RAYMOND HARBISON, called as a witness by and on behalf of the defendant Velsicol Chemical Corporation, having been first duly sworn, was examined and testified as follows:

THE COURT: Would you have a seat over here in the witness stand.

All right, sir.

DIRECT EXAMINATION

BY MR. BEYER:

Q. Doctor, please state your name.

A. My name is Raymond Harbison.

Q. And what is your current employment, sir?

A. I'm employed at the University of Arkansas for Medical Sciences.

Q. And what is your position there?

A. I am director of the Division of Toxicology in the Interdisciplinary Toxicology Program, which is a cooperative program between the University of Arkansas for Medical Sciences and the National Center for Toxicological Research.

Q. Could you tell us something about your educational background, sir?

A. I received a Bachelor of Science degree from Drake University in pharmacy in 1965. I received a Master of Science degree in pharmacology in 1967 from the University of

Iowa, and I received a doctorate in pharmacology and toxicology from the University of Iowa School of Medicine in 1969.

Q. Could you tell us something, Doctor, about your employment prior to your present employment at the University of Arkansas Medical School?

A. Yes. I was employed by Tulane Medical School for approximately three years, where I was an assistant professor of pharmacology and investigator in the laboratory of environmental medicine. I subsequently went to Vanderbilt Medical Center for approximately ten years, where I was in the Department of Pharmacology and the Center for Clinical Pharmacology and Toxicology.

Q. And could you tell us something about the duties that you now perform at the University of Arkansas?

A. Yes. I teach medical students in the area of toxicology. I also teach emergency medicine residents in the area of toxicology. I conduct research on the effects of environmental toxicants and chemicals on the living organism, and I direct a graduate education program for students who are receiving a degree in toxicology.

Q. Do you do any consulting work at any hospitals?

A. Yes, I do.

Q. Could you tell us about that, please?

A. I'm a consultant to the emergency room at the University

Hospital and to various hospitals within the Arkansas immediate area.

Q. And have you done any work in the area of birth defects?

A. Yes, I have.

Q. Could you tell us about that?

A. I have conducted evaluations of chemicals for their ability to produce birth defects and I also run a prenatal diagnostic testing laboratory for the evaluation of neurotube defects during the first trimester of pregnancy.

Q. Have you done any work with or for any federal agencies or federal government bureaus?

A. Yes, I have.

Q. Could you tell us about that, please?

A. I have served as an expert witness for the United States Department of Justice in enforcement litigations concerning the effects of chemicals on human health. I have served as the past chairman of the National Institute of Occupational Safety and Health Study Review Group, which is the group that reviews the research being done on chemical and chemical exposures in the workplace.

I have also served as a consultant to the Environmental Protection Agency for approximately the last eight years in the evaluation of human health effects associated with the spills or the presence of chemicals in the environment.

Q. And have you done work with the National Institutes of

Environmental Health and Safety?

A. Yes, I have.

Q. Could you tell us about that, please?

A. For approximately the last twelve years I have received funds from the National Institute of Environmental Health Sciences to evaluate the effects of environmental toxicants on the living system.

Q. And have you done any research on pesticides?

A. Yes, I have.

Q. Would you tell us about that, please?

A. I have evaluated the effects of chlordane and other chlorinated hydrocarbon insecticides and pesticides as well as the organophosphate insecticides and pesticides.

Q. Has that been funded by any public agency?

A. Yes, it has.

Q. Would you tell us what it was, please?

A. It's been funded by -- primarily by the National Institute of Environmental Health Sciences as well as the National Foundation, March of Dimes.

Q. And about what was the grant level that you've received over the past several years for that?

A. I would estimate that over the last ten years it's probably been around $3,000,000.00.

Q. And have you done any work for the State of Florida?

A. Yes, I have.

Q What did you do for them?
A For the State of Florida, I evaluated the effects -- the human health effects of a variety of chemicals that might be found in the environment, specifically to develop water quality criteria, that is, the criteria that would be used to set the allowable levels of chemicals in the water supply, and I have evaluated the health effects and set the criteria for chlordane in other chlorinated substances.
Q Have you had any publications in scientific or scholarly journals as a result of your research?
A Yes, I have.
Q About how many?
A I would estimate that I probably have over a hundred publications.
Q And have you published material on the toxicology of chlordane?
A Yes, I have.
Q Are you board certified?
A Yes, I am.
Q What field are you board certified in?
A I am board certified in the area of toxicology, with a specialty in the area of the evaluation of the health effects associated with the exposure to chemicals.
Q And what requirements are there to be board certified in that field?

A. There are educational requirements, there are experience requirements, and there is a general evaluation requirement.

Q. And do you belong to any professional associations?

A. Yes, I do.

Q. Could you tell us about those, please?

A. I belong to the Society of Toxicology, the American Association for Pharmacology and Experimental Therapeutics, the Teratology Society and the American Association for the Advancement of Science.

Q. And what is teratology, sir?

A. Teratology is the study of birth defects.

Q. Have you ever been qualified to testify as an expert in the federal court?

A. Yes, I have.

Q. About how many times?

A. I would estimate approximately a half a dozen times.

MR. BEYER: Your Honor, at this point we'd like to proffer Dr. Harbison as an expert in the field of toxicology.

MR. WOOLF: Well, Your Honor, I would agree that he's a toxicologist. I don't know if he's got any relevance to this case as yet. We haven't shown anything having to do with this case. I understand he does water quality research, but he hasn't been tied into this case or into chlordane.

THE COURT: Overruled.

Well, I'm going to permit him to testify in the

field of toxicology. If you have any specific objection to his testimony coming in, of course, you let me know.

BY MR. BEYER:

Q Doctor, would you please explain to us what toxicology is?

A Toxicology is basically the study of the harmful effects of chemicals and other substances on the living system.

Q In the study of toxicology, is there a concept of threshold?

A Yes, there is.

Q Could you tell us about that, please?

A Yes. One of the most important concepts in the area of toxicology is to be able to determine the level or the concentration that is required to produce an effect. That level or concentration is called the threshold, and the threshold is essentially the level that is required in the living system to produce an effect.

An analogy might be the taking of certain medications, for example. You know that you have to take two pills or four pills, basically, to have an effect.

The toxicologist evaluates the levels of chemicals that are required to produce certain effects in the living system.

Q And does the notion of threshold apply to all chemicals?

A Not to all.

Q Does it apply to chlordane and heptachlor?

A Yes, it does.

MR. WOOLF: Objection, Your Honor. We haven't -- still haven't had any qualifications of the witness to give an opinion on chlordane and heptachlor.

THE COURT: He said he's made studies, as I --

Well, did you say that you made studies of chlordane?

THE WITNESS: Yes, sir, I have.

MR. WOOLF: Could we find out what, Your Honor? I --

THE COURT: Huh?

MR. WOOLF: We still have a problem with this witness' qualifications to give an opinion on chlordane and heptachlor. He's certainly qualified as a general toxicologist, and I understand that he's certified as a general toxicologist, but we have not related this man to chlordane thresholds in humans or any other organisms.

THE COURT: Well, he hasn't had time to talk about it yet.

MR. WOOLF: Well, but he's elicited -- he's trying to elicit the opinion first without getting the qualifications.

That's my objection, Your Honor.

He may very well be qualified, but I think he's got a cart-and-horse problem. That's my objection.

THE COURT: Well, he says he's a toxicologist and I've said that he can certainly testify in that field, and he

says that he's done studies in chlordane and you can cross-examine him about it, but I'm certainly going to let him testify about toxicology and chlordane.

MR. WOOLF: So I don't have to keep interrupting Mr. Beyer, Your Honor, I just don't know about a general objection --

THE COURT: Well, no. Any time he asks a question that you object -- have any reservations about it, you object to it.

The jury understands it's your duty to object when you think you should.

I just don't want some general objection that you might state now and then, for other purposes later on, contend that it covered a half an hour of testimony.

MR. WOOLF: I appreciate that, Your Honor.

THE COURT: If you object to a question, you just object to it.

MR. WOOLF: All right. I'll just have to keep --

THE COURT: We'll forgive you.

MR. WOOLF: Thank you, Your Honor.

THE COURT: The jury will certainly understand that's your duty to your client.

MR. WOOLF: Thank you, Your Honor.

BY MR. BEYER:

Q Does the idea of a threshold for an effect of chlordane

or heptachlor apply to human beings?

A. Yes, it does.

Q. If, in a human being, chlordane or heptachlor passed this threshold, what is the mode of action of those chemicals on the human body?

MR. WOOLF: Objection.

THE COURT: All right. Overruled.

A. Chlordane has a very specific effect in the body.

Chlordane is very specific for the nervous system, and what chlordane does is to alter the ability of the nervous system to transmit various messages and the results of that alteration essentially is a stimulation of the nervous system which can result in a variety of symptoms.

So that the basic effect of chlordane is on the nervous system to essentially alter the normal transmission or the normal function of the nervous system.

Q. (By Mr. Beyer:) When you say chlordane, do you mean to include heptachlor as well?

A. Yes, I do.

Q. And in order to have this effect, do I understand you to be saying that chlordane or heptachlor have to pass a certain amount in the human body?

A. Chlordane and heptachlor have to reach a certain level within the human body before they will have such an effect.

Q. If chlordane or heptachlor reach a high enough level to

pass that threshold and have this effect, what are the external signs or symptoms that you would expect to see in somebody?

A. If the chlordane or heptachlor reaches a level that is able to affect the nervous system, the results are essentially a stimulation of the nervous system, and the first effects would be an increased excitation, essentially increased movement, agitation, perhaps a general increase in activity; that, if the level got higher, would pass to a tremor or a constant motion of the body and ultimately it might result in a convulsion, which would be the most extreme.

Q. And would you please describe what a convulsion is?

A. A convulsion is an extreme contraction of all the muscles of the body, resulting in a rigidity of the body and a shaking of the body, which can in fact injure the body if the convulsion goes on for some period of time.

It is essentially an uncontrolled contraction of all the muscles of the body.

Q. Is that sometimes called a seizure?

A. Yes, it is.

Q. Is that something that's really dramatic to witness?

A. Yes.

Q. If a person has a convulsion, is that person liable to become injured from falling down or other side effects of the convulsion?

MR. WOOLF: Objection.

Are we talking about chlordane seizure or other seizures?

Can we tie this into something so as to make it relevant to the case? Otherwise, I have to object.

THE COURT: Well, he's talking about convulsions in general, as I understand the question.

MR. BEYER: Yes, Your Honor.

BY MR. BEYER:

Q. Are the convulsions that come from too high a level of chlordane or heptachlor in the body different from convulsions generally?

A. No, they are not.

Q. All right. So is it possible that somebody who has a convulsion will be injured?

A. That is correct.

Q. What kinds of injuries might you expect from somebody who convulses?

A. Well, the initial onset of a convulsion generally results in the loss of consciousness. So as the muscles begin to contract, the individual will lose consciousness and fall down so that injuries can occur as a result of falling and subsequently, because of the muscle contraction, the severity of the muscle contractions, actually bones can be broken and vertebrae can be fractured and other bones of the

body can actually be injured as a result of the uncontrolled contraction of the muscles either as a result of banging into something or falling or just from the contraction of the muscles themselves.

Q Is the agitation, tremors and convulsion a progression that constitutes a single syndrome?

A Yes, it is.

Q Would you explain to the jury what a syndrome is?

A A syndrome is a collection of symptoms or a group of symptoms that occurs as a result of some initiation of some process within the body. So that the syndrome here would be initial agitation, which could pass on to tremors or shaking of the body and then ultimately into a convulsion, which would be the loss of consciousness and severe muscle contractions.

Q Is that progression in any way diagnostic of chlordane poisoning?

A Yes, it is.

Q Now, in order to get this characteristic result of chlordane poisoning, what kinds of levels are in fact necessary in the body?

MR. WOOLF: Objection.

THE COURT: Overruled.

A The levels that would be necessary in the blood would be levels of from approximately two parts per million to somewhere

around three to three and a half parts per million.

Q (By Mr. Beyer:) Well, I want to make sure that we understand this.

You're talking about parts per million with an "m"; is that right?

A Yes, sir, that's correct.

Q So if people had two or three parts per billion, with a "b," in their blood of various metabolites of chlordane, that would be a thousand times less?

A Yes, sir.

Q Okay. If somebody is in fact poisoned by chlordane and is exhibiting this syndrome, how is that person treated?

MR. WOOLF: I'm going to have to keep objecting, Your Honor.

THE COURT: Overruled.

A The general treatment for those symptoms are essentially symptomatic; that is, the convulsions, if they occur, are simply treated by drugs which are known to control convulsions.

So, essentially, it's fairly easy to treat those -- those symptoms which occur.

Q (By Mr. Beyer:) Is there a specific antidote to chlordane?

A No, there is no antidote to chlordane.

Q Is that good or bad?

THE COURT: We're going far afield now. Let's see if we can't --

Q (By Mr. Beyer:) Of the persons who have been poisoned and who show this characteristic syndrome that you've experienced, if they recover, do they show any long-term effects?

MR. WOOLF: Objection.

THE COURT: Overruled.

A No, they do not show long-term effects.

The effects of chlordane are temporary. While the chlordane is in the blood at the threshold level or above, it can cause these effects or these symptoms, but when the chlordane disappears, essentially those effects are no longer produced.

So it is a temporary effect which is produced only while the chlordane is present at those levels to produce that effect.

Q (By Mr. Beyer:) Now, we've been talking about blood levels. I'd like to ask you if there is any correlation of any of these effects with levels of chlordane or heptachlor or their components or metabolites in the body fat?

MR. WOOLF: Objection.

THE COURT: Overruled.

A No, there is essentially no correlation with the levels of chlordane or its metabolites in the body fat, and the reason that there isn't a correlation is because essentially those materials that are in the body fat are stored and they are not available to the brain to have some action. So those

substances which are in the fat essentially are unavailable for an effect within the human body.

Q (By Mr. Beyer:) Can the symptoms of nausea or vomiting be related to chlordane or heptachlor exposure?

A If the material has been drunk or if it's ingested through the mouth, yes, it could result in those effects.

Q Can nausea or vomiting be associated with overexposure to chlordane or heptachlor if the products have been inhaled?

A No.

Q Could you tell us how chlordane and heptachlor are eliminated from the body?

A Well, chlordane and heptachlor, like many other substances, are eliminated from the body essentially by a process in which the body converts these substances to other substances, and those substances are known as metabolites.

So the body is able to take chlordane and heptachlor and rather efficiently convert those to other substances which are subsequently eliminated or excreted from the body. So that what you take in within some period of time is eliminated as a result of this transformation which occurs within the body.

Q Is that what you were talking about as the reason for the transients, the temporariness, of the effects of chlordane?

A Yes, sir, that's correct.

Q Could we have an understanding that whenever I use the

word "chlordane" or you use the word "chlordane," we're talking about both chlordane and heptachlor?

A. Yes, that's agreeable.

Q. Okay. Now, what happens if somebody is exposed to chlordane -- chlordane vapor in the air over a long period of time?

Does that have any effects on anybody?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Chlordane vapors in the air -- since chlordane is not very volatile, there won't be a very high level of chlordane vapors in the air, but even if there were chlordane vapors in the air, essentially the low levels or the low-level exposure for a long period of time would not result in any harm because essentially the chlordane that is taken in is efficiently transformed by the body into these other substances which are known as metabolites and rather efficiently excreted.

So what is taken in is essentially eliminated from the body.

Q. (By Mr. Beyer) So if somebody lived in a house where there were trace levels of these compounds in the air, would you expect it to have any effect on them at all?

A. No, I would not.

Q. Could you explain why you wouldn't expect such an effect?

A. Well, because --

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Well, because the substances, when they're taken -- in this -- this case, chlordane, when it's taken into the body, is essentially transformed and eliminated from the body so that it can never reach a level -- the threshold which is required for the production of the effects of chlordane.

So essentially what's taken in is transformed and eliminated and, at these low levels, can never achieve a threshold or concentration which would produce some effect or result in the symptoms that I talked about earlier.

Q. (By Mr. Beyer:) What kind of exposure would you need, say, by drinking, or whatever, in order to produce this known syndrome of chlordane poisoning?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. It would require a large dose of chlordane to produce those effects. You would essentially have to drink chlordane to be able to get a level -- a threshold level which would produce the results that we talked about before.

Q. (By Mr. Beyer:) Thank you, sir.

MR. WOOLF: Your Honor, I hate to interrupt Mr. Beyer again, but he seems to have lapsed into his habit of thanking the witness, and I just would ask that the Court --

THE COURT: Yes.

Members of the jury, I've called to your attention before that indicated approval of a witness' answer by saying "thank you" is highly improper, and I would ask counsel --

MR. BEYER: I'll stop, Your Honor.

THE COURT: -- to stop.

It's up to you to determine whether you think that the answer is accurate or has any probative weight for you. It's not up to counsel.

BY MR. BEYER:

Q Doctor, if someone is exposed to chlordane or heptachlor in an amount sufficient to cause the known effects of that exposure, how soon after that exposure do the symptoms appear?

A The symptoms would appear immediately, within a short period of time, or certainly within thirty minutes to an hour.

Q Would the symptoms appear a year or a year and a half or two years after the exposure?

MR. WOOLF: Objection.

A No, they would not.

THE COURT: Overruled.

Q (By Mr. Beyer:) Doctor, based on your own research, your knowledge and your experience in the field, both in general toxicology and in the toxicology of chlordane and heptachlor, do you have an opinion to a reasonable degree of scientific certainty as to whether exposure to chlordane can

cause cognitive deficits?

MR. WOOLF: Objection, Your Honor. He's already --

THE COURT: Overruled.

MR. WOOLF: -- established the witness is not a medical doctor.

If he asks him about medical functions as opposed to toxicology, he's certainly moving out of the area.

THE COURT: Overruled.

THE WITNESS: I'm sorry.

Yes, I have an opinion.

BY MR. BEYER:

Q. And with regard to cognitive deficits, what is that opinion, sir?

A. My opinion is that chlordane cannot result in cognitive deficits.

Q. And on the same basis and to the same degree of scientific certainty, can exposure to chlordane cause someone to have difficulty in new-problem solving?

MR. WOOLF: Same objection.

THE COURT: Overruled.

A. No, chlordane cannot do that.

Q. (By Mr. Beyer:) And on the same basis and to the same degree of scientific certainty, do you have an opinion as to whether exposure to chlordane can cause memory loss?

MR. WOOLF: Same objection.

THE COURT: Overruled.

A. Yes, I have an opinion, and chlordane does not produce a memory loss.

Q. (By Mr. Beyer:) Okay. Could you explain to us all why you hold that opinion?

A. The reason I hold that opinion is because we know a lot about chlordane. Chlordane has been around for a long time and it's been studied extensively, and essentially we know the mechanism by which chlordane affects the body; and the mechanism, as I have previously explained, is a temporary effect on the nervous system, resulting in stimulation of the nervous system, resulting in a progression from agitation to tremors and to ultimately convulsions if the level is above the threshold or at the threshold, and it does not produce changes in memory or other changes within the brain.

Q. Does any symptom of chlordane exposure occur outside the context of an oncoming convulsion?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. No, it does not.

Q. (By Mr. Beyer:) Based on your knowledge, your research and your experience, do you have an opinion to a reasonable degree of scientific certainty as to whether chlordane -- exposure to chlordane or heptachlor can cause fevers?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Yes, I have an opinion. Chlordane does not cause fevers.

Q. (By Mr. Beyer:) And could you tell us why you hold that opinion, sir?

A. Because, again, the effects are very specific of chlordane in the brain, and it does not result in a change of the temperature of the body. It results in a stimulation of the brain, which results in agitation or can result in agitation, tremors and ultimately convulsions. It does not affect the temperature of the body.

Q. Do you have an opinion, on the same basis and to the same degree of certainty, as to whether exposure to chlordane or heptachlor has any known effect on the bladder or the urinary tract?

MR. WOOLF: Objection.

THE COURT: Overruled.

Why don't we do this: Why don't we just read off all this table that you want to and just let him make one answer as to all, if the same answer affects all, or distinguish, if there's some left out?

MR. BEYER: All right.

THE COURT: Then we won't have to repeat the --

MR. BEYER: Could I -- I do it --

THE COURT: -- the litany that goes with the answer or with the question.

MR. BEYER: Could I take each plaintiff individually, Your Honor?

THE COURT: All right.

BY MR. BEYER:

Q. Doctor, have you been consulted by medical doctors in cases of alleged poisonings by chlordane or heptachlor?

A. Yes, I have.

THE COURT: Has he what? I'm sorry.

MR. BEYER: I'm sorry. Been consulted by medical doctors.

BY MR. BEYER:

Q. Do you provide that consultation as part of your regular work?

A. Yes. As part of my normal practice and duty within the medical center, I provide consultation to the emergency room at our university hospital, as well as other emergency rooms, the information being provided or the technical advice being that certain levels produce certain things, and I provide knowledge and information about the levels -- the threshold levels which are required to produce those effects and what the effects are likely to be.

Q. Suppose a doctor told you that he had a patient who was complaining to him of nausea, diarrhea, a feeling that she can't catch her breath, dizziness, headaches, weakness, tingling, memory problems, lowered attention span, nervousness,

ringing in the ears, a rash which was treated and cured, an inability to sleep, burning in her chest, wart-like things growing on her skin, and an inability to urinate, and suppose you were also told that this person had blood levels of heptachlorepoxide of 3.2 parts per billion and of trans-nonachlor of .5 parts per billion.

Based on your research, your training and your experience, do you have an opinion to a reasonable degree of scientific certainty as to whether these symptoms are the result of poisoning by or exposure to chlordane or heptachlor?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Yes, I do.

Q. (By Mr. Beyer:) And what is that opinion, sir?

A. My opinion is that chlordane cannot cause those effects.

Q. And what is it about the blood levels that contributes to that opinion?

A. The blood levels are low.

In the normal population, the levels would range from one to 24 parts per billion.

So these blood levels would actually be exceedingly low for the normal population.

Q. And what is it about the symptoms that leads you to conclude that this is not a case of overexposure to chlordane?

A. The symptoms are not compatible with the known effects of

chlordane. Chlordane does not produce those symptoms.

Q And suppose a doctor told you he had a patient who complained of diarrhea after eating, soreness of the back, legs and hips, being short-tempered, having headaches and fever and exhaustion, and a rash in the armpit, and memory loss and had blood levels of 3 parts per billion of heptachlorepoxide and one part per billion of trans-nonachlor.

On the same basis and to the same degree of scientific certainty, do you have an opinion as to whether that would have been caused by exposure to or poisoning by chlordane or heptachlor?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Yes, I do.

Q (By Mr. Beyer:) And what is that opinion, sir?

A. My opinion is that chlordane could not cause those effects.

Q All right. And what is it about the blood levels that leads you to that conclusion?

A. Again, those blood levels are very low.

The normal population will range between one and 24 parts per billion.

So the one part per billion, for example, is at the lower end of the normal for the basic U. S. population.

Q And what is it about the symptoms that leads you to that

conclusion, sir?

A. The symptoms are not compatible with the known effects of chlordane. Chlordane does not produce those symptoms.

Q. Suppose a doctor said to you, sir, that he had a patient who was complaining of headaches and difficulty concentrating on his schoolwork, one episode of talking jibberish on the telephone, and a transient loss of vision on one side of his right eye.

Do you have an opinion to a reasonable degree of medical certainty as to whether that would have been caused by chlordane or heptachlor?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Yes, I do.

Q. (By Mr. Beyer:) And what's that opinion, sir?

A. My opinion is that it would not be caused by chlordane. Chlordane does not produce those effects.

Q. And if you were consulted by a doctor who said he had a patient who complained of headaches and a vision problem which was fixed by getting glasses, and having a persistent cough and the feeling of burning in the nose and who had 2.6 parts per billion of heptachlorepoxide in her blood and no detectable trans-nonachlor, would you have an opinion as to whether those symptoms were caused by exposure to chlordane or heptachlor?

A. Yes, I would.

Q. And what would that be, sir?

A. My opinion would be that chlordane could not cause those symptoms.

Q. And if you were consulted by a doctor who said that he had a patient who complained of headaches and occasional nocturnal leg cramps and a rash, and who had 2.9 parts per billion of heptachlorepoxide in his blood and one part per billion of trans-nonachlor in his blood, based on the same knowledge, research and experience, and to the same degree of scientific certainty, would you have an opinion as to whether those symptoms were caused by exposure to chlordane or heptachlor?

MR. WOOLF: Objection.

THE COURT: Overruled.

A. Yes, I would.

Q. (By Mr. Beyer:) And what would that opinion be?

A. My opinion would be that chlordane could not cause those effects of those symptoms.

Q. And what is it, sir, about the levels in the blood that leads you to that conclusion?

A. Again, those levels are low, the normal being from one to 24 parts per billion.

MR. BEYER: All right. Thank you, sir.

No further questions.

THE COURT: All right, cross-examine.

You folks need a recess? Can we hold out for a while?

Okay.

CROSS-EXAMINATION

BY MR. WOOLF:

Q. Dr. Harbison, you don't get -- it's not possible to get a rash from skin contact with chlordane?

A. No, sir.

Q. It doesn't produce irritation of the skin or the eyes?

A. It produces irritation of the eyes if you spill the liquid into the eyes, and with prolonged contact of the liquid, it can produce irritation of the skin.

Q. What's the difference between irritation of the skin and a skin rash?

A. Irritation is a reddening of the skin; a rash is the development of bumps and the actual change in the morphology or the character of the skin.

Q. Doctor, I was looking over your curriculum vitae and I see a lot of publications about psychedelic drugs.

That's an area you published a lot in, right?

A. I have published some papers in that area; yes, sir.

Q. How many?

Most of your publications have been on psychedelic drugs; isn't that true?

A. I don't believe that's true.
Q. Well, it's fair to say a lot of them have been; isn't that correct?
A. Some of them have been.
Q. And some of them have been on addiction; isn't that true?
A. That is correct.
Q. That's another major category of your publications?
A. I believe I only really have one publication on addiction.
Q. What's the difference between a publication and an abstract?
A. An abstract is a presentation that is given before a group of scientists at a professional meeting.
Q. That's not a publication that's been accepted by a peer review journal, then?
A. Yes. All of those are essentially published in the professional journal of the society at which they have been presented. For example, the presentations at the Society of Toxicology are published in the Journal of Toxicology and Applied Pharmacology.
Q. And that one preceding thirteen years ago, is that the only publication you've had that is on chlordane?
A. No, sir.
Q. How many others have you had on chlordane?
A. I would estimate that there are a few others. I can't

recall the exact number.

Q. When were they?

A. The exact year?

Q. Approximately.

A. Oh, I believe it probably would've been 1972, '73, '75.

Q. Are they publications or are they abstracts?

A. No, sir. That would be a publication.

Q. Are they listed on your curriculum vitae?

A. I believe so.

Q. Do you have a copy with you?

A. No, sir.

Q. You've got one on "Comparative Toxicology."

I assume that talks, at least in part, on chlordane.

Is that what you're referring to?

A. Yes, sir.

Q. Any others?

A. I believe that there are others. I can't recall them.

Q. You're not a medical doctor; is that correct?

A. No, sir.

Q. No, it's not correct; or, yes, it's correct, you're not a medical doctor?

A. I am a board certified toxicologist. I am not a physician.

Q. You're not licensed to diagnose and treat patients, are you?

A. No, I'm not.

Q. When you did the research that you alluded to about chlordane and heptachlor, that was on rodents?

A. Yes, sir.

Q. And from that, you can generalize to the human health effects of chlordane?

A. The study is what it was. It was a study of rodents. It's part of the scientific literature. It's not the -- it's not the pivotal publication upon which I base my opinion.

Q. The question is whether you can generalize or extrapolate from the effects of chlordane and heptachlor on rodents to the effects of chlordane and heptachlor on humans.

MR. BEYER: Objection, Your Honor. There's no testimony that that's what he's doing. As a matter of fact, he denied it.

MR. WOOLF: I'm asking him --

THE COURT: Well, he's answered the question. He said that's a part of the study on which he bases his conclusion.

MR. WOOLF: I understand that, Your Honor. What I'm trying to point out is that it's not responsive to the question. He says part of it. I'm just asking him if he can extrapolate.

That is a simple yes or no question.

THE COURT: Well, you can say yes or no and answer

it more fully.

I don't know exactly what he means by extrapolate from one thing to another, but perhaps you do.

THE WITNESS: I don't believe I can answer it yes or no. I think it depends on the substance that we're talking about. Generally, it is very difficult to extrapolate from animals to man.

BY MR. WOOLF:

Q Well, I did limit my question to chlordane and heptachlor, Doctor.

A For chlordane and heptachlor?

Q Yes.

A Basically the reason that animals are used is to determine the mechanism by which the substances produce effects in the biological system. The ultimate evaluation of the effects of these substances on humans is basically and best derived from human experience.

Q Let's try it again.

Can you extrapolate from the effects of chlordane and heptachlor on rodents to the effects on humans?

MR. BEYER: Your Honor, that's been --

THE COURT: All right. Let's move -- let's move on. You've asked that question.

MR. WOOLF: I respectfully suggest, Your Honor, that --

THE COURT: All right.

BY MR. WOOLF:

Q. Heptachlorepoxide is a metabolite of heptachlor; isn't that right?

A. It can be.

Q. It's one of the metabolites of heptachlor; isn't that correct?

A. Yes, sir, it can be.

Q. And it's more toxic than heptachlor itself, isn't it?

A. No, it's not.

Q. You know that chlordane and heptachlor bioaccumulate in the fatty tissue?

A. Heptachlor and chlordane do not bioaccumulate in the fatty tissue.

Q. They're not lipophilic?

A. Yes, they are.

Q. That doesn't mean that they accumulate in the fatty tissue?

A. It means that at some time they're present in the fatty tissue, but essentially they are transformed by the body and eliminated from the fatty tissue.

Q. Well, are their metabolites -- do their metabolites bioaccumulate?

A. No, they do not.

Q. And if we brought another toxicologist in here to say that they bioaccumulated, he would be wrong, in your opinion;

is that correct?

A. Yes, sir.

THE COURT: Well, you know, the doctor said what his belief is and the jury would have to make a determination whether he was right or wrong, if another one was brought in.

BY MR. WOOLF:

Q. Let me read you a list of symptoms of chlordane intoxication and ask if you agree with whether or not those are symptoms of chlordane intoxication.

Let me just try and short-circuit this by saying you've already said hyperexcitability is one; isn't that correct?

A. That is correct.

Q. And tremors are another, right?

A. Yes, sir.

Q. And convulsions?

A. That is correct.

Q. How about eventual paralysis?

A. Is this from inhalation or from the drinking of chlordane?

Q. Does it matter?

A. Yes, it does.

Q. All right. How about the drinking of chlordane?

A. Paralysis can result from the convulsive episode if one convulses to such an extent that it results in an oxygen deficiency for some prolonged period of time.

Q All right. So you get paralysis -- so ultimately you can get paralysis from ingestion -- oral ingestion of chlordane; is that correct?

A No. The paralysis would actually occur as a result of the convulsions.

Q All right. You can have chronic intoxication of chlordane, can't you?

A I don't know --

THE COURT: What kind of intoxication?

MR. WOOLF: Chronic, Your Honor.

THE COURT: Chronic intoxication?

THE WITNESS: I'm sorry, I don't know what chronic intoxication means.

BY MR. WOOLF:

Q Well, let me ask you if the following symptoms are symptoms of intoxication from chlordane: Loss of appetite?

A From the drinking or from the inhalation?

Q A symptom of intoxication by whatever route.

A No, sir.

Q Loss of weight?

A No.

Q Headaches?

A No.

Q Nausea, I think you already said, is a symptom; isn't that correct?

A. No, I did not.

Q. Is it a symptom?

A. No, it's not.

Q. And vomiting?

A. No.

Q. But you did say that chlordane is an irritant to the skin and eyes; isn't that correct?

A. It can be.

Q. And what about the throat and lungs?

A. It can be.

Q. Are you aware that all the symptoms that I read to you appear on a Velsicol document as being symptoms of intoxication of chlordane?

MR. BEYER: Objection, Your Honor. The document is not identified. He's asking the witness if he's aware of some document that he hasn't shown the witness. Whether it's in evidence or not, we don't know.

I object, Your Honor.

MR. WOOLF: I'd be pleased --

THE COURT: Well, we have some of them in evidence, as I understand it.

MR. BEYER: Your Honor, that document is not in evidence.

THE COURT: The label?

MR. BEYER: That's not the label, Your Honor.

THE COURT: Oh, I thought --

MR. BEYER: That's a document that is no in evidence.

THE COURT: Well, he asked him about -- about the label.

If the label's in evidence, show him the label.

MR. WOOLF: But, Your Honor, he's correct, it's not the label; it's the document Mr. --

THE COURT: Well, you asked him about "label."

MR. WOOLF: Excuse me, Your Honor.

BY MR. WOOLF:

Q You consult for chemical companies, don't you?

A I consult for chemical companies as well as others -- other agencies.

Q All right. You consult for Occidental Oil, right?

A That is correct.

Q Shell Development Corporation?

A That is correct.

Q Petrolite Corporation?

A That is correct?

Q Monsanto Corporation?

A Yes, sir.

Q Sanitary Corporation of America?

A Yes, sir.

Q Ethyl Corporation?

A. Yes, sir.
Q. Texaco?
A. Yes.
Q. Hooker Chemical?
A. Yes.
Q. In fact, you're consulting about Hooker Chemical was the health effects of Love Canal; isn't that correct?
A. That is correct.
Q. Chemical Manufacturers Association?
A. That is correct.
Q. American Petroleum Insitute?
A. That is correct.
Q. IBM?
A. That is correct.
Q. Exxon?
A. That is correct.
Q. Dow Chemical?
A. Yes.
Q. And, of course, you consult for Velsicol, right?
A. That is correct.
Q. Your publication on the "Comparative Effects of Pesticides" that included chlordane, was that on humans or animals?
A. That was rodents.
MR. WOOLF: Your Honor, I'm going to move to strike

the witness' testimony on the grounds that he has been unwilling to state that he can generalize from animal effects of chlordane and heptachlor on animals and that his research has been on animals and he has not identified any research on humans.

THE COURT: Motion denied.

All right. Any further examination of this --

MR. GORRY: What was the --

Motion denied?

THE COURT: Yes, sir. Any further --

MR. BREEDEN: No, sir.

THE COURT: May this witness be excused and free to leave the courthouse?

MR. BEYER: Yes, Your Honor.

THE COURT: All right. Doctor, we've separated the witnesses so one witness won't be influenced by what another one may have seen, heard or said in the courtroom. So don't discuss the case with any potential witness until the case is over.

THE WITNESS: Yes, sir.

THE COURT: Thank you very much, sir. You're free to leave the courthouse.

THE WITNESS: Thank you.

(Witness excused.)

THE COURT: All right. Members of the jury, let's take a five-minute recess.

(Thereupon, the jury retired to the jury room at 3:35 p.m.)

PROCEEDINGS OUT OF THE PRESENCE OF THE JURY

THE COURT: How many witnesses is the defendant Velsicol going to have?

MR. BEYER: Well, Your Honor, we find ourselves in kind of an embarrassing position.

THE COURT: Not again today, boy. If you are not ready to go forward, your case is over.

MR. BEYER: Well, Your Honor, we could be concluded by --

Your Honor, we expected a lengthier cross-examination.

THE COURT: I can't help that. I've told you all, at the beginning of this case, we're not going to have any delays between witnesses.

If you have no evidence to present, you close your case.

MR. GORRY: Your Honor, we have two -- specifically, we have two other out-of-town, out-of-state witnesses, and this --

THE COURT: If they're not here, your case is over, Mr. Gorry.

I've told you all time and again that we're not waiting for witnesses, have your witnesses here.

Last night I gave you a break. I'm not going to give you another one.

All right. Is that the end of your evidence?

MR. GORRY: Well, I'll have to talk with my co-counsel.

THE COURT: All right. We'll take a five-minute recess.

(The Court recessed at 3:37 p.m. and the Court reconvened at 3:50 p.m., and the following proceedings occurred out of the presence of the jury:)

MR. GORRY: Your Honor, we do not have any witnesses that we can go forward with at this time.

I do want to make for the record, though, this indication of what I believe to be the facts.

I respectfully would disagree with the Court that we were given a break yesterday.

THE COURT: You certainly were.

MR. GORRY: Well, --

THE COURT: I quit -- I quit early because you said you didn't have any witnesses.

MR. GORRY: Your Honor, on Wednesday, in chambers -- and because it probably wasn't taken down -- it was understood -- at least we believed it to have been understood that, in projecting the case, the defendant would start its defense on Friday, and so late yesterday afternoon, as per the prior understanding, we were not ready to start the case; but, as I say, that had -- I think it was Wednesday -- it was either Tuesday -- it was Wednesday -- in a chambers conference that that had been discussed.

I would just like the record to be clear that the plaintiff has had six days in which to put on its case.

By my very quick count, there was some eighteen witnesses.

Today is Friday. We did start the case today at nine o'clock a.m. We did put on four out-of-town expert witnesses, three of whom were not only out-of-town but out-of-state.

We do have additional expert witnesses from out of state, and we just were not able to have them here today on Friday in what we considered to be prudent scheduling, and that's the situation.

THE COURT: Well, you don't set the schedule of the Court, Mr. Gorry. The Court sets the schedule, and I've let you all know that I wasn't going to let this case go as long as you expected it to go, that I had a crowded docket.

I've got a lot of other things to do and I just can't waste a day, I've got too much to do, and I thought I let everybody know that this case was going to go just as rapidly as I could push it, and I'm confident I let you all know that and you had absolutely no right to set the schedule of this case or to schedule your witnesses in accordance with your views. You're supposed to schedule it in accordance with my views.

MR. GORRY: Well, Your Honor, we just do the best we can and these people do cost money and their schedules are busy as well.

THE COURT: Well, I know; but, you know, you all have taken the position that you're willing to proceed with this case at any cost, and that's the cost that you've decided you're going to undertake.

All right, Mr. Breeden, will you have any testimony?

MR. BREEDEN: I'm in the same position he's in in that regard. I have none here today. I had a couple coming on Monday, but they're also coming from out of town.

I've got a motion, if indeed the Court is going to compel them to rest; but other than that, I don't have any other testimony at this time.

THE COURT: I'm just outraged about the conduct of counsel in this case, when I told you all from the very outset that

this case had to move along and that you all have chosen to schedule witnesses in such a way that I'm wasting a good hour and a half of time that could be used that could have gotten rid of another witness.

MR. GORRY: Your Honor, we, last evening --

THE COURT: I've got stuff waiting for me in there that's up to the ceiling.

MR. GORRY: Judge, I understand, but last evening, when the Court set this case at nine o'clock, we did try to call one of our expert witnesses in Athens, Georgia. He couldn't get here today. We had told him Monday before, and that's --

THE COURT: You don't have any right to tell any witness to be in this court on any day except the first day of trial. That's when they're supposed to be here. And we get to them just as fast as we can.

Mr. Gorry, you practiced in this court long enough to know that we don't sit around and wait for the pleasure of witnesses. We try the cases and we try them as fast as we can because we've got such a backlog of work here.

MR. GORRY: Judge, again, with all respect, I just don't feel that I could have had expert witnesses sitting here seven, eight, ten days.

THE COURT: Well, you're going to the next time, I'll tell you, because I'm just not going to brook this sort

of thing.

I'm just as sorry as I can be, but, you know, --

MR. GORRY: Well, --

THE COURT: -- you've decided, if you're going to defend the case, you defend the case, and you defend it just as fast as the Court can properly move you along with -- we've given you a full opportunity to be heard, but I just -- we just can't afford to sit around here and waste time; there are too many other people waiting to get the ear of the court.

MR. BREEDEN: If Your Honor please, depending on what the Court does with this -- it may be entirely a moot question -- but we do have some medical records, of which we have certified copies, that we wanted to put in evidence here.

If the Court is going to preclude any further evidence, the certified copies that we wish to have produced in the record and which we have here are not going to be material because we won't have the witnesses here to discuss those records, but we would like to tender medical records, which we have subpoenaed from the University of Virginia, from Waynesboro Hospital, from the Veterans Hospital, and from MCV.

There again, we have custodians we have on subpoena to be here in case the Court will not admit the certified copies that we have, but that is a matter that needs to be

addressed.

THE COURT: Well, the rule is that medical records don't go to the jury room. They're only here for doctors --

MR. BREEDEN: Only for --

THE COURT: -- and for the professional people to testify from.

MR. BREEDEN: That's right. Well, that's what they're here for. I have them and I would like for Mr. DiMuro to look at them.

MR. DiMURO: Maybe I -- I don't want to get in the middle of the Court's discussion with Mr. Gorry, but I understood that the Norfolk neurologist, according to the witness list we got yesterday, was the fifth witness for today.

And is he not coming?

MR. GORRY: He's not coming.

THE COURT: Where is he? Is he out of town?

MR. GORRY: No, sir, he's not out of town.

THE COURT: Why don't you call him up?

MR. GORRY: Because we made a decision that we are not going to offer him as a witness, Your Honor.

THE COURT: How many witnesses do you have left?

MR. GORRY: We would offer the one foundation witness for that 1980 MMPI that was discussed; we would offer a psychologist, and we would offer a residue testing expert.

So there's two experts, plus the foundation witness for that report that was referred to earlier that Mr. Breeden was talking about.

MR. BEYER: May we confer for just a moment, Your Honor?

THE COURT: All right. Well, in any event, bring the jury in, Marshal. No sense in having them sit back there when we're not going to get to them one way or the other.

(Thereupon, the jury returned to the jury box at 3:58 p.m.)

THE COURT: Members of the jury, I regret to tell you that we're not going to be able to get any further today on this case. I hate to lose the remaining hour or hour and a half that would be available today, but we're just not able to get any further today with the case, and so I can excuse you until Monday morning.

I am hopeful that we will conclude the evidence no later than Monday, possibly Tuesday, and we hope to get the case in your hands no later than Wednesday.

I tell you this as a projection because I know that you have your own plans, but if something goes haywire and I'm not right, don't string me up. Just say that "The old guy did the best he could." That's all I can say to you.

And I hope you all have a real pleasant weekend.

And remember all my admonitions I gave you before.

Yes, sir. Did you have something you want to ask?

A JUROR: What time, Your Honor?

THE COURT: Well, you know, I'd like to start at nine, if you all can. I think the earlier --

Having started you at nine today and then find out that we're not in a position to finish up the day makes it a little difficult for me to impose upon you again.

If you're willing to be here at nine, that will be fine, if you are.

Okay; all right. We'll see you at nine o'clock, then, Monday, and you all have a nice weekend.

(Thereupon, the jury retired from the courtroom at 4:00 p.m.)

THE COURT: Well, if I hold this record open for you until Monday, will you be able to finish your evidence Monday?

MR. GORRY: Yes, sir.

THE COURT: All right. Now, Mr. Breeden, that means that you start with your evidence Monday and you have your witnesses here Monday and, if possible, I'm going to try and conclude all of the evidence Monday.

MR. BREEDEN: Yes, sir.

THE COURT: All right. We'll see you all Monday

morning.

(The Court adjourned at 4:01 p.m.)