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

FRANCES E. KEMNER, et al., Plaintiffs,	)	
vs.	)	CAUSE NO. 80-L-970
MONSANTO COMPANY, Defendant.	)	

REPORT OF PROCEEDINGS

Before the HONORABLE RICHARD P. GOLDENHERSH

Testimony of Dr. George Roush

July 23, 1985

Volume I

APPEARANCES:

MR. REX CARR, Attorney at Law, and
MR. JEROME SEIGFREID, Attorney at Law,
On Behalf of the Plaintiffs;

MR. KENNETH R. HEINEMAN, Attorney at Law, and
MR. JOSEPH NASSIF, Attorney at Law,
On Behalf of the Defendant.

Pamela L. Simpson, C.S.R.

Official Court Reporter

INDEX OF WITNESSES

EXHIBIT INDEX

BE IT REMEMBERED AND CERTIFIED, that heretofore, on to-wit: July 23, 1985, the matter as hereinbefore set forth came on for hearing before the Honorable Richard P. Goldenhersh, Circuit Judge in and for the Twentieth Judicial Circuit, State of Illinois, and the following was had of record, to-wit:

GEORGE ROUSH,

(being called as a witness, having been duly sworn, on oath testified as follows:)

CLARIFICATION EXAMINATION

BY MR. HEINEMAN:

Q Dr. Roush, in the examination of you by Mr. Carr, there was some discussion with respect to when laboratory tests are done, whether or not a certain percentage of normal people are expected to have abnormal results, is that right?

A. Yes, sir.

Q Would you explain that?

A Any single laboratory test that any one of us have done, the results of that laboratory test, if it's a blood count, the doctor looks at it in terms of some range -- reference range he uses for deciding whether that's normal or not normal. That definition of normal is based on taking a population that's normal and taking five percent of that, just statistically calling it abnormal. It may be normal,

everything says it's normal. For a way of handling it, we're quite comfortable with the normal range that two and a half above or two and a half percent below or five percent above and five percent below, depending on who's doing it. That means it's abnormal, listed as abnormal because of the statistical way of handling it. So when you go to a doctor there's a five percent chance, if you get any tests run, that it's going to be abnormal just by virtue of chance. Now, if you do five tests, five different tests, there is a 22 percent chance that one of them will be abnormal. So if you go -- if you do five tests, one of those is going to be abnormal just by chance in 22 percent of the testing and the bigger the number it gets, the more tests run, the more likelihood it's going to be abnormal. It doesn't mean it has any health significance, all it means -- the doctor has to look it over. What he does if you have a white count out of the range of normal, you say that may be abnormal. What he'll do the next time you come back, I'll repeat that blood test and do the blood count. And if the blood count comes back and then he makes a judgment of whether he sees lots of them that are like that. If it stays abnormal and if everything else about the blood count -- if he did a blood count, if the red cells are the right size and they're the right shape and the hemoglobin content is right, it can't be important because it's just a

chance in variation. But quite often the doctor will follow people with white counts that are over 10,000 which some people say is abnormal. There are few people that will carry white counts 11,000 all of their life and nothing is ever found. So every single number that's taken, the doctor has to make a judgment on those that are outside of normal range and what he usually does is to repeat that test.

Q Now, sir, I want to address the subject of whether or not there can be -- the larger the number of tests you do, the more chances there are that there's going to be an abnormal result. You're familiar with the Todd & Sanford Text?

A It's a generally accepted text, laboratory.

Q Diagnosis and management by laboratory methods, Todd & Sanford?

A Yes, sir.

Q And it's an authoritative work, is it not, sir?

A Yes, sir, often quoted.

Q This defense Exhibit 144 which has been previously identified as representing a table from the Todd & Sanford Clinical Diagnosis and Management by Laboratory Methods, 1984 Edition on Page 54. Do you see that, sir?

A Yes, sir.

Q Now, this table is entitled Relationship of Expected

Abnormal Results to Number of Measured Constituents. Is this table talking about the same kind of principle you were just talking about?

A Yes. And it says that if there are 20 different studies done the likelihood of you having one abnormal is 64 percent chance. In other words, if you had -- if you go in there and you get a blood test, there's a standard thing that they run through an autoanalyzer that will give you 20 different measurements and -- all done at the same time. They do 20 of them and the likelihood, if he does 20, one of yours is going to be abnormal. When they say abnormal they don't mean abnormal, see, it's in quotes, that doesn't mean abnormal, abnormal, saying that's a normal range. What we're doing now, better to say rather than abnormal, normal, that five percent from a normal population. What they're saying, that abnormal really means reference range and a reference range means it's outside of that range. Doctors do something about it, decide whether it's abnormal or normal.

Q So if you have 20 constituents measured there can be -- there's a 64 percent chance, 64 chances out of 100 that you're going to have one or more abnormal results?

A That's right.

Q If you have as many as 20 tests done?

A That's right.

Q And the standard blood test that you're talking about runs 20 different tests?

A That's right.

Q Thank you, sir. Now, yesterday we were talking about the Zach-Siskind and Zach-Gaffey tests. Do you remember that, sir?

A Yes, sir.

Q Those studies?

A Yes, sir.

Q Putting the two figures together, do you recall that?

A Yes, sir.

Q And in connection with the Monson Computer Program. Is this a computer program that is employed by Monsanto Company in your Hepademiology Department?

A Yes, sir.

Q And did you cause certain tests or certain computer runs to take place on that program?

A Yes, sir.

Q When did you do this?

A Yesterday afternoon.

Q All right. Now, tell us what you did, sir?

A I didn't have to do much. We have the data base, which means each one of the health records and work records on

each one of the 32 deaths recorded in the Zach-Suskind Study, there were 32 deaths. All of that data was already in the computer base and also in that computer was the mortality experience of the 58 people that were recorded in the Zach-Gaffey as having died. So that was already there. We also have a program in the computer, and it wasn't as simple as what Mr. Heineman said, we use the Marsh Proportional Mortality Program which means if you've got the data base in there like I've said, and if we have that computer program, all we've got to do is call that computer program and say print out the data from that data using this Marsh PMR and a part of that Marsh PMR is the definition of what is expected cancer and mortality experiences for people with every age group. So every five years there's another sample. How many people in that age group. If we had one man that's 40, what should be the mortality experience of people 40 years old? Everything is adjusted according to the Monson Table of Expected Mortality by age, that's a part of the Marsh Program as we put it together. Once we had that, the data base in place, no one had to do anything. All we do is push a button using the Marsh Program and out came the PMR Program.

Q Doctor, let me -- doctor, let me hand you what's been marked as Defendant's Exhibit No. 913. Would you examine that and identify it for me, please?

MR. CARR: May I see a copy, counsel?

MR. HEINEMAN: Certainly.

Q Can you tell me what that is?

A Well, this is the printout from our computer using the health data in our computer base plus the Marsh PMR Program. This is a standard program that can be -- just put those things together by computer.

Q Now, sir, this is a portion of the entire printout, is it not?

A Yes, sir.

Q This is not the entire printout. Now, sir, this says at the top --

MR. CARR: Your Honor, I object to what it says at the top. I object to anything about it. It's obviously something that's dated 1981. It's something that should have been produced to us years ago or at least a year ago.

MR. HEINEMAN: Your Honor, the witness has just testified that this document was created yesterday afternoon.

MR. CARR: Your Honor, the witness has testified that it was created by pushing a button. All he did was go in there and push a button. It's something they had all this time.

MR. HEINEMAN: No, sir.

MR. CARR: Did he push a button or did he do more

than push a button, is what I heard. All he did was push a button, isn't that right, Dr. Roush?

THE WITNESS: Yes, sir.

BY MR. HEINEMAN:

Q Now, Dr. Roush --

MR. CARR: Your Honor, may I be heard on this before there's any additional question?

THE COURT: Go ahead, Mr. Carr.

MR. CARR: If it's -- this is dated -- Monsanto had possession and it's been in their possession apparently since April of 1981. It's data we should have had. Nitro employees exposed to dioxin. It's something they had in there all these years apparently. Something that they can look at on their screen at their convenience, that they can print out at their convenience, and that they have obviously printed out in the past. And now on a so-called clarification examination of Dr. Roush, for it to be put to the plaintiff the first time, to allow the witness to testify to it or any use whatsoever, I say is completely unfair and contrary to all rules of discovery that this Court and other Courts have established.

MR. HEINEMAN: Your Honor --

MR. CARR: I'd like to know if there is more information that's in your computer that we haven't been given.

MR. HEINEMAN: It's my understanding, Judge, is that the April 1981 refers to the Proportional Mortality Ratio Analysis Program but not to the organization of this data in this fashion.

MR. CARR: How long has this data been in your possession in this fashion? How long has it been on that computer?

MR. HEINEMAN: How long has this data been in --

MR. CARR: How long has this information been in the computer?

THE WITNESS: The data and the Suskind data have been there since 1979. They haven't been brought together, the putting of the Zach-Suskind and Zach-Gaffey Study was only put together because of the question raised at Nitro's lawsuit.

MR. CARR: Who put it together?

THE WITNESS: Marcie Strauss put it together.

MR. CARR: And that was done in 1984?

THE WITNESS: No, sir.

MR. CARR: When was it done?

THE WITNESS: I don't know.

MR. CARR: Your Honor, I repeat my remarks. This data was brought together, they have it. All he did was push a button to spit it out. They had it and they knew they had it and they hadn't given it to us.

MR. HEINEMAN: Your Honor, this is the same data that Mr. Carr has.

MR. CARR: The data that I calculated, that I took off of the tables, it wasn't given to me. I took it from your studies, from your reports and analyzed it myself. This is something you had analyzed through Marcie Strauss. I would be willing to bet 1984, I have a lot of documents signed by Marcie Strauss dated 1984.

THE WITNESS: No, that's not the case.

THE COURT: Mr. Heineman, do you have any further argument?

MR. HEINEMAN: Your Honor, I'd like to staighten out -- Mr. Carr has made some allegations here with respect to how long this data has been here and what was done with it and I would like to straighten that out with this witness, if I may?

THE COURT: Go ahead.

BY MR. HEINEMAN:

Q Now, Dr. Roush, the data --

MR. CARR: Your Honor, I will object unless he asks a question rather than submitting a suggested answer.

THE COURT: You'll have to ask the questions in a nonleading form, Mr. Heineman. I'll interrupt you if I decide they're leading.

MR. HEINEMAN: That's fine.

Q If you will, sir, tell us what is the data upon which this computer printout is based?

A There's two sets of data. The health experience of those involved in the Nitro Zach-Suskind Study and a separate group that includes the Zach-Gaffey population of 58 deaths and these were two separate studies. Not together, they've never been put together.

Q The -- so the data --

MR. CARR: Object, leading form of the question. Just starting out that way.

THE COURT: Objection sustained. Rephrase it, please.

BY MR. HEINEMAN:

Q What is the form in which the data from the Zach-Suskind Study was gathered?

A Well, once that data was in place, the sum total just listing of each single one of those people in that study, including date of birth, date of hire, date of exposure, date of termination, and date of death, and cause of death, each one of those 32 have that data in the Zach-Suskind Study. Those are listed. In addition, the identical data is in the data base on the Zach-Gaffey 58 people. In other words, you can just go down the list and, just as I've said, each one of

them have that data.

Q Now, excuse me, sir. Mr. Carr showed you an Exhibit and I think it was Exhibit 1460, if I'm not mistaken. It was a list of people with their date of hire, date of death, do you remember that?

A Yes.

Q Let me hand you what's been marked Plaintiffs' Exhibit 1460. It talks about the Nitro TCP accident, correct, at the top?

MR. CARR: Your Honor, leading question. I object to it.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q Doctor, what is the relationship between this data and the Suskind data you were just talking about?

A This is a listing of -- I'm trying to decide whether it's complete, but this is a listing of those people that have been identified as having worked at Monsanto and had chloracne that was found, related in time to that accident at Nitro in the TCP operation.

Q And it totals 122, sir?

A I didn't check to see -- I can't read all this but -- the first number is out but I assume that's 122.

Q For the 1949 accident?

A Yes, sir.

Q All right. And what is the relationship between this list and the data you were referring to in connection with the Zach-Suskind Study?

A This is the data base that was in the computer for those 122. This is their health experience. The question is when were they born and were they alive at the end of the experiment, at the end of the study, and then what was the cause of death, if they had it.

Q Now, so this --

MR. CARR: Objection, your Honor, leading form of the question.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q Now, what is the information listed in the second column from the right on Plaintiffs' Exhibit 460?

A This is 460?

Q Yes, sir -- 1460.

A The second last column is a listing of where they were at the end of the study. That means, if they were there and working, that means that obviously they were not dead. So, they're trying to squeeze down those who had died based on the information available here.

Q All right. What is the letter in front of the first

name? I'm sorry, the first statistic that you just referred to for the first name?

A That refers to their status, whether they were dead or whether they were alive, whether they were retiring, so it's really their circumstance as of that date.

Q The first one is a D ?

A Right.

Q What does that mean?

A That means he was dead.

Q The third one is an A ?

A That means alive and working.

Q The next one is an R ?

A R means he's retired from Nitro.

Q But alive?

A Yes.

Q So when Mr. Carr --

MR. CARR: Objection to the leading form of the question.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q Dr. Roush, where did you get the information to answer Mr. Carr's question about which of these people were the 32 deceased ones?

A They came out of this list here.

Q Right out of Plaintiffs' Exhibit 1460?

A Yes.

MR. CARR: I object to the leading form of the question, your Honor.

THE COURT: Objection sustained. Mr. Heineman, you have to quit asking these leading questions.

MR. HEINEMAN: All right.

Q Sir, let me hand you what's been marked as Plaintiffs' Exhibit 1461. Can you identify that, please?

A It's a series of death certificates.

Q Sir, would you compare 1461 with Plaintiffs' Exhibit 1460?

A Well, the first one is Robert Arther on Monsanto's listing. You can correct it, the Social Security number is the same on the both of them so that we're talking about the same person. And of -- on the right side the status as of December 31st, 1978, he was listed as dead and the -- there's a 201.0, that's a classification of death and it refers to the immediate cause of death as Hodgkin's disease.

Q Sir, go ahead.

A You want to do the next one?

Q Please.

A The next name is Howard Cochran.

MR. CARR: Your Honor, unless counsel has abandoned

his efforts to get this later day study before us, I see that this has no relevance to the question that the Court has asked for evidence on.

THE COURT: Okay. Gentlemen, could you approach the bench for a minute, please?

(The following proceedings were held at the bench out of the hearing of the jury.)

THE COURT: Where are you headed with this?

MR. HEINEMAN: What I'm doing, your Honor, is demonstrating that the data that he's referring to as being the subject of that computer run is the very data that is in evidence, placed here by the plaintiffs.

MR. CARR: I don't quarrel with that in the least, that's not relevant.

MR. HEINEMAN: Of course it is because you're complaining about the fact that this is something that's not based upon --

MR. CARR: Don't be so -- you know good and well what I'm complaining about is this computer study that you've had all these years. I know I was given the raw data. What I'm complaining --

THE COURT: If there's no dispute as to that point, move on to whatever else you want to show in clarification and then I'll consider the objection, then I'll rule on the

objection.

MR. HEINEMAN: What I want to show, your Honor, is the data of the two are the same. That there isn't any more data in that study, in that computer, other than what's already in evidence here.

MR. CARR: Any more raw data.

MR. HEINEMAN: Mr. Carr had that.

MR. CARR: I had the raw data.

MR. HEINEMAN: The only other thing is the program.

THE COURT: I understand the difference. I understand the difference.

MR. HEINEMAN: The witness said that the two have never been put together before.

MR. CARR: Until Strauss did it which was sometime back -- that's exactly what he said, that's my objection. You brought the raw data together, you put a Marsh and a Monson PMR with that data, you kicked out this thing, you had this literally for years. I'm not at all making a point that I wasn't given the raw data. I was given these death certificates and I was given this list of people but I wasn't given anything else. I wasn't given this program, computer study that you've had in your possession for years and under direct order of this Court to bring in to me and you didn't do it.

MR. HEINEMAN: What I'm telling you is my

understanding is from this witness that that computer study was created for the first time.

MR. CARR: By Strauss and he doesn't know when.

THE COURT: That is what he said.

MR. HEINEMAN: Let me see if I can straighten that out.

THE COURT: Go ahead.

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

BY MR. HEINEMAN:

Q Now, Doctor, when was the program whereby the data from the two studies was put together, created for the first time?

A Put them together?

Q Yes. (Nod)

A To my knowledge it was put together for this lawsuit. Based on the -- what has been brought out here, we went back and tried to find out if he put these two together.

MR. CARR: That really isn't an answer to the question. The question was when was it put together?

THE WITNESS: I can't be sure.

BY MR. HEINEMAN:

Q Has it been within the last few days?

A As far as I know. I think it is, but I don't know

whether it was done for Nitro or not. I don't know whether the same question was raised there so I can't answer that because it could have been produced there because the same question could have been asked. I wasn't told about it but it could well be and we can establish that from our record. It could've been done just related to this lawsuit.

MR. CARR: It could've been done two years ago, too, couldn't it, Doctor?

THE WITNESS: I don't know.

MR. CARR: Correct.

BY MR. HEINEMAN:

Q What is it that you know as you sit here now about when it was put together?

A I asked for it after I was involved in this testimony. I asked for it for the first time and they went through the process and did it for me. Whether they had done it before, I don't know.

Q So that all you know is that it began after --

MR. CARR: Object to the leading form of the question.

THE COURT: Objection sustained. Rephrase it, please.

BY MR. HEINEMAN:

Q And as far as when your testimony began, sir, did

you ask for it after the 8th of July when you came back and initiated testimony again?

A Yes, sir.

Q So you asked for it after the 8th of July?

MR. CARR: Object to the leading form of the question.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q And when did you go out and produce this printout?

A I went out and produced it yesterday.

Q To your knowledge had a printout like that ever been produced before?

A After I came back and took place in this trial, after the recess.

Q After July the 8th?

A Yes.

MR. HEINEMAN: One moment, your Honor. Your Honor, that's all the questions I have on that subject.

THE COURT: Mr. Carr, do you wish to cross-examine on that subject?

CROSS EXAMINATION

BY MR. CARR:

Q Dr. Roush, what you do know, this was prepared for the Nitro case, don't you, sir?

A No, sir.

Q It says all Nitro employees exposed to dioxin, doesn't it, the project title?

A Yes. But it doesn't mean we produced it for the Nitro case.

Q And you do know Marcie Strauss made it?

A After July 8th.

Q You know that now, sir?

A I know that she did it, but I don't know whether she did it before as well.

Q Well, when did she do it, to your knowledge, for the first time? When did she make this computer study up for the first time?

A To my knowledge, after July 8th.

Q I thought you testified a moment earlier, Dr. Roush, that you didn't know when she put it together?

A I know she did it this time.

Q My question is, do you know when she first did it, sir?

A No, sir.

Q It could've been two years ago, couldn't it, sir?

A I have to ask that, so I don't know.

Q What you do know, that it was in the computer, this and more data in the computer and more tables are in the

computer because this talks about just Table 5 and Table 3 and Table 4, so there are other tables in this computer, aren't there, sir?

A Yes, sir.

Q That you have not brought here today?

A Yes, sir.

Q And we don't know what those tables show, do we, sir?

MR. HEINEMAN: I'd be happy to have them marked, your Honor.

MR. CARR: Your Honor, it's not just that I want and the Court has ordered for months, for years now, the Court has ordered that we receive this information and we have not received it today and my objections still stand. There's no -- the whole idea of discovery is that we can have this long enough ahead of time that we can give it to people that we trust and rely upon to determine the accuracy and the truthfulness of this data so that I'll have an opportunity to study it instead of being confronted with it for the first time in the Courtroom. That's the whole idea of it. I renew my objection to any use of it whatsoever.

MR. HEINEMAN: Your Honor, may I address that?

THE COURT: Yes, you may.

MR. HEINEMAN: Your Honor, the only evidence in this Courtroom about this data, this document, is that it was

created for the first time after July the 8th, 1985. The only other thing this man has said is he doesn't know whether it was ever done before that. But all he knows is that the only time that the two, the data from the two studies was put together was after the -- the only thing he knows about it was that it was after July the 8th, 1985. Obviously, there isn't any dispute, as Mr. Carr has told the Court, there isn't any dispute that the data itself was available to him and that he had it. The same data that's in the machine that was put together after July the 8th, 1985.

MR. CARR: Your Honor, now counsel is making a representation that isn't out in the record. He pushed the button after July 8th, 1985. He doesn't know how long this information has been in the computer. He has so said under oath he doesn't know when Marcie Strauss put it together and created the program.

THE COURT: Do you have anything further? Either of you?

MR. HEINEMAN: That's all we have, Judge.

THE COURT: Okay. I'm sustaining the objection. I think the production of this at this time and it's use under these circumstances violates the discovery rules and the statute and violates the orders of Court for prior production, and under those circumstances, I am sustaining the objection

made by Mr. Carr. Mr. Heineman, you may proceed.

CLARIFICATION EXAMINATION

BY MR. HEINEMAN:

Q Dr. Roush, in the course of your examination by Mr. Carr and/or clarification examination, we have discussed, have we not, sir, the Times Beach situation?

A Yes, sir.

Q Times Beach, Missouri. There have been a number of articles written, have there not, which have discussed Times Beach as well as other dioxin exposure incidents?

A Yes, sir.

Q Have any of those articles discussed the levels of exposure at any of these -- on any of these occasions, whether it be Seveso or Times Beach?

A At Times Beach there was a study of the people who had been involved in that exposure and they used one population with exposure from 20 up to 100 parts per billion as defined by the measurements of going around in the area where they live and taking core samples and using that as a base for deciding what the level of exposure was and they compared that population.

MR. CARR: I object. He's talking about they and what they did. There's been no identification.

THE COURT: Can you clarify that?

MR. CARR: Study by Monsanto, a study by CDC?

MR. HEINEMAN: Let me pull Defendant's Exhibit 55.

Q Doctor, let me hand you what's been marked as Defendant's Exhibit 914 and ask you if you can identify that for me, please?

A This is an article that was written by Dr. Dunagin. He's a Professor of Dermatology at the University of Missouri in Columbia and his paper was title, "Cutaneous Signs of Systemic Toxicity Due To Dioxins and Related Chemicals".

Q And this was the publication from what journal?

A It was published in the Journal of American Academy of Dermatology in April of 1984.

Q And, sir, is that a peer review journal?

A Yes, sir.

Q And do you regard this document as being authoritative?

A Yes, sir.

Q Now, Dr. Dunagin in his article, sir, does he address the subject of Times Beach?

A Yes, he does.

Q Does he address the subject of Seveso?

A Yes, he does.

Q Does he address the subject of other occasions of human exposure to dioxin?

A Yes, sir.

Q Now, I'd like to direct your attention, if I may, sir, to Page 691.

A Yes, sir.

Q There's a paragraph there entitled "Absorption", is there not?

A Yes, sir.

Q There's a sentence there that begins there with the word "Actually", do you see that?

A Yes, sir.

Q Would you read that sentence and the next two sentences out loud, please?

A "Actually, dioxin does not have distant effects such as the public perception of radiation. The vapor pressure is so low (1.7 X 10 to the minus 6 millimeter of Mercury) that vapors are not a problem. Dioxin must first be absorbed into the body before any effect on health can occur."

Q Now, sir, if you turn to the next page on 692 --

A Yes, sir.

Q In the first column, the last paragraph --

A Yes, sir.

Q Would you read beginning "Of course", there, would you read that paragraph, please?

A "Of course, the absorption of dioxin by dermal

contact would also depend on frequency and duration of contact. There have been several situations in which humans had daily exposure to dioxin; some idea of the levels necessary to cause toxicity by dermal absorption can be gathered from this information. In 1971 waste oil containing dioxin was applied to settle dust in horse arenas in Missouri. The people who lived at these sites had daily exposure in their occupation and play for three months. The level of dioxin in a soil sample taken after three months was 32 ppm."

Q What does p-p-m mean?

A Parts per million.

Q 32 parts per million. Would you go ahead, sir?

A "The original level in the waste oil may have been higher, because of some dissemination over the 3-month interval. The humans exposed to these levels on a daily basis developed chloracne and other symptoms typical of dioxin toxicity. When re-examined five years later, these patients had no laboratory abnormalities, chlorache resolved, and there were no apparent sequelae from dioxin."

Q What does the word sequelae mean, sir?

A There were no obvious effects that could be related to the dioxin.

Q Would you read the next paragraph, please, sir?

A "It is also known that workers involved in spraying

2,4,5-T herbicide in the 1960s and 1970s came in contact with 1-30 ppm dioxin in the concentrate. There is no evidence that people with daily exposure to these levels developed chloracne. Currently, the use of 2,4,5-T is restricted and the level of dioxin in the concentrate is less than 100 ppb."

Q For parts per billion?

A Pardon?

Q P-p-b meaning parts per billion?

A Right.

Q Would you go ahead, sir?

A "From these two examples, it appears that the amount of dioxin necessary to cause objective effects is in the 10-30 ppm range in an oily vehicle assuming daily exposure. In a soil-water vehicle, the level would probably be 10 to 100 times as much. If the patients in these examples absorbed some dioxin orally, the calculated levels would be even higher. Even with daily skin contact, soil concentrations of dioxin necessary to produce objective toxicity as shown by chloracne most likely exceed 100 ppm."

Q Would you read the next paragraph, please, sir?

A "Another possible route of exposure is inhalation. This may be an important route in some industrial accidents where aerosols may be released into the atmosphere. However, inhalation of dust does not seem to be important. If the

level of dioxin in dust is one ppb, the daily amount inhaled has been calculated as 1.4 picograms/day. This level is insignificant. The FDA has calculated a no-effect level of 70 ng/man/day."

Q All right. What is the relationship between a picogram and a nanogram?

A A thousand-fold.

Q Which is larger?

A A nanogram.

Q So there's a thousand picograms in a nanogram, is that right?

A Yes.

Q And the FDA have calculated a no-effect level of 70 nanograms per man per day?

A Yes.

Q Now, what is the amount that the CDC established or calculated would be consumed on a daily basis by a child at a one part per billion concentration in the soil?

A They assume that the child could eat someplace between one and ten grams of soil per day.

Q Now, a child eating the soil, they don't just pick it up and stuff it in their mouth, do they?

A No, sir.

Q How does that happen?

A Well, they're assuming that the child is playing in the dirt and he puts his hands in his mouth rather than just eating the dirt. Every time he puts his hands in his mouth he could get some exposure. They're overestimating that but they want to be on a conservative side.

Q And on 10 grams of soil, one to 10 grams of soil, with a concentration of one part per billion of dioxin in it, how many -- how much dioxin do they estimate that that child would consume per day?

A Ten nanograms.

Q The information -- let me show you, sir, that computation, if I may. Let me hand you Plaintiffs' Exhibit 1255 and I'd like to direct your attention to Page 48 of that Exhibit.

A All right.

Q Do you see there in Plaintiffs' 1255, that is the CDC article we were talking about?

A The CDC and Department of Agriculture both.

Q All right. Sir, on the second page of that Exhibit they tell you the computation that they have made, do they not?

A Yes, sir.

Q And what do they say is the amount of dioxin that a child would take in if consuming one part -- one to 10 grams

of soil contaminated with one part per billion of TCDD?

A Up to 44 picograms per day.

Q Forty-four picograms per day?

A Right.

Q Now, that would be ingested, taken into the stomach?

A That's total.

Q Total. That includes inhalation?

A Yes.

Q Now, according to Dr. Dunagin, inhalation could be expected if the dust were contaminated to one part per billion to be a total of 1.4 picograms per day, is that right?

A Yes, sir.

Q Now, how long can they say that a child could consume 44 picograms per day?

A It isn't very well stated here, but they're talking about through the time when the child is going to be eating dirt rather than when he becomes an adult.

Q So that would be what? What period of time does that occur?

A Ten to 12 years, something, I suppose.

Q Now, the Dunagin article further says, does it not, sir, that the FDA --

MR. CARR: Objection to the leading form of the

question.

THE COURT: Rephrase the question.

BY MR. HEINEMAN:

Q What does the Dunagin article say about an FDA calculation of a no-effect level, sir?

A The FDA had calculated their no-effect level at 70 nanograms per man per day.

Q Seventy nanograms per day?

A As no-effect level.

Q No limit on how many days?

A No, sir.

Q And how many times is that compared to the 44 picograms per day in the CDC?

A Oh, someplace around 40 percent higher than the CDC.

Q If you've got 70 nanograms, that would be 70,000 picograms?

A Yes.

Q So 44 picograms would be something in the area of a little less than 2,000 times less?

A Say that again. Repeat that.

Q If you have 70 nanograms per man per day.

A Right.

Q That's 70,000 picograms?

A Right.

Q Per day, correct?

A Right.

Q And if 44 picograms can be eaten per day would that not be in the neighborhood of a little less than 2,000 times more than the FDA is saying is a no-effect level?

A Yes.

Q Now, if you turn to the next page of the Dunagin article, sir, which is Page 693, there's a portion of the article devoted to the question of "Dose Response", is there not, sir?

A Yes, sir.

Q Would you read that paragraph, sir?

A "All animal experiments show that dioxin toxicity is dose-related, as would be expected by analogy with most other known toxins. At very low doses, there are no observed effects in animals. In rats, there is about a one hundred-fold difference in dose between the "no observed effects level" and the mortality levels. Dose-response was also established for Yusho disease in humans where the severity correlated with the amount of rice oil (containing dibenzo-furans) consumed. People with low levels of consumption showed no effects. Although the dose relationship seems obvious, a great deal of public consternation has been caused

by statements that any amount of dioxin, no matter how small the dose, is dangerous."

Q Sir, he then goes on to talk about the toxic effects in humans, doesn't he?

A Yes, sir.

Q And in the next column on Page 693, he refers to the importance of chloracne, do you see that?

A Yes, sir.

Q Would you read that to the jury, please?

A "The importance of chloracne is that it seems to be the most likely objective sign to occur at the threshold dose for humans. In other words, chloracne is the most sensitive clinical indicator of dioxin exposure in population groups. In most studies, 85 percent to 100 percent of patients who have any of the more severe objective effects also have chloracne. This is an extremely important fact in evaluating large groups of people exposed to unknown chemicals, or where the magnitude of exposure cannot be determined. However, there does seem to be a small percentage of patients who are resistant to getting chloracne. So for any given individual, one cannot determine with absolute certainty whether a toxic dose has been absorbed by the presence or absence of chloracne alone."

Q All right. Now, if you look at Page 695, sir.

A Yes, sir.

Q You have a portion of the paper that deals with chloracne as a marker as indicated by the previous page, correct?

A Yes, sir.

Q Now, on 695 he talks about the Seveso, Italy incident, does he not?

A Yes, sir.

Q And he says -- or would you please read what he says in the first full paragraph in the first column, beginning "Several thousand people"?

A "Several thousand people were exposed to dioxin in Seveso, Italy, and panic developed after the deaths of rabbits and other herbivores which consumed dioxin-tainted vegetation. An extensive health survey by the Lombardy Regional Government examined dermatologic, neurologic, hepatic, renal, reproductive, and immunologic parameters. They found 187 cases of chloracne, mostly in Zone A, the most heavily contaminated area. However, no other objective toxicity could be attributed to dioxin. Most of the cases of chloracne resolved in a short period of time. There were some cases of peripheral neuropathy, but only in people over the age of 55 who had diabetes or alcoholism. These cases were not attibuted to dioxin. Some surveys showed an increase in spontaneous abortions after the accident in Seveso. However,

it is also known that many women left Italy to have therapeutic abortions in other countries because of fear engendered by all the media publicity following the accident. Some of these may have been misinterpreted as spontaneous abortions in post hoc surveys. Most experts now believe there was no increase in abortion or birth defects."

Q Now, sir, I'd like you to turn to Page 696, if you would where there's a portion of the paper that deals with Teratogenesis and Carcinogenesis. Do you see that, sir?

A Yes, sir.

Q Let me direct your attention to some statements in the paper beginning around the middle of that paragraph, beginning with the sentence "Similarly". Do you see that?

A Yes, sir.

Q Would you read that, please?

A "Similarly, an increased incidence of cancer has been observed in most species of laboratory animals given dioxin; however, the doses required also produced overt signs of direct toxicity. The covalent binding of dioxin to deoxyribonucleic acid (DNA) is four to six orders of magnitude less than values for most known chemical carcinogens. Most authorities believe that dioxin is unlikely to initiate somatic mutation, but may act as a promoter. The calculation of relative risk for chemicals that may be promoters is not

as well established as for initiators of carcinogenesis. There is controversy about models used to extrapolate to lower doses than available experimental data. In some studies, dioxin and related chemicals have actually inhibited the formation of skin cancers induced by dimethylbenzanthracene (DMBA) in rats."

Q Now, if I could direct your attention to the last two paragraphs of that portion on Teratogenesis and Carcinogenesis which are in the next column. Would you read those, please, sir?

A "Populations with less exposure as shown by absence of chloracne would have a lower risk for carcinogenesis than workers. Still most newspaper articles have implied that people with no evidence of dioxin toxicity today nevertheless have a ticking time bomb that may strike as cancer any day. Similarly, studies of teratogenesis are continuing, but so far studies from Seveso, New Zealand, and Alsea, Oregon have not shown a greater incidence of birth defects than expected."

Q Now, sir, he relates, does he not, that there are studies that talk about the inhibition of skin cancers by using dioxin, is that right?

A Yes, sir.

Q Let me hand you, sir, what's previously been marked as Defendant's Exhibit No. 165. Can you tell me what that is, sir?

A This is an article by a group for the University of Wisconsin titled, "Time-dependent Inhibition by 2,3,7,8-Tetrachlorodibenzo-p-dioxin of Skin Tumorigenesis with Polycyclic Hydrocarbons". This was by J. DiGiovanni, Barry, Gleason, Kishore and Slaga, and it was published in McArdle Laboratory for Cancer Research in May of 1980.

Q And is this a peer reviewed study, sir?

A Yes, sir.

Q And published in 1980, you said?

A Yes, sir.

Q If I can direct your attention, please, to the abstract on the first page.

A Yes, sir.

Q There's a sentence that begins on about a third of the way down. It starts with the words "In contrast". Do you see that?

A Yes, sir.

THE COURT: Before you get into this article, is it a good time for a short recess? Ladies and gentlemen, we'll take a break for a short time. This will go for any other breaks we take, not to discuss this matter amongst yourselves or anyone outside the jury panel or form any opinions or conclusions about the matters on trial. The Court will be in a short recess.

(A short recess was taken.)

BY MR. HEINEMAN:

Q Doctor, at the time of the break we were looking at Defendant's Exhibit 165 which is the article by Dr. DiGiovanni and Drs. Barry, Gleason, Kishore and Slaga. Do you see that, sir?

A Yes, sir.

Q What is the McArdle Laboratory for Cancer Research?

A It's a laboratory that got started in doing research on cancer when two of the people working in research there found the ultimate carcinogen that causes cancer with benzo(a)pyrene or one of the related materials but one of the metabolites was the ultimate carcinogen because of -- that they've established a reputation as being very good in research and they now have a relatively large building that's devoted purely to research on cancer at the University of Wisconsin.

Q Are these authors with the McArdle Laboratory? Are some of them with the McArdle Laboratory of Research?

A I don't know these names so I don't know whether they all were or not. Apparently DiGiovanni is.

Q There are two institutions there listed below the names of the authors, are there not?

A Yes, sir.

Q And in these papers -- these peer-reviewed papers, do they directly list the affiliation of the authors so they know who they are and where they come from?

A I think they, for practical purposes, always do.

Q And what are the two institutions that are listed here under the names of these authors?

A First, McArdle Laboratory at the University of Wisconsin for Cancer Research. The second is the Biology Division of Oak Ridge National Laboratory at Oak Ridge, Tennessee.

Q Are you familiar with that laboratory, sir?

A The Oak Ridge National Laboratory has a Biology Division that has the responsibility both for monitoring the health effect of the workers as well as doing research on the effect of radiation, as well as attempting to define a new effects level for radiation because they're both part of the overall effort that was formerly the AEC.

Q Does that research at Oak Ridge have anything to do with cancer?

A Yes, sir, because one of the clear-cut examples of the effect of external environment on man is, I suppose since they first discovered radiation, it was in the 19 -- 1940s when they were using radiation to treat thymus and thyroid, they found that 10, 20 years afterwards they started developing

cancers of the thyroid. So it's been known for many, many years that radiation in large doses causes cancer and once that's established, they want to see how low the exposures have to be before you don't see it related to taking a chest x-ray or anything else.

Q Now, if I can direct your attention to the abstract of this article, sir. There's a mention about a third of the way down of an extremely long chemical name. The last part of which is benzopyrene, do you see that, sir?

A Yes.

Q I won't ask you to read the entire clinical name but what does that have to do with what you were telling us about the discovery of benzopyrene as a carcinogen?

A Well, this is one of the benzopyrenes. This is benzo(a)pyrene modified by one of the side groups on the benzopyrene molecule. They use this material because it's well known that these related chemicals when painted on the back of a mouse will produce papillomas. That means it will produce a growth wherever they put it. They'll shave the back of a mouse and then they'll put a drop or more on that paved -- or shaved area and then over a period of time the mouse will develop a little tiny growth, not a tumor -- a tumor but not a cancer, and then with time, sometimes it will go on to develop cancer. It's well-described, well-defined,

and uses a model for studying cancer in cancerigenesis.

Q Now, this abstract, sir, discusses what is the effect of the TCDD application for initiation of this papilloma formation, does it not?

A I haven't read it.

Q Let me direct your attention to that portion -- direct it to just before we broke which begins with the words "In contrast". Do you see that there?

A Yes.

Q Now, just before that there's a sentence that begins with "The application". Do you see that, sir?

A Yes.

Q Would you read that, please?

A "The application of TCDD five minutes prior to or one day after initiation with DMBA, benzo(a)pyrene, or MCA had little or no effect on papilloma formation."

Q All right. I'd like to ask you about that for a minute. MCA is methylcholanthrene, correct?

A Yes, sir.

Q Methylcholanthrene, is that another carcinogen like benzopyrene?

A I can't answer the question. There are a number of these polycyclic aromatic very closely related, but some of them produce cancer and some of them do not. So I'd have to

look in the book to see whether methylcholanthrene is a carcinogen or not.

Q All right. And what about DMBA, dimethylbenz(a)-anthracene?

A I have the same problem that's related to the methylcholanthrene.

Q Now, that sentence you just read says that if you apply TCDD five minutes before or one day after you initiate with these three materials, it has little or no effect on papilloma formation, correct?

A That's right.

Q Now, what does that tell you, sir, about whether or not if someone had already had exposure to a carcinogen and then was exposed to TCDD thereafter, whether TCDD would promote a cancer from exposure to that previous exposure to that carcinogen?

A The statement made there is that they know how many papillomas will be formed because of the many studies from DMBA by benzopyrene or methylcholanthrene. They know how many tumors would be formed by such painting, skin painting, and they're saying that when they gave the TCDD about the time of this painting, it had no effect.

Q How about when they gave it afterwards? Five -- one day after?

A No effect.

Q So would that indicate to you, sir, that exposure to a TCDD at least shortly after exposure to a carcinogen would not give rise to promotion?

A Yes, it says it did not.

Q Now, would you read the next sentence which begins with the words "In contrast"?

A "In contrast, when TCDD was applied three days prior to initiation with these hydrocarbons, a marked reduction in papilloma formation was observed."

Q All right. So that if you put on the TCDD three days ahead of time, you get fewer papillomas formed, correct?

A Yes, sir.

Q Now, if I can direct your attention to Page 1583 as it's numbered in that lower right-hand corner in that Exhibit, sir.

A Yes, sir.

Q We see in the left-hand column some remarks about the Effects of TCDD on Epidermal AHH, EH, UDPGT and GST. Do you see that, sir?

A Yes, sir.

Q What are they talking about there? What are those materials, AHH, EH, etc.?

A The only one I know offhand is the first one, the

AAH and the others I assume are also enzymes because they're talking about the effect of this on the enzymes.

Q All right. Now, AHH is what, sir?

A Aryl hydrocarbon hydroxylases.

Q And TCDD -- well, let me ask you. Is TCDD known to have any effect on the induction to AHH enzyme?

A In animals, yes.

Q And in animals, what effect does it have?

A It causes the measured AHH level in almost any tissue they analyzed for it, causes it to go up. In other words, you can measure enzyme activity by a bioacid.

Q By a bioacid. What do you mean by that, sir?

A You don't measure the enzyme itself but you measure it by putting it in the presence of something that's going to metabolize.

Q You measure the enzyme activity by showing the effect of that enzyme on something else, is that right?

A Yes, sir.

Q That's sort of like measuring an immune function, sir, with exposure to certain kinds of irritants?

A I'm not sure that you can go that far, but when we increase the amount of glucose we eat, we begin to produce more insulin, so that's a better example of an effect. If you get a lot of sugar, your pancreas will be putting out

more insulin. And a man that is overweight is more likely to get diabetes because he's used up his ability to make insulin on a continuing basis. The enzyme induction is something our body goes on all the time, depending on what we eat, we reduce one or another enzyme, depending on the food we're eating.

Q Is aryl hydrocarbon hydroxylases induced normally every day in the body?

A We know it varies and we're not sure what it is that's making it change.

Q But it's there and active at all times? It's in the body actually, is it not?

A Yes.

Q Now, so TCDD in animals is known to induce production or activity of AHH?

A Yes, sir.

Q Now, they have a discussion there, do they not, about the effect of TCDD on epidermal AHH activity, correct?

A Yes, sir.

Q They're talking about it in the skin?

A Yes, sir.

Q Now, do they suggest that in these animals that were reviewed here that the TCDD when painted on the skin caused the AHH to go up?

A Yes, sir.

Q And it would be increased for five to 10 days after TCDD application, is that right, sir?

A Yes, sir. But that doesn't mean at the same level. It means it was falling off over that five to 10 days.

Q Increased?

A Over background.

Q So it's increased the greatest amount in the first 24 hours and then it falls off?

A Yes, sir.

Q Now, what is the effect then -- is there any connection between the enzyme induction of TCDD and the reduction in the number of these tumors by application of TCDD?

A They have shown that these --

Q Were they mice?

A Yes, these mice that have the benzopyrene chemicals painted on their backs developed a papilloma and when they painted them on the back they also got elevation of the AHH. And when they put -- when they put the TCDD on before, they didn't see as many papillomas and I'm not sure -- they've shown that AHH goes up and it's logical to conclude that the AHH going up was a possible basis for the decrease in papillomas. That's a reasonable explanation based on both of these things occurring.

Q So what they -- if you look at Page 1584, sir, you see that? The first column there before Table 5?

A Yes, sir.

Q Would you read that sentence beginning with the word "Experiments" to the end of the paragraph, that short portion there, please?

A From the first paragraph?

Q Yes.

A "Experiments from our laboratories have shown that TCDD possessed little or no tumor-initiating (16) or tumor-promoting (3) properties in the skin of CD-1 mice at doses that produced a marked inhibition of the initiation of skin papilloma formation by several PAH (12). We therefore chose TCDD as a tool for studying the effects of enzyme induction on tumor initiation by PAH in mouse skin."

Q Now, the PAH are the poly aromatic hydrocarbons?

A Yes, that's those three chemicals we've talked about initially, the benzanthracene, the methylcholanthrene and the tetrahydrobenzopyrene.

Q All right.

A Those three are all PAH's.

Q Now, if you look at the last paragraph on Page 1585, sir.

A Yes, sir.

Q You see where it says the results?

A Yes.

Q What do they say? Would you read that paragraph?

A "The results presented above, coupled with the observed increases in epidermal AHH and UDPGT, suggested a possible mechanism for the ability of TCDD to inhibit tumor initiation by PAH. Under the influence of TCDD, epidermal cells may be programmed to inactivate PAH carcinogens more efficiently and therefore eliminate them more readily. Further analysis of the profile of water-soluble metabolites as well as of rates of clearance and excretion from epidermal cells may shed further light on the inhibitory effect of TCDD and similar compounds."

Q So that they're trying to relate experimentally two observations that they've made?

A Yes, sir.

Q One, that TCDD stipulates and induces AHH and production and activity, and the other, that TCDD inhibits the papilloma formation if it's given before -- ahead of time?

A Right.

Q Now, let me direct your attention, please, if I may, sir, to Defendant's Exhibit 166. That is another paper, is it not, sir, published in a -- well, let me ask you -- what is that, sir?

A This is a report by David Barry, Thomas Slaga, DiGiovanni and Juchau from Oak Ridge as well as the University of Washington in Seattle and they published a paper titled, "Studies With Chlorinated Dibenzo-p-dioxins, Polybrominated Biphenyls, and Polychlorinated Biphenyls in a Two-Stage System of Mouse Skin Tumorigenesis: Potent Anticarcinogenic Effects". This was published in the Annals of the New York Academy of Sciences.

Q Is that peer review?

A Yes. And it was published, I think based on the bottom, in 1979.

Q Now, some of these authors are the same people that were involved in the other article, are they not?

A Yes, sir, I think two of them -- three of them.

Q On the other occasion they were working with the McArdle Laboratory people at the University of Wisconsin and on this occasion they're working with the University of Washington, correct, sir?

A Yes, sir.

Q And if I can direct your attention to Page 411 of Exhibit 166. In the discussion section, do you see that?

A Yes, sir.

Q And would you read the first three or four sentences of the second paragraph of that discussion section,

sir?

A "This report demonstrates that TCDD possesses remarkable inhibitory actions on skin tumor-initiation to polycyclic aromatic hydrocarbons (PAH). Almost complete inhibition of DMBA tumor initiation is achieved with a single nontoxic topical dose of 0.1 micrograms and with a dose of 0.01 micrograms approximately 80 percent inhibition was achieved. This potent anticarcinogenic effect may be related to the ability of TCDD to induce epidermal enzyme pathways responsible for detoxifying PAH carcinogens in the skin."

Q Sir, what is it about the enzyme productions that can inhibit tumor or tumor production whether it be malignant or non-malignant or benign?

A Well, there's no cause and effect established here but what they're saying is these studies would be consistent with the fact that TCDD in very small amounts can produce enzymes which will break down the carcinogen. So it's not going to produce a reaction without producing a papilloma.

Q So that it's a biochemical effect?

A Yes, sir.

Q On the carcinogen itself?

A Right.

Q And that's done by virtue of the enzymes in the body being increased?

A Yes, sir.

Q Now, sir, we talked a little while ago about the fact that a health study had been done on the residents of Times Beach, do you recall that, sir?

A Yes, sir.

Q Let me hand you what's previously been marked as Defendant's Exhibit 55. Can you tell us what that is, sir?

THE COURT: Is that 55?

MR. HEINEMAN: Fifty-five, your Honor.

A This is a report, a progress report titled "Missouri Dioxin Health Studies", dated October 16, 1983. It lists the Missouri Division of Health, The Centers for Disease Control, the St. Joseph's Hospital of Kirkwood and the St. Louis University Hospital.

Q All right. Now, let me direct your attention, if I may, sir, to Page 3 of that report. Three being an Arabic numeral as opposed to a Roman numeral so it would be actually about the ninth page of the Exhibit itself.

A Page 3.

Q Where it's entitled "Background and Characterization of Environmental Contaminations", do you see that, sir?

A Yes, sir.

Q Now, what area are they talking about there?

A Well, they're talking about hexachlorophene plants

in southwest Missouri. They're talking about the horse arenas in Missouri.

Q You see on the next page, sir, they have a list of all of the various sites, various sites in Missouri. Do you see that, sir?

A Yes, sir.

Q There are 33 such sites listed?

A Yes, sir.

Q Is that any relation -- does that have any relationship, sir, to the EPA designated dioxin sites in Missouri?

A I think they are the designated sites. That doesn't mean it was complete today but as of that date it was complete.

Q Now, on the Page 3 that I've reference to before, they talk about the -- at the end of the first paragraph, what the contamination levels were, do they not?

A Yes, sir.

Q And they suggest that most of the levels ranged in what range, sir?

A Levels as high as 35 ppm were measured in the soil in one of the 33 sites. Currently, isolated levels as high as 1.9 ppm exist in these contaminated areas but most of the levels range from less than one part per billion to several hundred ppb.

Q So there's a very wide range of contamination levels, is there not, sir?

A Yes, sir.

Q Some less than one part per billion, some as high as several hundred parts per billion with a few up in the parts per million range?

A That's right.

Q Now, the next paragraph, sir, they talk about approximately half of the sites that they listed being contaminated with peak levels in excess of 100 parts per billion, correct?

A Yes, sir.

Q Now, that's the contamination level in the soil, is it not, sir?

A Yes, sir.

Q One hundred parts per billion and they say 11 of them are in residential areas, correct?

A Yes, sir.

Q Now, the one part per billion set by CDC is for residential areas, is it not, sir?

A Yes, sir.

Q Now, they characterize these people whom they studied in two groups, do they not, sir?

A For at least -- for one study. I'm not sure if

they're talking about the same study that I recall.

Q If I can direct your attention to Page 27.

A Yes, sir.

Q They talk about -- actually the section begins on the previous page, on Page 26, where they talk about how they conduct this study, do they not?

A Yes, sir.

Q They talk about a health effects survey questionnaire, that's the first thing they did?

A Yes, sir.

Q And they did that to elicit information on exposure risk, correct?

A Yes, sir.

Q Medical history, etc.?

A Yes, sir.

Q And then on Page 27 they did a dermatology screening clinic, did they not?

A Yes, sir.

Q And they say there in that first paragraph, "The primary purpose of this activity was to screen for persons with chloracne who were then referred for a complete medical workup". Correct?

A Yes, sir.

Q Then, thirdly, "They reviewed the initial group of

800 completed questionnaires and selected a group of individuals for inclusion in a pilot medical study." Correct?

A Yes, sir.

Q And they did 130 individuals to whom they gave a detailed medical workup, did they not, sir?

A Yes, sir.

Q Now, they go on and describe what the high risk and low risk people are, do they not?

A Yes, sir.

Q What are the high risk people? What are the criteria for them?

A They selected a high risk group, those individuals who lived or worked in the TCDD-contaminated area or participated more than once per week on an average in high soil contact activities such as gardening, field or court sports, horseback riding, or playing in the soil in TCDD-contaminated areas. And these contaminated areas contain TCDD in levels between 20 and 100 parts per billion for a period of at least two years or greater than 100 ppb for a period of at least six months.

Q So if they have the exposure to dioxin-contaminated soil over 100 parts per billión in the soil for six months or more, they were included?

A Yes, sir.

Q Or if it were only from 20 to 100 parts per billion in the soil, it would be -- have to be for at least two years?

A Yes, sir.

Q And they did have one soil contamination level of 33,000 parts per billion, correct?

A Yes, sir.

Q That's what, 33 parts per million?

A Yes.

Q Now, the low risk was whom, sir?

A Individuals most who were from the original 800 who had completed the questionnaires with the lowest risk of exposure based on the type of exposure site, age, sex, race, and a socio-economic status characteristic of a two to one ratio of high/low risk subjects. This group was comprised of 40 individuals, when they selected them, who had no reported any access to or any regular high soil contact activities in a contaminated area.

Q So the low risk people were people who had not reported any access to any of these contaminated areas or regular high soil contact activities in any of these contaminated areas, is that right?

A Right.

Q And they say that there were --

MR. CARR: Your Honor, counsel is just repeating

what the witness has read from the Exhibit. He's duplicating and it's leading and all it does is take more time.

THE COURT: Objection sustained. Please refrain from that.

BY MR. HEINEMAN:

Q Now, Doctor, if I can direct your attention to Page 32 of this Exhibit. It talks about the presentation of results of this study, does it not?

A Yes, sir.

Q Now, that's the place where that portion starts on that page?

A Yes, sir.

Q If you turn to Page 33, sir --

A Yes, sir.

Q They talk about -- direct your attention to the first full paragraph starting with the word "Regarding".

A Yes, sir.

Q Would you read the first two sentences, please?

A "Regarding the prevalence of specific generalized disorders as reported in the Health Effects Survey questionnaire, there were no differences or consistent trends. Of the five cases of cancer reported (three in the high risk group and two in the low risk group, difference not significant at the 0.05 level), none of the cancers were soft tissue

sarcomas."

Q What is the 0.05 level? Is that one of these statistical things you were talking about before?

A Yes, sir.

Q Okay. Briefly, what does that mean, sir?

A It means that for those five cases of cancer the three in the high risk group and two in the low risk group, that kind of difference could occur by chance and it doesn't say by what level but it said not a significant difference.

Q Now, if we look at the next page, sir. Would you read the first sentence on Page 34?

A "No consistent overall trends or statistically significant individual diagnostic differences were detected for reproductive health outcomes from the questionnaire material."

Q In other words, they were comparing the low risk and the high risk groups?

A Yes, sir.

Q And saying no consistent overall trends were significant individual diagnostic differences?

A That's right.

Q Now, what about the next sentence there?

A "No difference was noted for males in prevalence of reported sexual dysfunction and, although no differences

were reported in the questionnaire regarding an increased prevalence of reproductive health problems, females in the high risk group reported a later age at menarche."

Q That's the onset of menstruation, is that it?

A Right.

Q Now, the next sentence, sir, would you read that, please?

A "When the analysis was restricted to only those women who had reached menarche during the time at which they would have been potentially exposed to environmental dioxin, the significance of this difference diminished."

Q They give a value of P equals 0.17?

A Right.

Q That again is a statistical figure, correct?

A Yes, that means that could occur. That is a lot more significant than that 0.05. In other words, there was a real overlap of those two populations.

Q Would you read the next two sentences, please, sir?

A "Only 30 births were reported in the entire study population since 1972 and no trends were noted in the questionnaire medical history or reproductive outcome sections. No birth defects were reported among children born to women in the high risk group after the time at which exposures could have occurred."

Q All right. Would you read the first -- read the first two sentences of the next paragraph, please, sir?

A "In the dermatologic screening, no cases of chloracne were seen. For the 104 individuals in the study population, no significant differences in dermatological findings were demonstrated by either medical histories (as reported on the questionnaire) or physical examination."

Q So they found no chloracne --

MR. CARR: Objection, your Honor. He's repeating now what the witness just said.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q Now, would you turn to Page 35, sir? Would you read the first sentence of that first paragraph?

A "The data from the neurological examinations were analyzed and showed no significant differences between the two groups or apparent patterns for either the self-reported neurological conditions from the neurological examination or the questionnaire medical histories."

Q Would you read the next sentence, please, sir?

A "Except for diminished vibration sense at 256 Hz for those in the high risk group ($p = 0.13$), none of the differences on neurological examination approached statistical significance."

Q So did they find, sir, one neurological difference between the groups?

A No, sir, none.

Q Didn't they find a diminished vibration sense in the high risk group?

A Yes, but it wasn't statistically significant.

Q Now, would you read the first sentence of the next paragraph, sir?

A "As presented in Table 2, there appeared to be a trend of increased urinary tract problems among the high risk cohort as reported from the medical history section of the questionnaire and the urinalyses although no statistically significant differences were demonstrated."

Q Now, in the next paragraph, sir, the last paragraph on the page, there's a sentence that refers to physical examination. Do you see that, sir?

A Yes, sir.

Q Would you read that sentence?

A "On physical examination, there was a greater prevalence in the high risk group of hepatomegaly, although this finding, as well as all others, was not statistically significant."

Q What's hepatomegaly, sir?

A It just means liver is enlarged.

Q Okay. Now, would you turn to the next page and read the last sentence of the top paragraph on the page?

A "The two groups showed no difference in characteristic urinary porphyrin patterns (see Table 4) and no cases of overt porphyria cutanea tarda (PCT) or any precursor conditions (latent PCT or Type B porphyria) were detected."

Q Now, would you read the first sentence of the next paragraph?

A "As reported in the medical histories, there were no differences in prevalence of immune disorders."

Q Now, they do say something about the physical examination in that respect, do they not, sir?

A Yes, sir.

Q And what do they say about that?

A "On physical examination, the only significant difference noted was a higher prevalence of palpable axillary lymph nodes in the low risk cohort (p less than 0.05) and the suggestion of a greater prevalence of palpable nodes among the low risk group."

Q That was their low risk group?

A Yes.

Q Now, in the course of your examination by Mr. Carr, there was discussion about whether the findings of coronary heart disease in the Nitro plant were related to the levels

of coronary heart disease found in the Kanawha Valley in West Virginia, in general, do you recall that, sir?

A Yes, sir.

Q Now, you recall, do you not, sir, that this was a phenomena that was referred to Dr. Marian Moses?

A Yes, sir.

Q Did she use that statistic as an explanation for the higher coronary heart disease levels found in the Nitro plant?

A Yes, sir.

Q Now, sir, does everything with respect to dose response relationship, does that exist in connection with every toxin that one might be exposed to that we know of?

A Yes, sir.

Q You mentioned, sir, that one could explain the condition of the people in the Kanawha Valley because of the lifestyle, was that right?

A Some of the conditions.

Q All right. I'm talking now about the coronary heart disease, the higher cardiovascular disease, is that right?

A Yes, sir.

Q Now, I believe you told Mr. Carr that you have not personally observed the people that live in Charleston or Nitro to see with your personal knowledge what their lifestyle

is, is that right?

A Yes, sir.

Q What can you tell us from your experience is the connection between lifestyle and heart disease throughout the country?

A From the Framingham Study, this is a study that was started in the 1950s. They studied the population of Framingham, every single person that lived in that community, and they developed parameters that could be evaluated later, including all laboratory tests where they had high blood pressure. The completed examination was put into a computer data base and from that they found that people have elevation of blood pressure. They have more heart disease. People who smoke have more heart disease. People have elevation of cholesterol, have more heart disease. Now, I'm not sure when that came from Framingham, all of those and since that time the treatment of people who have any one of these conditions, the responsibility of their physician is to tell them to change your ways because it could well be that you'll have heart disease. Some time since then it's also been established that inactivity is related to coronary artery disease as well. So, those are the risk factors that are generally discussed. Since that time there's been a question of whether triglycerides may be associated with it and it's

not clear. And then the other lipids that have been managed, the VHDL's, the LDL's and the HDL's are all a part of some, how the risk factors that are associated with coronary artery disease.

Q Now, in the course of your examination you and Mr. Carr discussed the fact that the levels in the plant were approximately the same as the levels in the Kanawha Valley, generally in terms of the amount of coronary heart disease found or cardiovascular disease, is that right?

A Yes, sir.

Q Now, would you expect, sir, because of the dose response relationship that if in fact the coronary heart disease was due to exposure to TCDD that it would be higher in the plant where the people are the closest to that material?

A Yes, sir.

Q All right. Why is that?

A That's that dose response group. If dioxin causes coronary artery disease, then those who have the most exposure are going to have the most effect. Those who have infinitesimally small exposure, a level that can't be measured, whether it's there, if we can't measure it but it's possible, the effect of that as compared to the dose that was inside of the plants should be strikingly different.

Q So that regardless of whether there may be some element of exposure in the Valley generally, infinitesimally small, do you not say?

A Yes, sir.

Q You would expect it to be much higher in the place where people would be getting activity day after day exposure?

A Moreso than that because the dose response curve is not a straight line. It doesn't mean as you go up the dose curve, if you've got it at one level and at a higher level you're going to see more, that isn't the way the dose response curve works. It becomes very sharp some place in the dose response curve, it would be dramatically increased.

Q What do you mean by very sharp?

A It's no longer a straight line and it's curved upward, a small increase in dose will produce more than just that little increase related to a small increase in exposure. It becomes multiplied. We call it geometrically increased rather than linearly related.

Q So that at a level of very low exposure it may be relatively flat?

A Yes.

Q And then at some level it shoots up?

A That's right. So the effect is greater than the proportional increase in exposure.

Q What conclusion -- you told us before something about how exposure diminished with distance from this source of exposure?

A Yes, sir.

Q All right. You discussed that briefly with Mr. Carr, I believe, did you not?

A Yes, sir.

Q What did you mean by that?

A If -- as you go away from the source, the concentration diminished more than --

MR. CARR: Your Honor, this is repetitious. Counsel and the witness discussed this themselves. I object to it. It's repetitious of what he's testified to yesterday.

THE COURT: Objection sustained. It is repetitious.

BY MR. HEINEMAN:

Q Doctor, what conclusion would you reach by virtue of the fact that the cardiovascular disease inside the Nitro plant and in the Kanawha Valley, in general, are approximately the same?

A The dioxin had no effect on the population inside of the plant.

Q Did Marian Moses reach the same conclusion?

A Yes, sir.

Q Sir, let me hand you what's been marked as

Plaintiffs' Exhibit 1494, which is something Mr. Carr discussed with you. Would you agree with me, sir, that 1494B is a blowup of a couple of paragraphs on the second page of that Exhibit?

A Yes, sir.

Q Okay. Now, it's -- this is a blowup of the third and the fifth paragraph, correct?

A Yes, sir.

Q Now, this document, as I recall from your examination by Mr. Carr, is a work description for dismantling the residue equipment in Department 237, is it not, sir?

A Yes, sir.

Q And this was repaired in September 30th, 1983, by a Mr. J. Linn, L-I-N-N ?

A Yes, sir.

Q I think you said he was somebody at the plant?

A Yes, sir.

Q That's at the Krummrich plant. And if you look at Page 2 of the Exhibit which is actually the third page of the Exhibit, you see the work description that is requested, do you not, sir?

A Yes, sir.

Q And it says remove the insulation from the residue equipment in Department 237?

A Yes, sir.

Q The residue equipment consists of the still pot, the residue tank, the residue pump, the re-boiler pump and the associated piping, correct?

A Yes, sir.

Q Now, the residue equipment, sir, and the still column -- isn't that the stuff that the --

MR. CARR: Leading question, your Honor.

THE COURT: Objection sustained. Rephrase it, please.

BY MR. HEINEMAN:

Q Where is that located to your knowledge in connection with the still column itself?

A Well, it's related to -- that's the -- when we take off the product and what we have left is the reside and that's the cleaning up of this residue equipment, the final throw-aways is what this is concerned with.

Q That's the still pot at the bottom?

A Right.

Q In the residue tank?

A Right.

Q And that's what's left after --

A The property is taken out.

Q The property is taken out. Now, the warnings that

are contained here, sir, are contained here are they not? Part of the warnings contained in this paragraph here?

A Yes, sir.

Q "Due to the possibility of exposure to the above chemicals rubber shoes, rubber gloves and disposal coveralls must be worn in addition to the normal plant safety clothing." Correct?

A Yes, sir.

Q Also respirators, rubber gloves, rubber shoes, that sort of thing, correct?

A Yes, sir.

Q Now, didn't you tell us what it was that Monsanto requires the people in the plant to wear when they were cleaning up a spill?

A Yes, sir, we told them to use equipment much as described in that second paragraph.

Q That would be a spill of chlorinated phenol?

A Yes, sir.

Q And the purpose of that is what, sir?

A Primarily to keep it off of their skin. These materials are very irritating and will produce a burn if you get it on your skin. And obviously we don't want them to get it in their eyes, nor do we want them to have some way of getting the stuff into their lungs.

Q Now, the people that were going to do this job were not going to be exposed just to that --

MR. CARR: Your Honor, I object to the leading form of the question.

THE COURT: Objection sustained.

BY MR. HEINEMAN:

Q Would they be exposed, sir, to the material being produced and coming out of the still in the process?

A No, sir.

Q What is it that these people might be exposed to?

A These here?

Q Yes, in this document.

A Yes, those people are going to be working in a place where the dioxin would be concentrated as opposed to the general work inside the plant. Their chance of being exposed to dioxin is much more than can be found in any other circumstance.

Q Because they're going to do what?

A Because they're going to dismantle these residue areas. The residue equipment consisting of the pot, the tank and the boiler pump.

THE COURT: Is this a good point to break for lunch?

MR. HEINEMAN: Yes, sir, be fine.

THE COURT: Ladies and gentlemen, we'll take a

break at this time for lunch. Resume again at one o'clock. I would remind you of the admonishments I made to you, that will apply during this break also.

COURT RECESSED:

STATE OF ILLINOIS)
) SS
COUNTY OF ST. CLAIR)

I, PAMELA L. SIMPSON, C.S.R., Official Court Reporter in and for the Twentieth Judicial Circuit, and the Official Court Reporter who transcribed the above-styled cause had on July 23, 1985, do hereby certify that the foregoing transcript of proceedings is a true, correct and complete transcript of the proceedings had on said date.

DATED this 30th day of July, 1985.

Pamela L. Simpson

PAMELA L. SIMPSON, C.S.R.
Official Court Reporter

STATE OF ILLINOIS)
) SS.
COUNTY OF ST. CLAIR)

I, RICHARD P. GOLDENHERSH, Circuit Judge in and for the Twentieth Judicial Circuit, hereby certify that the above is a true and correct transcript of the proceedings had in the case FRANCES E. KEMNER, et al. vs. MONSANTO COMPANY, Cause No. 80-L-970, heard on July 23, 1985.

DATED this 30th day of July, 1985.

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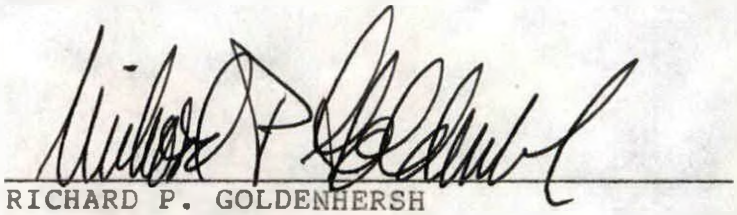

RICHARD P. GOLDENHERSH
Circuit Judge