

On the same basis as the regulations call for, the seven-day, ten-year low flow for the Coosa River 1300 cfs.

For the Oostanaula , 495 cfs.

Q And what is the receiving water for the Hudson Falls facility?

A The Hudson River.

Q And its low flow at that point?

A 1600 cfs.

Q And the Fort Edward facility?

A The same.

Q You've given some detail about the levels of PCB's that would be required to be discharged. Could you tell us

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for each of these facilities what quantities and concentrations of PCB's are being discharged now?

A We analyzed to get data for the Refuse Act permit applications. The current discharge from the Pittsfield plant from current production is approximately .1 pound per day.

Q Are you able to isolate discharges from current production and discharges from old production?

A Isolate physically?

Q Well, how do you distinguish-- Let me ask it that way. How do you distinguish discharges from current production from discharges from residues?

A We transferred, at about the end of 1972, from the use of Aroclor 1260 to the use of Aroclor 1254. When samples are analyzed, we attribute any 1260 peaks in the gas chromatogram to residuals from past production and use only the 1254 peaks to establish the levels of current discharge, that is, discharge from current operations.

Q Well, let me ask you about 1260. Do you have data on the levels of 1260 now being discharged from the Pittsfield facility?

A They also run approximately .08 to .1 pound per day; almost the same as that from current production.

Q. Has an effort been made to elucidate or to identify rather the sources of contamination of the waste stream with these PCB's?

A. The contamination from past operations, or from present operations?

Q. From present operations.

A. We have approached the problem of present operations with the same philosophy that Dr. Wright mentioned: that, because these operations in the manufacture of transformers do not require process water, that Pyranol, which is the G-E trade name for its use of PCB's, these operations do not involve water, the Pyranol is used in an anhydrous state.

Therefore, we have taken all of the steps that we thought were warranted and necessary to keep losses from that operation from getting into drainage systems that would ultimately be discharged to the river.

Q. Have you identified the sources of the contamination? Because apparently there is some contamination of the effluent despite your best efforts.

Have you identified what these sources are?

A. You have to understand that, in the operation of a transformer manufacturing plant, the transformer has to be filled at a particular station. It is done over a deadended sump, with carefully marked special hoses so that there is no opportunity for mistaking what you are dealing with. There is

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a daily check by an engineer who goes around with a checklist to make sure that all of the hoses are in proper position; that the sump is not full; when it reaches a certain level, it is pumped out.

So, all of these stages of building transformers are monitored and controlled as carefully as it is humanly possible to do. With a big transformer which may hold a thousand gallons or more of Pyranol, the kind of losses that we are observing are in order of parts per million of the total amount being used.

Q Well, you have stated losses are in the order of parts per million.

How are these measured?

A I say, if you measure the total amount that's in the effluent stream. That is the only place where we can measure an actual loss from a plant. Inside the plant, the drains are deadended. The sump is deadended. It is pumped out daily.

Q What's done with the residue?

A Any waste material that is not recoverable for further use is transported to an incineration facility that we have constructed on site. This facility is capable of complete incineration of PCB's, with the only effluent being carbon dioxide and water.

So any PCB's that are not recoverable for further

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use are incinerated on site.

Q Well, you have described what you have done, and you have also described that there are PCB's in the effluent.

Is it your testimony that you don't know how the PCB's get into the effluent?

A In handling any big equipment which must be transported from a filling site to a testing site, and back and forth, there is always the possibility of an adventitious loss of a drop here or a half a drop there.

Q Well, the transformers are sealed after they're filled, are they not?

A Ultimately they are sealed. There are operations that must be carried out in the testing of transformers before the sealing is completed.

Q What is done with a reject or a transformer that has been shown to have a leak?

A The Pyranol that is in the transformer is drained, and, as I said earlier, if it is suitable for reuse it is put back into the production system.

If the Pyranol is not suitable for reuse it is incinerated.

Q And the transformer from which the Pyranol was extracted?

A After it has been freed of its Pyranol it is repaired if it can be repaired. Those are massive pieces of

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equipment that are not likely to be discarded if there is any possibiility of repair and sending it back through the production line.

Q. Is Pyranol a trade name for a PCB compound?

A. It is the trade name under which G-E identifies its transformer fluid.

Q. What does Pyranol consist of?

A. It consists of the Aroclor 1254, and it consists of trichlorobenzinc.

Q. How much of each?

A. It's approximately a 60 - 40 percent ratio.

Q. Have you made any attempt; that is, G-E made any attempt to measure PCB residues in receivving waters from any of its facilities?

A. We have taken occasional samples from the Housatonic River, which is the receiving stream for the Pittsfield plant.

Q. What levels of PCB were observed in the organisms?

A. We have not sampled organisms. We've sampled the river water.

Q. I see.

Could you tell me what levels of PCB's were observed in the water?

A. The report that I have seen show values in the vicinity of the outfalls of between one and three parts per

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billion -- in that range.

Q. Would this be before or after reasonable mixing had occurred, in your opinion?

A. I could not give you an answer to that, because I have not gotten -- I have not seen a definitive position in the river where this was taken.

Q. The sampling was done at only one point?

A. No, samplings were made also below the outfall, and at a distance of something between one and six miles -- and I am not sure of the exact distance at this point, but it could be as small as one mile below the outfall--no detectable PCB's.

Q. What was the analytical technique used?

A. Essentially, the technique recommended by EPA: the extraction of the water with hexane, concentration of the hexane extract, and then injection of a sample of that extract into a gas chromatograph where calibration is done against standard samples of PCB's.

Q. The limit of detection of that technique is only one part per billion, isn't it?

A. That has been our experience.

Q. So that if there were smaller quantities, you'd not expect to be able to measure them, isn't that right?

A. We would have no reliance on numbers that would show up in calculation from that chromatogram as being below

one part per billion on an industrial type of sample.

Q. Have you measured the PCB levels in the sediments of the river?

A. May I check?

Q. Certainly. Use any document you like.

A. Yes.

Q. Could you describe where the samples were taken and what levels were found?

A. At the same sites at which this one-to-three part per billion range in the water, the sediments were 130 and 1,300 parts per million.

Q. Were samples taken at the second point, the one six miles downstream?

A. In areas where it was not detectable in the water, the sediments were 30 to 60 parts per million.

Q. Were these identifiable as 1254 or 1260?

A. I do not have that information.

Q. Do you know when the samples were taken?

A. October of 1971.

Q. Therefore it would all be 1260, wouldn't it?

A. It would probably all be 1260. Correct.

Q. Have the control measures which you have been -- let me rephrase that.

You referred to control measures to minimize the discharge of PCB's.

How long have those control measures been in effect?

A. It is an evolving program. For example, the incinerator is a relatively new installation, within the past two years. The diking around the unloading area, or consolidation of filling stations to reduce the number of areas in which Pyranol is handled at the plant -- all of these have been steps that have been taken over a period during the last four years, let us say.

Q. Do you have any data on the levels of PCB's in the effluent on or about October, 1971, when the samples were taken in the river?

A. I do not.

Q. Were any observations made of the aquatic population in the river at that time?

A. We have done nothing with the aquatic population.

Q. Now, in the Rome plant have measurements been made of PCB discharges?

A. Yes.

Q. Would you give me the data in the same fashion as you gave me the data for the Pittsfield plant?

A. I don't have it in that same form, but our engineers, who have taken samples and made the appropriate calculations from that have estimated that the current discharge is on the order of one pound per day.

Q. Which Aroclor is this?

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A. There, too, 1254 is the Aroclor that is used.

Q. Could you describe the control measures currently in effect at the Rome plant in order to minimize discharges of PCB's?

A. The same program of control measures is being installed at that plant, but it is not as far along as at Pittsfield.

But basically, the program is the same; that is, containment of the PCB's in the production area.

Q. To avoid repetitive questioning, let me ask you a general question.

Have measurements been made of residues in biota for any of the facilities operated by G-E?

A. We have made no measurements of biota for any facility of the General Electric Company.

Q. Now, for the Rome facility, have any more measurements been made of PCB levels in the -- I believe you stated it was the Coosa and the Oostanaula River.

A. The Oostanaula River.

I do not believe that my data on those plants indicate any analyses of rivers, but are basically the data of the plant discharge. I do not know of any numbers pertaining to the rivers themselves.

Q. Could you give me for the Hudson Falls plant the levels of PCB's discharged?

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A. These outfalls from the Hudson Falls plant, which are incorporated now in the permit application, in total come to two facilities, is on the order of 25 to 30 pounds per day.

Q. 25 to 30?

A. Yes.

MR. ECKERT: Your Honor, I think I have a good deal more questioning for Dr. Simons.

Would it be appropriate to break for lunch at this time?

JUDGE SWEENEY: All right. We'll recess until one o'clock.

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(Whereupon, at 12:00 noon, the hearing in the above-entitled matter recessed, to reconvene at 1:00 p.m. the same day.)

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AFTERNOON SESSION

(1:00 p.m.)

Whereupon,

EDWARD L. SIMONS

resumed the stand and, having been previously duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION (Continued)

BY MR. ECKERT:

Q Dr. Simons, you testified that the combined effluent from the Hudson Falls and the Fort Edward plants is 25 to 30 pounds a day. Is that correct?

A Mr. Eckert, I wonder if I might have your indulgence, before answering that specific question, to add some clarification to the answer that I gave you with regard to Pittsfield, because I think they're germane to the kind of answer I would have to give to your question.

Q Well, perhaps so.

A You asked basically two questions concerning the Pittsfield operation. One was the number of pounds per day that were being discharged and secondly, could we identify the sources of that.

I gave you a number of .1 pound per day of 1254 from current production. I think it's appropriate to indicate the way in which that number was arrived at.

We have two outfalls from the PCB plant whose

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effluent has been found to contain PCB's. During 1973, each one of these outfalls was sampled once a week for 45 weeks and each sample was then analyzed both for 1254 and for 1260.

As has been pointed out both in our testimony and in the testimony of Monsanto, sampling of industrial wastes for a material like PCB's is a difficult process whose reproduceability is quite poor. The value of .1 pound per day was calculated by taking the average concentration for all 45 samples during 1973 and multiplying it by the average volume of discharge from those two outfalls. So there was no single number that was measured over a period of continuous measurement for one day and we collected .1 pound.

These were all calculated from single grab samples once a week for each of 45 weeks.

At the same time that I give you an average I have to also indicate that there were certain samples which gave values which were higher than that average and if we took the single highest value of each of these 90 samples and combined that with the effluent flow we would come up with a value of .8 pound per day as a maximum figure.

So there's a wide range, with occasional excursions as high as .8 pound per day on the 1254 and as high as .4 or .5 pounds per day on the 1260.

That puts, I think, the analysis into perspective. It is not a matter of collecting and weighing an actual .1

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pound. These are all calculated numbers. The actual parts per billion in the individual samples were usually in the range from one to ten parts per billion.

When you get down to analyses that are as close as that to the sensitivity of the method, the actual value can become distorted by a very small amount of any impurity that might get in during the actual handling of the sample.

But this is the best number we have and it's the number I gave you, but I thought it would require that additional clarification as to how it was arrived at.

Now let's come back and answer in a little bit more detail the question of where this .1 pound might come from.

To put that .1 pound per day in a possibly more illustrative format that would correspond to a small jigger of whiskey, about one ounce, so we are not talking about a major spill. This is a relatively small volume of liquid.

As I said, our philosophy was that for current production we should try to modify our manufacturing operation to reduce the possibility of any loss of PCB's. I probably am-- A year ago when I officially assumed my present responsibilities -- a little over a year ago -- I was probably in the same position as you in being unable really to visualize what these controls meant in a practical term, but I have made it a point to visit on two occasions the

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Pittsfield plant and examine in great detail the individual handling and manufacturing steps from the arrival of the tank car through the finished transformer, and I have quite a different appreciation than I did before of what a loss of one ounce can mean.

Remember, we are not manufacturing at this plant, only Pyranol-filled transformers. We also manufacture -- and the major part of our production is oil-filled transformers; Pyranol-filled transformers are not the major product at Pittsfield.

We have attempted to reduce to a minimum the number of places in the plant where we handle the Pyranol so that doesn't get spread out and handled everywhere. The filling is all done in a fixed station and I've explained that earlier, but after the Pyranol has been added to the transformer tank it must then go by conveyor to certain highly specialized test stations which have to go through a series of electrical tests to be sure, before the transformer is completely sealed, that it has been filled properly, that there are no air spaces and other things that affect its electrical performance.

This is a transfer operation during which the transformer is not sealed. It then may have to go back for further filling, which is another transfer operation. It eventually has to get a final topping off, all of this before the sealing.

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At any one of the stages when you consider that some of these transformers will hold as much as 1500 gallons, even the loss of a fraction of an ounce on a workman's shoes, on his hands, these are things which I think even the most elaborate containment system in a massive manufacturing operation like that cannot guard completely against.

To put this again in terms that might be a little more illustrative, when it's available we all use gasoline to power our cars, and you know what happens when you use up -- when the attendant or at the self-service station, you yourself use a hose to fill up your tank. Your tank may hold 20 or 25 gallons. There are varying degrees of gasoline lost during that filling operation. I doubt that-- It is seldom as low as a drop or so; more often it's much more than that.

Again I want to indicate that we are applying very strict standards to the filling of this, but these are big equipments. It is inevitable that there is going to be something that gets on the lip, something that gets on the conveyor, and these are things that we try to keep to a minimum.

The goal is zero containment but in a plant as big and as old as this, and with workers around there who have to handle this in order to get it out to the test station, a loss of something of the order of one ounce during

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the day's operations is, we think, a very creditable performance. I don't know of any other really heavy manufacturing operation which handles fluids in which that kind of level of control is displayed.

Now I think I can come to answer your question about Hudson Falls.

One minor correction. I said those numbers I gave you were from our permit application. I meant to say these are the numbers that appear in the draft permit for that plant which we have received from EPA Region 2, which indicate certain initial effluent limitations to be placed upon this plant.

And by the way, as you correctly said, the Hudson Falls and Fort Edward are so close together they are being considered as a single plant for purposes of this permit, so that the number given here was for the outfall that corresponds to the Hudson Falls plant, ten pounds per day as the daily average as the initial effluent limitation and for the discharge from the Fort Edward plant, the initial discharge limitation is 20 pounds per day. That's where the 30 came from, but again these are daily averages.

And once again I must refer back to -- I must refer to sampling procedures. We have not taken samples as frequently at Hudson Falls as at Pittsfield. They are more likely at once-a-month intervals so we have about ten of

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those rather than 45.

These numbers again represent the average pounds per day as calculated from a parts per billion analysis and a flow rate.

There have been excursions which, in proportion, are about the same as we've had at Pittsfield. That is at Pittsfield I said we had an average of .1 pound per day and a maximum of .8. We have seen days when, if we took the analysis at its face value and calculated it through with the flow rate, we would end up with 90 pounds of discharge.

This reflects some of the difficulties in sampling. It may reflect accidental discharges in the plant. We just do not know, but I think that's the way in which these numbers have to be viewed.

An average number over a ten-month period and with maximum excursions can be as high as eight times or nine times as high as that.

Now I think that would represent the clarification I would give, up to this point, and I would await your further questions.

Q Let me see if I understand this correctly.

The 10- and 20-pound a day figures which appear on the draft permit, are those the same as the numbers which you arrived at by calculation from the effluent concentration and effluent flows?

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A These are essentially the numbers that we arrived at from these measurements of grab samples over a ten-month period, averaged them out, and made the computation from the average flow rate through those discharges.

Q What was the range of concentrations which were observed?

A The concentrations observed at the-- I only have the average figure here. I do not have the range and the concentrations.

From the Hudson Falls, 350 parts per billion, and Fort Edward, 4,000 parts per billion, and it's these numbers--

Q I'm sorry, at Fort Edward what was it?

A 4,000.

It's these numbers which combined with the flow rates from those installations were used to calculate the average pounds per day.

Q Has GE attempted to measure the concentration of PCB's in the Hudson River below the plants?

A No.

Q Are the PCB's discharged from the Fort Edward and Hudson Falls plants all 1254?

A No. There are several important distinctions between the operations at these two plants which manufacture capacitors and the two plants that manufacture transformers.

To answer the first part of your question, it is

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not 1254. The capacitor grade Aroclor 1016 is used exclusively at the capacitor plants. And I would say that that probably accounts for 95 percent of the-- 95 percent of the production is with 1016 Aroclor.

Q What is the five percent?

A I don't know. There may be a few specialized oil transformers, mineral oil for certain specialized uses, but those are not a-- The large bulk of the production--

MR. RICHEL: We've been informed it is mineral oil.

THE WITNESS: That's what I said, mineral oil.

BY MR. ECKERT:

Q So far as you know then, no PCB other than Aroclor 1016 is used at Fort Edward and Hudson Falls. Is that right?

A At present that is so. We formerly had used the 1242 before 1016 was developed. 1016 is a relatively recent development by the Monsanto Company as a special grade for capacitors from which the higher boiling homologs have been distilled out.

In other words, we believe on the basis of the evidence from Monsanto that the 1916 is the most highly biodegradable of the commercially used Aroclors and that is the reason we switched to that for capacitors.

But there is also another very significant distinction between the use of PCB's in capacitors and in

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transformers. Transformers are, as I mentioned, relatively large units, as big as 1500 gallons capacity, and they are made in relatively small quantities. I guess you could say in the tens of units per day kind of range.

Being a big tank, you can put a hose into it and fill it directly that way.

On the other hand, capacitors are much smaller units and we're talking here about an operation in which we have to fill millions of small units with PCB's, and by "small units" I'm talking about things that might be the size of a pack of cigarettes or less, as small as that.

Obviously, these kind of units are not filled by a hose. They are filled in bulk by putting them in a tray which is sent into a vacuum oven. The whole thing is evacuated and then filled by filling that container with PCB's so that they are sucked into the evacuated cans.

That means, therefore, that when you take these out of that for handling there are not only PCB's inside the can but on the outside, and this must be disposed of, so that all of the handling problems, the units and all, increase the probability of losses by adventitious handling.

And then there's a third important distinction which was brought out in Dr. Wright's testimony, that for the electrical industry as a whole, there are approximately three times as much -- three times the amount of Pyranol or PCB's

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used in the manufacture of capacitors total as are used in the manufacture of transformers, so we're dealing with a total amount of material that is much larger and it is distributed over a tremendously large number of very tiny units which have to be filled.

So there's quite a major difference, all of which -- the processing of all of which accounts for the major discrepancy or difference between the discharge in the capacitor plant and that for a transformer plant.

Q Why are PCB's used in capacitors?

A The basic reason for the use in capacitors is to improve reliability and performance characteristics in a smaller volume of total product.

They also confer the safety factor of the non-flammability of PCB's.

Q Aren't there other diaelectrics that could be used, other than liquid diaelectrics? For example, hasn't Mylar been used in capacitor manufacture for example?

A There are certain capacitors-- You have to recognize that there are basically three types of capacitors and I want to put in one warning here. I am not an electrical engineer so that I cannot speak with the same degree of confidence as I have been speaking on the previous ones.

But it is my understanding and if it is permissible, Dr. Pozefsky from our Capacitor Department has my permission

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to correct me if I make any misstatements.

There are what we would call electronic-type capacitors which are basically -- many of which are a dry type and are manufactured without any PCB's at all and have this kind of aluminum and plastic film.

Then there are the kind which are manufactured at our Hudson Falls and Fort Edward-- Hudson Falls is basically the power transformers which are used in the electrical utility industry and for these there is no substitute for a liquid-filled transformer or capacitor.

The only place where there has been some experimental work that indicates a partial substitution to, shall we say, a dry type which doesn't use any liquid is in some of the industrial type capacitors of a kind that are used in the ballast for fluorescent lamp fixtures and air conditioners and so on, but I believe that the technology for that is not anywhere near the level where it can be considered as a short-range alternative to PCB's.

It would obviously facilitate greatly the production if we didn't have to handle liquids.

Q Why is there no substitute for liquid-filled capacitors in power applications?

A I can't give you a specific answer technically to that. It has something to do with the requirements that these capacitors -- the kind of currents that these have to

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carry. But I would have to defer an answer on that, unless you want to get clarification from Dr. Pozefsky on that question.

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Q. Well, perhaps we can pass over that for the time being.

Have you attempted to measure the PCB levels in the sediments observed in the Hudson River?

A. There have been no measurements made by us of the Hudson River.

Q. Have the workers themselves been monitored? For example, have blood samples been taken and measured for PCB content?

A. Before coming down here I checked with the medical director of our Pittsfield plant, who is aware of -- who can speak in terms of direct experience at Pittsfield and is aware of the situation at the other plants that use PCB's, because in our testimony we had indicated that the only medical effects that had been reported during the four decades that we were in this business have been occasional cases of chloracne or other minor skin irritations of a non-chronic nature which disappeared upon the transfer of the employee to some other operation.

I asked the medical director if that statement is still valid today; he assures me it is, and that that is the extent of the medical problems that we have encountered among the employees exposed to PCB's.

Q. Well, that doesn't quite answer my question.

I asked if their blood levels have been monitored

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for PCB's.

A. No, not to my knowledge.

Q. Now, in specific reference to the medical data, I don't have it in your testimony -- yes, it's on page 6 -- the statement here reads that:

"Medical records show that over a nearly 40-year period, the only adverse health effects experienced by U.S. workers exposed to PCB's," -- etc. --"have been limited to occasional cases of non-chronic chloracne or other temporary skin lesions or irritations."

A. Yes.

Q. Now, I assume that over a 40-year period some of the workers died, did they not?

A. That's a reasonable assumption.

Q. Some of them might have gotten cancer; isn't that correct?

A. MR. RICHEL: I would like to object at this point. The man is having visions of vinyl chloride and has introduced no basis into the record for this kind of excursion.

MR. ECKERT: Well, it seems to me that the basis for the record is the statement here that the only adverse health effects experienced by U.S. workers exposed to PCB's was non-chronic chloracne, and I'm trying to get at whether or not anyone bothered to find out whether these workers might

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have had a higher incidence of cancer than the --

MR. RICHEL: I think the witness has made it clear that all inspection, all we did -- and we're not trying to make anything more of it -- all that we did was react to requests made by employees, and no further tests, no considerations of cancer, no considerations of -- no blood tests; nothing other than what we have said.

But if you further lay the foundwork, if all you further do is leave innuendo, then I think this is grossly improper.

MR. ECKERT: I'm certainly not leaving any innuendo.

BY MR. ECKERT:

Q Is that your testimony; has Mr. Richel accurately stated your testimony?

A These medical records are based upon the examination of workers who have come to the medical office of the company with a complaint. And these have been examined, and when they have been convinced that these complaints which were brought to the attention of the medical officials were a result of exposure to PCB's the worker has been transferred to other operations, and the complaint has disappeared.

MR. ECKERT: That's all I wanted to establish.

Thank you.

BY MR. ECKERT:

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Q Getting back to the Hudson Falls and Fort Edwards plants; what is the total quantity of PCB's used at these plants per year?

A I've been advised by the Counsel for the affected products departments that they consider the data on total usage of product material as material that would be useful to competitors and should be considered as proprietary information.

MR. ECKERT: Is it your position, Mr. Richel, that this information relates to trade secrets, processes, or methods entitled to protection as trade secrets?

MR. RICHEL: Apparently that's the contention of the Counsel for the affected department, and that's why Dr. Simons indicated as he did. I have no reason to support or reject that contention.

MR. ECKERT: In other words, you don't know?

MR. RICHEL: That's correct.

I do know that it's significantly different from effluent data, and anything other than effluent data is given the opportunity for certain privileges under the Water Act Amendments of '72.

MR. ECKERT: That's not quite correct.

It isn't the only information subject to protectic methods or processes entitled to protection as trade secrets

MR. RICHEL: That's correct.

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And that itself relates to other than effluent data.

ME. ECKERT: Well, we can dispose of this off the record.

BY MR. ECKERT:

Q. I wonder if you would describe the sources, if you have identified them, of effluent contamination at the Hudson Falls and Fort Edwards plants?

A. There is one significant source of contamination from the Fort Edward plant, which results from one of these basic differences that I mentioned to you between manufacture of capacitor and of transformers.

The transformer cases, after they are filled, as I stated, have PCB's on the outside just because of the way in which these tiny cases have been filled. That layer -- even after draining there is still a residual layer of PCB on the case, and it had been the past practice to remove them through a washing operation with an aqueous-based detergent; and that has been identified as a major source of water contamination.

There is one case where water was actually -- the only case where water was actually used in the processing of the equipment itself.

Q. Excuse me.

Are you referring to transformers or capacitors?

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A. Capacitors.

The transformers, that have to be -- because of their size -- filled by this vacuum inpregnation technique, which means the entire capacitor is essentially immersed in a sea of PCB's, and when the tray containing these capacitors is taken out the PCB's are on the outside as well as on the inside of these little capacitor cans.

The vast majority of that PCB is allowed to be drained off and be reused, but there is always a residual film that remains on the can which must be removed before the can can be sent out as a finished product.

And the standard practice had been to remove that by a washing with an aqueous solution. That would represent the major source of contamination of effluent from the Fort Edward plant.

And the management and the operations at Fort Edwar have recognized this and have now begun to investigate and are prepared to install alternate means of removing that PCB from the outside of the cans so that that single -- that largest single source of contamination is removed.

Q. Now, you say you are prepared to install; but is the water wash still being used at the present time?

A. It is.

Q. That would account for the Fort Edwards plant.

How about the Hudson Falls plant?

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A. The number that I have given for both plants -- or the numbers that I have given for both plants represent a total PCB concentration. It is not quite as easy to make the differentiation between current and residual in the capacitor manufacturing operation as it is in the transformer because 1016 and 1242 are much more closely alike than are 1254 and 1260.

So --

Q. What's being used at Hudson Falls?

A. 1016 is being used now, prior to the development of 1016 by Monsanto 1242 is used.

1242 and 1016 have very close to the same total chlorine content. The major difference has been the removal of some of the higher-boiling homologues present in 1242 that are not present in 1016.

It is a more difficult analytical procedure to try to differentiate between 1016 and 1242 in a chromatogram of a mixture of these two. It is a much easier job to differentiate as we do at Pittsfield between 1254 and 1260.

And so at Pittsfield we can look at a chromatogram and say, "Yes, this much is caused by residuals, and this much by current production."

It is not as simple an analytical job to do that at Hudson Falls, and therefore a large amount of that could very well be from our residuals of production that has been

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going on there since the early '50s, before any controls at all were instituted.

So the only clearly defined process operation associated with a loss of PCB's directly to the water is that detergent wash at Fort Edward. The other losses we cannot pinpoint and say how much is from a particular current operati and how much is from residuals from decades past.

Q Now, the Fort Edwards plant: what treatment is given to the wash water from the capacitors?

A None.

And rather than institute treatment, there is a process -- I would have to qualify that.

There are three stages in this: there is washing and there is rinsing. The wash water itself is internally recycled. The only thing that goes directly to the river untreated is the final rinse, which itself contains only a trace amount of the detergent so that the bulk of the PCB's that are removed by this washing operation do not leave the plant; they are retained internally and ultimately disposed of through incineration the way other waste PCB's are. It's only the final rinsing stage that goes untreated to the river.

And it is, in our opinion, a more satisfactory resolution of that problem to change the process rather than to try to remove the PCB's from the rinse water before discharge to the river.

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Q When a transformer is installed, does it ever need to have its diaelectric replenished?

A There are times when that has to be done.

Q What is the cause of that?

A I'm afraid I can't give you a specific technical answer to that question.

Q Well, would you infer, if it has to be replenished, that some is being lost through leakage?

A It could be some being lost through leakage; it could also be there may be -- remember that a transformer is not just a big tank filled only with PCB's. There is a very complex combination of wire with insulation, other kinds of materials in there. There's whole guts of very complicated electrical equipment.

Some of that must be thoroughly impregnated with the PCB at the time of the manufacture if it is to function properly. There may be other parts where that is not critical.

And over a period of use, it's possible -- and again I'm speaking only from conjecture since I do not know enough about the details of that -- it is possible that PCB's impregnate parts of the transformer where they don't normally become or are not normally needed, and therefore reduce the level of free diaelectric.

So that's a second possibility that I throw out without the same degree of assurance that I have spoken with

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on other matters.

Q Do transformers ever need repair on the site on which they are installed?

A Usually -- and again I will speak only -- well, there may be certain repairs that can be done on the site. I don't know the nature of all the ills and ailments that a transformer can fall heir to during its thirty years of expected life.

So there may be some malfunctions that can be repaired onsite. There are others that require more extensive repair work.

Q When they need that more extensive repair work, are they shipped back to G.E. for work?

A There are service shops that the General Electric Company and other companies maintain at which transformers can be repaired, along with lots of other heavy equipment; they are not exclusively transformer repair shops.

Q Does G.E. manufacture transformers or motors for electric trains -- I mean, electric locomotives?

A If you're talking about the trains that operate on electrified lines --

Q Either those or for diesel electric locomotives.

A Diesel electric locomotives, as I understand it, do not need transformers. They have their own generators and generate electricity there.

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The main use of transformers in railroad transportation is on the electrified lines, where the electricity is taken from a third rail or from an overhead line.

And yes, we do manufacture the transformers that are mounted underneath the cars of such electrified railroads.

Q. These are like all other transformers in terms of their susceptibility to leakage, are they not?

A. I assume that they are.

They are designed of a size to fit under the railroad car, but basically the transformer is the same kind of instrument. It's made and welded shut, and so on, and I assume that damage that could occur to one can occur to another.

Q. When you receive PCB's from the manufacturer, does it come in in tank cars?

A. Yes.

Q. How is it offloaded from the tank cars?

A. Basically by the same kind of procedure that Dr. Wright described. It is pumped out from there into appropriate storage vessels, and from there piped to the areas in the plant where it's used.

Q. Is it unloaded under cover from the elements?

A. This varies from plant to plant.

At our Pittsfield plant that station is covered. It's a new station, relatively new. It was built with all the

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appropriate diking and sumping and so on, and that is unloaded under a cover.

I would point out, however, that these are -- these unloading operations are basically infrequent kind of things. You don't get this kind of a shipment in every day. This is not a daily operation, and these are carefully monitored as the transfer takes place.

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Q What precautions are taken to avoid spills during the unloading operation?

A. The unloading operation, as I have seen it at Pittsfield, that I can speak of from direct observation, is carried out in an area which is diked and which has deadend sumps, so that anything which does drip or spill during the transfer operation does not get out of that area, is retained by the dike, goes to the sumps, and is pumped for recovery or incineration.

Q Are you familiar with the operations at Fort Edwards and Hudson Falls?

A. The tank car there is on an open siding adjacent to the building.

Q Is the area around the tank car unloading platform diked?

A. The diking is essentially accomplished by the building itself, whereas at Pittsfield there's an entirely separate area. There was no building there, so a separate dike wall was put up.

Q Are there deadend sumps at the Hudson facility?

A. Part of the program that's being undertaken there now is to identify all of the drains accessible to PCB's which could lead into the aqueous discharge, and to block those off.

This was an old plant. We took it over in about 1952. I don't know what the age is, but it was not originally

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built as a plant. It was bought as an existing building, and as we go along through that plant, we find other areas that need attention. And there's a systematic review of all the drains, gutters, and so forth to plug up all the possible avenues of escape of PCB's.

Q Do you use PCB's in any other process than the manufacture of capacitors and transformers at any of your facilities?

A No.

The only manufacturing operations that use PCB's are transformer and capacitor manufacturing.

Q Are the PCB's treated or conditioned in any way prior to putting them into the capacitors or transformers?

A Yes.

Q What's done?

A There is basically a filtration type of process to remove impurities that may have been picked up during transit or from long storage in the tank car, and so forth.

Basically a filtering process through a porous bed.

Q Is the filter, the filtering material disposed of by incineration?

A Our incinerator can handle material, yes.

Q Well, is it handled at --

A Yes. I believe it is also disposed of there. Yes. Because this is a combustible bed.

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Q Do you apply heat and --

A Excuse me, when I'm talking about this, I'm referring to the Pittsfield plant. It's the only plant that has its own incinerator.

Q What is done at Fort Edwards and Hudson Falls with the filter material.

A Combustible wastes are sent to an outside scavenger who has incineration facilities.

Q And noncombustible wastes?

A They are like scrap capacitors and things like that, which can't be burned.

These are disposed of in an appropriately operated landfill, an approved landfill.

Q Are the PCB's heated or vacuum treated to demoisturize them before putting them into the capacitors and transformers?

A I don't know.

First, for the transformers, I don't know.

In the capacitors, the operation of filling is at a higher temperature than it is in the case of transformers, but I do not know that it is a separate heating operation.

Q Has any measurement been made of the evaporative losses of PCB's during this process?

A I've been told by the plant people that they have had measurements made of the concentrations of PCB vapors in

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the work area, and it is my understanding that these are below the threshold limit values established under the Occupational Safety and Health Act.

Q Is water employed for equipment or floor cleaning in the Hudson Falls or Fort Edwards plants?

A Water employed for floor cleaning?

Q Floor cleaning, and for equipment cleaning. You know, when they talked about capacitor wash --

A Oh, cleaning. No. If there are any spills, for example, that occur on the floor, they are -- this commercial absorbent material is put over them and that is then swept up and sent out for incineration. It is not washed.

Q If there is no spill, is the floor washed under ordinary circumstances?

A No.

Q The floor is never washed?

A Never.

(Shaking head negatively.)

Q Do the workers wear any type of protective clothing?

A We have seen no need for that. The usual protective clothing that an employee in manufacturing may wear; coveralls, and things of that sort. But nothing that's specifically designed as protection for the particular material they're handling.

Q What is the volume of effluent discharge from the

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combined Hudson Falls and Fort Edwards outfalls?

A. Approximately 2.6 million gallons per day.

Q. Can you break that down as to --

A. Approximately half a million gallons per day from Fort Edwards, 2.1 million gallons per day from Hudson Falls.

Q. Have you monitored the various waste streams within the plant to see which one contained and which ones did not contain PCB's?

A. Well, we don't really have waste streams in the plant, in the sense that, with the one exception of this final rinse in the washing operation at Fort Edward, there is no process water used in the manufacture of capacitors or transformers.

Q. But there are other process waters used, are there not?

A. The bulk of the water is essentially for noncontact cooling.

Q. Has the noncontact cooling water been monitored for PCB levels?

A. As I say, these discharges that we speak of, where we analyze grab samples, the bulk of that water is of a cooling water nature, and we find PCB's in them.

Q. But that's after it has been mixed with the capacitor wash or capacitor rinse water, is it not?

A. No, I'm talking here -- let's say the case of the

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permit composed for the Fort Edward-Hudson Falls, there are altogether four separately defined outfalls.

One of these is the outfall to which the rinse water is directed. Of the other three, only one has been shown on analysis to contain PCB's, and that's the one which has this approximately 2.1 million gallons per day -- no, there are 2 at Hudson Falls and 2 at Fort Edwards -- 3 at Hudson Falls which have the 2.1 million gallons per day. But only one of those has been found to contain PCB's on analysis.

Q Now that one which does contain PCB's, have you gone back up the pipe, as it were, to find out where the PCB's enter the stream?

A. We have attempted to -- we have assumed that because there is no process water used in contact with PCB's at Hudson Falls, that these represent a combination of residuals and of adventitious losses from what is essentially an anhydrous process, and our approach has been to seek out all the possible avenues by which PCB's might get into this non-contact water, and block those off.

We have also looked to see whether any possible sources of some of the residuals -- we have found some areas that we suspect, and are taking remedial steps with those.

But it is not an easy job just to go back up the pipeline which has been fed by many different sources of non-

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contact water.

Q. Well, is it your opinion that the major part of the 20 pounds from Fort Edwards comes from the rinse water, the capacitor rinse water?

A. We believe, sir, that is the major contributor to that one outfall that contains the PCB's.

Q. Have you been able, similarly, to identify a major source or major sources of the 10 pounds per day from Hudson Falls?

A. That is much more of a problem of conjecture, because, as I said, there is no point in the process, as there is at Fort Edward, where we consciously bring water into contact with PCB's.

And therefore, as I say, rather than try to go around and identify a particular source, we've gone the other way and said, let's try to close up all possible avenues by which PCB's can escape from a process which is essentially anhydrous and get into a stream of water which had never contained them, because it is never used in processing PCB equipment.

Q. Now, in the Pittsfield plant, is any of the 1.86 million gallons a day that you've identified as your daily discharge employed in the manufacturing operation directly associated with PCB's?

A. No. And that, by the way, is divided between two

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distinct outfalls. That's the sum of those two. There are seven outfalls that appear on our permit application. Only two of them have been identified as containing PCB's, and the sum total of those two is 1.86.

Q. And I would ask the same question here as with respect to Fort Edwards and Hudson Falls: has an attempt -- this is a very large amount of water. 1.86 million gallons per day. Has an attempt been made to analyze the various streams that make up that, to see which ones do and which ones do not contain PCB's?

A. There are so many -- let me back off and give you some perspective here on this one, too.

The Pittsfield plant is about 72 years old. When it was being built up over the years since it was first opened, every time a new building would be put up they would run a drain line across the shortest distance between that building and the river.

The result was a multitude of more than 30 discharges into the river.

When -- and I can't give you the exact date -- but when that plant, which is progressive and looking at its environmental problems, set up a specific environmental protection operation as part of the facility's operation there, the manager of that set about in a systematic program to consolidate those streams, so that we have now reduced

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that down to seven by putting in crosspiping, and so on.

And it would therefore be virtually impossible at this stage, without digging up the whole thing and going underground, to try to pinpoint from which of the myriad of pipes under that plant a particular amount of PCB is coming.

Remember, we're talking about only on the average a tenth of a pound total.

Q You have testified that accumulations of PCB's would result in continued discharge, even if the plants were to completely eliminate PCB's from their current operations.

What percentage of the discharge could be eliminated if PCB's were to be eliminated at Pittsfield?

A If I refer back to these 45 samplings from each of the two discharges over the year 1973, I said the average was about a tenth of a pound per day of 1254, and about .08 pounds of 1260.

We're assuming that 1260 is a representative of the residuals not of current production and the one-tenth pound per day average is what represents the losses from current production. That's not a completely strict division, since there have been improvements in the containment process since the date in 1972 when we switched over completely to 1254. So there may be a small amount of 1254 in the residual, but basically 1260 is the residual, 1254 is the current production.

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Q Have you or has anyone under contract to G-E conducted treatability studies for a waste treatment system to remove PCB's?

A We have approached the problem on the ground that the major priority should be the control of current production, and basically all of our environmental control efforts have been directed towards that.

We have been encouraged in that approach by report memoranda, conversations, with EPA officials during the past few years indicating that EPA's major concern was the control of current losses.

They recognized that over forty years of use, there are going to be lots of PCB's -- quite ubiquitous, to use the terminology of the interdepartmental task force -- and that the compelling need was to control the current production. So we have put virtually all of our effort into that, as the desired direction over which we could have some real control and immediate impact.

Q You've referred several times to sampling problems associated with PCB's.

Could you elaborate on why there are problems associated with sampling PCB's?

A These can arise from several sources. Well, I'm speaking here from information given by our plant people, because I have not been directly involved in the sampling.

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Let me mention some of these.

Sampling is generally done through a manhole that presents you with access to the pipe through which the liquid is flowing. We may specify a certain number of gallons a day going through that, but remember, this is not a uniform flow. It isn't always flowing at a constant rate every minute of the day.

And secondly, this is water which is noncontact cooling water which is going through old pipes and may also contain some runoff. So it is not necessarily a clean water, in the sense of being completely free of suspended material, not material that is readily removable by filtration; I'm talking about very fine particles -- which nonetheless can adsorb PCB's, and the difference in the analysis could come from the amount of this material that may come into the grab sample. These are, as I say, grab samples. It's not a continuous sampling of a nice uniform process stream which fills the pipe to a given depth all the time.

But these are the kind of factors that lead to the wide variability in sampling, as I have been told.

Q Well, now, let's take specifically: the flow is not constant.

But over a long series of measurements, wouldn't that tend to average out?

A We are talking here about taking a sample, one

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grab sample a week. Now, I don't know that those samples are taken at precisely the same hour on the same day of the week, and even if they were, I don't know that one would then still guarantee that that flow would be the same.

But as I say, yes, you say these average out. We are reporting an average of 1/10th of a pound per day, but an excursion can go as high -- the highest value based on those 90 measurements gave us a calculated 0.8.

Q Are PCB's adsorbed in water?

A Yes.

Q So, wouldn't it be possible that they would tend to settle in a stream or in a waste effluent? That is, they would tend to ride down so that a sample taken from the top might contain less PCB's, might it not, than a sample taken at the bottom?

A There are undoubtedly differences in the depth from which you measure this. Part of the problem that we face in these residuals probably arises precisely from that effect, that the pipes, through which uncontrolled effluents have been going in years past, do contain on their walls deposits of PCB's laid down in the fashion you speak of.

Q Do you know what the solubility of Aroclor 1016 is?

A Not offhand. The most recent value I've seen was for 1254, and I believe that some of the other -- the Aroclo

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is, as I recall, on the order of 100 to 200 parts per billion. That's the water solubility.

Q So the concentrations that you've measured in the effluent, which, as I understand your testimony, were 350 and 4,000 parts per billion for the Hudson Falls and Fort Edwards facilities, respectively, are actually well above the limit of solubility, aren't they?

A. That is correct. We are getting this phenomenon that you mentioned.

Some of these are heavier, they get swirled around, and sometimes you find a sample that has a sort of insoluble coagulated PCB.

End 2E.

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Q Now you referred to, as I recall, about 30 pipes discharging into seven outfalls at the Pittsfield plant; is that right?

A A consolidation of individual discharges into a controllable number. I may have the actual number. I know seven are reported now. I don't know the number historically, but it was considerably larger.

Q Now wouldn't it be possible to isolate the -- let me ask it a different way:

Of two pipes which do contain PCBs, two discharges, aren't those two pipes themselves consolidated discharges? Don't they lead back to other pipes which branch back?

A Lead back in which direction, toward the plant or toward the river?

Q Toward the plant?

A Yes, they represent the consolidated output of a large network of pipes that are decades old running under buildings that they don't even service. It's a whole maze of drainage systems from in-plant and surface drainage and so forth, and to get this whole system under control the facilities people said, "Look, we can't just have an uncontrolled number of a couple of dozen discharges. We've got to consolidate this." Because what we have done, you see, is -- Let me tell you some of the reasons why this was done to indicate that we are not -- this was not to make things -- just to hide things and

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say we don't know about them, because we only have seven instead of 37.

I mentioned that Pyranol is a relatively small fraction of the total operations at Pittsfield. Even transformers are not the only things we make at Pittsfield. And the most ubiquitous material is oil, lubricating oils, and cutting oils and so forth, and the environmental people at Pittsfield showed a commendable initiative and technical resourcefulness in developing a relatively simple but effective oil-water separator.

This oil-water separator, just parenthetically, the developers of this received a reward from the National Society of Professional Engineers as one of the ten outstanding engineering achievements in 1972. So it's a good piece of engineering work.

We have installed four of these at outfalls in Pittsfield from which major oil contamination of the river can occur.

One of the reasons for consolidating all of these drains was so that we could funnel all the water, surface runoff, cooling water, everything else, through these, so all of the water that could possibly be contaminated by oil is run through these oil water separators before it is discharged to the Housatonic River, so this consolidation was done to control that kind of ubiquitous contamination which is much,

much larger in terms of quantity than the PCBs.

Q Let me see if I understand you correctly.

When the pipes are run together into the separator, you must be able to identify which pipes go where and is it my understanding -- is my understanding correct that you have not gone back up to these pipes to measure the PCB levels in each?

A You have to visualize, Mr. Eckert, the way this is. You have had a whole network of pipes all underground. These are drainage pipes; they're not -- all the pipes by which Pyranol or PCBs are transported around the plant are now above ground, so that any leaks that occur are immediately detectable and repairable, but these are drainage pipes for cooling waste water, for storm runoff, for everything that we don't need anymore, and these are all underground.

Now, what was done some years back-- And this predates the concern for PCBs as an environmental contaminant. What was done was to say, Look, we had all these outfalls going to the river. So they were clearly identified. What they did was to dig up and put connectors there and send them all to consolidated outfalls and then bury the whole thing again because this is all underground.

Now we see nothing to be gained by digging all that up and putting individual sample stations on all these, because we would not even know where these originated from

in the plant. Remember, this is just down where they would terminate at the river we have consolidated them into a common manifold. But even identifying those individual pipes would not identify the sources. We know where the current production is located and our philosophy has been, "Let's stop losses to the best of our ability from those." Anything else that gets in could come from anyplace in the plant, because for 70 years we've moved around production underground facilities and everything else and nobody has detailed records of where everything is in all 70 years of operation.

Do you know, you have referred to an incinerator, and the only incinerator GE operates is at Pittsfield; is that correct?

A The only incinerator that is capable of destroying PCBs, yes.

Q Yes.

Now, have the emissions from the stack of that incinerator been monitored to determine precisely what they contain?

A The emissions from this incinerator have been tested. They are acceptable both to the state and to the EPA. Indeed, we are now just concluding negotiations for a program that was initiated by Region One, headquartered in Boston.

They have come and inspected our incinerator

facility. They are satisfied that it is an environmentally compatible way of destroying PCBs without adding air pollutants. And they've said:"Look, we havein Hingham, Massachusetts I don' know how many pounds or tons of DDT that has been pulled off the market as a result of EPA's ban on DDT, and we want to get rid of that, and we are convinced that your incinerator provides an environmentally sound way of doing that."

It was just last week that representatives from Region One and from the state visited our Pittsfield plant for the final negotiations. We have agreed to accept on a test basis a certain number of pounds and we will carry out that incineration; if it is satisfactory, we will destroy more.

So they are convinced, too, that this is a sound way of disposing of DDT without providing environmental contamination.

Q Well as I recall, my question was as to the levels that were measured in the emissions.

A I don't have any data on that specifically. I've been told by the plant people that the emissions do meet the requirements and I am also inclined to believe that when I see that EPA has come and said, "Look --" we did not go out to solicit this business; we're not in the business of incinerating DDT. We have been asked specifically by EPA to perform this as a service for them.

In fact, I believe in my testimony I quote from the

initial visit on page 3, in which Dennis Huebner, the Chief of the Solid Waste Program for EPA Region One, sent an unsolicited letter indicating his approval of the process: "The great strides forward in solving the processing of disposal problems of PCB. I'm very pleased with your willingness to assist Massachusetts in solving some of their hazardous waste disposal problems, particularly the DDT stored in Hingham, Massachusetts."

We did not ask for that letter.

Q On page 10 of your testimony, you refer to the rapid metabolism of the lower chlorinated homologs and you give a quotation and a Reference 19.

In my copy of the testimony, there is no Reference 19. I wonder if you could tell me what the reference is that you intended to cite there.

A That's what happens when documents are put together against a deadline.

I'm afraid I can't answer unequivocally now. I would have to go back and look at my earlier draft and see that, so I cannot answer that at this sitting. It was obviously a direct quotation and it was from some published paper, but without going back to the original draft. I could not identify it here.

Q Has GE done any work to determine the biodegradability of PCBs?

A No.

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Q Has GE done any independent work to determine whether or not PCBs are metabolized?

A We have relied entirely on the data which others have published and, upon reading it, we have found that it seemed to be data which were properly obtained and reported and we have relied on the scientific ability and integrity of those who have reported it. We have not done any independent work of our own.

Q If all of the PCBs which were discharged from the two plants on the Hudson River were mixed with Hudson River water, have you calculated what the concentration in the Hudson River would be after such mixing?

A I have not. I have done it for the Housatonic River, because there we had actual measurements and these calculations and measurements were -- I mentioned we had one at three parts per billion; that's what the calculations would have indicated. Since we didn't have any measurement of the Hudson, I didn't have the same immediate incentive to do the calculation. I don't know whether Dr. Pozefsky may have done that, but I have not. It can be done, based on the 1600 cfs as the flow rate.

Q Thank you, very much.

MR. ECKERT: I don't have any further questions.

MR. RICHEL: I have just a few questions.

REDIRECT EXAMINATION

BY MR. RICHEL:

Q A while back, you referred to certain initial limitations for the Hudson Falls facility. I take it those limitations were not the proposed final limitations as well?

A These were not. These were for an initial period as defined in the permit.

Q And the final limitations proposed were?

A Zero discharge.

Q A while back you also referred to -- what was the duration of the permit? Do you recall offhand?

A The initial limitations were for a period of 21 months following which the condition was changed to zero discharge for chlorinated hydrocarbons.

Q And the duration of the permit entirely was five years?

A I would have to check that point.

Yes. The initial period was 21 months, the total five years, yes.

Q Now you also referred at one point a while ago to the concept of zero containment. I just want to make sure there that it reads properly.

Am I correct in assuming that zero containment is the equivalent of a hundred percent containment?

A Thank you for correcting that. I mean containment

from which the losses are directed as low as possible toward zero.

Q Just one other point. Mr. Eckert touched upon

Mr. Eckert touched upon the company's manufacture of transformers for railroad applications. Where is that done?

A Pittsfield.

Q Is it also done at Erie?

A Erie manufactures the cars and they purchase transformers from Pittsfield and install them on the cars that they manufacture at Erie.

Q And has Erie received any inquiries from representatives of operating railroads and representatives of the Department of Transportation and the Department of Commerce concerning the application of this proposed standard?

A The Department of Transportation and the Department of Commerce and major railroads, particularly in the Northeast, have expressed great concern over the continued availability of PCB-filled transformers for mass transit operation.

Q Very simply, without a long dissertation, what's the problem?

A With them getting it? Or why they use it?

Q What's the problem if they can't get it any further?

A Flammability. These are mounted underneath the cars on which passengers ride. If there should be any malfunction of the transformer or any rupture of the transformer,

allowing liquid to leave it, as through an accident, if that liquid is oil there is immediately a fire hazard endangering the safety of lives of the passengers.

Q To your knowledge, has this problem been considered by EPA?

A I've seen no evidence that EPA has considered this.

MR. RICHEL: I don't have any other questions.

XXXX

RECROSS EXAMINATION

BY MR. ECKERT:

Q Does GE intend to attain zero discharge at the two plants on the Hudson River?

A Zero discharge as it appears in the Federal Water Pollution Control Act is a national goal. And --

Q Well, I'm referring to the proposed permit condition which Mr. Richel questioned you about.

A Oh. We have filed a formal objection on grounds that I'm sure Mr. Richel, who wrote the letter, could explain in more legal terms than I. Whom of us do you wish to answer that, because we feel there was an improper imposition of a condition in the permit which was not justified either in terms of timing, or certainly even in terms of the proposed regulations? The proposed regulations would not set zero discharge into a river flowing at 1600 cubic feet per second.

MR. RICHEL: Let me just say that in this instance, as with one other recent instance, we felt regional

EPAs were attempting to prematurely impose toxic pollutant standards for the sake of administrative convenience. That principle was acknowledged by Region Four recently, and we're hoping that that same principle will be acknowledged by Region Two; and therefore will not impose zero discharge limitation as being representative of best practicable technology.

BY MR. ECKERT:

Q Are there alternative dielectrics for PCBs in transformers for railroad use?

A The use of PCBs in transformers is dictated exclusively by the safety factor that it imparts to the equipment. From an electrical point of view, mineral oil would do just as well. It would be cheaper for us and for the customer. It would provide a transformer that was lighter in weight. It would provide a transformer which would not require some of the special insulation that is required inside of PCB-filled transformers.

There has therefore been ever since we got into this business all of the traditional economic incentives for us to find a substitute material. And over the last 30 years, more than a hundred possible substitutes for PCBs have been looked at in the laboratory for use in transformers.

That effort has been accelerated within the past year, since the first indication that these regulations might

appear as stringent as they have been published. And to date we see nothing that would combine the electrical and safety characteristics of PCBs.

Q Thank you, Dr. Simons.

MR. ECKERT: I don't have any further questions.

JUDGE SWEENEY: You're excused, sir.

(Witness excused.)

JUDGE SWEENEY: We'll take a 15-minute recess.

id 3A (Recess.)