IN THE CIRCUIT COURT
TWENTIETH JUDICIAL CIRCUIT OF ILLINOIS
ST. CLAIR COUNTY

FRANCES E. KEMNER, et al	)	
	)	
Plaintiffs,	)	
	)	
VS.	)	No. 80-L-970
	)	
MONSANTO COMPANY,	)	
	)	
Defendant.	)	

Before the HON. RICHARD P. GOLDENHERSH, Judge

REPORT OF PROCEEDINGS

JURY TRIAL

November 6, 1985

APPEARANCES:

MR. REX CARR and MR. JEROME SEIGFREID
on behalf of the Plaintiffs;

MR. KENNETH R. HEINEMAN and MR. JOSEPH NASSIF
on behalf of the Defendant.

KIMBERLY GANZ, CSR, RPR, CM
Official Court Reporter

BE IT REMEMBERED, that on November 6, 1985 the same being one of the regular judicial days of said court, the above-entitled cause came on regularly for hearing before the HONORABLE RICHARD P. GOLDENHERSH, one of the Judges of said court, at the St. Clair County Building, 10 Public Square, in the City of Belleville, St. Clair County, Illinois. Whereupon the following proceedings were had:

(The following proceedings were had in the hearing and presence of the jury).

THE COURT: I apologize for starting late. There were some other court matters to be taken care of.

FRANK DOST

having resumed the witness stand, being previously sworn, testified further as follows:

DIRECT EXAMINATION

By

MR. KENNETH R. HEINEMAN.

Q. Doctor Dost, when we stopped off, stopped testimony yesterday afternoon, you were just, you had just finished discussing these photographs of Doctor Zahalski's charts which are marked as Defendant's Exhibits 1291 through 1295. In the meantime, have you done some writing on these photographs?

A. Yes. I made some remarks that relate -- I wrote

some remarks on there that related to the oral testimony that I gave yesterday with respect to those diagrams.

Q. Would you step down, please, and with respect to each of the exhibits, point out to the jury the remarks that you have written on them?

A. The diagram as it is set up in my view at least does not represent the process by which TCDD is associated with an increased incidence of tumors in experimental animals. There is some resemblance to the process by which TCDD interacts itself to induce the P450 enzymes that react with foreign chemicals. The interaction to this point is correct except that I do not believe that the term recognizer is appropriate because it is not specific. It is a receptor that accepts a large number of chemicals and that complex is formed in the body of the cell, not on the cell wall.

Q. Which number is that that you were just referring to?

A. This was on Exhibit 1291, the first of that series. In 1292, you really don't have such specific information that we could say it reacts with a critical target. Obviously it has to react in a special way in order to cause the sequence of events that take place afterwards but that interaction or the nature of that interaction at the present time is not adequately known. There is information

about it but no one has taken the position that they understand precisely what is happening.

In any case, there is an interaction with the genome to cause this RNA blueprint that we have talked about to go to the endoplasmic reticulum. These are the messengers, so called. That is not an inappropriate way to describe messenger RNA because that is what the biochemists call it because the purpose is to carry information from one place to another. Out in the cell, there is interaction on the messenger RNA causes the endoplasmic reticulum to manufacture specific proteins. These proteins are not, this represents the same thing as the receptor or recognizer that was described earlier. And that is stated here.

The proteins that are made are not receptors. The proteins are made are the P450 enzymes and other enzymes that are not in that particular chemical class that are formed that we have, many of which we have named and they remain on the endoplasmic reticulum which is a very, a membrane that is all wrinkled up in the cell. Very high surface area that occupies a relatively small part of the space in the cell. If you were to take a big piece of tissue paper, you could crinkle that all up into a very, very small space and yet the surface area is still very, very large. The surface is still the same. It just occupies a very small space and that is

the way many of the membranes inside the cell are formed so that they can get an awful lot of surface into a very small space so that endoplasmic reticulum is in the cell sap or in the soluble or out in the cell body and not out here on the cell wall. And we are not talking about a receptor.

These are the proteins that are made are enzymes that among other things have the function of interacting with TCDD and making it less toxic. We don't go back to this cycle a second time. And we don't create additional -- as I said, you don't create additional receptors but then apparently according to this description, do something different than they did the first time. And we don't form reactive intermediates. This statement is incorrect.

And then in the last diagram, again the question of reactive intermediates and they don't bind in the cell. The results of the interaction of TCDD with those enzymes is a non reactive product and as I stated the other day, I don't really think that any mechanism of this sort represents any of the, any of the mechanism by which TCDD is associated with the increased tumor incidence that is seen in high lifetime doses in the various studies that have been done to show that TCDD has some potential presumably as a promoter.

Q. Doctor Dost, then the last one down by the word transformation, you put a question mark there, did you not,

sir?

A. Yes.

Q. And what was the purpose of that?

A. Well, for one thing, we believe that TCDD is a promoter. There are some problems with terminology because the term, the concept of promotion and transformation sometimes become -- I won't say they become interchanged but it is hard to tell where one leaves off and the other begins. We do not know anything about a mechanism by which that might happen and it certainly doesn't occur as a function of binding of TCDD to critical targets, so to speak, such as DNA. Certainly we know that the formation of the metabolites of TCDD does not result in cell toxicity. Apparently it is toxicity that is produced by TCDD depends on in tact, unchanged TCDD molecules.

MR. HEINEMAN: Your Honor, at this time we would move the admission of Defendant's Exhibits 1291 and 1295 into evidence.

MR. CARR: No objection, Your Honor.

THE COURT: 1291 and 1295?

MR. HEINEMAN: 1291 through 1295.

THE COURT: All right. Admitted without objection.

Q. Doctor Dost, in describing or in discussing these particular charts, you will recall that Doctor Zahalski

talked about one molecule of dioxin being able to initiate cancer or to initiate immune collapse. Do you recall that, sir?

A. Yes.

Q. Now, did you tell us yesterday you disagreed with that?

A. I did, yes.

Q. And why is it that you disagree with that, Doctor Dost?

A. Well, we can deal with it biologically or chemically or both. To begin with, reactions of chemicals in the body follow the same rules, the same natural laws that reactions in a test tube or anywhere else must follow. And one fundamental concept, one fundamental fact in chemical reactions is that as the concentration of reactants decreases, the rate of reaction decreases. In fact, it decreases more rapidly than the concentration does and also, the probability that a reaction can be started in the first place also depends on concentration. I believe I pointed out yesterday that one of the reasons for this is because it takes time. It is very difficult to imagine time in compartments so small that it would relate to a molecule. I mean we talked about how many molecules there are in very, very small amounts of any substance yesterday. However, if a

molecule does not remain on the site where it is going to react for some finite period of time, and the physical chemists speak in terms of pecoseconds when they discuss these kind of things. If it doesn't stay there long enough, it won't react.

Well, it can stay there long enough if there are enough other similar molecules in the system to make it stay there. Otherwise, because of the natural physical activity, molecules move around. They don't stay in one place. They are not lying there like a rock. And as a consequence, the molecule will not stay in place long enough for the physical forces that would hold it in place to actually bind it so that it can react. If there is a large population of molecules that surround it, then the potential for it to stay in place long enough to react becomes significant and a reaction presumably can take place. It may be very slow but it can take place. A single molecule, the likelihood of a single molecule reacting with anything is in practical terms impossible.

Q. What about with respect to promotion of an already initiated cancer cell?

A. Okay. We are talking about, again we are talking about a chemical reaction and TCDD is not a magic chemical. There are no magic chemicals. There are no chemicals that

behave apart from the basic laws of chemistry and physics and the same idea applies. There just is not enough material there even with the incredible toxicity, if you will, of TCDD and it is a very toxic substance. No one has ever denied that. There has to be enough molecules available to interact. One molecule in a practical reasonable sense is not going to undertake a reaction.

Q. What about individual susceptibility? You would certainly agree that one individual may be more susceptible to the action of the chemical than another person may be?

A. The differences in sensitivity of individuals are really not all that great. You may be talking about differences of 10, 20 fold, even animals or people with genetic differences that magnify individual or variability within a species. These differences are not on the order of hundreds and thousands and ten thousands. They are relatively small numbers. Now to be sure, an individual who is twice as sensitive, let's say, to an anesthetic agent and this is a very real possibility. A person who is twice as sensitive to an anesthetic agent is always a possibility in a surgical context and the anesthesiologist must be exceedingly careful that that individual is not just given some dose of anesthesia and assume that they are going to be properly anesthetized because the average dose is at some level. If

an individual is only twice as sensitive, the consequences could be drastic but a 10 fold sensitivity, when we are speaking in an issue where levels are so low as to be virtually unimaginable has very little meaning.

Q. So that you wouldn't find a ten trillion fold --

A. Oh, no.

Q. Difference in sensitivity?

A. No. Never.

Q. Now, with respect to the idea that we discussed yesterday that Doctor Zahalski suggested that promotion would occur before initiation. Do you remember that testimony?

A. Yes.

Q. Are there any studies, particularly in skin tumor agenesis in animals that have looked at what happens when TCDD is applied to the skin before a known initiating carcinogen is applied?

A. Well, the skin tumor model is a very widely used system for studying the ideas, the processes of promotion and initiation and their interrelationship because -- and the way that the system works is that an initiator, let's say di-methylbenzanthracene. It is applied to the skin and then the promoter is applied to the same spot over an extended period. Let's say twice a week for half a year after a single dose of an initiator. And this is a very sensative

system for at least certain kinds of tumor agenesis and it has provided a great deal of information that has given rise to the concepts of promotion and initiation.

TCDD doesn't work as a promoter in that rather sensitive system. In other words, if you were to treat a mouse with di-methylbenzanthracene and then follow it with TCDD at, well, the doses that have been used are as high as a microgram twice a week applied to the spot over, say, a 30 week period, still don't see any promotion. You see some skin injury. Some hyperplasia but you don't see any tumors. If you give TCDD prior to the initiator in that system, what happens is very dramatic. The incidence of tumor formation drops very sharply and the reason that it drops is very straight forward. What TCDD has done is to initiate the chemical metabolizing enzymes, the P450 enzymes in skin where they exist, not as extensively in liver but they are there and so if we give TCDD, let's say a week ahead of the initiator, the skin, the P450 enzymes in the skin have risen sharply. They have been induced and they metabolize the di-methylbenzanthracene and get rid of those of it and so the tumor incidence drops very dramatically.

Q. So instead of promoting, they inhibit?

A. In that situation instead of promoting, they really inhibit because they are accelerating the metabolism of the

initiating carcinogen so that the actual availability of the initiator has been decreased very sharply.

Q. Now --

MR. CARR: Counsel, did the witness perform these studies? You said they were studies but I didn't hear him identify --

A. I did not do that.

MR. CARR: I didn't hear you identify who did it?

A. Those have been done by Doctor Berry, Doctor Slaga again. A group primarily at the National Institute of Environmental Health Sciences. DeGiovanni, Cohen.

Q. Now, discussing di-methylbenzanthracene, I will have you take a brief look once again at the Eisen chart which is Plaintiffs' Exhibit 233. This particular document, this particular study, is this TCDD specific? Is that what --

A. This study is looking at -- No, it is not. Many of the things that are in here do relate to TCDD. I believe I mentioned yesterday that this part clearly is associated with the action of TCDD and this part. There are questions as the document shows but whether these particular enzymes are also elevated, the evidence is not clear. It doesn't apply to this concept of the formation of a reactive intermediates which then interacts to cause cancer or other elements of

toxicity. There is a possibility that there is evidence, in other words, to suggest that TCDD does have some activity in this general area. This is an area that has not been fully worked out yet. I suspect that we will find, in fact, there are interactions here and establish those very clearly.

Q. The question mark, sir, do they mean that it is a hypothesis?

A. Well, as I said yesterday, this is an overall model that is intended to include all, most of the reasonable possibilities for all chemicals but not as a specific model for any one chemical. You mentioned di-methylbenzanthracene. That fits into this category because there are presumably reactive intermediates formed. However, in the studies that I just was describing, apparently the interaction in the skin is sufficient that it either, there is such a short-lived intermediate or conceivably there may be a direct conversion without going through the reactive intermediate. That substance does cause or does form reactive intermediates in the liver.

Q. Now, there have been a number of occasions here, Doctor Dost, when you have disagreed with the testimony of Doctor Silbergeld and with Doctor Zahalski. The views you have expressed in disagreement with those two witnesses, are those views solely your own, sir?

A. No. They are not.

MR. CARR: Your Honor, I object, certainly object to that unless the witness is going to be here to cross examine. I object as to what Doctor Dost is doing and what Mr. Heineman is doing and counsel clearly knows that this is not proper.

THE COURT: Objection is sustained. It is not proper.

Q. Your views here today, sir, and yesterday, what have you based your opinions on?

A. My opinions are based on a thorough analysis of the scientific literature, analysis of the opinions of other scientists.

MR. CARR: Your Honor, I most certainly disagree, object to that. Counsel knows that it is not proper. If there is an authoritative article or if there is a citation of some sort, this witness may refer to it. He may not refer to conversations of so-called other scientists that are not here. We have no way of identifying. No way whether it is a fact or truth. It is the rankest form of hearsay and counsel knows it from many times we have been up on points similar to that and I object to it and ask the jury to be instructed to disregard what this witness has said with regard to conversations with other scientists.

MR. HEINEMAN: May I respond to that? As we have gone through this witness's testimony, he has specifically related to specific papers and specific studies by specific scientists when he has expressed his opinion.

MR. CARR: And I have no objection to that. That is not what I am objecting to now.

THE COURT: That is not a similar situation. The objection is sustained. The jury is ordered to disregard the remark. Mr. Heineman, you were admonished to avoid any such area, any such remarks or any question that calls for such remarks.

Q. Doctor Dost, have you, yourself, done any specific hands-on work in the laboratory with dioxin?

A. No. I have not.

Q. But you said to us that you have read the literature?

A. That is correct.

Q. On the subject of dioxin?

A. Yes.

Q. How many -- approximately how many such articles have you read?

A. I have no idea, really. Hundreds, I am sure.

Q. Is it -- do toxicologists such as yourself in operating daily as toxicologists deal solely with the result

of their own work in reaching conclusions about situations that are presented to them?

A. No. That would be impossible because for a number of reasons. For one thing, toxicologists tend to do research on certain classes of chemicals or work involving certain kinds of mechanisms. It is not possible for any of us to do a significant amount of work in any specific field. I at one time was considered to be a major expert in the area of the toxicology of the hydrosenes and I doubt if I had done three percent of the research on hydrosenes. The toxicologist has to be in a position to respond to problems and use the basic principles, the basic scientific principles and concepts of toxicology in doing that and there is no way that any of us could possibly do all of the work or even enough work to reach a conclusion on a wide basis. Certainly a researcher, Allen Poland, for example, has done a great deal of work on the AHH receptor and I am sure he has a very clear conclusion in his mind based on his own work about that but I am also sure that it, he has examined everybody else's work as he has approached his conclusions and we are all -- When we do do research, our research is shaped by the work that other people have done. If it was not, we would just waste our efforts because everything would be done over and over again.

Q. Now, one of the things I would like to ask you

about, sir, is the testimony by Doctor Zahalski on May 3rd of 1984, page 110. He suggested that one molecule of dioxin could result in one million cancer cells in 30 days. Do you remember that testimony, sir?

A. I remember that testimony.

Q. Do you agree with that?

A. No.

Q. And could you tell us why not?

A. Well, I have already explained why I really am convinced that a single molecule is not going to induce the carcinogenic process. But some simple arithmetic would and I discussed yesterday also the doubling time of tumor growth.

If I recall, Doctor Zahalski had mentioned the idea of rewarding his daughter for something, a penny a day, double it tomorrow, or do you want that or do you want some now. If one were to use that figure, that is using a doubling time of one day where there are two cells, one cell yesterday and two day, four tomorrow, et cetera, there would be on the order, I have calculated this, it would be in excess of 500 million cells at the end of a month. If we assume a doubling time or if we assume that there are a million cells starting from that single cell, at the end of a month, there would be, if we did start just with one cell, at the end of a month there would be a million cells, at the end

of two months there would be a trillion and at the end of three months there would be, each of those cells would form a million cells and there would be 10 to the 18 cells. Now, if we assume that there are 10 to the 9, that is one billion cells in a gram of tissue which is something of the order that we find in the liver, that means that at the end of the second month, there would be a thousand grams of tumor. Now, a thousand grams is only a kilogram. That would certainly be noticeable, but by the end of the third month, we would have a thousand kilograms of tumor cells and a kilogram is a fairly substantial amount of material. A person may weigh 70 or 80 kilograms and by the third month we already have a thousand kilograms of cells. If we wanted to multiply this by the amount of, by the number of molecules that we were talking about yesterday that are in the body at a dose of one nanogram per kilogram and I don't remember what the number was but we were talking something on the order of 130 trillion molecules at that dose, I think, something of that sort and if each of those molecules was to initiate this process, we are moving into numbers here that I no longer am able to imagine.

But in three months, a single cell reproducing at that rate would produce a tumor that weighs about a thousand kilograms.

Q. How much is that?

A. Well, that is 2200 pounds, something over a ton.

Q. Now, and that would be if indeed one molecule will result in a million cancer cells in 30 days?

A. Yes.

Q. Now, in fact, sir, would you explain to the jury the doubling rate that occurs in cancer and how that relates to a latency period and the development of a tumor after a period of time?

A. Well, the latency -- latency is defined in sometimes different ways because you recall, if I might bring up 1285, we talked about this initiation process and that can happen and that cell may remain there initiated for the life of the animal even. So there is no specific time between this event and the process of promotion and ultimately transformation. That cell may remain initiated for a lifetime. That sometimes is thought of as part of the latency period but if we just think of it from this point forward when that cell has reached the point where it is going to become a tumor without question. It has evaded immune surveillance, it is going to become a tumor and if we have, if we have a doubling time, I think I spoke yesterday of doubling times on the order of 30 to 90 days.

Now there are some culminating types of tumors that

go at an incredible rate. Not doubling everyday but they do go very fast but if a tumor doubled at a rate of 90 days, at the end of one year we would have two, four, at the end of six months we would have four cells. At the end of nine months we would have eight and at the end of 12 months we would have 16 and so on. And it would probably require a population. If one was really looking and was able to see tumors, you have got, you know, tumors are hardly ever found until they are of substantial size because they are found only when they are starting to cause some kind of disruption. A tumor of this size in the liver would almost certainly be undetected but with our present level of sophistication because it is hard to identify tumors on the basis of some biochemical change in the body. The only way they can really be identified is morphologically in most cases.

Now, some of the leukemias and so forth are detectable with a blood sample, but even so, they are rarely sought. You rarely look for them unless something is going wrong. So, most of the time a tumor isn't detected until it is causing some kind of a disturbance and that may be because of its size and it takes a long time, if a tumor is, let's say, this big around, it probably weighs what 20 or 30 grams and if there are a billion cells per gram, that means 20 or

30 billion cells and when the rate of doubling is only 90 days, that means that the growth of that tumor is going to be very, very small and it will probably have been going on for years and years and years. There are tumors that double even more slowly than that. So, that really is the basis for the latency idea. It is a little depressing to realize that all of this can be going on without us knowing it but that is what happens.

Q. Now, at some point, though, the mass of cells gets large enough that a doubling has a very substantial effect, isn't that right?

A. Oh, yes. There is another property here, too, and that is as a tumor becomes very large, oftentimes the doubling rate slows because the tumor is not well nourished. In other cases, it is well nourished and it will just keep right on going but oftentimes the tumor may be even capsulated. The cells in the tumor are not necessarily well nourished and that would slow the growth down. It varies with the kind of tumor.

Q. Now, with respect to the dose response theory, what do the studies of the effect of TCDD and cancer, what do they show with respect to whether or not a dose response principle exists in cancer?

A. Well, they all clearly show that at the highest

doses, there is some incidence of increased, some increased incidence of tumors, particularly in the liver, some thyroid. And in animals that are fed the material, apparently some incidence of tumors in the palate and upper respiratory area but as the dose decreases, and I might add that at those doses, these are animals that are showing other kinds of pathology as well. And as the dose decreases, that evidence just simply stops and at the lower doses, there is no evidence of increased tumor incidence.

Q. Well, who are the people? Who are the scientists who have studied this subject?

A. There have been a series of studies done under the auspices of the National Toxicology Program. They have studied TCDD in rats and mice given by stomach tube and also applied to the skin. The study by Koceba in rats that I have mentioned a number of times. Studies by a researcher named Toth, T-o-t-h, on mice. There have also been studies -- I mentioned earlier the skin tumor initiation promotion experiments that have been done. Allen Poland has done studies in nude mice. Identifying the promotion character of the promoting character of TCDD as have Henry Pitot. Those I think are the principal sources of data. There has been a study done by at the University of Wisconsin by Van Miller, James Allen and that group but it was a peculiar study, very

small numbers of animals. It was intended as a preliminary study. They found evidence of tumors but most of the control animals died. There was a higher mortality in the control animals than there was in any of the experimental groups except those in which all of the animals died because of the high dose of TCDD.

They used a very wide range. I think they used nine different dose levels but a relatively small number of animals in each.

Q. When they are measuring lethality of animals, do they find that it is cancer that kills them?

A. It doesn't seem to be, no. That is not the mechanism by which they die.

Q. With respect to whether there is a threshold for TCDD and cancer, have the Koceba studies addressed that subject?

A. Koceba did not specifically address that as part of the problem. The data suggests that there is, in fact, a threshold. In my opinion, I think there is a threshold for that kind of effect.

Q. What doses did Doctor Koceba test and what did he find with respect to any kind of tumors?

A. Well, in his two year study, they used a dose or a dose rate, if you will, of a microgram per kilogram per day.

I beg your pardon, a tenth of a microgram per kilogram per day over the lifetime of the animal and then there was a dose ten fold lower than that at .01 micrograms and a dose at .001 micrograms per kilogram per day.

Q. And what was found at those respective doses?

A. At the lowest dose, no evidence of any carcinogenic response. At the intermediate dose, there were some hepatic nodules that are characteristic of a lot of hepatic intoxicants and then at the higher dose, primarily hepatic carcinomas, some evidence of tumors, increased tumor incidence as I have just mentioned in the palate and upper respiratory tract. I don't recall whether he found -- I think he may have found some evidence of thyroid tumors in the high doses too and decreased incidence of tumors in the endocrine gland.

Q. Lower than in the control?

A. Yes.

Q. Now, based upon that, do you have an opinion as to whether there is a no effect level with respect to TCDD and any relationship to cancer?

A. Well, in my opinion, I think that there is a no effect level.

Q. And what is that?

A. Well, based on the studies of Koceba and in the

National Toxicology Program studies where the doses were approximately equivalent and in the Toth studies on mice, I think that we can consider .001 micrograms per kilogram to be a no effect level. It is often stated as a no effect level.

Q. Now, Doctor Dost, there has been some testimony in this case in the past relating to a certain paper put out by the Centers for Disease Control and Doctor Renate Kimbrough, Henry Falk and others. And, in fact, it is in evidence as Plaintiffs' Exhibit Number 1255. Have you read that document?

A. I have, yes.

Q. And what is the level in soil that is discussed as a level of concern in that document?

A. In that document, they consider that a level of one part per billion or above in residential soil is a level of concern.

Q. I would like you to look at the exhibit -- first of all, I have a copy of Plaintiffs' Exhibit 1255 and I would like to direct your attention to page 74 of that exhibit. Doctor Dost, I am showing you Defendant's Exhibit Number 1296 and ask if that is an accurate copy of page 74 of Plaintiffs' Exhibit 1255?

A. Yes. It is apparently a photocopy of this page.

Q. All right.

MR. HEINEMAN: Your Honor, we would move admission of Defendant's Exhibit 1296.

MR. CARR: No objection.

THE COURT: Okay. It is admitted without objection. Before you get into that, let's take a short break at this point in time. Court is in recess.

COURT RECESSED:

(The following proceedings were had in the hearing and presence of the jury)

FRANK DOST

having resumed the witness stand, being previously sworn, testified further as follows:

DIRECT EXAMINATION

By

MR. KENNETH R. HEINEMAN.

Q. Doctor Dost, you have before you there Plaintiffs' Exhibit 1255, do you not, sir?

A. Yes, I do.

Q. And the one part per billion level in residential soil that you related to us, what according to the CDC is the relationship between the level of contamination and where that contamination is in terms of the assumptions they have made and the level that they have made applicable?

A. The one part per billion level relates to

residential soil. The assumption is that the entire area is contaminated at a level of one part per billion. In other words, this is an area where people are living and the entire area is assumed to be contaminated at one part per billion.

Q. Now, by the entire area, you are referring, the articles is referring to what?

A. It is referring to soil. In other words, the garden, the lawn, wherever soil contact might be and the assumption is that it could very well be the entire area in open soil.

Q. Does it state anything with respect to whether any commercial or industrial area is considered?

A. Yes, it does. It points out that in commercial or industrial areas where there is often gravel covering, paving, where there is essentially limited foot traffic contact by individuals, people may be crossing over it but they are not in contact with the soil to any appreciable extent, they state that higher levels would be also without risk. In other words, they would not, they would be concerned only at higher levels than one part per billion.

Q. Did they state whether or not inhalation or skin contact would be assumed in gravel or commercial sites?

A. They did speak to that and their assumption was that there would not be skin contact nor certainly there

would not be ingestion because the people who are going to be in industrial sites are going to be almost exclusively adults and small children are not going to be playing in such sites.

Q. Does this one part per billion, sir, relate to a concentration in a product or a concentration in soil?

A. No, sir. It relates only to the ultimate concentration that might result in soil.

Q. And what were the assumptions behind the one part per billion?

A. Well, they have listed them on page 74, yes. Which we have reproduced here. The assumptions are listed here. This formula up here is simply a formula that -- this is worked out on a daily basis over a lifetime and so what this formula actually amounts to is incorporating each of the assumptions for each day and then with a computer going through and adding it all up over a lifetime. The factor is the expected lifespan in days. This factor is the age specific amount of soil ingested each day and they have made some estimations of soil ingestion patterns according to age with ingestion of approximately a gram of soil a day between ages 9 and 18 months, 10 grams of soil a day between a year and a half and three and a half years of age and then the amount ingested tends to diminish with age and they have also made estimates of daily deposition of soil on skin with age

and those estimates of deposition on scale for the age groups are about the same. And they have made an estimate of the percentage that should be expected to be absorbed through the gastrointestinal tract and they have arrived at a figure of one percent absorption.

In other words, you see they have the amount ingested and the amount absorbed. They have the amount that they would estimate to be deposited on skin and the amount that they would expect to be absorbed through the skin. The amount -- this is a symbol for inhalation. This is an estimate of the amount of air exchanged each day. It is known what our respiratory exchange rate is. We probably, with the kind of activity that is going on in here, probably have an exchange rate of something like 10 or 15 cubic meters a day that we breathe in and breathe out. Concentration of dust in the air, and a variable for season. They may be assuming that in the winter months where children are not outside, that that would be zero. So they put in the factor one for the fair weather months and zero for the cold weather months. And they made estimates when they did the ultimate calculation based on one part per billion and on a hundred parts per billion. These are the doses that they estimated.

But the main thing we are interested in here are the considerations that they brought into the calculation.

They make the point again that they are assuming uniform contamination across the entire area.

Q. Doctor Dost, what did they assume would be the primary route of exposure?

A. By ingestion of soil and primarily at the age range of one and a half to three and a half years where they assume 10 grams of soil taken in a day.

Q. 10 grams per day?

A. Yes.

Q. And what about the routes of dermal exposure or inhalation?

A. They came to the conclusion that inhalation exposure was not significant and they made a note of that but they did not include inhalation as part of the calculation because the factor is so small that it made no contribution to the ultimate estimated dose.

Q. And did they look at the time of exposure? In other words, the length of time?

A. Well, they looked at -- they set this formula up to deal with the entire lifetime. In other words, when they arrived at an estimated dose, they are making the assumption of a total lifetime exposure. In other words, if I were to live from birth to death in one site and the assumption is made that the contamination level remains constant throughout

that time.

Q. And did they build in any kind of a safety factor?

A. Well, they used, they used the safety factor or the no effect level that is currently accepted by the Food and Drug Administration as well as CDC of a no effect dose at one nanogram per kilogram and then, of course, they find that they have -- well, all right. The average daily TCDD dose to an individual over a 70 year lifetime would be 44.6 picograms. Now, we are talking about a no effect level at one nanogram per kilogram per day or 70 nanograms per person, approximately, 50 to 70 kilogram person, it would be 50 nanograms and since that is a number that is similar to 44 -- That is a thousand fold difference. In other words, 44.6 picograms is 1,000 fold less than 45 or, yeah, 50 nanograms.

Q. Now, what about the dose response analysis and assumptions for promoters versus carcinogens? What sort of assumptions did they make there?

A. Well, they made the assumption -- you understand that this is a document intended for regulatory use. It is the practice in the regulatory context because the regulatory context looks at events that might be in the future, not events that are in the past. And even though they make the statement in the document that TCDD is apparently a promoter, they use the assumption that it is a complete carcinogen. In

other words, they used an assumption that does not include a threshold. In other words, the dose response relationship is essentially linear down to zero dose which is the custom in any kind of regulatory context at the present time.

Q. All right. Now, how does that square with what the studies show with respect to whether or not there is a threshold?

A. In this document itself, they make the point that it is, I can't remember their exact language, it is possible or it is likely that the dose response relationship with respect to a promoter and, therefore, TCDD may be non linear. That is, that it may come down to a threshold or have some other configuration that approaches a threshold and what they do is acknowledge that along with the other assumptions that they make and the other estimates that they make, they are setting up a highly conservative model from which to judge the potential hazard of a one part per billion contamination.

Q. And as a matter of fact, if you look at the Exhibit 1255 there, I direct your attention to the second page of the exhibit in the middle of that first paragraph.

A. These calculations assume that a linear dose response relationship exists for carcinogens such as TCDD that based on current evidence are thought to be primarily

promoters. However, the dose response curve for promoters may not be linear causing an over-estimated risk. Is that what you are referring to?

Q. Yes. Now, Doctor Dost, have you been to Sturgeon?

A. Yes, I have been to Sturgeon.

Q. And how did you go?

A. I believe it was in late July or early August. I only remember that it was very, very warm when I was there.

Q. And what did you do while you were there? Where did you go?

A. Well, I walked the trackage from the, actually from the middle of Sturgeon through what is it Ogden Street, Wentz Street and on clear out to the intersection past the site where the tank car came to rest and then back. Inspected the area so that I could get an understanding of the topography and the kind of land that was adjacent. Visualize the treatment facilities that were set up and the excavations that were done and so forth.

Q. Now, at the time you were there, of course, none of that equipment was there?

A. Everything was gone.

Q. Did you have photographs with you from which you could visualize where the things were?

A. I had studied photographs very extensively before I

went. I took a couple along so that I could keep oriented but, yes.

Q. Are you familiar with the smell of chlorinated phenols, sir?

A. Yes, I am afraid I am.

Q. And were you able to detect the smell of chlorinated phenols when you were there on that hot day?

A. No. I couldn't smell them.

Q. And where else did you go besides walking up and down the track?

A. Well, we walked in some parts of the town, entered a couple of stores. We were debating whether to have lunch there or whether to go someplace else for lunch. Bought a soft drink. Drove throughout the town. Followed the course, most of the course of the ditch that leads from the, from about the point where the French drain ended and, in general, toured throughout the town. Walked some of it, drove through some of it and then went out into some of the surrounding agricultural area to get a general sense of the nature of the community.

Q. Now, with respect to Sturgeon, sir, and your understanding of this incident, was residential soil contaminated by the spill in Sturgeon?

A. I don't believe so. I can't see how it would

become contaminated.

Q. Now, what was the area that was contaminated by the spill?

A. The area that was primarily contaminated by the spill is an area just outside the town.

MR. CARR: I object unless the witness states the basis for his knowledge of the area that was contaminated by the spill.

THE COURT: Objection is sustained.

MR. CARR: Unless counsel gives it to him in a hypothetical. I am sure this witness has no knowledge of his own.

THE COURT: Objection is sustained.

Q. Doctor Dost, if you were to assume that the car came to rest on the main line track adjacent to the Triple C Construction property there at Sturgeon. Did you see the Triple C Construction property there?

A. I did, yes.

Q. And if you assume that the car came to rest there, sir, and that the derailment began near Ogden and Wentz Streets and the car proceeded west from there along the track until it came to rest?

A. Yes.

Q. Now, what was the area that received, if the car

came to rest there, the area that received the primarily contamination?

MR. CARR: Your Honor, I object to that. Counsel hasn't given the witness any facts yet. The witness can't answer a hypothetical, give a factual answer to a hypothetical.

THE COURT: I think there is some lacking in that question, too. Could you rephrase it and ask more. I will give you that opportunity. Objection is sustained.

Q. Doctor Dost, can you tell me which of the assumptions upon which the CDC estimate was based in your opinion do not apply to the Sturgeon situation?

MR. CARR: Your Honor, I object until the witness is given the facts to make an opinion on it. Right now he has been given no facts except that a tank car ran through Sturgeon.

THE COURT: Objection is sustained.

Q. Now, what is the age, Doctor, at which one would expect ingestion of soil that might be contaminated? What is the age at which that is expected to occur?

A. Well, according to the CDC and its consultants, the age at which the maximum amount of soil might be ingested would be between the ages of one and a half and three and a half. Somewhat less prior to that time and the amount would

diminish until by the age of five the estimated intake is on the order of 100 milligrams a day of soil, dirt.

Q. All right. Now, how is that according to the CDC assumption, how is that soil ingested? How does that occur?

A. Well, just because children do not eat much dirt purposefully but children are not that careful about the way they handle toys and they tend to take a lot of soil in just through carelessness.

Q. Is that in the area where they play?

A. Primarily in the area where they are playing, where they are spending most of their time, yes.

Q. And where do children who are ages one and a half to three and a half years spend most of their time, according to the CDC estimate?

A. Well, I would assume that at times when they are not under immediate and direct supervision, they are in their own yard and in their own home.

Q. And it is at that location that the CDC is assuming that this ingestion of dirt is going to occur?

A. That is correct.

Q. Does the railroad right-of-way at Sturgeon that you observed run through the yards of any of the people that live in the town?

A. I believe there is one residence through which or

near which the railroad right-of-way runs. It doesn't run through any yards.

Q. Do you have a conclusion, sir, as to -- do you have an opinion as to whether the one part per billion level of concern established by CDC in this document would be applicable to Sturgeon?

MR. CARR: Your Honor, I object unless it is based simply upon what the doctor has yet to suggest to and not any other consideration because no other facts have been given to Doctor Dost.

THE COURT: With that caveat, you may answer the question, Doctor Dost. I think that is properly brought out.

A. In my opinion, there is no relation to an exposure that might take place at any point on a railroad right-of-way and an exposure in a residential yard and I don't think that the CDC estimate is applicable to the situation in Sturgeon.

Q. Doctor Dost, with respect to dioxin isomers other than 2,3,7,8 TCDD, is there any literature that treats the toxicity of those other types of dioxin isomers?

A. Yes. There are some. There is some research in this area.

Q. How do the other dioxin isomers relate in terms of toxicity vis-a-vis 2,3,7,8 TCDD?

MR. CARR: Your Honor, I object unless he identifies the source of his knowledge at this point and cites the literature.

THE COURT: Objection sustained. Can you rephrase the question.

Q. What literature are you referring to, Doctor Dost?

A. Quite a few years ago Doctor Scwetz did a comparative lethality study on TCDD and other chlorodioxins.

MR. CARR: Can you spell his name?

A. S-c-w-e-t-z. There have been studies of the ability of TCDD to induce and others as a comparative study TCDD and other isomers to induce AHH in cultured cells as well.

Q. And who has done that work?

A. Primarily a group including Doctor Bradlaw, Doctor Casterline.

Q. And what do these studies demonstrate with respect to the toxicity of the other dioxins?

MR. CARR: Your Honor, to my knowledge we have not been given these studies. The witness hasn't referred to them and we didn't -- It is not in the document that he has given us.

MR. HEINEMAN: I certainly believe you have been. I don't know that I have that sheet here. Which one is it

that you don't have, Mr. Carr?

MR. CARR: I have got nothing that refers to Scwetz at all. I have got nothing that refers to Bradlaw at all.

THE COURT: Gentlemen, it is almost noon. Why don't you resolve this over the lunch break and we will start again at 1:15. Court is in recess for lunch. We will resume again at 1:15. I would remind you that you are not to discuss this matter among yourselves, with anyone outside the jury panel or as of yet form any opinions or conclusions about the matters on trial. Court is in recess.

COURT RECESSED:

(The following proceedings were had in the hearing and presence of the jury)

FRANK DOST

having resumed the witness stand, being previously sworn, testified further as follows:

MR. HEINEMAN: Your Honor, may counsel approach the bench for just a minute please.

THE COURT: Sure.

(Bench conference had out of the hearing of the jury.)

MR. HEINEMAN: Right before the lunch break, Judge, Mr. Carr had raised an objection with respect to having testimony on the, with respect to the paper by Bradlaw.

THE COURT: Bradlaw and someone else.

MR. CARR: The Scwetz paper we have. There were two papers. We have the Scwetz paper.

MR. HEINEMAN: Okay. My understanding is that both papers were in the Carnow bibliography which was provided to Mr. Carr a long time ago but it is also my understanding that in the list of papers which Doctor Dost was going to rely on, the Scwetz paper was mentioned by the Bradlaw was not.

MR. CARR: That is correct.

MR. HEINEMAN: And, therefore, I am not going to have him testify to anything involving the Bradlaw paper so the questions.

MR. CARR: You have a copy of the Bradlaw paper here?

MR. HEINEMAN: I don't have one here. No. I don't think so. I don't think so. I am not going to ask him anything about it.

THE COURT: About Bradlaw?

MR. HEINEMAN: No. Because I think Mr. Carr has a legitimate objection.

MR. CARR: And it wasn't listed.

THE COURT: But you are going to ask him about Scwetz?

MR. HEINEMAN: Yes.

THE COURT: And since you have it, there is no objection?

MR. CARR: Correct.

(The following proceedings were had in the hearing and presence of the jury)

DIRECT EXAMINATION

By

MR. KENNETH R. HEINEMAN.

Q. Doctor Dost, before we broke for lunch, we were talking about the work of a Doctor Scwetz and with respect to investigating the lethality of certain isomers of dioxin. Do you recall that, sir?

A. Yes.

Q. All right. And in connection with Doctor Scwetz's work --

MR. CARR: Counsel, would you make it clear that he mentioned other reports before lunch and that you are not going to ask him about it in the record, just the Scwetz?

MR. HEINEMAN: I am not going to ask you about the Bradlaw, just the Scwetz.

Q. With respect to the other isomers of dioxin, what does the Scwetz work indicate as to the relative toxicity?

A. Well, the TCDD is, of course, the most toxic. The other four chlorine isomers that they tested were much less

toxic on a comparative -- in fact, they were so much less toxic that they had trouble getting good quantitation. Their estimate of the lethality was that it required in excess of 100 milligrams per kilogram which would be 100,000 micrograms while in the rat whereas TCDD is lethal at a dose on the order of 20 to 30 micrograms per kilogram in the rat.

Q. As opposed to 100,000?

A. As opposed to 100,000 for other four chloro isomers. The two chloro isomers, 2,7 and 2,8 are another order of magnitude, less toxic still. On the order of what would amount to a million micrograms per kilogram.

Q. Now, when you are talking about the other four chloro isomers, are you including 1,3,6,8?

A. 1,3,6,8, 1,3,7,9. These are four chloro, tetrachlorodioxins with the chlorines located other, at other places than on the outside corners. We could have two of them, for example, in those positions but if the others are not, the toxicity drops precipitously.

Q. Now, what about the hexas and octas?

A. They are -- in part, it depends on the location of the chlorines, on the hexas, but the most toxic is perhaps 10 to 15 fold less toxic than TCDD.

Q. And with the octas, sir?

A. The octas are relatively innocuous. They are not

very toxic at all.

Q. Now, sir, I would like to talk to you about phenol and chlorinated phenols. Would you tell the jury what phenol is? What are its physical characteristics?

A. Phenol is a much simpler compound than is TCDD. It is -- at room temperature it is a clear crystalline material. If it is a little bit contaminated, it may be slightly pink in color but it is basically a clear crystalline substance that has a vapor pressure of about a third of a millimeter of mercury which means that it has some volatility but it is not highly volatile and it has a very strong odor.

Q. Now, speaking of the odor, Doctor Dost, would you define the difference for us between odor threshold and TLV?

A. An odor threshold is the concentration in the atmosphere that can be detected by humans and this is determined by using a so-called odor panel. In the same way the taste panels are used for judging the taste of food products in which a group of people are individually exposed to varying concentrations of the substance and when they can first tell that it is in the air, then they identify that concentration. The TLV or the threshold limit value is a factor that is used in industrial hygene to identify the level of a compound that is acceptable for workday exposure

in the workplace.

Q. What is the odor threshold for phenol?

A. For phenol it is about on the order of five hundredths of a part per million. .05 parts per million.

Q. Which would be how many parts per billion?

A. That would be, that would be 50 parts per billion.

Q. And what is the threshold limit value in the workplace for --

A. The threshold limit value in the workplace for phenol is five parts per million.

Q. Which would be how many times higher?

A. It would be 100 times higher than the odor threshold.

Q. All right. Now, do you recall the testimony of Doctor Silbergeld that phenols can be detected in the air between 1 to 10 parts per million and OSHA recommended a TLV for phenol at the level you can detect or on the order of one part per million? Do you recall that testimony, sir?

A. Yes, I do remember that.

Q. Do you agree with that?

A. No, sir, I do not.

Q. All right. And on what basis do you disagree?

A. Well, really on the basis that I have just stated. That the odor threshold is substantially lower than that.

The odor threshold is at .05 parts per million which is 20 times less than one part per million and that the OSHA TLV which was last reviewed in, I believe, 1976 is at five parts per million.

Q. So, would it be true, sir, that if you can smell phenol in the air, then there is clearly more there than there should be according to the OSHA standard?

A. Not according to the OSHA standard, no, sir.

Q. Now, what happens to phenol in the body, sir?

A. Well, phenol is absorbed very readily. It is absorbed when its contact is by the digestive tract. Phenol vapor can be absorbed even across the skin. In fact, the TLV identifies that fact by stating that phenol exposure is not limited to the respiratory exposure but also to vapor exposure across the skin. Phenol is not held in the body for a very long time. It is a non specific compound. It doesn't have preferential sites to which it moves. It is sufficiently water soluble; that substantial amounts are excreted without change but phenol also goes through this process of glucuronidation which I have discussed in which a soluble molecule is attached to it and it then goes out in the bile or perhaps in the urine.

Q. Is that through metabolism?

A. In a sense. It is metabolism in the sense that the

compound is changed. We don't take something off of the compound except the one hydrogen off of that hydroxyl group and exchange it and put on another more soluble group but the ring is not broken up. The basic structure of the compound is not changed. If we were to subject that glucuronide to a glucuronidase enzyme later on, you would get phenol back out of the system.

Q. Does the human body in its normal state contain some phenol?

A. Yes. As a matter of fact, it probably arises primarily from the activity of bacteria in the digestive tract as they interact, as they metabolize certain amino acids, tryosine. Some of the aromatic amino acids are broken up to form phenol.

Q. And where do those materials come from, sir?

A. Well, those are normal constituents of the diet.

Q. Now, is it normal to find either in the animal or in the human certain constituents of phenol in the urine?

A. Yes. It is not -- anytime that one is looking for baseline levels of phenol, if you were looking at an exposure to extrinsic, that is phenol coming from the outside, you have to take a baseline level to learn what the level of phenol in the urine already is.

Q. Well, Doctor, what are the toxic properties of

phenol?

A. Phenol is what sometimes is called a protoplasmic poison because it does haven't any specific effect. At any point where the concentration becomes sufficient, it simply causes damage. It will cause damage in the kidneys if a large amount is taken in; the liver, almost any organ where the circulation is substantial. On the skin it is a serious, it is a severe caustic. Phenol will burn the skin. If someone was to ingest phenol, it would devastate the upper digestive tract. The mouth, the esophagus and so forth.

Q. It can cause death, can it not?

A. It certainly can. It is a highly toxic substance.

Q. Does it have any genetic potency?

A. It doesn't appear to have an appreciable ability to cause genetic change. It is a rather non specific poison because it is so reactive, I suppose, that it is imaginable that it could perhaps cause some damage. I, at the moment, do not know of specific tests that show any positive results of it in genetic studies.

Q. What are the levels of phenol that are found to be required to cause some sort of biological reaction?

A. I would say that a dose of 20 or 30 million grams per kilogram would cause toxicity. The lethality of the phenols runs in between two and 400 milligrams per kilogram

depending on the species. Some are somewhat higher.

Q. Is the TLV, I assume, lower than any level that would cause any --

A. Heavens yes. That is the whole idea of establishing industrial hygene limits with any substance. TLVs are set for all substances that are encountered in the industrial environment, at least nearly all substances.

Q. Is there any evidence, sir, that chronic phenol exposure below the odor level is harmful, toxic?

A. I know of no evidence.

Q. As a matter of fact, the odor level is far below the TLV, isn't that correct?

A. The odor level is below the TLV and it is-- because the odor of phenol is so sharp, there is very little question when one is in its presence.

Q. So that if Doctor Silbergeld testified, sir, that the toxic effects from chronic phenol exposure below the odor, can arise below the odor level --

MR. CARR: What page is that and what day?

MR. HEINEMAN: April 16, page five.

Q. If she had testified, sir, that chronic exposure at levels below the detection by smell can result in toxic effects, would you agree or disagree with that statement?

A. I cannot agree with that.

Q. As a matter of fact, is there phenol found in the body all the time?

A. Yes.

Q. Now, there is evidence, sir, in this case. There is testimony that people tested the levels for phenol at Sturgeon. In fact, the EPA measured phenol in the air at Sturgeon. I would like you to assume that and assume that there was never a finding by either EPA or Monsanto of phenol above the threshold limit value. Could you assume that, sir?

A. Uh-huh. Yes.

Q. I would like you also to assume that there was testimony in the case that people could smell strong phenolic odor as far away as a mile or two from the spill site according to testimony in the case. Will you accept that, please, sir?

A. Yes.

Q. Can you tell me what it was they would be smelling?

A. Well, most of the material that spilled was two chlorophenol and two chlorophenol has a very, very sensitive odor threshold. It has a recognition threshold on the order of 95 parts per trillion. In other words, not only can it be detected but a person who is familiar with that smell can identify it at 95 parts per trillion and that level generally comes quite a bit, at a higher concentration than the

detection threshold or the odor threshold and I wouldn't at all be surprised that it could be smelled some distance away because that is a very, very small amount of material.

Q. Now, by two chlorophenol, is that the same thing as orthochlorophenol?

A. That is orthochlorophenol.

Q. Now, I would like you to assume that Doctor Silbergeld testified at page 14 on April 16th that the process of metabolizing phenol can cause damage to the liver and kidney. Would you assume that, sir?

A. All right.

Q. Do you agree with that statement?

A. Well, when the concentration of phenol in the body becomes high enough, it is going to damage the liver and the kidney but it has nothing to do with the process of metabolism. It has to do with the fact that the concentration is so high that it is causing cellular destruction.

Q. So that if the concentration of phenol in the body is below that at which, for example, skin destruction or tissue destruction would occur by the mere contact, would the fact that metabolizing it cause any toxicity to either the liver or the kidney?

A. No. There is a dose response with this sort of

thing just like every other kind of chemical impact and below the level where there is actually being cellular destruction, there is going to be a variety of toxicological injury but this has nothing to do with the metabolism of the compounds. It has to do with the reaction of the compound in the tissues as it exists as the phenol. The process of metabolism to the extent that it takes place is really a means of getting rid of the material. And at lower levels, the mammal, humans and other animals are very, very efficient at disposing of it.

Q. Well, sir, let me ask you if you recall the testimony of Doctor Silbergeld on April 16, page four, with respect to the toxic effects of phenol on the liver being related to the removal of chlorine from the phenol ring producing what is called a free chlorine radical. Do you remember --

A. Yes.

Q. That testimony, sir? Do you agree with that?

A. No, I do not.

Q. And can you tell us why?

A. There is no evidence at all that chlorine is metabolized by any mechanism that removes chlorine from the ring. Furthermore, the idea of a free chlorine radical as an entity in the toxicity of a chlorinated compound is really not sound because chlorine, when it is removed from organic

ring structures, is removed as a chloride ion and it is not highly reactive. Our body is saturated with chloride ion. We are full of sodium ions and chloride ions. We can't survive without it. If it were a highly reactive species. It would be no more reactive than the multitude of active oxygen and peroxide and so forth I believe that I was discussing yesterday as agents that are, that occasionally cause damage to DNA and there are multitudes of scavenging mechanisms that straps such substances and removes them from any activity. But basically the best argument is very simply that that kind of reaction does not occur with a chlorophenol.

Q. Now, Doctor Dost, you suggested that sodium, charged sodium and chloride ions are necessary to our existence?

A. Well, of course. When I say charged, we are simply talking about, about ionized sodium, ionized chloride. That is the state that sodium chloride is in in solution.

Q. What is sodium chloride?

A. It is salt, just like table salt.

Q. And so that negatively charged chlorine atoms and positively charged sodium atoms are in the body all the time?

A. We won't call them atoms. They are ions because they have had a change in their electrical charge but they

are not, they are not destructive entities. They don't go around having violent interactions with other components of the organism.

Q. Doctor Dost, would the fact that people were able to smell orthochlorophenol at Sturgeon mean that 2,3,7,8 TCDD was present in the atmosphere?

A. Certainly not.

Q. Why do you say that?

A. Orthochlorophenol is quite volatile. It also has a very low odor threshold. TCDD is virtually not volatile. Its volatility is so low as to be considered essentially nil.

Q. To your knowledge, sir, has TCDD ever been measured in ambient atmosphere anywhere in the world?

A. I know of no case where it has been measured in the atmosphere as a gas.

Q. Are there any other factors which would lead you to believe that TCDD would not be present in the atmosphere other than what you have already told us?

A. Well, TCDD has a very strong tendency to bind to anything that it comes in contact with and that would inhibit its ability to move. It also is subject to degradation by light.

Q. All right, sir. Have there been studies done on the toxicity of 2,4 dichlorophenol?

A. Yes. Yes.

Q. And what do they demonstrate, sir?

A. They demonstrate again that the compound is similar to the other chlorophenols in that the toxicity is relatively non specific. That is, it attacks when it reaches concentration that is sufficient to simply interact directly with cells. It is rather quickly excreted. Half times are very short. It appears to have very little reproductive or immunological effect. It is like all chemicals, fetotoxic in sufficient concentrations. In other words, if 2,4 dichlorophenol is given to a pregnant animal, not only the parents but the offspring would be expected to be intoxicated at sufficient doses.

Q. You say in sufficient doses. Does it have a no observed effect level?

A. It appears to, yes.

Q. All right. Doctor Dost, I would like to ask you a hypothetical question, sir. And I want you to assume, if you would, that on the night of January 10, 1979, a tank car derailed while moving west through Sturgeon, Missouri. Assume that this tank car spilled approximately 19,000 gallons of orthochlorophenol-crude, a mixture of phenol and various chlorinated phenols, and that this mixture also contained between .6 and 45 parts per billion of 2,3,7,8

tetrachlorodibenzo-para-dioxin which would be no more than 81 percent of a teaspoon in this 19,000 gallons of chemicals.

Assume also that the spillage involved the main line track, the passing track and a seven foot wide walkway between the two tracks. Further assume that this tank car traveled 2700 feet after it derailed, coming to rest beyond the city limits of Sturgeon; that there were only scattered splatters and splashes of chemical on the ground, along the passing track the first 2,400 feet past the point of derailment and that the major spill area was 240 feet long at the extreme western end of the spill area where the tank car came to rest.

Assume that dioxin has a low volatility, 16 billion times less than water at 77 degrees Fahrenheit, so that it does not tend to become airborne or turn into gas.

Assume that the inhabitants of Sturgeon were evacuated the night of January 10, 1979, but were notified they could return to Sturgeon January 12, 1979, after the EPA determined from air samples taken by the EPA and by Monsanto that no health hazard existed from breathing the air at Sturgeon. Assume that the air in the town of Sturgeon was sampled for four to six months starting in April of 1979 and that no levels in excess of one part per million of any of the spilled chemicals were ever detected in the air in the

town of Sturgeon.

Assume that the railroad retained a contractor to clean up the site of the spill under the direction of the EPA. Assume that the contractor dispatched a team of workers who arrived at Sturgeon at nine o'clock a.m. the morning after the spill. Assume that the first operation in connection with cleanup of the track they performed was cribbing or removing material from between the ties. Assume that all the material between the ties and the main track was removed to a depth of six to eight inches below the bottom of the ties as well as all material between the end of the passing track ties north of the rails. In addition, assume that all material between the passing track ties was removed to a depth of eight to ten inches in the western 150 to 200 feet of the spill area where the surface of the snow and the ballast of the passing track had been visibly discolored by the spilled chemical.

Assume that by January 26, 1979, all of this material had been removed from the tracks and transferred by gondola car to a staging area south of the tracks which had been scraped and surrounded by a wall of soil to contain the material. Further assume that no dust was kicked up either by the cribbing operation or by the transfer of this material to the staging area. Assume that this material removed from

between the ties was placed in two piles in this staging area and that the cleanup workers were instructed to keep any contaminated material confined to these piles.

Assume that this material never thawed while it was in the piles and that there was no dust blown off the piles as there were no particles small enough to be picked up by the wind. Assume that a backhoe lifted soil and ballast out of these piles and loaded it into 55 gallon drums. The larger or east pile was covered with plastic as the west pile was loaded into the drums.

During the loading of the barrels, there was no dust picked up by the wind. Workers then leveled off the material by hand to the top of the barrel and secured the lid. Assume that after the lid was securely fastened, the workers rolled the barrels away from the contaminated area so that the scatbacks which picked up the barrels would not drive over any contaminated material. Assume that as material was loaded from the piles into the barrels, the backhoe operator would scoop up any material which was no longer on the pile back onto the pile so that the backhoe would not be tracking through any contaminated material.

Assume that after the barrels were rolled away from the contaminated area, they were loaded by scatbacks onto flatbed trailers which were then pulled to the north side of

the tracks where the barrels were unloaded for temporary storage. Assume that it is possible that less than a cubic yard of contaminated material was carried out of the staging area on the wheels of the scatbacks or flatbed trailers. Assume that the barrels were reloaded on the north side of the tracks into enclosed tractor trailer trucks to be transported out of Sturgeon. And that no drums left the site in anything other than enclosed tractor trailer trucks.

Assume that by March 1, 1979, 4,500 drums of material had been removed from Sturgeon. Assume that after the cribbing operation was completed, a ditch two and a half feet wide and four feet deep was dug between the passing track and the main track from Ogden Street to the place the tank car came to rest. Assume that additional material was also removed onto the main track by an undercutter machine. Assume that this machine removed the ballast and earth beneath the main track to a depth of 46 inches in the 200 to 240 feet of track where the most chemical was spilled and to a depth of two feet for the rest of the main track.

Assume also that some dirt was removed from the ditches around where the tank car came to rest. Assume that all of this material was loaded into trucks previously lined with sheets of plastic. Assume that in order to prevent any spillage of soil, the trucks were not filled to the top, the

plastic was folded over the top of the soil and a heavy canvas tarp was secured over the top of the truck and no truck left the spill site without a plastic liner and a canvas tarp. Assume that by March 1, 1979, 2,855.3 cubic yards of soil had been removed from Sturgeon in these trucks.

Assume that the cleanup workers spent the night in towns other than Sturgeon and only went into the town of Sturgeon for lunch with the exception of a couple of workers who went into town for hardware supplies on days when they were not working in the contaminated material. Assume that the workers always went to Daisy's Cafe for lunch. Assume that when the workers arrived in the morning, they put on protective PVC rain suits and rubber gloves kept on site and that when the workers left the site for lunch at Daisy's or at the end of the day, they always removed their protective suits. Assume that when the workers were at the western end of the spill site, they always either brushed off their boots before leaving the site with a dry brush or scrub them with a brush and soap and water. And that even when the workers worked at the less contaminated eastern end of the site, some still scrubbed their boots before leaving the site.

Assume that throughout the January and February cleanup, the weather was nearly always below freezing.

Sometimes as low as 20 degrees below zero and that this was too cold for soil and other material to stick to boots or tires. Assume that the only place where mud was generated during this period was in a non contaminated area. Assume that no cleanup worker ever testified that he saw any mud tracked anywhere by the cleanup workers or that anyone ever complained that the workers were tracking mud into Daisy's or anyplace else.

Assume also that one of the duties of the EPA on-site cleanup coordinator was to see if any chemicals were tracked away from the cleanup site and that he never observed any chemical being tracked out of the controlled site area by any equipment or personnel. Assume that there were banner guards erected at the Ogden Street crossing to prevent unauthorized people from getting into the site and that no unauthorized people were seen on the site. In addition, assume that the railroad posted railroad security guards during the weeks following the derailment at the Triple C driveway to restrain on-lookers, spectators and townspeople that did not have any business being there from driving into the Triple C driveway.

Assume that Monsanto informed the EPA on February 9, 1979 that it had confirmed the presence of tetrachlorodibenzo-para-dioxin in the spilled material at a

level of approximately 37 parts per billion and that EPA determined at that time in consultation with outside toxicologists that even if the dioxin present was the most toxic form of TCDD, no increased endangerment to the townspeople was expected as a result of this information and that the primary problem was exposure to the phenolic compound.

Assume the ponds south of the railroad tracks were found in March of 1979 to be discolored in the same manner that water known to contain phenol compounds is discolored and that these ponds were found to contain orthochlorophenol and phenol compounds. Assume further that discolored water was also observed in Saling Creek when it overflowed its banks during the latter days of April. Assume also that dioxin has a very low solubility in water and, therefore, would not tend to migrate with this water unlike phenol and chlorinated phenols which are water soluble.

In this regard, assume that a sample of water obtained by Doctor Gary Osweiler on April 4, 1979 from a ditch north of the main track at the spill site was analyzed by Doctor Matthew Zabik and found to contain over 15 percent phenol and chlorinated phenols but only 14 parts per trillion TCDD with no 2,3,7,8 tetrachlorodibenzo-para-dioxin present.

Assume further that dioxin has a strong attraction to soil and would tend to bind to soil rather than to become

airborne or to migrate with water flowing through the soil and that, therefore, the movement of phenol and dioxin through soil will not be similar.

Assume that the railroad hired a second cleanup contractor which arrived in Sturgeon during the first week of April of 1979 and worked at the site until June of 1980. Assume that this contractor was originally retained to treat the water in the Kemner pond, to reduce the level of contaminants to a level set by EPA at less than 100 parts per billion. And to reduce the level of contaminants in soil in the area to a level set by EPA of 200 parts per million.

Assume that EPA also subsequently established a criteria of 60 parts per billion for runoff water from the spill site into the Kemner pond. In May of 1979 assume that this contractor learned from Monsanto that 37 parts per billion tetrachlorodibenzo-para-dioxin had been in the spilled material and that EPA had labeled the entire amount as 2,3,7,8. Assume that this contractor discussed this information and determined that no changes need be made in the cleanup methods used as a result of those discussions and that EPA also did not require any change in cleanup methods as a result of any information about dioxin content and the spilled material. Assume that this cleanup contractor determined that the source of the water contamination in the

Kemner pond was the western most 220 feet of the spill site which lay outside the city limit of Sturgeon.

Assume further that the second cleanup contractor contained the runoff from this area to channel it into the Kemner pond, installed a carbon filtration system in the pond south of the railroad tracks and installed an underground pressure injection system to flush the chemicals in the railroad bed into the pond for treatment. Assume that this cleanup contractor also observed contamination in Saling Creek on April 27, 1979, and traced the source of that contamination to a French drain located under the railroad tracks in the eastern portion of the spill site.

Assume that the site manager for the cleanup contractor testified that the spilled chemical did not move into the French drain the night of the spill because of the ground frost but instead was carried into the French drain with the water several months later. Assume that that same day the contractor constructed dams to prevent discharges from the French drain from north into the town of Sturgeon or into Saling Creek along the railroad right-of-way. Assume that the contractor treated all the water collected behind these dams before it was discharged into Saling Creek and that a permanent drain pipe was installed to route water from the French drain onto the railroad tracks to Saling Creek

where it was filtered by a second carbon filtration system before it entered the stream.

Assume that in all 106 water samples analyzed by the contractor in the Sturgeon area during a period from May 22, 1980 through June 23, 1980, less than 40 parts per billion of orthochlorophenol were detected. Assume also that the soil around the Kemner pond was sampled in May of 1980 and that no levels of contamination above the EPA criteria were detected. Assume also that an outside hydrogeologist investigated the ground water in the Sturgeon area and that as a result of this investigation, the EPA determined that there was no health hazard associated with the ground water at Sturgeon. Also assume that in addition to water treatment as described above, the second cleanup contractor also excavated and removed earth in an area 20 feet wide and 393 feet long on the north side of the tracks and ranging from four to 29 feet wide for the same length on the south side of the tracks. These areas were excavated to depths from six feet closest to the track to one foot furthest from the track.

Assume that during this excavation the contractor sampled the soil in the excavation area and that whenever a level of contamination higher than the level set by the EPA was found, additional excavation was performed at the

location of that sample until subsequent samples showed that the EPA criteria had been met. Assume that all the earth excavated was loaded into dump trucks or trailers lined with plastic and was covered with plastic and a canvas tarp before shipping. Assume that between April 19th and June 25, 1980, the second cleanup contractor removed a total of 1,351.7 cubic yards of earth from these areas in this manner.

After this earth was excavated, assume that the entire area of excavation was layered with an average of six inches of carbon which is capable of absorbing large quantities of organic material. Above this was placed two separate six inch layers of compacted clay mixed with industrial sealer to keep water from leaking into the excavated area. Above this was placed a 6 to 12 inch layer of clay mixed with top soil which was seeded with grass seed to keep the area from eroding. Assume that the only soil sample taken at Sturgeon would show the presence of tetrachlorodibenzo-para-dioxin was performed in 1983 by EPA on a sample taken February 16, 1979, and showed 65 parts per trillion total tetrachlorodibenzo-para-dioxin. Other analyses performed at the same time showed no dioxin in sediment from cropland along Saling Creek at a detection level of three parts per billion and no dioxin in a well water sample at a detection level of 25 parts per

quadrillion.

Assume also that the half-life of TCDD and the top two millimeters of soil exposed to ultraviolet light is no more than 36 hours so that at the end of that period of exposure to ultraviolet light, one-half of the TCDD in that layer will have been destroyed and that TCDD will move through soil at a rate of no more than .033 millimeters per day. Further assume that based on these facts it has been calculated that TCDD will take at least 60 to 62 days to move through the top two millimeter layer of soil and that a concentration of 65 parts per trillion at the two millimeter level will have been reduced to a concentration of no more than 625 parts per quintillion by the time it reached the surface.

Assuming that all the facts stated above are true, do you have an opinion based upon a reasonable degree of toxicological certainty whether a resident of Sturgeon, Missouri, during the period from January 10, 1979, to the present could have been exposed to any amount of 2,3,7,8 tetrachlorodibenzo-para-dioxin sufficient to cause any adverse health effects?

A. Yes, I have an opinion.

Q. And what is that opinion, sir?

A. I don't believe that there is any meaningful

possibility of such an effect.

Q. Now, Doctor, in your experience with the phenoxy herbicides, did you have occasion to review the presence or potential presence of dioxin in 2,4-D?

A. Yes, as a matter of fact.

Q. In your review, are you aware of whether or not 2,4-D, the herbicide, was ever found to contain 2,3,7,8 TCDD?

A. I know of no evidence that it has ever -- that 2,3,7,8 TCDD has ever been found in 2,4-D.

Q. Was 2,4-D tested for dioxin to the best of your knowledge?

A. Yes.

Q. By whom and when, approximately?

A. In 1980 a Canadian researcher studying Canadian production of 2,4-D found that there were a variety of other chlorodioxins in 2,4-D as well as the 2,7 isomer which a chemist would expect to find in a product containing, that is derived from 2,4 dichlorophenol. That is the dichlorodioxin that would be expected in production of that product. It had not been found previously. When that work was reported, it was reported first in a meeting in Rome and then published in the United States. The EPA carried out a sampling program of commercial sources of 2,4-D and they analyzed some 33 samples as I recall. They found no 2,3,7 TCDD. They found traces of

others, one or two other tetras. They found traces of one or two trichlorodioxins. In three of the samples they found small amounts of the 2,7 which was somewhat surprising because we anticipated that they should find it in more samples. They found it in one sample, if my memory serves, at a concentration of 57 parts per billion and in two other samples at levels less than 30 parts per billion. Considering that, the 2,7 DCDD has very, very limited toxicity. Those are not toxicologically significant amounts. That generally is the picture that was found in that EPA sampling.

Q. Did the testing include a mean and ester product?

A. It is my understanding that both the mean and ester products were tested.

Q. To the best of your recollection, sir, was 2,3,7,8 TCDD ever found in any of those samples?

A. No, it was not.

Q. To your knowledge, Doctor Dost, has any scientist or anyone ever reported finding 2,3,7,8 TCDD in 2,4-D?

A. I know of no such finding.

Q. Do you know what 2,4 dichlorophenol is used for industrially?

A. I am sure it has many uses but the use that I am familiar with is as a starting material for the manufacture

of the herbicide 2,4 dichlorophenoxyacetic acid, 2,4-D.

Q. Doctor Dost, I want you to assume the following facts. That 2,4 dichlorophenol manufactured by Monsanto between December 1, 1978 and April 1, 1979 contain total tetradioxins in a range from none detected to as high as approximately 500 parts per billion. The latter having 120 parts per billion coeluting with 2,3,7,8 TCDD. Assume that this material was manufactured in a process which used caustic, which use was discontinued after April 1, 1979. Assume that an isomer specific analysis was performed in February of 1981 on a sample of 2,4 dichlorophenol showing total tetras of 149 parts per billion and 14 parts per billion coeluting with 2,3,7,8 TCDD. I am sorry, let me repeat that. I said it was an isomer specific analysis so it wouldn't be coeluting. It found 149 parts per billion total tetras and 14 parts per billion of 2,3,7,8.

Assume that levels coeluting with the 2,3,7,8 standard have been found in 2,4 dichlorophenol as high as 210 parts per billion. Assume that the 2,4 dichlorophenol was shipped by tank car and was used in an enclosed system for the production of 2,4-D, a mean product.

Based upon your studies of the use of phenoxy herbicides, the levels of dioxins found therein and the toxicological significance of dioxin, do you believe that the

dioxin levels as stated above reached the level of toxicological significance to humans in their handling or use of either the 2,4 dichlorophenol or subsequently manufactured 2,4-D product?

A. Well, this concentration in the dichlorophenol because of the toxicity of the dichlorophenol itself, I would consider it to not have significance. It does not take very much dichlorophenol on the skin or ingested to cause substantial injury and I would consider that this level of contamination in the phenol, per se, would not represent a significant part of the toxicity of the total.

Q. Doctor, I want you to further assume -- well, first of all, what about in the subsequently manufactured 2,4-D product?

A. In the 2,4-D product, and we are assuming that this is carrying forward in the product at 210 parts per billion, is that correct?

Q. Well, would you assume that?

A. Not necessarily.

Q. And why not?

A. Well, there is a reaction that takes place that adds another molecule.

MR. CARR: I object here unless this witness is qualified as a chemist of some sort. I think he hasn't and I

object to this answer.

MR. HEINEMAN: Your Honor, he is clearly qualified. He has a background in studying the phenoxy herbicides and he has had chemical training as testified to on the very first day of his testimony.

THE COURT: Do you have anything further you want to say?

MR. CARR: I don't recall it but if he has some training that makes him capable of answering that question, I will withdraw it but I don't recall anything, any chemical training.

MR. HEINEMAN: Well, my recollection, Your Honor, he testified both when he got his Doctor of Veternary Medicine and his Masters in Physiology, he had extensive study in the area of chemistry among others, pharmacology, biochemistry, physical chemistry. That is my recollection of his testimony and, of course, his experience with agricultural chemicals.

MR. CARR: I have nothing further, Your Honor.

THE COURT: Objection is sustained.

MR. CARR: Your Honor, I won't object if counsel establishes it in more detail but I certainly don't want to keep this testimony out if this witness, if --

THE COURT: If you wish to lay a further

foundation, you may. Go ahead under your original hypothetical.

Q. Doctor Dost, would you tell the Court and the jury the training that you have had in chemistry in the course of obtaining the degrees that you have, that you have achieved?

A. Well, I have had courses in, of course, the kind of elementary chemistry that any college freshman takes. Analytical chemistry, biochemistry, some physical chemistry and organic chemistry.

Q. When did you obtain, when did you take these courses?

A. Well, I took some of them, of course, at Washington State University in my undergraduate training. I took some of them at Kansas State University. I have also taken courses while I was on the faculty at Washington State University. I also took some courses in chemistry and biochemistry.

THE COURT: Objection is sustained.

Q. Doctor Dost, I would like you to further assume that 2,4-D, a mean product -- First of all, Doctor, tell me, sir, do you know whether or not in the manufacture of 2,4-D, that 2,4 dichlorophenol is blended with another material in that process?

A. 2,4-D is a more complex chemical than the 2,4 DCP.

Another molecule is combined with it to make the 2,4-D.

Q. What is that other material?

A. It is acetic acid.

Q. Do you know, sir, what are the proportions in which the acetic acids and the 2,4 dichlorophenol are added together?

A. Well, they are mol for mol. In other words, for every molecule of the phenol, there would have to be a molecule of the acetic acid in the ultimate product.

Q. Now, sir, that being true, what would that tend to do to the concentration of a contaminant in the 2,4 dichlorophenol?

A. It would bring it down to some extent. I would judge on the basis of the molecular weights of the two that it would bring it down perhaps by 25 percent.

Q. Now, Doctor, I want you to further assume that the 2,4-D, a mean product manufactured from the 2,4 dichlorophenol product that I mentioned before, has been used in a 9 percent solution as 2,4 dichlorophenoxyacetic acid in a product called Weed-B-Gone and that this product has been applied by homeowners on their lawns at a rate of four teaspoons per gallon. In your opinion, Doctor, based on a reasonable degree of toxicological certainty, would either of the Weed-B-Gone product or the spray solution reach a level

of toxicological significance to humans as the result of the presence of dioxins mentioned before in the 2,4 dichlorophenol product?

A. Well, when we are dealing with the 2,4-D as such, at that concentration, it has a marginal tendency for toxicity. If one were to pour it on the skin and not wash it off, there is some possibility of illness. But toxicity is clearly less than we were talking about with concentrated dichlorophenol. At the same time, the concentration of the TCDD has been diminished very sharply and I don't think that it represents a hazard in the solution as it is sold. It is a registered pesticide and certainly when it is further diluted for distribution, four teaspoons per gallon would be about two-thirds of an ounce in 128 ounces. That would dilute it substantially further and when it is spread, when it is used as a herbicide, sprayed on vegetation and inevitably on the ground, the concentration is going to be very low of TCDD and I don't really think that that represents a significant hazard.

THE COURT: Is this a good point for a short break?

MR. HEINEMAN: Sure, Judge.

THE COURT: We will take a short recess at this time and then resume testimony. The admonishments that I

have given you earlier will apply during this break also. Court is in recess.

COURT RECESSED:

(The following proceedings were had in the hearing and presence of the jury)

FRANK DOST

having resumed the witness stand, being previously sworn, testified further as follows:

DIRECT EXAMINATION

By

MR. KENNETH R. HEINEMAN.

Q. Doctor Dost, I would like to ask you another hypothetical question. I would like you to assume, sir, that during a period from August of 1978 until March 1, 1979, Monsanto manufactured orthobenzo-parachlorophenol known as Santophen-1 by a process using caustic. That there were a number of product samples produced during this period which were analyzed for tetradioxins and found to have levels which ranged from 1.5 parts per billion to 56 parts per billion. That these samples were tested coeluting with the 2,3,7,8 TCDD and found to have a range of coeluting with 2,3,7,8 TCDD from not detected to seven parts per billion with the second highest level being 2.9 parts per billion.

I want you to further assume, sir, that this

material was blended into a solution containing anywhere from 2.7 percent to 4.5 percent of Santophen-1 and sold as a disinfectant to hospitals and the public for cleaning bathrooms, nurseries, et cetera. You should further assume that the manufacturer suggested a further dilution of the disinfectant into a water solution of one and one quarter ounces of disinfectant per gallon of water. You should assume that the rate might vary slightly based on actual home or hospital use. You should assume that the manufacturer recommended the use of gloves and the water rinsing of the material in the nursery.

In your opinion, Doctor Dost, based on a reasonable degree of toxicological certainty, would either the Santophen product, the disinfectant solution or the recommended application reach a level of toxicological significance to humanbeings including infants as a result of the reported levels of dioxins in Santophen product?

A. In my opinion, no.

Q. And on what basis do you reach that opinion, sir?

A. Well, again this is a product that is highly toxic. This particular phenol just and all phenols are. It is very toxic. The concentration at the highest is still relatively low at seven parts per billion and in the solution, assuming the maximum concentration in which it is

marketed, the concentration would be much lower and as it is used, the dilution is still another hundred fold lower and the concentration is down at levels in the low parts per trillion and there simply is not enough of the material there to represent a hazard.

Q. Doctor Dost, you have previously testified regarding your work with the Environmental Protection Agency pertaining to 2,4,5-T and the levels of 2,3,7,8 TCDD in that product. During the period from 1970 until 1979, did the EPA have a tolerance level of 100 parts per billion of 2,3,7,8 TCDD in 2,4,5-T?

A. It wasn't precisely a tolerance level. It was, it was a guideline that was adhered to by all producers. It was never incorporated in the law apparently as nearly as I know but it was a guideline that EPA projected and it was followed by all manufacturers and, as a matter of fact, the concentration is steadily diminished but that was the level that was acceptable until 1979.

Q. Was 100 parts per billion?

A. 100 parts per billion.

Q. Doctor, as a herbicide, was 2,4,5-T registered under FIFRA?

A. Yes.

Q. Pursuant to that registration, was it not within

the power of EPA to require the presence of that 2,3,7,8 TCDD to be placed on the label?

A. I would presume that they have that power.

Q. Isn't that one of the things that FIFRA is about in registering a product? You have to register the label too?

A. The label is a legal document that identifies the product and the way it is to be used and the label really reflects among other things the toxicological character of the substance.

Q. Doctor Dost, during the period from 1970 to 1979, did the EPA or any other federal agency require the disclosure of the levels of dioxin present in 2,4,5-T on the labels for that product?

A. Not to my knowledge. Those levels were never published on the labels.

Q. Did the EPA require, to your knowledge, any notice whatsoever of 100 parts per billion of dioxin being present in 2,3,7,8 TCDD to purchasers of the product?

A. Of dioxin in 2,4,5-T you mean?

Q. In 2,4,5-T.

A. I have never seen such notice and so I assume that it wasn't required.

Q. Now, this product, Doctor Dost, was sold to and used by farmers, foresters and many other people for blending

and direct application for the killing of weeds?

A. That is correct.

Q. And it was sprayed. What was done with this product?

A. It was sprayed either by aircraft or by machines or backpack apparatus, a variety of methods of application but it was sprayed as a liquid.

Q. Now, following the withdrawal of the registration of 2,4,5-T, did the EPA ever require a recall of any 2,4,5-T product from the marketplace?

A. To my knowledge, never.

Q. Did the EPA ever require any cleanup of any of the property upon which the material was sprayed?

A. No.

Q. Subject to photodegradation or any other breakdown, microbial or otherwise of this material, as far as anyone knows, is the EPA certainly aware of the possibility that materials sprayed on the soil and grounds of farms in 1979 might still be beneath the surface of the soil today?

A. Well, I am sure they have access to the same information that we all have access to and so I suppose that they would have to make that assumption of that possibility.

Q. Doctor Dost, are you aware of any animal experiments performed with contaminated materials from the

Sturgeon spill site?

A. I am aware that Doctor Osweiler conducted some experiments with water that I believe emerged from the ground after the thaw in that spring.

Q. And where did that water come from?

A. It is my understanding that it came from a site --

MR. CARR: Again I object to the witness. He obviously doesn't have any knowledge of it. Counsel is going to have to give him the facts. The witness wasn't there and he is not Doctor Osweiler. It has to be hearsay.

THE COURT: Objection is sustained.

Q. Doctor, I would like you to assume that Doctor Osweiler obtained this water from a ditch which was alongside the area where the tank car came to rest. That the water he obtained contained sediment and that he fed this material to goats and guinea pigs and that none of the guinea pigs died as a result of being fed this material. Would you assume that for me, please, sir?

A. Yes.

Q. Is there any significance to the result of that study in terms of whether or not there is any hazard to the residents of Sturgeon from dioxin at the spill site?

MR. CARR: Your Honor, I object to that because the question does not include the fact that the Osweiler water

was never found to have dioxin in it. Clearly the evidence shows that. That is an important factor that counsel must include within the aspect of the question to the witness.

MR. HEINEMAN: All right. I will be happy to include that.

MR. CARR: He never found 2,3,7,8 TCDD in the water.

MR. HEINEMAN: That is right.

Q. I will ask you to assume this, too, Doctor, which we already did in the previous hypothetical that was read to you. That Doctor Zabik analyzed that water and found 14 parts per trillion of tetras but did not find any 2,3,7,8 TCDD in the water, all right. Now, based upon that, do those experiments have any significance in your opinion to whether or not there is a hazard to the people of Sturgeon from any dioxin being present at the spill site?

A. The fact that water and sediment contained perhaps -- you ask me the question again so that I can give you a direct answer and then I should perhaps explain the reason for my answer.

Q. I am trying to remember the question.

(The Court Reporter read back the last question.)

A. Yes. They have very real significance.

Q. And what is that, sir?

A. The fact that there was no 2,3,7,8 TCDD found in the water that emerged from the track area.

MR. CARR: Your Honor, I object to that. There is nothing in the hypothetical that shows it emerged from the track area.

THE COURT: Objection is sustained.

MR. HEINEMAN: I think I did say where the water came from, Your Honor.

MR. CARR: It came from a ditch but he is saying it emerged from the track. There is a difference coming from the ditch.

THE COURT: I think the question just included the track part. I don't think it included anything. I mean the ditch part, not the track.

MR. HEINEMAN: Well, Your Honor, I am sorry.

Q. Doctor, assume, if you would, that Doctor Osweiler testified that he asked the EPA to take him to the spot where he could get water from the spill site, from the track, and they took him to this ditch and that is where he got the water that he used in the experiment. All right. Now, with that further assumption, sir, continue with your explanation, if you would?

A. The water contained no 2,3,7,8 TCDD. It did contain -- what was the phenol level in that water?

Q. 15 percent.

A. 15 percent. So the water clearly was associated with the phenol. The fact that no TCDD, 2,3,7,8 TCDD was found indicates to me one of two things, possibly a third. That the phenols in water as they have moved left the TCDD, the 2,3,7,8 behind. The concentration of 14 parts per trillion even if it were 2,3,7,8 would imply that there is a vastly lower level than the 45 parts per billion that was originally in the material and even with the 15 percent factor, we have about a thousand fold decrease in concentration.

I would suggest that one of three events occurred and possibly a combination of the three. The phenol in water as it moved left the TCDD behind. The 2,3,7,8. The other possibility is that the analytical data on the reserve sample may have been incorrect. That is a possibility because there was other evidence that the levels were lower. Those are two possibilities. The third possibility is that that material in the ditch in the open was, in fact, subject to photodegradation which resulted in the loss of the 2,3,7,8 which is more vulnerable to photodegradation because of the positioning of the chlorines than are other isomers.

Q. What is the significance, sir, of feeding the material to guinea pigs?

A. Guinea pigs --

Q. With no effect?

A. Well, guinea pigs are very sensative. Can you tell me what levels were fed those guinea pigs?

Q. I can't, as I sit here right now, no. All right. Doctor Dost, I would like you to assume, sir, that there was a 90 day study in which the high dose -- There was a high dose group of guinea pigs, a low dose group of guinea pigs and a control group of guinea pigs. The high dose group started out at a ratio of one part of this sediment water to 10 parts of plain water, was then changed to one part of the sediment ditch water to five parts of plain water and then was changed to a one to one ratio of sediment ditch water to regular water. The low dose group was fed one part ditch or sediment water to 10 parts regular water throughout the experiment and the control group got regular water throughout the experiment. There was no decrease in thymus weight and no significant differences in the weights of the three groups.

Based upon that information, sir, would you continue with your explanation.

MR. CARR: Your Honor, I will object to that question because there is no testimony that it was sediment water. The testimony is that Doctor Osweiler took it off of

the top one foot of the water that was in the ditch. It was at least two feet in depth and that, in fact, the sediment that was found on the filter subsequent to the analysis and the analysis by Doctor Zabik was 70 percent phenols and OCP and could not describe, was unable to describe what the 30 percent consisted of.

MR. HEINEMAN: Your Honor, if I could respond to that. Doctor Osweiler testified that he put the bucket in the water a foot down when he scooped the water out. That he kept, that there was indeed sediment in the water and that everytime he fed the animals, he stirred the water to get the sediment up into the water.

THE COURT: That doesn't meet what the objection was. The objection was sustained. You will have to rephrase it.

Q. Doctor Dost, would you assume as true what I have just told you in terms of how Doctor Osweiler obtained the water from the ditch and how he stirred it before he fed it to the animals and that he said there was sediment in the water?

MR. CARR: Your Honor, I object unless the witness is further given the significant facts as I have indicated; that that sediment that was, whatever was in the water was filtered out and found to be over 70 percent OCP and phenol

and the remaining less than 30 percent, the constituents of it was unknown.

THE COURT: Objection is sustained.

MR. HEINEMAN: It was not filtered out before it was given to the animals.

THE COURT: That doesn't make any difference in that. Objection is sustained.

Q. I will add that to it. If you want to add that to it, fine. Assume that as well.

A. Well, it is an astonishing level of phenols. I am startled that the guinea pigs tolerated. Their drinking total water supply is one to one mix of a solution that is very, very high in phenols which surprises me. However, the fact that they showed no evidence of decreased thymus weight and no evidence of decreased body weight over a three month period in which they were maintained on this water source indicates to me that there would not have been a significant amount of TCDD, 2,3,7,8 TCDD in that material.

MR. CARR: Your Honor, the witness has assumed the fact that isn't true. There wasn't any 2,3,7,8 TCDD in the material as so testified by Doctor Zabik clearly under oath.

MR. HEINEMAN: Well, Your Honor, clearly this amounts to a bioassay and that is what -- that is certainly what the analytical result was but it certainly is equally

well to say that that is what a bioassay showed as well.

MR. CARR: Your Honor, the bioassay cannot show that there was 2,3,7,8 TCDD in that water. Nothing happened to the guinea pigs and the only evidence we have is that that water did not contain any 2,3,7,8 TCDD. That is the only evidence in this case.

THE COURT: Objection is sustained. I think that was also part of your hypothetical.

Q. Doctor Dost, I would like you to assume that Doctor Silbergeld testified that the water flowing into the Kemner pond would contain 30,000 parts per million of OCP giving a TCDD concentration in the pond of 1.4 parts per billion. Would you assume that what you testified to, sir?

A. Uh-huh. Yes.

Q. Would you agree with that statement?

MR. CARR: What page and date, counsel?

MR. HEINEMAN: April 16, page 38.

Q. Would you agree with that statement, sir?

A. Is this referring to in the spring when the weather warmed up?

Q. Yes, sir.

A. If I understand these figures, they are implying that the concentration of the phenol that moved into the pond was accompanied by the same concentration of TCDD that was

supposedly originally in the tank car. I would disagree with that.

Q. And why is that, sir?

A. Because the material that moved into, that moved away from the site at the time of the thaw, the material that was left after the excavation, the initial excavation in which so much material was hauled away, is going to be modified by the fact that it has been in the soil. The TCDD will bind to the soil. TCDD will not travel with the OCP. I would suggest that this is the same reason that the TCDD did not appear in the water that emerged beside, that was found beside the track.

Q. Now, Doctor Dost, you recall Doctor Silbergeld's testimony with respect to TCDD being in the air because of the burning of railroad ties?

A. I remember something to that effect.

Q. Do you recall her saying beginning at page 48 on April 16th that when she was asked what happens to the TCDD that is on the ties when the ties burned and the ties is reduced to smoke or vapor and she said that unless the fire temperature reaches a very high level which it would not as far as I can tell from the way you have described this as having occurred because it takes very specific conditions and hazardous waste incinerators, the 2,3,7,8 TCDD would not be

changed and I would expect it to enter and be moved about in the environment, attached to particulates from the fire, that is soot and burned organic material from the railroad ties. Do you recall reading that when you reviewed her testimony?

A. Yes.

Q. Would you agree with that statement?

A. I would agree in part because the temperature of a fire of that sort certainly is not high enough to degrade TCDD. Probably also not high enough to degrade all of the other organic material, although some of it certainly would be that is involved with the railroad ties. There is a lot of creosote and other material that is used as a preservative. I question whether the TCDD that might be attached to particulate material, unless it had been totally combusted and was completely inorganic in its nature, I think that that TCDD bound in that fashion would probably be subject to breakdown by light.

Q. Why is that, sir?

A. Well, because the organic, the organic matrix to which it is attached could serve as a hydrogen donor and I would expect, I would expect photodegradation to take place in such a situation.

Q. Let's assume, sir, that for the sake of argument that there would be some TCDD on some organic material there

that would not be photodegraded. Would that kind of movement of material in the air create any kind of a hazard for the people of the town of Sturgeon?

A. I don't believe so.

Q. Why not?

A. Well, my experience with smoke and the components of smoke and the potential for respiring smoke or any of the material that is contained in it indicates that material of that sort, smoke is distributed throughout an enormous volume of atmosphere. And the relationship between the respiratory volume, even of a person who is working vigorously which an athlete might very well get a respiratory volume up to 40 cubic meters per day or a person who is doing very, very heavy work at home, I am concerned about fire fighters. Even that is a turnover of volume compared to the volume of distribution of that very, very small amount of material that might have become associated with the ties because most of it is going to go right on by. There will be some surely that soaks into the tie. The ties are old and cracked but that total amount is really not large compared to the amount, the total amount that was spilled.

Q. You are talking about the amount that would be in the tie versus the amount that would go into the ballast?

A. That went right on through into the ballast, the

soil under the tracks and so on.

Q. Now, if you take that tie and you burn it, sir, would that smoke create a hazard for anybody in the town of Sturgeon?

A. I don't think so. I don't think so because it is going to move away. The air, the wind velocity, the average wind velocity in that area is on record and it runs in excess of I think seven miles an hour. The volumes of air that are involved are just enormous and the dilution is so large and the material, even if that burning was to continue for a day or two, the dilution is so great that I find it difficult to imagine anyone coming into contact with an amount of TCDD that has any meaningful possibility of significant exposure.

Q. Doctor Dost, based upon the facts that I have asked you to assume in these hypothetical questions with respect to the townspeople of Sturgeon, what is your opinion as to whether or not there is any possibility, any practical possibility of there being any hazard to any of the townspeople of Sturgeon from exposure to 2,3,7,8 TCDD as a result of that spill?

A. I don't think that there is any practical possibility of a meaningful exposure. I really don't.

Q. Let's assume, Doctor Dost, that the spill had not been cleaned up at all. Assume for the sake of argument that

nothing had been removed from that spill site. Would there be any hazard to the people of Sturgeon from the TCDD spilled there?

A. Not from the TCDD in my opinion.

Q. And why do you say that, sir?

A. Well, if you wish, we could perhaps go directly back to the CDC document which represented a one part per billion concentration in residential soil as being the level at which concern should be expressed. They also pointed out that higher concentrations would be acceptable in industrial sites where the exposures are less. A railroad right-of-way is really an industrial site. It has very little common traffic. The material went into the ground. The dilution by soil, if you will, brings the concentration I am sure below or down to at least 10 fold. We know from the concentrations of phenols found in that area that the dilution by soil was at least 10 fold. If we were to simply make a division of 45 parts per billion by 10 and assume that the soil contained 45, four and a half parts per billion of TCDD, it would not fall outside the criteria that are expressed in the Centers for Disease Control document in my view for an action level, if you will. A level at which some action should be taken to, for protection of people in the vicinity.

Q. And what is the safety factor built into the CDC

assessment?

A. It is about a thousand.

MR. HEINEMAN: That is all the questions I have of the witness at this time, Your Honor.

THE COURT: Mr. Carr.

MR. CARR: Yes, Your Honor.

CROSS EXAMINATION

By

MR. REX CARR.

Q. Doctor Dost, I would like to start off by asking you a few questions about your background insofar as it concerns your work with TCDD and 2,4,5-T. Actually, you have in the past characterized yourself as something of a quote instant expert in the area of TCDD, have you not, sir?

A. I did that at the time that I became involved with the EPA in 1970, yes.

Q. And you became an instant expert not based upon any background with TCDD but based upon the fact that you served on an advisory panel for the United States Department of Agriculture in 1970 and '71, isn't that right, sir?

A. I served on that panel, yes, sir.

Q. Is the answer to my question that is when you became the instant expert? I know you served on that panel.

A. That is when I became an expert.

Q. And as you characterize yourself, an instant expert?

A. That is correct.

Q. And you characterize yourself as an instant expert in 1970 under oath, have you not, sir?

A. Yes.

Q. Now, at that point in time, what you did in 1970, you had no prior experience with TCDD or dioxin, isn't that correct, sir?

A. That is correct.

Q. And what you did at that time was for this United States Department of Agriculture was to review the literature that was in existence at that time and not doing any research at all, isn't that correct?

A. No bench research, that is correct.

Q. No research of any sort other than reading the literature?

A. That is correct.

Q. All right. And it is the same literature in large part that we know that we have read parts of it at least to this jury. You have seen the Monsanto exhibits. You have seen our exhibits and it is the same kind of literature that this jury has already heard about, isn't that correct, Doctor?

A. That is correct.

Q. And what you did was to read this literature and summarize it and come to a conclusion, the conclusion that you reached, in 1971 as to whether or not 2,4,5-T should continue to be used in the forest land as it had been used up to that time, isn't that correct, sir?

A. The concern went beyond forest land.

Q. Well, range land, grassland and things of that sort?

A. Yes.

Q. And what you did -- and by the time you finished with this review of the literature, the EPA had come into existence in 1971 and your actual report that you and others on this panel made as to the use of 2,4,5-T, your actual report went to the EPA which had just then come into existence and taken over this responsibility, isn't that correct, sir?

A. Yes.

Q. And you made your opinion that you recommended that the company be continued to allowed to use the 2,4,5-T on these various lands, isn't that correct, sir?

A. There were specifications, yes.

Q. Is the answer to my question yes, you recommended that they be continued to use this 2,4,5-T on the range land,

the forest land and the grassland of this country?

A. We recommended it be continued but we made recommendations about conditions that should be applied.

Q. And what were the conditions that you recommended?

A. That the TCDD levels in the product should not be, a new product should not be higher than a tenth of a part per million and a hundred parts per billion and that if existing, if they were lower than a half a part per million could continue to be sold.

Q. What you said was use up what you got but in the future, cut the levels down to a hundred parts per billion on new manufactured 2,4,5-T, isn't that correct, sir?

A. Essentially, yes.

Q. And the EPA at that time in 1971 accepted the recommendation of your panel, didn't they, sir?

A. At that time it did not act on it.

Q. Well, at some point in time they did act upon it, did they not, sir?

A. Apparently they did.

Q. And they allowed the continued use. They used the informal guideline, if you will, of the 100 parts per billion and they allowed the continued use of the more heavily contaminated 2,4,5-T, isn't that correct, sir?

A. That is correct.

Q. Actually in point of fact, they really took no real official action at all at that point in time. It was just kind of an informal thing that they more or less went along with your recommendation, isn't that correct, sir? By you, I don't mean you specifically, I mean your entire panel?

A. I don't know the full mechanics but the substance remained in registration.

Q. Is the answer to my question yes, that that is what occurred?

A. You used the term informal. I don't know whether it was an informal or a formal action.

Q. Well, if it was a formal action, you would have known about it, would you not, sir, being an expert in the field?

A. I am not sure that I would. It is a government regulatory action. I know that the chemical was returned for registration.

Q. You worked in 2,4,5-T for a number of years after you made this recommendation. You would have known if there had been any formal official EPA action taken on your recommendation, wouldn't you, sir?

A. I know that EPA returned it to its registration.

Q. That isn't my question, Doctor Dost. I know they returned it. My question is, you would have known if there

had been any formal action on this recommendation, wouldn't you, sir, in view of the work that you did subsequently?

A. I am not sure that I would have known. I am a toxicologist.

Q. All right. Well, now, at that point in time, as far as being a toxicologist was concerned, this was the first time you were asked to offer an opinion from a toxicological viewpoint on 2,4,5-T or dioxin and it again was based upon your search of the literature and not any other kind of activity on your part, isn't that correct?

A. That is correct.

Q. Now, after you made that recommendation and after you became kind of this instant expert, as you have characterized it, you then were called upon to testify in behalf of a number of chemical companies. In behalf of the Department of Forestry or other departments of that sort against actions brought by various citizens' group who were protesting the use of 2,4,5-T, isn't that correct, sir?

A. Yes, sir.

Q. Yes. As a matter of fact, in 1976 you testified in favor of the chemical companies in Oregon where the citizens' group brought an injunction action against the use of 2,4,5-T in the United States forest, didn't you, sir?

A. No, sir.

Q. You didn't testify in behalf of the United States Attorney General's Office where the citizens' group was trying to get an injunction against the use of 2,4,5-T?

MR. HEINEMAN: Objection, Your Honor. The question was did you testify in favor of chemical companies. He changed the question.

THE COURT: Objection is sustained. Could you rephrase that question.

Q. Did you not testify, sir, that 2,4,5-T should be allowed, continued to be allowed to be used in Oregon and elsewhere for that matter in the federal court where the citizens' group sought an injunction against the use of 2,4,5-T?

A. I testified that I thought it was a safe chemical to use.

Q. Could you answer the question as I phrased it. Did you testify against the citizens' group and in favor of the continued use of 2,4,5-T?

A. Yes.

Q. And it was a citizens' group that brought this action in 1976, wasn't it, sir?

A. That is correct.

Q. Now, again, in 1977 in California, another citizens' group brought another injunction action trying to

prevent the use of 2,4,5-T again in the forest at that time, isn't that correct, sir?

A. No, sir.

Q. That isn't correct, sir?

A. No. The chemical was 2,4-D.

Q. All right. Against the use of 2,4-D and 2,4,5-T was not involved at that time?

A. No, sir.

Q. In any event, it was testimony to allow the chemical companies to continue to manufacture and sell 2,4-D and 2,4-D in 1977 and 2,4,5-T in 1976, isn't that correct, sir?

A. No, sir.

Q. That isn't correct?

A. It had nothing to do with the chemical companies.

Q. Doctor Dost, the chemical companies make the product, don't they, sir?

A. They make the product.

Q. And if it is not allowed to be used in the forest land, they can't sell their product in the United States, can they, sir?

A. The issues that I was concerned there with are forestry uses.

Q. Answer my question, Doctor Dost.

A. Forestry is a small use.

Q. I am sorry. What you are saying is in this particular action, the chemical that they are trying to prevent the use of this in forests?

A. That is correct.

Q. And to that extent, the chemical companies could not sell it for use in forests if the citizens' group had prevailed, isn't that correct, sir?

A. Not exactly.

Q. Well, how is that incorrect?

A. Because this was an action against the United States Forest Service. It had no bearing on commercial, on industrial forestry.

Q. Well, I see your point, Doctor Dost. What it boiled down to is the chemical companies couldn't sell the product to the United States Government for use upon all the thousands and thousands and thousands of acres of United States forest if this action were correct?

A. In that region, that is correct.

Q. Now, that would have affected the ability of the chemical company to sell these chemicals to the United States Government, wouldn't it, sir?

A. I am sure it would.

Q. And to that extent, it was beneficial to the

chemical companies, was it not, sir?

A. I guess I would assume so.

Q. Now, in 1979 or in 1980, an individual brought an action trying to prevent the State of Oregon from spraying 2,4-D on a forest, did he not, sir?

A. I am not sure I remember which case you are referring to.

Q. Well, maybe I can help you remember it. My notes are not that explicit. I made notes from your deposition and they are not that clear.

A. If my deposition depended on my memory, why --

Q. We would all be in trouble. Doctor Dost, what you did according to your deposition, this was a case brought by a citizens' group against the Bureau of Land Management in the federal court in Portland. You provided a statement and supplement to that witness's statement. You did not appear in court. You did not give a formal deposition. Does that help you?

A. That is correct.

Q. All right. Now, that was a suit brought by a citizens' group against the California Department of Food. That must be a different one. There was a subsequent injunction action against the State of California, wasn't there, sir?

A. I remember such an action at some point.

Q. And there was one case where you testified you were asked to, there was an individual who was being prosecuted. He was trying to prevent 2,4,5-T from being used on the forest land. You blocked access to the state spray crew and he was being prosecuted, a jury trial, and the State of Oregon, you came in and testified against that individual and in behalf of the prosecution, did you not, sir?

A. I believe the chemical was 2,4-D.

Q. Yes.

A. I did that, yes.

Q. And then you testified involving an injunction action again against the California Department of Food and Agriculture. That is the document that you provided, correct, sir?

A. I did provide a document in that action, yes.

Q. And then there was in '79 there was a citizens' group in Portland Oregon that brought suit against the Bureau of Land Management to prevent the use of 2,4-D, was there not, sir?

A. Yes.

Q. And then you testified in that case against the citizens' group, did you not, sir?

A. That is correct.

Q. And in 1982, and that must be the California action where you provided an affidavit to be used against the citizens' group that was suing the California Department of Agriculture, isn't that correct, to prevent the use of 2,4-D?

A. I am very vague about the dates and the times but I remember such actions.

Q. All right. Now, in 1978 or '79, the EPA finally did reject your 1971 recommendation and, in fact, suspended the use of 2,4,5-T on forest land, didn't they, sir?

A. They suspended the use of 2,4,5-T.

Q. Is the answer to my question yes, that they did do that?

A. Well, there were two questions, I am sorry.

Q. First of all they rejected your 1971 recommendation, did they, sir?

A. I have no knowledge at all whether they rejected that recommendation.

Q. Doctor Dost, you recommended that they be allowed to continue the use of 2,4,5-T in forest land, didn't you, sir?

A. Yes.

Q. And they did not go along with that in '79 or 78, did they, sir? They said no, we are going to suspend the use of 2,4,5-T in forest land, didn't they, sir?

A. I just don't know the reasons why they did that.

Q. That was contrary to your recommendation, wasn't it, sir?

A. Yes.

Q. Now, and since that point in time, you have never been used by the EPA as an expert or in any capacity since that time, have you, sir?

A. By EPA?

Q. That is correct. By the EPA?

A. No.

Q. But you have since that time, been -- you have been continued to be used or you are used and have been used by the chemical industry, have you not, sir, and by the forest industry?

A. I have served a number of times, yes.

Q. As a matter of fact in 1983, and you mentioned that you referred to it in your direct testimony, in 1983 you testified, gave statements in behalf of the Nova Scotia Forest Industries Company, didn't you, sir?

A. Yes.

Q. And that was a lumber or timber company that wanted to use 2,4 -- wanted to continue to use 2,4,5-T in Canada, isn't that right, sir?

A. That is correct.

Q. And there was an individual and a citizens' group in Canada just like they did in the United States brought actions against the Nova Scotia Forest Industries, didn't they, sir?

A. Yes.

Q. And you testified, you came down there and testified on the side of the industry, didn't you, sir?

A. Yes.

Q. Now, you also were used by the Diamond Alkali Company as an expert witness who was being sued by a lady who became very, very ill after using a herbicide, isn't that correct, sir?

A. It was Diamond Shamrock, I believe.

Q. Diamond Shamrock, whatever. You did testify in behalf of that company who was being sued by a lady who became very, very ill after using the herbicide, didn't you?

A. I did not testify. I provided a witness statement.

Q. Provided a deposition, sir?

A. Not a deposition. I provided an evaluation of the evidence.

Q. Now, you provided an evaluation of the evidence to be used by the chemical company in its defense of its case against this lady who was, as you have described it in the earlier case, very, very ill, isn't that right, sir?

A. That is correct.

Q. Now, in that case, do you know whether or not the herbicide was made from Monsanto's 2,4 dichlorophenol?

A. I have no idea.

Q. Well, you do know that that company bought 2,4 dichlorophenol from Monsanto, do you not, sir?

A. I have been told that.

Q. And this herbicide that made this lady -- that she at least said it made her very, very ill, so far as you know was made from Monsanto's 2,4 dichlorophenol, wasn't it, sir?

MR. HEINEMAN: Objection, Your Honor, unless we get an identification of what the herbicide is.

THE COURT: Objection is overruled.

Q. What was the herbicide?

A. The herbicide was a substance called MCPA.

Q. Do you know whether or not that is made with Monsanto's 2,4 dichlorophenol?

A. MCPA is not made with dichlorophenol. It has only one chlorine on it and it as a methyl group on it.

Q. And it would have nothing to do with Monsanto then?

A. I really don't know. I have no knowledge about the sources of those chemicals.

Q. I have no knowledge that Monsanto made any such

product and so the answer to -- if this answer to my question so far as you know, Monsanto's chemicals were not involved, isn't that correct, sir?

A. Yes.

Q. All right. Now, you have also given a deposition or, you couldn't have testified because the case didn't go to trial but you gave an expert deposition and served as a consultant on the side of Monsanto and these other chemical companies, on the side of the chemical companies and against the Vietnam veterans in the Agent Orange case, isn't that correct, sir?

A. Yes.

Q. And you have also testified for Monsanto and against the workers, employees, in Nitro, West Virginia, haven't you, sir?

A. Yes.

Q. Now, have you ever, since you became an expert in 1970 or '71 on dioxin in the fashion that you have described, have you ever testified in behalf of an individual or a citizens' group involved with dioxin or dioxin contamination?

A. Not with those chemicals. With others, though.

Q. Have you ever served as a consultant to the EPA except on the occasion when the United States Department of Agriculture started in 1970 and was taken over by the EPA?

A. No.

Q. Have you ever served as a consultant to any governmental agency, testified before a Congressional committee or done any kind of government work or service since 1979 when the EPA suspended the use of 2,4,5-T?

A. Other than natural resource agencies, Bureau of Land Management, forest service, state agencies, no.

Q. All of that was before the EPA suspended the use of 2,4,5-T, was it not?

A. No. That activity continues right to this day.

Q. In behalf of whom?

A. Behalf of the United States Forest Service, the Bureau of Land Management, State forestry agencies, British Columbia Administry of Forests, the Department of Environmental Quality in Oregon.

Q. You are testifying involving 2,4,5-T?

A. You asked me if I served as a consultant to those agencies. Did you specify 2,4,5-T?

Q. I think you are probably right. I don't believe I did specify 2,4,5-T. You have served since 1979 as a consultant to one of these, one or more of these agencies, sir?

A. Yes. The Bonneville Power Administration which is a branch of the United States Department of Energy.

Q. Well, what it was in 1982, you served as a consultant on herbicides for the Bonneville Power Administration?

A. I still do. I do that on a standing basis as essentially part of my job.

Q. Doctor Dost, to talk for a few minutes about your background so that we can get that clear, the expertise that you have acquired in TCDD that we are concerned here with did not come from any scholastic or academic training or courses, did it, sir?

A. No.

Q. You have a veterinarian degree and by virtue of that fact, you are properly called doctor, are you not, sir?

A. Yes.

Q. Because you have a DVM, isn't that correct, sir?

A. That is correct.

Q. But you do not hold a Ph.D.. That is a doctors degree in any scientific field, do you, sir?

A. No.

Q. You hold what you do hold, the only advanced academic degree that you hold over and above your veterinarian medicine degree is a Masters Degree in veterinary physiology, isn't that correct?

A. In physiology, yes.

Q. And, of course, you are aware of Doctor Silbergeld whose testimony you read and critiqued, if you will, for the benefit of this court. You are aware that she does hold a Ph.D. and that it is based upon original scientific research. You do know that, don't you, sir?

A. Yes.

Q. And you do not hold a degree of that nature, do you, sir?

A. No, sir.

Q. Now, have you ever taken any university taught courses in toxicology?

A. Not in toxicology, per se.

Q. And have you ever taken any university taught courses in epidemiology?

A. No, sir. I have never represented myself as an epidemiologist.

Q. Doctor, of necessity, when you testify as a toxicologist, you have to have or do you consider that you have to have knowledge of epidemiological studies in order to determine the toxic consequences of exposure to certain chemicals?

A. If one is considering direct effects on humans in using that data, one needs some expertise in epidemiology.

Q. And you don't consider that you have any expertise

in that field?

A. I have general expertise but I don't consider myself an epidemiologist.

Q. I didn't ask you that, sir. In order -- because this case is about human health effects on a group of people. Of necessity for you to testify in this case, you have to have some knowledge of epidemiology, must you not, sir?

A. I don't think so.

Q. You don't think so. Then all of the opinions that you have been giving here have not been based upon the human health studies that are in existence?

A. They are based on human health studies, animal studies. The human -- as I see the human, when I read the scientific literature, is one of many species. I don't try to interpret population effects.

Q. And nothing, no testimony that you have given here then has been based upon any consideration from an epidemiological viewpoint?

A. I don't believe so.

Q. All right. And you have, of course, not be taught any such courses in any university, isn't that correct, sir?

A. That is correct.

Q. Now, have you, yourself, ever taught any

toxicological courses at a university?

A. Yes, I have.

Q. What courses have you taught, Doctor?

A. I have taught some special topics courses at Oregon State University in the graduate program in toxicology. We have a training grant at Oregon State University that has been going on for a long time and I have taught students in that. I have taught post doctoral fellows in my laboratory and graduate students in toxicology.

Q. And when was that, Doctor?

A. Up until 1980. I have not taught formally in the classroom. In fact, I did little formal class room teaching at Oregon State University. I have conducted special topics courses for students in the toxicology program leading them on special assignments.

Q. Doctor, according to the CV that I have been given, since 1980 you have been an extension specialist. That means you don't teach courses, you go out in the field?

A. That is exactly right.

Q. Since 1980. That has been the last five years you haven't taught at all, isn't that correct?

A. I have not taught formal courses. I have taught physicians. I have taught foresters, farmers, managers.

Q. Well, that is an agricultural extension service

that is given to the public in Washington or Oregon, isn't that correct, sir?

A. Yes.

Q. From '75 and until '80 you served as a professor in agricultural chemistry and veterinarian medicine, didn't you, sir?

A. The toxicology program is centered in the Department of Agriculture Chemistry.

Q. Well, is there some description in anything that you have given us that will suggest that you taught any toxicological courses, sir?

A. No.

Q. And the experience that you have had insofar as, well, for instance, neurotoxicology, have you ever done any research other than reading literature in neurotoxicology, for instance?

A. We did research on hexachlorophene in which we were very concerned about the anatomy.

Q. You are saying we, Doctor Dost. So we won't get confused, you are a part of a group, this area here where there is different people have different assignments?

A. My colleague was a biochemist.

Q. Your colleague was the biochemist. My question is, have you ever done any research in neurotoxicology?

MR. HEINEMAN: You mean alone?

Q. My question stands on its own, counsel.

A. I suppose it is a matter of interpretation. I have done work that involved neural effects. I won't say that I have directed it specifically to neurotoxicology.

Q. Doctor, have you ever done any research other than in the field of, other than reading literature in the field of toxicology that is concerned with TCDD?

A. No.

Q. Or any other polycyclic hydrocarbon?

A. Hexachlorophene. I have collaborated on other projects on insecticides. Chlorinated hydrocarbon insecticide. Hexachlorophene work is, I believe, the only paper that I have published in that area.

Q. Doctor, have you ever performed any research on the effect of chemicals or chemical substances on either the porphyrins or the immune system?

A. No.

Q. Have you ever reviewed any scientific documents, literature, anything of that sort for the EPA excepting the 1970 or '71 service that was up, ultimately taken over by the -- well, no, I take that back. I mean reviewed scientific documents for the EPA, period?

A. Not for the EPA.

Q. All right. And except for the work that you did in '70 and '71 in 2,4,5-T, have you ever reviewed any dioxin articles for the EPA?

A. Not for EPA.

Q. Have you ever performed any service for the Food and Drug Administration?

A. No.

Q. Have you ever performed any service for the Department of Health and Welfare?

A. I have reviewed a couple of documents for NIOSH which is associated with HEW and I served as a consultant for NIOSH.

Q. When was that, Doctor?

A. That was back in the mid '70s, I think.

Q. It was at the time before the EPA rejected your recommendation, was it not?

A. Yes.

Q. Doctor, have you ever published any article in a peer reviewed scientific journal or done any original research in the field of toxicology concerned with TCDD?

A. No.

Q. And organizations, sir, are you a member of the National Academy of Scientists?

A. No. Very few people are.

Q. Well, you know that Ellen Silbergeld is, don't you?
A. I am not sure that she is. I would like --
Q. Well, she is, indeed.
A. Is she?
Q. Yes, she is. You are not, you were not aware of that, Doctor?
A. No. I am not aware of that.
Q. Are you a member of the American Public Health Association?
A. No.
Q. You know that Doctor Silbergeld is, don't you?
A. If you tell me she is.
Q. Well, you read her testimony in this case, did you not, Doctor Dost?
A. I don't remember reading that but --
Q. Well, my question is, you read her testimony, did you not?
A. I read her testimony.
Q. I am sorry?
A. I read her testimony.
Q. And you don't recall reading that she is a member of the American Public Health Association?
A. I don't remember reading that. I am not sure that I read every word.

Q. Are you a member of the American Association for the Advancement of Science?

A. Yes, as a matter of fact.

Q. When did you become a member of that association?

A. When I paid a subscription price for the magazine.

Q. Well, perhaps that is your description of the -- there is more to running the American Association for the Advancement of Science than paying a subscription to a magazine, isn't there, sir?

A. Membership requires only the payment of a fee.

Q. Are you a member of the Society of Neuro Science?

A. No.

Q. Do you hold membership in the American Society of Neuro Chemistry?

A. No.

Q. Are you part or hold any membership in the International Brain Research Organization?

A. No.

Q. Do you hold membership in the Society for Occupational and Environmental Health?

A. No.

Q. Are you part of the assembly of scientists that is part of the National Institute of Mental Health?

A. No.

Q. Are you a member of the Science Advisory Board for the EPA?

A. No.

Q. Are you on any NIOSH committees? Are you on any committee of the Occupational Safety and Health Committee for NIOSH?

A. No.

Q. In your years of service, have you ever received any awards or honors in science dealing with toxicology?

A. Well, I consider that my election as chair of the Gordon Conference at a time when the conference was in danger of being suspended because of problems with its quality and its direction, when I was asked to save the conference, one of the most important conferences in the Profession, I consider that a signal honor.

Q. Well, is it considered getting an award or an honor in science or toxicology?

A. Chairmanship of a Gordon Conference.

Q. I am sure it is, Doctor Dost, as far as you are concerned an honor and there is no question about it but what it is is an honor. It is a compliment to you to be made that appointment but my question is more specific. Have you received something that is called honors, sir, or awards?

A. No.

Q. Now, you know that all of these things that I have asked about, all of these memberships, all the work for the FDA, working for the Department of Health and Welfare, publication in Nature, the Journal of Science, all of these membership things, all of these things you know from reading the deposition of Doctor Silbergeld that she has received and is a member of these various organizations and have done these various things, don't you, sir?

A. Uh-huh.

Q. Yes. Now, Doctor, so we can make it clear, you have given us earlier the list of documents that -- of course the jury is not aware of this -- the list of articles and documents upon which you base your opinions, isn't that correct, sir?

A. Yes.

Q. And none of these documents, none of these articles is based upon any work that you have done but all of them are based upon work that others have done and that you have read about?

A. That is correct.

Q. All right. Now, Doctor, insofar as your opinion as to various things here, is your opinion that dioxin, that is this 2,3,7,8 TCDD dioxin, is the most toxic synthetic substance of which you have knowledge?

A. Yes.

Q. It is also your opinion, is it not, that it is the most toxic substance that you have ever encountered?

A. I am not sure what you mean by encountered, Mr. Carr.

Q. Well, you recall your testimony in the case involving the Nitro, Monsanto employees?

A. I don't recall all the details.

Q. Well, I am sure you could. Do you recall being asked this question. "Of all the things that man has come up with, this may be the most toxic thing that you have ever encountered?" And your answer to that question was, "It could very well be. Synthetic substances, yes". Now, is there any other toxic substance of which you are aware that you have ever encountered that is more toxic of any sort than 2,3,7,8 TCDD?

A. Well, you are speaking of encountered and I guess I will assume --

Q. Work with, I am sure.

A. I have concerned myself about. Certain hexatoxins, for example, which is a very potent biological substance that I have had occasion to be concerned about.

Q. Is it more potent than 2,3,7,8 TCDD?

A. It may be.

Q. On what scale, Doctor?

A. Well, I think I can't remember exactly but its lethality, I think, is comparable.

Q. Now, insofar as the health effects of this 2,3,7,8 dioxin, you have found that it affects the skin, haven't you, sir?

A. Yes.

Q. You have found, you have concluded that it affects the immune system, have you not, sir?

A. At what doses?

Q. At whatever doses it may affect. You have found, Doctor, you have concluded that it does affect the immune system, haven't you, sir?

A. Yes.

Q. You have concluded that it affects the liver, haven't you, sir?

A. Yes. At sufficient doses.

Q. Doctor, if you don't mind, you have found that it affects the liver, haven't you, sir?

A. Yes.

Q. You have found that it has some cardiovascular effect, haven't you, sir?

A. Some, yes.

Q. You have found that it affects the gastrointestinal

system, haven't you, sir?

A. Yes.

Q. You have found that it affects the nervous system, haven't you, sir?

A. Yes.

Q. You have found that it affects the reproductive system and the endocrine. You found that to be true also, haven't you, sir?

A. Yes.

Q. You found that to be mutagenic to a limited extent, haven't you, sir?

A. I would question whether it is mutagenic.

Q. Doctor, do you recall your testimony on page 21,210, counsel, this question being asked you. "And you found that to be mutagenic. You found that to be true?" And your answer was, "To a limited extent". Wasn't that your answer at that time to that question in Charleston, West Virginia?

A. Yes, and that is my feeling now.

Q. Well, it was true then that you found it to be mutagenic to a limited extent. It is true today that it is still mutagenic to a limited extent, isn't it, sir?

A. All right.

Q. Isn't that correct, sir?

A. Yes.

Q. And you also found it to be carcinogenic, didn't you, sir?

A. Yes.

Q. Doctor, all of these things -- and you found, of course, that it is teratogenic, didn't you, sir?

A. Yes.

Q. And you found that it is a promoter of cancer. You found that, didn't you?

A. Carcinogenic effect.

Q. Is it a promoter of cancer?

A. Yes.

Q. And you did find that it affects the nervous system including the peripheral system in humans, didn't you, sir?

A. I have heard evidence to that effect.

Q. Excuse me. My question is, sir, you found that and you accept that as true, do you not, sir?

A. Yes.

Q. Now, Doctor Dost, many of these things that you say now that you have found to be true, you have just got through saying is directly contrary to a number of things that you said in direct testimony, isn't it, sir?

A. No, sir.

Q. Well, did you testify that it was mutagenic in

direct testimony?

A. I said, if I recall, that there had been some studies which showed a mutagenic effect that had not been when attempted to repeat them, they had not shown up positive. I also mentioned the work --

Q. Doctor Dost, that isn't what I am asking.

MR. HEINEMAN: Objection. He is interupting him as he is answering the question.

THE COURT: Objection is overruled. It was not responsive.

Q. Doctor, you said in response to my question that you found it to be mutagenic to a limited extent. Now, in response to the same question now, you are saying that there is literature that is saying that. Now, my question and the question asked you in Charleston, West Virginia, was specific. You found it to be mutagenic to a limited extent, isn't that correct, sir? Isn't that what the question was and isn't that what your answer was at that time?

A. In the reading of the literature, that is what I found then.

Q. Yes. And, Doctor, if you found it in the Spring of 1985, it is still true in the Fall of 1985, isn't it, sir?

A. Yes, and I described it in my testimony.

Q. Now, Doctor, you told this jury that it doesn't

affect the nervous system but yesterday you have just got through saying a moment ago that you found that it did affect the nervous system, didn't you, sir?

A. The comment --

MR. HEINEMAN: Objection, Your Honor. Mr. Carr when he asked the question doesn't distinguish between animals and humans. The doctor said very clearly in his direct examination, he distinguished between the test results in humans as opposed to the test results in animals and Mr. Carr doesn't ask him that distinction.

MR. CARR: And what is it? That it affects of peripheral nervous system in animals and not in humans? Is that what you are suggesting, counsel?

A. I stated --

THE COURT: Wait a second. Is that the basis of your objection?

MR. HEINEMAN: My objection is to the Court is that you are switching the question on the witness.

THE COURT: I don't think that is a switching. Objection is overruled.

Q. All my question for the record deals with human health effects and those were the questions asked in Nitro, West Virginia, and those are the questions that I am asking today. You are dealing with human health effects, are you

not, sir?

A. In my testimony here, I have been speaking to animal effects. The toxicology in animal.

Q. And never talking about human effects?

A. On rare occasions I spoke.

Q. Doctor Dost, are now you saying that we should consider that none of your testimony relates to humans?

A. Of course not.

Q. You have testified time and time again as to relation to humans, did you not, sir?

A. I pointed out the humans' behalf with the same kind of systems that mammals do.

Q. And you meant for your testimony to be applicable to humans. You meant for this jury to believe, to take your expertise and tie it in to the humans, here in this case the plaintiffs, that are alleging, claiming certain health effects. You meant that, didn't you, sir?

A. In my description of the animal toxicology, that is what I would expect.

Q. And the long hypothetical question that was asked you, you understood that the plaintiffs' were humans that were described in that question. You understood that, didn't you, sir?

A. Yes.

Q. And you have found, have you not, that the human peripheral nervous system is affected by dioxin. You have found that too, have you not, sir?

A. My recollection of the information is that in the Nitro workers --

Q. Excuse me, Doctor Dost, could you answer that question and then if you want to explain it, please explain it, but you have found that, haven't you, sir?

A. Yes, and if I may explain?

Q. Yes.

A. And I didn't bring this up in my direct testimony in this case because I had forgotten it but in the examination of the workers at Nitro, I did mention one individual who had a nerve biopsy and that individual was found to have some demyelinization. The evidence of nervous effects in humans in the Nitro case was reported on interviews with the patient who described aches and pains, tingling of the extremities and such symptoms. I do not know the results of the clinical examinations of those individuals. I do not remember what the clinical examinations showed. On that basis, it can be assumed that those individuals had nervous effects.

Q. And, Doctor, you found in addition and you testified in Nitro that you are convinced that it does have

the ability to exert a toxic effect on the peripheral nervous system in humans, didn't you, sir?

A. I don't remember that. It is not unreasonable.

Q. It is a fact. You are convinced, aren't you, sir?

A. If that testimony is so, then I will accept that.

Q. Notwithstanding that testimony. Just assume that I am making that up. You are convinced, aren't you, sir, that TCDD does have a toxic effect on the human peripheral nervous system, aren't you, sir?

A. I am not.

Q. You are not. Now, when you were under oath in Nitro, West Virginia, you were convinced, weren't you, sir?

A. Yes, and I have given it a great deal --

Q. Doctor Dost, if you don't mind.

A. Yes.

Q. Have you done some new research since the spring of 1985 to unconvince you? You are convinced in the Federal court in West Virginia and you are not convinced in the State court in Illinois. What has occurred -- well, let me ask it a different way. Have you done any research since then, sir?

A. Only reading.

Q. Have you read any new articles since then, sir, that would suggest that there is not an effect upon the peripheral nervous system of humanbeings?

A. All --

Q. If so, please name the article?

A. I have read animal toxicology studies.

Q. We are talking about humans.

A. I have no evidence in humans, per se.

Q. Now, have you read some animal data that would convince you or make you no longer convinced that it has this toxic effect upon the peripheral nervous system in humans? If so, please state the name of the studies?

A. I have read -- I have reread a number of papers. The studies on monkeys. I reread all of the pathology studies including Doctor Koceba's work, including the National Toxicology Program work, and I do not see evidence in those studies for effects on animals in the peripheral nervous system.

Q. Doctor, you read all of those studies. All of those studies are old. There is none of them new.

A. That is correct.

Q. They are many, many years old. You knew about them in 1979 and you knew about them in 1980 and you knew about them in '81, '82, '83, '84, '85. None of those things are new. You reread those and you had knowledge of all of those things when you testified in the Federal court, did you not, sir?

A. I did.

Q. And you reread those articles for the purpose of testifying in this case, didn't you, sir?

A. No. Actually not. I have been concerned about neural effects for a long time and I have gone back independently of this case to try to come to some conclusion.

Q. But now you are no longer convinced that it has an effect upon the nervous system, is that right, sir?

A. In the nervous system of animals.

Q. No, of humans. I am talking about humans because you were convinced in the Federal court that it had the effect upon humans. I am talking about humans. I don't give a hoot about the animals, Doctor.

A. Well, animals are what I work with.

Q. Doctor, I understand that. But my question is specific. Are you now convinced or are you unconvinced that the peripheral nervous system in humans are not affected by TCDD?

A. I say -- I think the word that you have used unconvinced is perhaps more appropriate.

Q. All right. You were convinced in the spring of '85 but you are not convinced today?

A. I am no longer certain.

Q. And the only thing that has caused you to become

from convinced to no longer certain is your rereading of these studies that you have mentioned?

A. That is correct.

Q. Is that correct, sir?

A. That is correct.

Q. Now, Doctor, you knew that these men that were exposed in Nitro, West Virginia, you knew they complained of peripheral neuropathy and peripheral neuritis along with the finding that the myelin sheath in a biopsy was damaged and destroyed. You knew those things, didn't you, sir?

A. That is correct.

Q. You also know that those men today -- how many years later, 26 years later, no more than that, 36 years later are still complaining about the peripheral neuritis and the pains and the aches, aren't they, sir?

MR. HEINEMAN: Objection, Your Honor. Are you equating all the Plaintiffs in Nitro with the people that were originally examined by Suskind?

MR. CARR: If you don't mind, I will ask this question of the Doctor.

THE COURT: Objection is overruled. Please answer the question.

Q. You are aware of that, aren't you, sir?

A. I am aware that there are complaints. I am also

aware of the --

Q. Doctor, if you don't mind, my question was, you are aware of the complaints, aren't you, sir?

A. I am aware of the complaints.

Q. These workers at Nitro, they could be lying about their aches and pains, couldn't they, sir?

A. I suppose they could.

Q. Or they could be exaggerating, couldn't they, sir?

A. Yes.

Q. And with humans, however, different from animals, when you look at an animal, unless he is arthritic or have difficulty walking, you really can't tell whether he is or is not having a peripheral neuropathy. By this I don't mean the reflexes but I mean pain in the legs?

A. Well, I can tell if an animal is lame. I can't tell if he has minor problems.

Q. But if I am walking along right now, if I were a horse or a dog, you couldn't tell whether I have lack of sensation in that foot or pain running down this leg with me walking here?

A. Not just obesrving you, no.

Q. But now the humans can tell you that. I mean, they can tell you that they have what you call, what you called, I don't know whether you meant it or not, what you called minor

pains. Humans can tell you that they have these so-called minor pains, can't they, sir?

A. Yes.

Q. Now, Doctor Dost, do you really think that somebody that has had pain down their legs and in their joints for 36 years, that you can call that a minor pain?

A. No.

Q. And it is something, Doctor Dost, that isn't going to show up on any test that you can give that human, isn't that right, sir?

A. Well, I am not a clinician but I will assume so.

Q. Well, you are enough of a clinician. You studied and have a Masters in physiology, veterinary physiology and I thought you told this jury that the physiology, you take the same courses that the med students do. The same classes and it is much the same. You don't have to be a clinician to know that, do you, sir?

A. Well, to be able to do, to make the observations on humans, the laboratory observations that would provide that information, yes.

Q. Doctor, I am not aware of any laboratory examination that can tell anybody that I do or do not have pain in my leg.

A. I will agree with that, certainly.

Q. And, Doctor, you were a doctor. You would have to depend upon the truthfulness of that person, wouldn't you, sir?

A. Yes.

THE COURT: Mr. Carr, is this a good point to break?

MR. CARR: Yes, Your Honor, it is fine.

THE COURT: Ladies and gentlemen, we will recess for the day at this time. We will start tomorrow morning at 9:30. I would remind you as I do for any overnight break that you are not to read, listen to or watch anything about this case in particular or subject matter in general in any of the media. Thank you for your attention and cooperation. Court is adjourned.

COURT ADJOURNED:

STATE OF ILLINOIS)
)
TWENTIETH JUDICIAL CIRCUIT) SS
)
COUNTY OF ST. CLAIR)

I, Kimberly Ganz, one of the Official Court Reporters, do hereby certify that the foregoing transcript is a true and correct transcript of the proceedings had in the above-entitled cause.

Dated this 13 day of November, 1935.

Kimberly Ganz

KIMBERLY GANZ

STATE OF ILLINOIS)
)
TWENTIETH JUDICIAL CIRCUIT) SS
)
COUNTY OF ST. CLAIR)

I, RICHARD P. GOLDENHERSH, one of the Judges in and for the Twentieth Judicial Circuit, do hereby certify that the foregoing transcript is a true and correct transcript of the proceedings had in the above-entitled cause.

Dated this 13 day of November, 1985.

HON. RICHARD P. GOLDENHERSH

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