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EXHIBITS SUBMITTED ON BEHALF OF THE DEFENDANT:

Defendant's Exhibit No.:

909	(paper)		104	
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1 BE IT REMEMBERED, that on the 17th day of July,
2 1985, the same being one of the regular judicial days of said
3 court, the above-styled cause came on regularly for hearing
4 before the HONORABLE RICHARD P. GOLDENHERSH, one of the
5 Judges at the St. Clair County Building, 10 Public Square, in
6 the City of Belleville, County of St. Clair, State of
7 Illinois. Whereupon the following proceedings were had:

8 COURT CONVENED:

9 THE COURT: Mr. Heineman?

10
11 DR. GEORGE ROUSH

12 (being called as a witness on behalf of the Plaintiff, under
13 Section 2-1102, having been previously sworn, continued to
14 testify as follows)

15 CLARIFICATION EXAMINATION

16 BY MR. KENNETH HEINEMAN

17 Q. Dr. Roush, yesterday during a break, you suggested
18 to me, did you not, sir, there was a statement you had made
19 with respect to porphyrins that you wanted to clarify, is
20 that right?

21 A. Yes, sir.

22 Q. Okay, would you please do so.

23 A. In my example of one of the porphyrins diseases I
24 used the word acute intermittent porphyria. Acute

1 intermittent porphyria I said was related to elevation of
2 uroporphyrins. That was an incorrect statement. In my
3 generalization from talking about porphyrin metabolism and
4 then talking about what causes it, I slipped. And I meant to
5 say -- I should have said porphobilinogen, which is a step
6 before the making of uroporphyrin that goes up to acute
7 intermittent porphyria. The uroporphyrins go up in
8 erythropoietic porphyria. That's another congenital
9 disease. The one in which the uroporphyrins go up, that's
10 associated with skin disease and usually this disease is
11 found by the dermatologist. The man will go to the
12 dermatologist and say every time I go out in the sun I get a
13 blister. Just a little exposure will get a blister, he may
14 say that the urine that he's been putting out will be red.
15 And then they will run uroporphyrins and they will go up in
16 that form. That's about the same as it is in the porphyria
17 cutanea tarda, that's the part of the porphyria associated
18 with dioxin. That's very similar to erythropoietic
19 porphyria.

20 Q. As I understand what you said, erythropoietic
21 porphyria and intermittent porphyria are genetic in origin?

22 A. Yes, sir.

23 Q. Now, Dr. Roush, yesterday when we left off, we were
24 talking about this exhibit which is Plaintiff's Exhibit 1264,

1 as representing some notes taken by Phocion Park at a meeting
2 on February the 9th, 1979. Do you recall our discussion of
3 this last night, sir?

4 A. Yes, sir.

5 Q. And, we mentioned the fact that the 37 parts per
6 billion, it was your decision to tell the EPA that all of it,
7 to assume that all of it was 2,3,7,8, even though Monsanto
8 didn't have any evidence that that was the case, is that
9 right?

10 A. That's right, sir.

11 Q. Now, this third paragraph on those notes has a
12 couple of statements I want to ask you about. Can you read
13 it there, sir? It says first sign of exposure to dioxin is
14 Chloracne?

15 A. Yes, sir.

16 Q. All right. Now, do you recall in that meeting
17 whether that subject was discussed, that is the subject of
18 what would one expect to find from dioxin exposure?

19 A. Yes, sir.

20 Q. All right. Now, would Chloracne be the first sign
21 of dioxin exposure, taking into account dose response
22 relationship, and that's one of the things I wanted to ask
23 you about today.

24 A. Industrial experience very clearly demonstrates

1 that the first effects that you will see with exposure to
2 dioxin is going to be Chloracne at the clinical level.
3 Whether there are some things, if we did a study more than
4 has been done and see if there was something else at the same
5 time is not clear, but the general feeling of everyone having
6 looked at it at a clinical level, the first thing you are
7 going to see is Chloracne.

8 Q. All right. Now, that is if it's in a sufficient
9 dose to produce Chloracne?

10 A. Right. And that's quite clear what those doses
11 will take to produce that, the study by Quigman quite clearly
12 demonstrated it's going to be more than 16 micrograms to
13 produce it, and it may be up to multiples of that before you
14 will see Chloracne.

15 Q. All right. And that's applied to the human skin,
16 is that right?

17 A. (indicates affirmatively.)

18 Q. Now --

19 THE COURT: I'm sorry, I didn't hear an answer to
20 that.

21 A. That's applied to the skin, yes.

22 Q. Now, here in parenthesis is the phrase, "This is an
23 acute toxicity effect?"

24 A. That's what it says, yes, sir.

1 Q. Now, we have been talking about acute effects and
2 chronic effects in the course of your testimony, isn't that
3 right?

4 A. Yes, sir.

5 Q. Now, there are certain things which you have stated
6 you recognized to be acute effects based upon, among other
7 things, the experience at Nitro, is that right?

8 A. And what's been published as well.

9 Q. All right. Now, those acute effects include
10 Chloracne?

11 A. Yes, sir.

12 Q. Correct? Chloracne is not the only acute effect,
13 is it, sir?

14 A. No, sir.

15 Q. Depends upon the dose?

16 A. That's right.

17 Q. Now, the third line said that as of February the
18 9th, 1979, chronic effects of dioxin exposure is not known,
19 do you see that, sir?

20 A. Yes, sir.

21 Q. All right. What discussion did you have with
22 respect to the chronic effects of dioxin?

23 A. Well, the chronic effects as we see in our workers
24 is that if you take them out of exposure, their Chloracne

1 will diminish. We also know that the worker exposed to
2 dioxin on a continuing basis, as in the work place, without
3 an acute exposure may develop Chloracne, and we don't know
4 whether that's an acute effect during the time of exposure
5 with a little bit or what it is, but you can see it with
6 chronic exposure as well.

7 Q. Now, you have testified in this court, have you
8 not, sir, that in your opinion, Chloracne is the chronic
9 effect of dioxin exposure, is that right?

10 A. When you talk about chronic effects, you have to
11 talk about if you've had an exposure, and you stop exposing
12 him what will be left, the literature is replete with
13 demonstrations that all of the effects will go away for
14 practical purposes except for Chloracne. So, after an acute
15 effect you can have chronic effects from just one acute
16 exposure. You can have chronic things that may go on for
17 years. Now, that's different than talking about a man
18 exposed at a chronic low level. The concerns that chronic
19 low level is started with the concern about reproductive
20 problems in Viet Nam. And about the same time they did
21 animal studies that said there are reproductive effects in
22 the rat with exposure to dioxin. And there were several
23 episodes, particularly one I recall is in Portland where they
24 were spraying 2,4,5-T and the question was was there birth

1 defects associated with that and, with further study they
2 showed that wasn't the case, but they still had the lingering
3 problem, does it produce reproductive problems at some level,
4 not at all levels, but under some circumstances can it
5 produce reproductive problems.

6 Q. That's in human beings?

7 A. Yes.

8 Q. Now, what was your feeling, sir, at that time, as
9 to 37 parts per billion, assuming it was all 2,3,7,8, what
10 was your feeling as to whether or not that would be a hazard,
11 taking into account all of the things you've just said?

12 A. We know that dioxin has been present in 2,4,5-T
13 used worldwide as a very effective herbicide and most people
14 had it in their garage and used it for spraying from time to
15 time. So, very widely used. And the numbers aren't huge,
16 but it's something on the order of five million pounds used
17 per year of this material that contains in the parts per
18 million. And I don't know how high you want to go, but it's
19 thought that it was above 5 ppm and considerably higher than
20 that in the 1960's, so there is a concern of those workers
21 exposed at that level at 5 ppm or higher, chronically, over
22 many years whether that has produced any effects including
23 cancer. But, the Government had said that 100 parts per
24 billion is a safe level of dioxin for 2,4,5-T. That was the

1 same in Canada and the same thing in Europe. So, the concern
2 is for that level of exposure. It's dose related. They are
3 not interested and not concerned about background levels,
4 whatever that means when in 1979 we thought that ten parts
5 per billion was a very low dose, very low amount of dioxin,
6 but since then we are not able to get down to the parts per
7 trillion. So, the exposure of the workers or the people who
8 lived in Times Beach at a hundred parts per billion, the
9 people who lived in Sturgeon exposed at less than one part
10 per billion, was not a concern, because we are talking about
11 one part per billion vs. 5 ppm or a thousand to five thousand
12 times higher than the level found at Sturgeon.

13 Q. Now, it was your opinion, sir, in 1979, then, that
14 37 parts per billion, even assuming that it was all 2,3,7,8
15 would not be a hazard?

16 A. That's right.

17 Q. And isn't that your opinion today?

18 A. Yes, sir.

19 Q. Now, following this meeting there were
20 communications between Monsanto and the EPA, is that correct,
21 sir?

22 A. Yes, sir.

23 Q. And, there were oral communications and written
24 communications?

1 A. Yes, sir.

2 Q. Sir, let me hand you what's been marked Defendant's
3 Exhibits 867, you see that, sir?

4 A. Yes, sir.

5 Q. Now, that's a document as to which you got a copy,
6 is that right?

7 A. Yes, sir.

8 Q. And that is a memo from Joe Metcalf to the file
9 dated February the 12th, 1979, isn't that right, sir?

10 A. Yes, sir.

11 Q. Now, would you read aloud, please, the first
12 paragraph of that document?

13 A. "On Friday, February 9, about 7:30 p.m., I called
14 Harry Gilmer and reported that we had detected 0.037 ppm of
15 tetrachlorodibenzo-para-dioxin in our reserve sample of the
16 tank car ruptured at Sturgeon, Missouri, on January 10. The
17 analysis were done in triplicate and the actual values
18 were .034, .036, .040 ppm. The limit of detection for our
19 method was .10 ppm."

20 Q. Excuse me, .010?

21 A. Right.

22 Q. .010 ppm?

23 A. Right.

24 Q. Now, those numbers expressed like that are

1 equivalent to what, sir?

2 A. Put them in parts per billion, it would be 34 parts
3 per billion, 36 parts per billion and 40 parts per billion
4 with unlimited detection at 10 parts per bill.

5 Q. And the number that was reported in the second line
6 by Joe Metcalf to Harry Gilmer was?

7 A. 37 parts per billion, which is about the average of
8 those three.

9 Q. All right. Now, that's a phone call on Friday
10 February the 9th, 1979, at 7:30 p.m., correct?

11 A. Yes.

12 Q. Now, the second paragraph, would you read that,
13 please, sir?

14 A. "He asked if we had identified the isomer, and I
15 told him we didn't have this analytical capability. We
16 doubted that it was the 2,3,7,8 isomer, but couldn't be
17 sure. In response to his question, I told him that it was
18 our opinion that this finding did not change the situation at
19 Sturgeon. The citizens were not at increased risk."

20 Q. And then that indicates in the next paragraph, does
21 it not, that Mr. Metcalf told Mr. Gilmer that he planned to
22 call Western Environmental Services the next morning,
23 correct?

24 A. Yeah.

1 Q. And Western Environmental Service was the clean-up
2 contractor on the site?

3 A. Yes, sir.

4 Q. All right, would you read the fourth paragraph of
5 the memo, please, sir?

6 A. "On February 10th, I tried several times to call
7 Western Environmental Services, (WES), and Gilmer called me
8 back before I got through to them. He had already contacted
9 them and they were using additional safety equipment. I did
10 talk to Roland Miller of WES, who confirmed the conversation
11 with Gilmer. He appreciated the call but was not overly
12 concerned about an additional hazard existed."

13 Q. Would you read the next paragraph, please?

14 A. "Gilmer had talked to several people including
15 Renata Kimbrough and Dr. Doull. They had expressed varying
16 degrees of concern. EPA had chartered an airplane and a
17 sample taken at the site was being flown to Chicago for
18 analysis. He requested that the two portions of our reserve
19 sample that he had promised earlier be taken to Lambert Field
20 where they could be picked up on their return to Kansas
21 city."

22 Q. Okay. Would you read the next paragraph, please,
23 sir?

24 A. "I called Jim Gloeckner, the Krummrich Laboratory

1 Supervisor, who went to the plant, packed the samples and
2 delivered them to the B Building lobby early Saturday morning
3 -- Saturday afternoon."

4 Q. And the next paragraph?

5 A. "I called Dr. Paget at 11:50 a.m. Gilmer had
6 called him around 11 p.m. the night before and was told that
7 our position was not changed."

8 Q. Now, there is an asterisk at the bottom of the page
9 and it says actually University of Illinois at Champaign,
10 correct?

11 A. Yes.

12 Q. And that asterisk refers to, if you look at the
13 third to the last paragraph which you just read a few minutes
14 ago where it says Chicago?

15 A. Yes, sir.

16 Q. All right. So Metcalf is recording his
17 understanding that the EPA had chartered an airplane and a
18 sample taken at the site was being flown to Chicago for
19 analysis. And it turned out it was actually the University
20 of Illinois at Champaign?

21 A. Yes, sir.

22 Q. Correct. Now, if you turn to the next page, sir,
23 and you look at the second to the last paragraph, would you
24 read that, sir, please?

1 A. "Gilmer called me on the morning of February 12th
2 to say that the EPA had detected 9 parts per trillion of
3 2,3,7,8 isomer in the site sample. This information had been
4 given to the press release. I told him that we had heard
5 over the radio Saturday night mentioned only dioxin, one of
6 the most toxic chemicals known."

7 Q. All right, would you read the last paragraph,
8 please?

9 A. "He was unhappy about the release in that he
10 thought the Mayor of Sturgeon, the N & W Railroad, WES,
11 landfill operators in Wright City and Kansas, and Monsanto
12 should have been informed before the information was released
13 to the public. Nevertheless he was quite pleased that the
14 level was so low."

15 Q. Now, those are all conversations that occurred
16 between Joe Metcalf and Harry Gilmer, all things that
17 Monsanto was doing in the few days following this meeting
18 when it was first learned that there were tetra-dioxin
19 isomers in the reserve sample?

20 A. Yes, sir.

21 Q. Now, let me hand you, sir, what's been marked as
22 Defendant's Exhibit No. 875 and this shows, if you look at
23 the fifth page, sir, did you get a copy of this document as
24 well?

1 A. Yes, sir.

2 Q. Now, if we look at this memorandum dated February
3 -- pardon me, not a memorandum, it's a copy of a letter, is
4 it not, sir?

5 A. Yes, sir.

6 Q. To whom?

7 A. Dr. Gilmer of the EPA.

8 Q. From whom?

9 A. From Joe Metcalf of Monsanto.

10 Q. And, this letter puts in writing some of the things
11 that are referred to in the memorandum that we just were
12 talking about, isn't that right?

13 A. Yes, sir.

14 Q. A written letter informing Gilmer officially of
15 some of this information?

16 A. Yes, sir.

17 Q. Now, if you look at the second page of this letter,
18 sir, would you start, read the third paragraph?

19 A. "You asked that I explain why we would not expect
20 the 2,3,7,8 tetrachlorodibenzo-para-dioxin to be present in a
21 significant amount in our product."

22 Q. Would you go on?

23 A. "In our chlorophenol operation our primary products
24 are 4 chlorophenol and 2,4-dichlorophenol. In preparing the

1 4 chlorophenol, we also form the 2-chloro isomer which is
2 separated by distillation and is a component of
3 orthochlorophenol-crude."

4 Q. Yes, sir. Would you continue?

5 A. "In preparing the 2,4-dichlorophenol, we form a
6 small amount of 2,6 isomer and traces of trichlorophenol.
7 Since chlorine attacks the phenol molecule primarily in the
8 ortho and para or the 2,4,6 positions, this trichlorophenol
9 is present as the 2,4,6 isomer. This material is present in
10 high boilers from the distillation of 2,4-dichlorophenol and
11 is another component of orthochloro-crude.

12 Q. Please go on, sir.

13 A. Some tetrachloro-dioxins are formed by the
14 condensation of two molecules of trichlorophenol. The 2,4,6
15 isomer will form the 1,3,6,8 molecule. Whereas the
16 2,4,5-isomer, is needed to produce the 2,3,7,8 dioxin. The
17 2,4,5-trichlorophenol is not produced by the direct
18 chlorination of phenol. It is manufactured by the hydrolysis
19 of tetrachloro-benzene."

20 Q. Now, would you read the next paragraph, please,
21 sir?

22 A. "We cannot say that there is no 2,4,5-isomer in
23 this small trichlorophenol component of
24 orthochlorophenol-crude. But it is certainly not a major

1 constituent. It follows then that the 2,3,7,8
2 tetrachloro-dioxin, if present at all will be only a small
3 fraction of the total tetrachloro-dioxins."

4 Q. Now, sir, did you have conversations with Ed Paget
5 about this time?

6 A. Yes, I did.

7 Q. And who is Ed Paget?

8 A. Dr. Paget is a physician who came to Monsanto just
9 shortly before this episode took place, and he came to us
10 from England where he was running a toxicology laboratory of
11 considerable size and real respect. In addition to that, he
12 was known for his work on drug development with one of the
13 drug companies, so he had had a great deal of very important
14 experience and is well recognized as a toxicologist as well
15 his ability in drug development.

16 Q. Now, sir, at the time that this incident occurred,
17 the Sturgeon spill, was Dr. Paget reporting to you?

18 A. Yes, sir.

19 Q. And, did you have conversations with him with
20 respect to this incident, the Sturgeon spill and this 37
21 parts per billion?

22 A. Yes, sir.

23 Q. All right. Did you communicate with him your
24 decision that the EPA should be informed to assume that the

1 37 parts per billion was all 2,3,7,8?

2 A. Yes, sir. We do that because in toxicology we have
3 to make different assumptions and we will say what would
4 happen if it were all, and therefore we said in this case we
5 will assume it is all 2,3,7,8-tetrachlorodibenzo-dioxin.

6 Q. Now, did you instruct him to inform the EPA of that
7 fact?

8 A. Yes, sir.

9 Q. Now, if you were to assume, sir, that Dr. Paget
10 testified in this courtroom that indeed he did so inform
11 Harry Gilmer, would that have been in compliance with your
12 instruction?

13 A. Yes, sir.

14 Q. Now, sir, we were talking about the differences in
15 exposure that would be possible in the Krummrich plant
16 between the dusty conditions in Department 2,3,6 and the
17 liquid in the pipes and vats and tanks in Department 2,3,7?

18 A. Yes, sir.

19 Q. Correct?

20 A. Yes, sir.

21 Q. Now, why was there a dusty condition in Department
22 2,3,6?

23 A. The pentachlorophenol, that's product made in 2,3,6
24 is a crystalline structure that is -- forms large plate-like

1 structures, and in the process of making those structures,
2 part of it is in a powder, and part of it is just plain old
3 broken fragments of those thin wafers of pentachlorophenol.

4 Q. Now, Mr. Carr in questioning you suggested to you
5 that 2,3,6 and 2,3,7 were adjacent departments, didn't he?

6 A. Yes, sir.

7 Q. And he said that one could stand right by 2,3,7, at
8 the edge of 2,3,7, and 2,3,6 would just be a couple of feet
9 away, correct?

10 A. Yes, sir.

11 Q. Now, why is it, did you understand from his
12 question, sir, that he was implying to you that not only was
13 2,3,7 an open-air department, but 2,3,6 was as well?

14 MR. CARR: Your Honor, I would object. I was
15 asking questions of the witness. The witness was either
16 agreeing with those questions or disagreeing, I wasn't
17 testifying. It was the witness who was testifying. I object
18 to the suggestion that I was implying that either the witness
19 did or did not agree with --

20 THE COURT: Objection is sustained.

21 Q. (by Mr. Heineman) Doctor, why is it that the dust
22 in Department 2,3,6 stayed in Department 2,3,6 and became an
23 exposure problem?

24 A. It was exposure problem and it had to be contained.

1 Q. Why didn't it get out? Why didn't it blow away?

2 A. It had to be contained to be in some kind of an,
3 enclosed area, so it was a partially enclosed area at least.

4 Q. Now, as you sit there now, sir, are you aware as to
5 whether or not 2,3,6 was contained in a building?

6 A. I'm not sure.

7 Q. Not sure. All right. So you don't know one way or
8 another whether or not somebody could just walk from 2,3,7
9 right straight through into 2,3,6, you don't know that?

10 MR. CARR: Counsel, my question went from 2,3,6 not
11 to 2,3,7, not as you are putting it. My suggestion is that
12 the people in 2,3,6 could be exposed to 2,3,7 not as you are
13 -- you've got it backwards.

14 Q. Well, sir, you don't know as you sit here, whether
15 or not conversely, someone from 2,3,6 could merely walk
16 across into 2,3,7?

17 A. No, sir.

18 Q. And you don't know, as you sit here, whether or not
19 indeed the people who worked in 2,3,6 did go over to 2,3,7
20 while they were working in 2,3,6?

21 A. No, sir.

22 Q. You don't know one way or the other?

23 A. (indicates negatively.)

24 Q. And you don't know whether or not 2,3,6 was

1 enclosed in a building or not?

2 A. In our factory, no, sir, but it's hard to explain
3 the dust problems they had without some degree of enclosure.

4 Q. Now, Mr. Carr was asking you about whether or not
5 someone would be exposed if they were just walking by or if
6 they just happened to be in the same plant area for either,
7 for any period of time, you recall that?

8 A. Yes.

9 Q. And, it's talking about whether or not there are
10 low-dose exposures, you recall that, sir?

11 A. Yes, sir.

12 Q. And, as I recall, you advised that there could be
13 some kind of exposure by just walking through a department,
14 did you not?

15 A. Yes, sure.

16 Q. Now, would you explain to us what you mean by that
17 in terms of degree of exposure, dose response, what you mean
18 by whether there could really be an exposure?

19 A. The amount of chemical that a man will get is
20 related to his distance from the source of that chemical. As
21 a matter of fact, it decreases by the square of the distance
22 from that exposure. In other words, if you go ten feet as
23 opposed to one foot away from it, it's one one-hundredth of
24 the dose you would get at one foot, so there is a dose

1 response. There is a dose related to distance from the
2 source. If you are ten feet away as opposed to one you get
3 one-hundreth of a dose you get at one foot. So the effective
4 distance is very important. So, what we do, and we do this
5 in a plant all the time, is we monitor the level of exposure
6 that takes place inside of a plant. And in the
7 pentachlorophenol, we keep it below one half million gram per
8 cubic meter. In other words, we actually have an air sampler
9 that takes -- that sucks the air through a -- through a pump
10 and deposits it on a piece of filter paper and then we
11 analyze that to find a concentration. We analyze the levels
12 within the plant and we analyze for where it's not found.
13 So, when I say that it can take place out in the street, I am
14 talking theoretically, because it's not that we could ever
15 measure it.

16 Q. Now, when you say you can't measure it, what do you
17 mean? You've got measurement levels that go down to parts
18 per trillion?

19 A. No, sir, not for pentachlorophenol.

20 Q. Now, but the analytical laboratories that you have
21 at Monsanto can measure down to parts per trillion, can they
22 not?

23 A. Not for all chemicals. You can do that for
24 chlorinated chemicals because of the presence of the chlorine

1 atom but there are other substances you don't have chlorine.
2 So whether you could do it in penta I'd have to talk to a
3 chemist about how far they have gone because we didn't find
4 it necessary to go that low.

5 Q. What you find is that while theoretically there may
6 be an exposure, you can't measure it, you can't find it on
7 the filter paper?

8 MR. CARR: Your Honor, I object, this is not
9 relevant to the issue. The issue is not whether or not our
10 clients were exposed to penta, whether the workers of
11 Krummrich are exposed. The issue our clients are exposed to
12 dioxin which they can measure down to parts per trillion. All
13 this is irrelevant to the issue. I object to the question,
14 it's completely irrelevant and immaterial.

15 MR. HEINEMAN: Your Honor, I believe I'm talking --
16 trying to talk generally about the relationship between dose
17 and levels and response and exposure. The Doctor just
18 happened to use the example of penta, but I would -- I do
19 intend to expand it into the other chlorophenols that are the
20 subject.

21 THE COURT: The extent to which you've gone into it
22 now is not relevant. If you wish to go into a relevant area
23 of it you may. On the basis of what's been testified to so
24 far, the objection is sustained.

1 Q. Dr. Roush, Mr. Carr was asking you specifically
2 yesterday about if someone in Department 2,3,6 walked into
3 Department 2,3,7 would there be some exposure, or if someone
4 in the street walked past Department 2,3,7, could there be
5 some exposure, you remember that?

6 A. Yes, sir.

7 Q. Now, it was to that series of questions that you
8 testified that there could be some exposure?

9 A. Yes, sir.

10 Q. Now, that is what I want you to discuss, please,
11 rather than the penta, what do you mean by there could be
12 some exposure?

13 A. If a chemical is found in the air, and a man walks
14 through it, and what we do, he'll have a little personal
15 sampler that he wears on his lapel, that little sampler just
16 as I described, it will take the air through it, deposit it
17 on that filter, and then we take it back to the laboratory
18 and analyze it and decide whether or not we can -- what we
19 can find on there. In our work at all of our plants, we
20 sample for eight hours of continuous exposure, and we
21 selected all in that filter. We do not do analyses for short
22 exposures. But, the fact is, is the amount we measure over
23 eight hours is the sum total of the little bits he gets for
24 that entire eight-hour period. So, if that's the case, then,

1 if he's there, what reaction, ten minutes, five minutes,
2 three minutes, it's three minutes, oh, vs. Sixty times eight
3 or three minutes or 480 minutes or one one-hundreth of the
4 dose he would get if he would stay there all day. So, it's
5 small compared to the amount that the workers are getting
6 there on an eight-hour basis.

7 Q. Now, are you capable of measureing the dose that a
8 person could be exposed to by walking through a department
9 like 2,3,7?

10 A. Depends on the level of contamination of that
11 nature to which he is walking, and it depends on the
12 detection capability of the instrument we use for measuring
13 the material that is deposited on that filter.

14 Q. Now, let's assume, sir, that Department 2,3,7 is,
15 as you testified, an enclosed system and there is testimony,
16 there has been testimony in the case that in Department 2,3,7
17 it's enclosed, the materials are liquid, they are in pipes,
18 they are in vats, they are in tanks. In that situation, is
19 there any appreciable amount that someone could be exposed to
20 by walking through Department 2,3,7 or even working there on
21 an eight-hour basis per day?

22 A. The workers who are there are exposed to very
23 little. We are much below the permitted exposure level for
24 the chlorophenols. So the man who walks through there is

1 getting that depending how long he stays there that ten
2 percent or five percent or one-hundreth, as I took for a five
3 minute time.

4 Q. So there would be -- would there be an appreciable
5 level of exposure, something you could measure?

6 A. It depends on level detectable and what the
7 concentration, I do the eight-hour, I know that, and if I've
8 got the quantity that was found in that hour sample, I could
9 then talk by the amount of times spent in that work area,
10 what the actual amount he was exposed to, but the other one
11 is -- the man who walks through there, and doesn't get close
12 to that pipe or valve or whatever, the little bit is coming
13 out, he's still working at that low concentration as compared
14 to the man who was working close to the source. So, if the
15 man is working at 10, 15, or 20 feet, or a hundred feet away
16 from the source, if we took a man and put him there and said
17 you stand where this man came in there by chance, and he had
18 that on here, we could do that analysis over an eight-hour
19 period and then divide it by the amount of time spent there
20 and tell you how much is present and it will be dependent
21 only on one thing, it's a percent of the eight-hour time he
22 spent there, when we say the man can be there for eight hours
23 without an adverse effect.

24 Q. Now, you say a man can be there for eight hours

1 without an adverse effect?

2 A. It's by an appreciable amount because of the low
3 vapor pressure of the chlorophenols.

4 Q. You say chlorophenols have a low vapor pressure?

5 A. Yes.

6 Q. Now, the fact that Dr. Suskind reports that with
7 respect to those people who worked only in Department 2,3,7,
8 there was no Chloracne found?

9 A. Yes, sir.

10 Q. What does that tell you about exposure in 1979 to
11 workers in the Department 2,3,7?

12 A. That their exposure is below the level at which it
13 will produce Chloracne.

14 Q. Can you tell whether or not there is any exposure
15 at all?

16 A. We do it best by the personal monitors that we have
17 on those workers and we are appreciably below the TLV or our
18 exposure level permitted in that workplace.

19 Q. What do you mean by TLV, sir?

20 A. The Government has a -- not the Government, but
21 it's called, there is an agency called the American
22 Conference of Government Industrial Hygienists who over the
23 last 20 to 30 years have been developing standards for man
24 exposure to him of the toxic substances. There is something

1 between three and four hundred chemicals for which standards
2 have been written. Although this is only a semi-official
3 agency, those exposure limits, safe exposure limits for the
4 worker produced by this group are used worldwide as a
5 standard for exposure. In those limits that they have
6 prescribed, are called TLV's, or threshold limit values.
7 Now, there is no threshold limit value for chlorophenol. So,
8 we have written our own. And we are below that level.

9 Q. On what basis did you write your own, sir?

10 A. Below the level which it would produce irritation
11 in the man because of the irritant potential of the material.

12 Q. So you were able to determine the level at which an
13 irritation could be produced by chlorophenols in a human
14 being?

15 A. Right.

16 Q. And what was that level, do you recall?

17 A. I don't recall, because -- I don't recall the
18 number, but we do have it -- I think it's three-tenths of a
19 milligram threshold but that's only as I recall, I wouldn't
20 say as a fact.

21 Q. Now, and that's the amount, the threshold limit
22 value is the amount that a person can be exposed to eight
23 hours a day, five days a week, 365 days a year, well,
24 wouldn't be 365 if it's only five days a week. What is the

1 definition for that?

2 A. A threshold limit value is that limit to which most
3 workers can work exposed below that, at that level or below
4 for eight hours a day, five days a week, throughout his
5 lifetime without an adverse effect.

6 Q. Now, is there a difference, sir, between exposure
7 -- strike that, let me start over again. You talked about
8 there being a difference between exposure depending upon the
9 distance from the source, is that right?

10 A. Yes, sir.

11 Q. So that the farther you get away from the source,
12 the more diluted the material would be and therefore the less
13 the exposure?

14 A. Yes, sir.

15 Q. Now, therefore, one walking by the plant, would
16 have a much less exposure, if any exposure, than the person
17 who is right there at the source, is that right?

18 A. Yes, sir.

19 Q. Now when you are measuring exposures, when you are
20 comparing groups who have been exposed. Can you therefore
21 compare groups within the same plant who have differing
22 levels of exposure?

23 A. If they are exposed to the same materials,
24 certainly can.

1 Q. Now, would why would you, for example, compare
2 people who had Chloracne with people who did not have
3 Chloracne?

4 A. The purpose of comparing those with and without
5 Chloracne is recognizing that it requires a certain exposure
6 to develop the Chloracne. Those who have not gotten
7 Chloracne have had lesser exposure. And so the comparison is
8 a part of the understanding of toxicology, the bigger the
9 dose, the more likely there is going to be an effect and this
10 is a part of pharmacology, teaching of medicine, everything
11 we do about using of drugs is related to that principle. For
12 instance, no one would suggest that taking a fraction of an
13 aspirin is as effective for taking care of a headache as
14 would taking two aspirin. No one would think of taking a
15 crumb for an effect. So there is a dose response curve. Man
16 who's got Chloracne as a bigger dose than the man who does
17 not have Chloracne, so the comparison is the means of
18 comparing the effects of high exposure with low exposure.

19 Q. Now, sir, do you still have before you Defendant's
20 Exhibit 908?

21 A. No, sir.

22 Q. It's the Moses, Marion Moses study?

23 A. No, sir.

24 Q. Let me hand you Defendant's Exhibit 908. Now, as a

1 matter of fact what you have just described, is that what
2 Marion Moses did when she did her examination of the Nitro
3 workers?

4 A. Yes, sir.

5 Q. Now, she says, does she not, if you look at page
6 169, you see that portion where she talks about occupational
7 history and exposure assessment?

8 A. Yes, sir.

9 Q. Would you read that first sentence a aloud, please?

10 A. "Attempts to construct a reliable exposure index in
11 order to determine whether duration or intensity of exposure
12 to 2,4,5-T was associated with any of the biological various
13 were unsuccessful for several reasons."

14 Q. And the several reasons she talks about are the
15 availability of measurements of the various variables
16 contaminants, finally products in the workplace, correct?

17 A. Yes, sir.

18 Q. The job classifications and work assignments?

19 A. Yes, sir.

20 Q. The fact that workers not directly involved in
21 2,4,5-T production often worked in areas adjacent to 2,4,5-T
22 processes, correct?

23 A. Yes, sir.

24 Q. Now, if you go onto Page 170, sir, she said that --

1 would you read the first paragraph at the top of Page 170?

2 A. "Thus, since Chloracne is generally considered a
3 quite reliable indicator of heavy dioxin exposure, it was
4 decided to use Chloracne as a surrogate for exposure and to
5 classify the study population by its presence or absence. It
6 is recognized that those without Chloracne but with
7 appropriate work history, work exposure history might also
8 have had TCDD exposure and were therefore not unexposed."

9 Q. Unexposed control?

10 A. Control, right.

11 Q. So what she is saying there is that she is using
12 Chloracne as the indicator, correct?

13 A. Yes, sir.

14 Q. That it is possible that there are people who did
15 not have Chloracne, who may have had some degree of TCDD
16 exposure, is that right?

17 A. Yes, sir.

18 Q. But that she was unable to tell which those people
19 were, is that right?

20 A. That's right.

21 Q. So, she compared Chloracne with non-Chloracne,
22 isn't that right?

23 A. Yes, sir.

24 Q. And isn't that exactly what Dr. Suskind did?

1 A. Yes, sir.

2 Q. And Dr. Suskind did that, sir, in the Zack-Suskind
3 study, isn't that right?

4 A. No, sir.

5 Q. Which study was it, sir?

6 A. It was in the Nitro study, the Suskind Nitro study.

7 Q. The Suskind morbidity study?

8 A. Yes.

9 Q. Okay. Now, and did he do that in the Krummrich
10 study as well?

11 A. Yes, sir.

12 Q. Now, sir, if you were to assume that the
13 concentration of 2,3,7,8-TCDD in the materials spilled at
14 Sturgeon were 37 parts per billion, or 40 parts per billion,
15 or 45 parts per billion, would that constitute a hazard with
16 respect to the people who are residents of that town?

17 A. The hazard associated with the dioxin in Sturgeon
18 is going to be related to only one thing and that is man's
19 contact with that material. And man's contact with that
20 material is going to be dependent on how close he gets to
21 it. Now, since this material was not -- that was spilled in
22 Sturgeon was not 2,3,7,8, but was chlorophenol contaminated
23 with dioxin, we had to be concerned there not with the
24 dioxin, but with the chlorophenol, because as small as a half

1 a teaspoon of chlorophenol may well kill a man, a half a
2 teaspoon, and if they were to get that material on their
3 skin, they could get a bad blister, therefore, the amount of
4 contact any man would have with that material would be
5 related to the toxicity of the chlorophenol. So, in order to
6 get to the place where that chlorophenol was not going to
7 produce an irritation and a burn of the skin, the
8 concentration of that chlorophenol would have to get below
9 about five percent.

10 If we get down to five percent of chlorophenol in
11 that area, if they cleaned it up that good so there was only
12 95 percent of it had been cleaned up, the amount of dioxin
13 now present would be below 1 part per billion and so now we
14 have to be concerned with material below 1 part per billion,
15 because once it got down to that level where there was no
16 chance of a man getting a burden, now we have to be concerned
17 with what is the hazard with the man being exposed to one
18 part per billion. And the way the man is going to be exposed
19 to that dioxin is going to be possibly by inhalation if it
20 has sufficient vapor pressure, and for practical purposes the
21 vapor pressure is so low that you can't measure it if we took
22 that same monitor and went out and measured it. So, it isn't
23 going to be an inhalation problem. There are only two ways a
24 man can get it, if it's not inhalation, one is by eating it.

1 And that's very unlikely. The EPA suggests that indeed
2 children could eat it, but they have said that below one part
3 per billion that a child could be eating up to ten grams of
4 that contaminated soil for all of his youth time while he was
5 eating dirt and it would be without effect, would be a safe
6 exposure, so, the practical problem then is related to skin
7 contact. And the likelihood of skin contact along the
8 railroad is very small. So, trying to assess the hazard of
9 the dioxin content as found at 37 to 45 ppb in that
10 chlorophenol, orthochlorophenol-crude spill is -- there is
11 little or no hazard associated with that kind of an exposure.

12 Q. Now, sir, let's assume that there are, whether or
13 not 37 or 45 parts per billion of 2,3,7,8-TCDD in the
14 material and it spills out of the tank car and it hits the
15 soil?

16 A. Yes, sir.

17 Q. Or the ballast. Which is gravel and rock and that
18 sort of thing on top of the dirt below, what happens to it in
19 terms of its concentration as soon as it hits the soil or the
20 gravel or ballast?

21 A. Once it hits the soil, you can't talk about it any
22 longer in terms of that was 45 parts per billion in the soil,
23 it's going to be 45 parts per billion. As soon as it hits
24 the soil it's going to start diluting. And --

1 Q. What dilutes it, the --

2 A. It becomes diluted in the soil. It isn't all going
3 to be chlorophenol. It's not going to be all dioxin. It's
4 going to be impregnated on the dirt, so it's going to be
5 related to the amount of dirt in which it's now
6 contaminated.

7 Q. So that as soon as it hits the soil or the rock or
8 the ballast or whatever, the concentration begins to dilute?

9 A. Yes, sir.

10 Q. And, let's assume then that some of that soil is
11 carried away, is carted off either in drums or in trucks,
12 then if there is dioxin in the soil that is carried away,
13 that dioxin is no longer there, is it, sir?

14 A. No, sir.

15 Q. And, if it drives and blows away in the wind, then
16 it's no longer at Sturgeon, it may be someplace else in the
17 wind, but it's certainly more dilute then?

18 A. Yes, sir, and related to that, if it gets a hundred
19 yards as opposed to one yard away it becomes one
20 ten-thousandths of what it was at one foot or one yard.

21 Q. So it just, the dilution continues geometrically by
22 it's distance from the original source?

23 A. Yes, sir.

24 Q. And whatever there is, whatever there was there in

1 January of '79, is all the dioxin that there was?

2 A. Yes, sir.

3 Q. Now, your concern, your main concern, as I
4 understand it in January or February of 1979, was exposure to
5 the chlorophenol?

6 A. Yes, that might have killed them.

7 Q. And, were you in contact with Harry Gilmer about
8 that, Gilmer knew there was chlorophenol there, didn't he?

9 A. Yes, sir.

10 Q. And, the EPA planned to supervise this clean-up and
11 get it out of there?

12 A. Yes, sir.

13 Q. Now, if you were to assume, sir, that on January
14 the 20th approximately, 19th, 18th, there was a soil sample
15 taken by the EPA, that showed 69,000 parts per million of
16 chlorinated phenols in the soil, what would that tell you
17 about the concentration of the chlorophenols in the soil, on
18 that occasion?

19 A. I assume that's an average, so that says it's about
20 7 percent.

21 Q. That would be an average of the core sample taken?

22 A. Right.

23 Q. So it would be a little under 7 percent?

24 A. Yes, sir.

1 Q. Would that be right about -- you said something
2 about 5 percent?

3 A. Yes, that was to keep from being an irritant.

4 Q. So that at 5 percent or below, it wouldn't even be
5 an irritant any longer?

6 A. That's right.

7 Q. You could still smell it?

8 A. Oh, yes.

9 Q. And that would be the chlorophenol itself?

10 A. Yes.

11 Q. Now, if that chlorophenol, before it hit the soil
12 or the ballast, contained 45 parts per billion of
13 2,3,7,8-TCDD, what would be the concentration of 2,3,7,8-TCDD
14 in that soil contaminated with 7 percent orthochlorophenol?

15 A. It would be less than 2 to 3 parts per billion,
16 because without dilution it would be 3, around 2 to 3 parts
17 per billion, and as soon as it gets in the soil it would be
18 diluted, determined by how much soil it was diluted in.

19 Q. So that if they measure the soil contaminated with
20 OCP and phenol, and that is 7 percent OCP and phenol in the
21 soil, then you would multiply that by the 45 parts per
22 billion to see what the level of 2,3,7,8 could be?

23 A. Yes, sir.

24 Q. And, that would be in the area of what, three?

1 A. Something of that order.

2 Q. Parts per million. Now, you mentioned in your
3 testimony, sir, that it was your understanding that the level
4 of chlorophenol to which the EPA was having the track cleaned
5 was 200 parts per million?

6 A. Yes, sir.

7 Q. Is that correct?

8 A. Yes, sir.

9 Q. Now, what would be -- that would be 3,000, 300
10 times less than that original soil sample, I haven't done my
11 arithmetic here.

12 A. Nor have I.

13 Q. 350 times less than that original sample?

14 A. So you take 350 -- it's of 45.

15 Q. No, you take 350 of whatever it was at 7 percent,
16 wouldn't you, sir?

17 A. No, no, you take it of the original, if you go down
18 to 200 ppm, you take that and that's -- multiply that times
19 45, so it's 45 divided by 350 so that's --

20 MR. CARR: No, it's not Doctor. Mr. Heineman is
21 right and you are wrong. You already reduced it when you get
22 down to 70, that caused you to reduce it.

23 A. I didn't know what that number 350 was.

24 MR. CARR: 200, 1300, 50th of the 70,000, not of

1 the one million.

2 A. Right.

3 Q. So what you would take, sir, if you take 45
4 times.07, that's 3.15 and divide that by 350?

5 MR. CARR: 350.

6 Q. You get .009 parts per billion, correct?

7 A. Yes, sir.

8 Q. Would that be 9 parts per trillion?

9 A. Yes, sir.

10 Q. And is that what the EPA said the University of
11 Illinois found?

12 A. There were several samples that I don't know who
13 did it, but I know there were several samples that were found
14 in parts per trillion range.

15 Q. Well, there were two, sir, weren't there, there was
16 one --

17 MR. CARR: Witness said there was several, I'd like
18 to know those several.

19 Q. Which ones do you know about, sir?

20 A. There is one of 60 parts per trillion, as I recall,
21 and there is another one that was higher than that. There
22 were two samples -- all I recall they were both in the parts
23 per trillion range.

24 Q. Well, we just read about one of them in the exhibit

1 we are looking at, did we not, sir? In Exhibit 867, I don't
2 know if you still have that before you or not?

3 A. No, I do not.

4 THE COURT: Before you get into that exhibit, is
5 this a good point for a short break?

6 MR. HEINEMAN: Sure.

7 A. Oh, yes, I have it.

8 THE COURT: We will take a short break at this time
9 and we will resume testimony. I would remind you this would
10 go for any other breaks we take during the day that you are
11 not to discuss this matter among yourselves, with anyone
12 outside the jury panel, or as of yet form any opinions or
13 conclusions about the matters in trial. Court is in recess.
14 (Following a recess, these proceedings were had in open
15 court.)

16 Q. Doctor, just before the break, I was asking you to
17 look at Defendant's Exhibit 867, do you have that before you
18 there, sir?

19 A. Yes, sir.

20 Q. And that is the Joe Metcalf's memo to the file that
21 we read from earlier, do you recall?

22 A. Yes, sir.

23 Q. And, if you look at Page 2 of that exhibit, it says
24 in the next to last paragraph, it mentions that the EPA had

1 detected 9 parts per trillion of the 2,3,7,8 isomer in the
2 site sample?

3 A. Yes, sir.

4 Q. See that, sir, and on the first page it refers to
5 them getting that site sample and taking it to the University
6 of Illinois at Champaign?

7 A. Yes, sir.

8 Q. See that, sir?

9 A. Yes, sir.

10 Q. Now, is that one sample that you knew about, one
11 test?

12 A. Yes, sir.

13 Q. All right. And then you knew about one that you
14 said was somewhere around 60?

15 A. Yes, sir.

16 Q. Parts per trillion, right? Are there any other soil
17 sample tests for the presence of dioxin that you are aware
18 of, sir?

19 A. No, sir, all I know is that there were soil samples
20 taken for phenol.

21 Q. Okay. And that was done by the EPA?

22 A. No, sir, I don't think so.

23 Q. The samples were taken by whom?

24 A. The clean-up crew, it was under their

1 responsibility.

2 Q. I see. The samples were actually taken by Western
3 Environmental Services?

4 A. No, I think it was subsequent to that.

5 Q. Okay. By O. H. Materials?

6 A. Yes.

7 Q. And they measured the amount of phenol?

8 A. Chlorophenols.

9 Q. Chlorophenols in the soil?

10 A. Right.

11 Q. I think -- I don't want go into all that with you,
12 sir, now, I know the jury has seen Plaintiff's Exhibit 123
13 which is the soil book done by O. H. Materials and that's in
14 evidence. I don't want go through all that with you now. I
15 will ask you this one thing, if you have ever seen that soil
16 book before. Do you have 123? Can't seem to find it right
17 now.

18 THE COURT: Okay.

19 Q. We will get back to it another time. Now, getting
20 back to where we were, Doctor, if the soil sample -- if the
21 soil were reduced to a concentration of chlorinated phenols
22 of 200 parts per million, which, and that contained a
23 concentration of dioxins of 45 parts per billion, then the
24 concentration of dioxin in that soil sample would be 9 parts

1 per trillion?

2 A. Yes, sir.

3 Q. By the calculations we did before. Now, would a
4 soil concentration, sir, of 9 parts per trillion present any
5 hazard?

6 A. No, sir.

7 Q. To anyone?

8 A. No, sir.

9 Q. Now, you mentioned earlier the Center for Disease
10 Control, what was the level which they reached of soil
11 contamination which they found to be the borderline between
12 the level, for a level of concern?

13 A. One part per billion.

14 Q. One part per billion in soil?

15 A. Yes.

16 Q. And what did they say with respect to how much one
17 could consume of soil contaminated with --

18 MR. CARR: Your Honor, this is all repetition.
19 Counsel went into that with this witness just this morning.
20 I object to it, it's cumulative, testimony been in this case
21 at least thirty times by now.

22 THE COURT: Objection is sustained. It is
23 cumulative.

24 Q. Doctor, you mentioned in your testimony a moment

1 ago, that a child could eat, according to the CDC, ten grams
2 of soil per day for its lifetime?

3 A. During the time when it would be eating soil.

4 Q. And, with no adverse effects?

5 A. Yes, sir.

6 Q. And, the -- there has been testimony in the case,
7 sir, by witnesses that the estimate of the total amount of
8 dioxin that could have been spilled at Sturgeon was something
9 on the order of 3 grams. Now, how does that compare, sir,
10 with, for example, the Seveso, or Seveso incident in Italy?

11 A. The number I recall is 2 kilograms.

12 Q. Two kilograms?

13 A. Two thousand --

14 Q. Two thousand grams?

15 A. Right.

16 Q. Was on the soil at Seveso?

17 A. Yes.

18 Q. Now, there have been documents published, have
19 there not, sir, about what has been found among the people at
20 Seveso?

21 A. Yes, sir.

22 Q. And, what is the result of the follow-up of those
23 people, sir?

24 A. There were a small number of people who were

1 exposed to the Seveso spill of 2,3,7,8-TCDD who developed
2 Chloracne. And there were some of them who had some
3 neurologic deficit, and there was something else I've
4 forgotten, some other minor effects, but those over a period
5 of a short period of a year or so, those effects went away
6 and there was no after effects beside the fact that they
7 formerly had had Chloracne.

8 Q. So that the Chloracne that they had went away?

9 A. Yes.

10 Q. Was the Chloracne concentrated, the appearance of
11 Chloracne, was it concentrated among the children?

12 A. Primarily children.

13 Q. Was there an explanation given in those studies as
14 to why the children primarily got Chloracne?

15 A. It has the same concern of CDC that the children
16 are out there playing in the grass, lying in the grass, and
17 getting their hands in the dirt, so that they had by far the
18 greatest exposure.

19 Q. In this, on this grass and soil that had some two
20 thousand grams?

21 A. Yes.

22 Q. Spread on it. And, indeed when this incident
23 occurred, does the literature state something about a cloud
24 of material that came out of the plant and went over the

1 Seveso area?

2 A. Yes, sir.

3 Q. And the children playing hide and seek in this
4 cloud it was so dense?

5 A. Yes, sir.

6 Q. Now, if there had been material in that cloud,
7 obviously that would have been a source of skin exposure to
8 the children, would it not?

9 A. Yes, sir.

10 Q. Now, the Environmental Protection Agency, sir, has
11 listed certain sites in Missouri that they have referred to
12 as dioxin sites, isn't that right?

13 A. Yes, sir, the order of thirty of them.

14 Q. Thirty of them. Has the EPA ever listed Sturgeon
15 as one of those sites?

16 A. Not to my knowledge.

17 Q. Now, what was the contamination level on the
18 Missouri dioxin sites listed by the EPA in the soil to the
19 best of your recollection?

20 A. Any site where they had more than one part per
21 billion.

22 Q. Any site where they had more than --

23 A. One part per billion.

24 Q. What in fact were some of the contaminations, some

1 of those sites?

2 A. Generally the levels of contamination in the sites
3 were in the order of a hundred parts per billion or lower,
4 but they did find at least one place where it went up to one
5 part per million, it was at Quail Run, I think.

6 Q. Now, a number of those people living at those
7 Missouri dioxin sites have been examined medically, have they
8 not?

9 A. Yes, sir.

10 Q. Has there been any Chloracne found in any of those
11 people to your knowledge?

12 A. No, sir.

13 Q. Now, the Times Beach people were examined by the
14 Center for Disease Control, were they not?

15 A. Under the auspices of the CDC.

16 Q. Who actually performed the examination?

17 A. It was primarily done by St. Louis University.

18 Q. Dr. Stephen Ayres?

19 A. Yes, sir, Karen Webb is the one who did the study,
20 but she worked for Dr. Ayres, so they were working at it
21 together, but she was responsible for the conduct of the
22 examination.

23 Q. Now, this was an examination done of people who
24 were at Times Beach and other sites?

1 A. I think it was primarily at Times Beach.

2 Q. And, this area had been sprayed how many years
3 before those examinations had occurred?

4 A. Something in the order of ten years.

5 Q. And, was there any -- I guess there were children
6 living in those communities?

7 A. Yes, sir.

8 Q. Who played in the soil in their yards and did the
9 various things that the CDC was contemplating when they set
10 that one part per billion limit?

11 A. Yes, sir.

12 Q. Is there any evidence reflected by that study, sir,
13 of any adverse effects to any of those people?

14 A. Nothing of statistical significance. In other
15 words, they found nothing they could relate to their being in
16 that area.

17 Q. Now, you mentioned earlier that the 7 percent
18 concentration of chlorinated phenols in the soil would be an
19 average concentration based upon the total of the soil sample
20 taken, is that right, there was a core sample taken it would
21 be averaged out to 7 percent?

22 A. That talk about that 7 percent, that one number we
23 have, that was taken with a core and that was the original
24 concentration in that core.

1 Q. All right. Now, how does the CDC take their soil
2 samples, sir, same way?

3 A. Yes, sir.

4 Q. And, have they devised this one part per billion
5 level in the same fashion?

6 A. Using that -- using those same methods of taking
7 the core sample is the basis for their saying whether it's
8 one part per billion or higher.

9 Q. So, it would be an average?

10 A. Yes.

11 Q. Of whatever would be in the soil, is that right?

12 A. Yes.

13 Q. You mentioned to Mr. Carr in his examination of
14 you, that the period of time as to which you had, you were
15 directing your concern on the Sturgeon matter was during the
16 period of the initial clean-up, do you remember that
17 conversation between you and Mr. Carr?

18 A. Yes.

19 Q. That was that two-month period when Western
20 Environmental Services was in there cleaning up the road bed?

21 A. Yes, sir.

22 Q. That period. Did you consider whether there would
23 be any danger of exposure to any one after that clean-up
24 occurred?

1 A. No, sir.

2 Q. Why not?

3 A. Because they had to clean-up that area to the level
4 where it was not going to be producing a burden on the people
5 and, therefore, it had to be below five percent to me and
6 that means that five percent of chlorophenol is of the order
7 of one part per billion in the soil, that's one. And, in
8 order for them to get that one part per billion, they had to
9 be in contact with the material, and since it was confined to
10 the railroad area, they are not going to be getting into that
11 area to any appreciable amount. Since it was deposited on
12 the, primarily on the chat and gravel, that is sunk down
13 below the gravel, is not going to hold the dioxin, so it's
14 going to be down below that area, and it is not going to be
15 where people are going to be in contact with it. So, without
16 contact with the material, you are not going to be exposed to
17 it and absorb it.

18 Q. Now, you say it was confined to the road bed, now,
19 if there were some that while -- first of all, surely Western
20 Environmental Services would have cleaned up and carried away
21 a large portion of that which had been contaminated.

22 A. Yes, sir.

23 Q. And, it was taken in trucks and drums and railroad
24 cars, I think as we mentioned before. Let's assume that some

1 of this soil might have dropped out of a truck as it was
2 driving out of town?

3 A. Yes, sir.

4 Q. And would be deposited on a street. What would --
5 what effects would that have in terms of the concentration of
6 the material in the soil at the site?

7 A. If we talk about it being at one part per billion,
8 or if we take that 45 parts per billion, and you don't talk
9 about 45 parts per billion, you've got to talk about the size
10 of the thing you are putting out there, and if you put that
11 out there, you are not going to be able to measure it, and if
12 you can't measure it, the CDC said it's not a problem.

13 Q. The Center for Disease Control talked about the
14 various methods of exposure, didn't they?

15 A. They sure did.

16 Q. Did they regard inhalation to be a problem?

17 A. No, sir.

18 Q. Why not?

19 A. Because of the lack of volatility of the material
20 and the fact that the amount that could be deposited on the
21 dust in the area is so small that it was a small portion of
22 the risk factor as far as they calculated it.

23 Q. Now, so that if there were soil that were carried
24 away from the site and dropped off a truck and got scattered

1 on the street, maybe dried there, become dust and blew in the
2 wind, would that have, what effects would that have on the
3 concentration with respect to that soil?

4 A. Which soil?

5 Q. That which had dried and became dust and blown in
6 the wind?

7 A. The site where it was taken from or where it was
8 deposited?

9 Q. Where it's deposited, sir.

10 A. It depends on how much was in that, how big. We
11 are talking about in soil that was carried away and the cloud
12 was left there. Got to talk about how much we are talking
13 about, but no matter what, it would be so small, once it's
14 broken up, that you wouldn't be able to measure it. It would
15 not be a source that could be measured, and if it's not
16 measurable, you can't talk about the effect.

17 Q. Now, of that three grams that was there, we know
18 that some would have washed perhaps into the pond, if some
19 washed into Mr. Kemner's pond that would no longer be in the
20 road bed, would it, sir?

21 A. No, sir.

22 Q. Would the effect of removing it from the road bed
23 and it washing over to Kemner's pond, would that have a
24 tendency to dilute it?

1 A. The amount that is washed away into the pond can no
2 longer be in the railroad, so both of them are diluted.

3 Q. So the amount that is in the railroad bed is
4 diluted by whatever goes into the pond, but the amount in the
5 pond is diluted from what the level was when it was in the
6 railroad bed?

7 A. Yes, sir.

8 Q. Is that by virtue of the fact that it's been mixed
9 now with water and other soil and things like that?

10 A. Yes, sir.

11 Q. Now, let's assume, sir, that some goes off into
12 Saling Creek, would there be a further diluting of that?

13 A. Yes, sir.

14 Q. And any that went down the creek would be gone?

15 A. Yes, sir, it's well demonstrated from the time the
16 Missouri sites, the Minker Stout area, there was a place
17 where they had had the dirt that had been in the Shenandoah
18 Stables was taken over. And it was the high parts, it was in
19 parts per million when it was put there. And, they did a
20 study of an stream that ran down there and despite this being
21 in parts per million, they found it in that stream bed in
22 parts per trillion. Just again demonstrating, and they
23 wouldn't find it very often, they knew that the soil was
24 being carried away because they could see where a ravine had

1 been cut that had carried the soil away.

2 Q. You mean there was erosion of the soil?

3 A. That's right, and the amount they can measure down
4 in the stream was in the parts per trillion range compared to
5 parts per million where it had been deposited.

6 Q. Okay. Parts per million would be a thousand times
7 higher than parts per billion?

8 A. Yes.

9 Q. Now, if you were to assume, sir, that there was a
10 flushing operation that occurred in 1979 and 1980 on the
11 railroad track, including the passing track, where water was
12 injected into the ballast, what do we know now about the
13 ability of water to remove dioxin from sand or gravel or
14 rock?

15 A. You do it by comparison. Dioxin has an affinity for
16 some soils more than others. And it is not clear what all
17 the factors are related to, but it appears to be related at
18 least to the organic content of the soil. In comparing that
19 with rock, and chat, and sand, there is very little
20 absorption that takes place on those, except for the little
21 bit of organic that may be on the surface of it, so there can
22 be some, but by and large it is washed off the rock.

23 Q. Now, have there been studies or tests done which
24 have demonstrated that principle?

1 A. The studies down at Elgin Air Force Base is where
2 they looked to see if it comes off of the sand.

3 Q. Okay. How do you spell that, sir?

4 A. E-l-g-i-n, I think, Eglin.

5 MR. CARR: Eglin, not Elgin.

6 A. E-g-l-i-n.

7 Q. E-g-l-i-n?

8 MR. CARR: Yes.

9 A. Yes.

10 Q. Okay. So there have been studies at Eglin Air
11 Force Base indicating the proclivity of dioxin to bind to
12 sand?

13 A. No, to wash it off of sand, will come off of sand.

14 Q. Whether it can be washed off?

15 A. Matter of degree again is not absolute.

16 Q. Now, if you were to assume that the water that
17 would be flushed through the track would be carried into a
18 filtration system, with perhaps activated carbon or something
19 in the filtration system, would that tend to remove dioxin?

20 A. I'm sure it would.

21 Q. Why do you think that the activated carbon or
22 charcoal would tend to remove dioxin from water?

23 A. The same thing we know that it binds to organic, is
24 the same thing would make it bind to the active charcoal.

1 Q. Organic material is material that has carbon atoms
2 in it, isn't that right, sir?

3 A. That's right.

4 Q. That's how organic material is defined, really,
5 carbon and hydrogen?

6 A. Yes, sir.

7 Q. Now, Mr. Carr suggested to you that the photographs
8 taken at Sturgeon would show dioxin in the snow, you remember
9 that, sir?

10 A. I didn't recall him saying.

11 MR. CARR: I'm sure he couldn't recall it because I
12 asked him nothing about dioxin in the snow. You must be
13 thinking about some other case.

14 MR. HEINEMAN: No, I remember your saying something
15 about dioxin in the snow and you don't have an obligation to
16 test the soil and prove it's still there. I remember that
17 very clearly.

18 Q. Now, sir, can you see dioxin in snow?

19 A. If you had enough.

20 Q. If you had enough you could see it?

21 A. Sure.

22 Q. What would it look like?

23 A. I don't know, I've never seen it.

24 Q. Do you know how much it would take to see it?

1 A. I'm not even sure what the color of it is and
2 depending on what color it is, but it certainly ought to in
3 grams, I don't know, but it certainly would be an appreciable
4 amount, much greater than we are talking about.

5 Q. So if you had three grams spread over a half a
6 mile, you think you'd be able to see that in the snow?

7 A. No, sir.

8 Q. You had some conversation with Mr. Carr about
9 whether or not a no-effect level of dioxin had ever been
10 established, you remember that, sir?

11 A. Yes, sir.

12 Q. What do you mean by the term established, what does
13 that mean to you?

14 A. Established means that there is sufficient
15 information to say that if a man is exposed to that material,
16 then it is quite clear that that level of exposure won't
17 produce any effects.

18 Q. Does it have anything to do with any official
19 recognition?

20 A. Yes, sir.

21 Q. What is that official recognition?

22 A. The EPA and CDC has come to the place where they
23 say that at one part per billion that level of exposure is
24 safe for man's exposure for a lifetime. That's an

1 established number, then it results, it's really a consensus
2 of all experts saying that's a reasonable place to say that
3 there is no -- that could be without effects.

4 Q. Have there been, sir, incidents which would
5 demonstrate that at a particular level no effect occurred?

6 A. There have been a series of -- depends on acute or
7 chronic effects. There is little doubt that the level of a
8 hundred parts per billion in the soil does not produce
9 Chloracne. And so that is established fact for practical
10 purposes that you are not going to get Chloracne if it's less
11 than a hundred parts per billion, and I suppose if you looked
12 hard enough we could find some level higher than that that
13 will not produce Chloracne. You could do some work but it
14 would be a calculation of what would be a safe level of
15 preventing Chloracne in the soil. Now, in terms of the
16 long-term health effects, there are a number of lifetime
17 studies in which they have not demonstrated a cancer effect.
18 The Germans did find three cases of stomach cancer as I
19 recall in their work force, but they didn't have any excess
20 of cancer. But they had three stomach cancers and they
21 couldn't decide whether that was related to the exposure or
22 not. But, when you put all of them together with the others
23 not showing stomach cancer, it was to indicate that the level
24 of exposure of occupational exposure is without effects. We

1 are still left with the problem what to do about the soft
2 tissue sarcomas that have come out of a number of studies.
3 But the sum total of looking at all the soft tissue sarcoma
4 studies to me, say that there is little or no evidence that
5 soft tissue sarcomas is produced by the levels of exposure
6 that have happened in industry with levels up to -- I don't
7 know how high, at least 50 ppm and higher.

8 Q. At least what?

9 A. 50 ppm.

10 Q. 50 parts per million?

11 A. Yes, and higher without any evidence of cancer or
12 soft tissue sarcoma being established.

13 Q. So that there obviously are no-effect levels but
14 there has been no official recognition of a no-effect level,
15 is that what you are saying?

16 A. That's right.

17 Q. Let me ask you about those soft tissue sarcomas,
18 sir. Mr. Carr asked you about the NIOSH studies in which
19 there had been a combination of those soft tissue sarcomas
20 which had been found among Monsanto employees with those that
21 had been found among Dow employees, you recall that?

22 A. Yes, sir.

23 Q. What -- that study was published a number of years
24 ago, was it not?

1 A. The review of that was only in the last year or
2 two.

3 Q. The --

4 A. At first there was a concern that they had those
5 seven or eight cancers that represented some multiple, I've
6 forgotten how, but appreciable increase over expected, when
7 they took those out of those Dow-Monsanto studies, but that
8 was based on findings of seven soft tissue sarcomas, and then
9 when they went back and started looking at themselves as you
10 should do, NIOSH decided that three of those people did not
11 have exposure to dioxin or significant exposure or measurable
12 exposure by their definition. They called them non-exposed
13 and couldn't be associated with it, and then there are
14 several of them in which the tumors that had originally been
15 called soft tissue sarcomas were not soft tissue sarcomas.
16 So they ended up with two tumors that are soft tissue
17 sarcomas, which makes it a game of saying it has no
18 established relationship.

19 Q. Now, has -- those studies, and I don't know if you
20 can call them studies, I remember something done by a Dr.
21 Honcher and then followed up by a Fingerhut, is that what you
22 are talking about?

23 A. Yes, sir.

24 Q. Now, and Dr. Honcher is employed by NIOSH?

1 A. I think she still is, when we started it, but
2 Fingerhut took over the responsibility for it.

3 Q. On behalf of NIOSH?

4 A. Yes.

5 Q. So is it now NIOSH's position that that soft tissue
6 sarcoma question that was raised originally by Honcher is no
7 longer a concern?

8 A. No, they are really saying they can't, that concern
9 has been lessened, but to establish that there is no effects
10 they are still wanting to do some other studies.

11 Q. They want to do additional investigation but they
12 are saying that what they thought was initially a connection
13 does not apparently exist because of additional data?

14 A. That's right.

15 Q. Now, one of the things that Mr. Carr asked you
16 about was whether or not if there were dioxin in the material
17 that went into the ballast, that it would tend to be
18 concentrated at the top, do you remember that questioning?

19 A. Yes, sir.

20 Q. Would it indeed concentrate at the top layers of
21 whatever material it was going through?

22 A. The distribution of dioxin in the soil when it is
23 put on the surface initially, when it's put down, will be
24 higher on the surface than it is deep, so there will be a

1 gradation down to zero, based on how much was put on the
2 soil, the porosity of the soil, so that if you had sand, the
3 concentration on the top would be relatively soil. If it was
4 rock on the surface it would be relatively soil. So it would
5 run through that and start binding to the soil as it goes
6 down. There is no evidence that the concentration would be
7 higher in the soil than it was in what was put on the top of
8 the soil. If it were that, there would have to be a
9 filtering system that collects it out of that, and there is
10 nothing to suggest that that is the case. But, it could come
11 up, I would suspect, if you kept on putting it so that it
12 would approach the concentration in the material that was put
13 on it. But not higher than.

14 Q. So at the top it could approach the concentration
15 of the material that was put on?

16 A. Right.

17 Q. The top. That would be what, if you get putting it
18 on?

19 A. Yes.

20 Q. Now, if it were concentrated at the top, if you
21 remove the top, you would remove the greatest concentration?

22 A. Yes, sir. Yes, sir.

23 Q. There were some -- Mr. Carr was asking you about
24 the Freeman and Shroy studies that have been done at

1 Monsanto, and I wonder if you would -- well, let me ask you
2 this, there was a discussion between you as to whether or not
3 you agreed with their conclusion, you remember that, sir?

4 A. Yes, sir.

5 Q. Now, as I recall, sir, you said that what they have
6 shown is that whatever is at the surface of the soil, does
7 disappear, but their model is an attempt to explain why. Is
8 that right?

9 A. Yes, sir.

10 Q. So you don't disagree with the fact that it goes
11 away or leaves the soil, you are just not sure if their model
12 explains why?

13 A. That's right.

14 Q. Is there any other explanation that you know of as
15 to why?

16 A. I'm not a physicist in talking about how dioxin
17 would move in the soil, so I can't answer that question.
18 What they are really trying to deal with is that if the
19 material is left on the soil, as in Times Beach, or where
20 ever else it's been deposited, the concentration falls
21 relatively fast at the surface. So that instead of having a
22 gradient from the highest concentration on the surface down to
23 the deepest point, falling off as it goes, with a period of
24 time the concentration falls, and we are talking about ten

1 years now, the concentration false first on the soil, and so
2 whether the dioxin moves up by diffusion to the top and then
3 evaporates over a period of ten years, that's not talking
4 about very much per day, or per week, or per month, or
5 whether it gets to the surface and is destroyed by photolysis
6 or being exposed to the sunlight is not known. That is what
7 they are trying to prove right now. But, there is little
8 question that when the dioxin is put on the surface where
9 there is carbon, and were there is a hydrogen source, that
10 the dioxin is broken down relatively rapidly. So, what gets
11 to the surface may be evaporating or being destroyed very
12 rapidly because of contact with the sun. That is where the
13 quarrel comes, but the fact is that over a period of ten
14 years, a significant portion of it depends on the binding of
15 the soil, how tightly it's bound, but 60, 70 percent of it
16 may well be removed.

17 Q. The -- this is not related to the half-life
18 phenomenon, is it, sir?

19 A. It's the basis for the half-life determination.

20 Q. Now, if the level at the surface of the soil were
21 one part per billion, or ten parts per billion, what would be
22 the concentration of any volatilization -- let's assume that
23 it isn't immediately destroyed by the sun on the surface, but
24 rather that it volatilizes in some way, and then gets up in

1 the air, what is the concentration that that would be if it
2 were one part per billion or even ten parts per billion in
3 the soil itself?

4 A. Infinitesimal, not measurable.

5 Q. The vapor pressure of dioxin is extremely low, is
6 it not?

7 A. Very very low.

8 Q. So that there may be a few molecules breaking off
9 at a time and getting up in the air. Would that be the kind
10 of thing you would be talking about?

11 A. Yes, sir.

12 Q. In other words, when Shroy and Freeman are
13 describing this principle, they are talking about dioxin
14 moving. Is it molecule by molecule, or is it in larger
15 portions than that? Or how does that work?

16 A. It would be dependent on how much is there, I
17 suspect, but at a level of one part per billion, you are
18 talking molecules.

19 Q. Certainly whatever was available by volatilization
20 would be at a lesser concentration than the one part per
21 billion that CDC says you can be exposed to without adverse
22 effects?

23 A. Because they included that.

24 Q. Explain that to me, sir, I'm not sure I

1 understand.

2 A. When they reach the one part per billion by
3 assuming the man, or the child who is exposed to that
4 material, they consider it all sources of exposure which may
5 include that, that they can breathe in, the amount they can
6 get on the dust, the amount that he can get from getting it
7 on his skin and absorbing one percent of it, and the 30
8 percent he would get if he ate ten grams per day, so they are
9 considering all of those, and that is one part per billion
10 that is safe, includes the amount that would be taken in by
11 vaporization.

12 MR. CARR: Object to the continued use at one part
13 per billion is safe by CDC. What they said is one part per
14 billion is a level of concern. They did not call it safe. I
15 object to that and ask the jury be instructed to disregard
16 it.

17 THE COURT: Jury is so instructed.

18 MR. HEINEMAN: Your Honor, I believe that that
19 level is referred to in two places in that work, and in one
20 place I believe it's referred to as a safe level.

21 THE COURT: I don't believe that is correct, I
22 think it is considered as a level of concern. The jury is
23 ordered to disregard the phrasing that has been objected to,
24 to which this Court has agreed, and all future phrasing at

1 that level will be in the level as stated by the CDC as level
2 of concern. You may proceed.

3 Q. (by Mr. Heineman) sir, Mr. Carr asked you whether
4 you felt there was a higher risk of cancer for the children
5 of Sturgeon by virtue of the spill, do you recall that?

6 A. Yes, sir.

7 Q. Do you believe there is a higher risk of cancer for
8 those children at Sturgeon?

9 A. No, sir.

10 Q. Why not?

11 A. Because they are not being exposed to that material
12 in any appreciable amount, measurable amount.

13 Q. Do you believe that there is -- there have been a
14 number of other studies in which the subject of cancer has
15 been addressed, have there not?

16 A. Yes, sir.

17 Q. Does Diamond Shamrock, did they discuss the cancer
18 phenomenon?

19 A. I don't think so.

20 Q. How about Coalite and Seveso incidents?

21 A. The Coalite was done.

22 Q. Do any of the studies that you are aware of, of
23 occupational exposures or industrial accidents demonstrate a
24 higher risk of cancer as a result of dioxin exposure?

1 A. No, sir.

2 Q. Now, there was conversation between you and Mr.
3 Carr with respect to the Binghamton, New York fire, do you
4 remember that?

5 A. Yes, sir.

6 Q. And that was a fire in which the -- he showed you
7 an article which said that it had been estimated that there
8 was 2.8 parts per million of 2,3,7,8-TCDD found in the soot
9 that resulted from that fire, do you recall that?

10 A. Yes, sir.

11 Q. Now, do you know, sir, whether there has been a
12 follow-up with respect to the people that were exposed to
13 that clean-up of that fire?

14 A. I recall reading that a Dr. Kim from the Health
15 Department had an examination of those people and found no
16 evidence of an adverse effect on them.

17 Q. Dr. Kim of who?

18 A. He's with the Health Department, I think.

19 Q. Of the State of New York?

20 A. Yes.

21 Q. Now, that was an incident in which -- would that be
22 characterized as an acute or a chronic exposure?

23 A. It would have to be -- depends who we are talking
24 about. Those who were exposed for a brief period of time

1 before they found what was taken place would be called
2 acute. Those who were working and had some participation in
3 the clean-up of it would be called more chronic exposure.
4 How long we going to call chronic, I don't know the details
5 of who participated and how long, but they would be
6 relatively chronic, and in those who were involved in the
7 clean-up.

8 Q. Now, the Binghamton incident, was one in which
9 there was a fire in an enclosed building, is that correct,
10 sir?

11 A. Yes, sir.

12 Q. And, the soot from the fire was conducted up into
13 all kinds of nooks and crannies around the building, isn't
14 that right?

15 A. Yes, sir.

16 Q. And it was up in air ducts in the air conditioning
17 system and up between the floors and behind the covering of
18 the walls and that sort of thing?

19 A. Yes, sir.

20 Q. Now, there would be no, and I think it was tested
21 for its level before it was cleaned up. I'm sure they went
22 in and tested it while it was still on the site, the soot?

23 A. Yes, sir.

24 Q. And, there wouldn't be any sun within that building

1 to destroy any dioxin, would there be, sir?

2 A. No, sir.

3 Q. There would certainly be sun at Sturgeon, wouldn't
4 there?

5 A. Yes, sir.

6 Q. There wouldn't be any wind or rain inside that
7 building to have any effect on the concentration of the soot
8 there, would there, sir?

9 A. No, sir.

10 Q. But there certainly would be wind and rain at
11 Sturgeon, wouldn't there?

12 A. Yes, sir.

13 Q. Now, in discussing the Seveso incident with you, I
14 recall that Mr. Carr read to you from an exhibit that he
15 called -- it was Plaintiff's Exhibit 1399 A, it was a portion
16 of a study, do you remember him reading some information to
17 you about that? About the Seveso incident?

18 A. Yes.

19 Q. And there was a woman there who had had some
20 2,3,7,8 found in her body tissues, do you remember that?

21 A. Yes, sir.

22 Q. Let me hand you what has been marked here as
23 Plaintiff's Exhibit 1399 A, which is apparently Page 2 of
24 another document, is it not, sir?

1 A. Yes, sir.

2 Q. Now, he was -- Mr. Carr was telling you that this
3 woman had had a cancer, correct?

4 A. Yes, sir.

5 Q. And that had she had died from a pancreatic
6 adenocarcinoma seven months after the Seveso accident, isn't
7 that right?

8 A. Yes, sir.

9 Q. I think he had you read that sentence into the
10 record, as I recall?

11 A. Which sentence?

12 Q. The one that says the subject of the study was a 55
13 year old woman?

14 A. Yes, sir.

15 Q. There was another sentence just following that I
16 don't recall any mention being made of and it says, "Although
17 the cancer was not a result of the exposure to TCDD, the
18 woman was significantly exposed to the toxic cloud." So this
19 lady's cancer, according to this article, was not a result of
20 her TCDD exposure, correct?

21 A. Yes, sir.

22 Q. But, it does say that she did have significant
23 exposure to the toxic cloud, and it does say that she did
24 have some TCDD in certain portions of her body, is that

1 right?

2 A. Yes, sir.

3 Q. As a matter of fact, it was as high as 1.8 parts
4 per billion in her fat, isn't that right?

5 A. Yes, sir.

6 Q. Put down as 1840 parts per trillion, but that would
7 be 1.8 ppt, wouldn't it?

8 A. Yes, sir.

9 Q. And the lowest concentration that they said they
10 found was in her blood, is that correct?

11 A. Yes, sir.

12 Q. At 6 parts per trillion?

13 A. Yes, sir.

14 Q. Do you know what they mean when they say values
15 obtained at a resolution of 10,000, do you know what that
16 means?

17 A. No, I don't.

18 Q. Now, is there such a thing, sir, as body burden
19 with respect to a dose being absorbed by a living animal or
20 man or child?

21 A. For dioxin?

22 Q. Yes, sir?

23 A. Yes, there is.

24 Q. And, one of the things they measure when they do

1 testing of rats and mice and that sort of thing is they
2 determine what the total body burden is?

3 A. They approximate it.

4 Q. And they measure the dose and the body burden by
5 virtue of telling you how much of the material, as in, for
6 example, micrograms was given per gram or kilogram of body
7 weight?

8 A. Yes, sir.

9 Q. And that tells you how much they are really getting
10 in them for each gram or kilogram that they weight, is that a
11 way of addressing the body burden question?

12 A. Well, the body burden simply means the amount of
13 that material, foreign substance, that you find in the body.
14 And, the way that is done is either if it was -- if it's
15 something that can't be burned, as you destroy the tissue, we
16 are talking about an element. If you want to measure
17 calcium, you burn up the tissue and then measure the calcium
18 or the lead or the thorium or whatever, so that you are
19 really trying to find the total in the body. If I have a
20 substance that is found in just certain tissues, you take the
21 amount, concentration in that tissue and multiply the amount
22 of that tissue. And, if you have, if you want to do many
23 tissues, you've got to measure each one of those tissues and
24 multiply the amount of that tissue, and you add up all those

1 and that gives you the body burden.

2 Q. Now, does the body burden have anything to do with
3 whether a person, whether one person may have a toxic effect
4 and another person may not, from an exposure to the same
5 amount of material?

6 A. Yes, sir.

7 Q. So that a child might get a certain amount, and
8 have a greater reaction than that very same amount would have
9 in the system of an adult, because the adult's body is larger
10 and the, and its ability to handle the material might be
11 better, is that correct?

12 A. The amount that the two different people absorb
13 will have a number of independent variables in terms of
14 whether the adult has less absorptive surface in his
15 gastrointestinal tract than a child as relative to his makes,
16 so that less will be absorbed in an adult than it will be in
17 the child porportionately, so he will get more absorbed.
18 Then we are talking about dioxin as a child has less fat and
19 so he won't store it the same as an adult. The adult with a
20 large fat store will store it more than the child will, so
21 there are a number of factors determining whether -- but
22 that's more important, the dose, than is the variability in
23 the response.

24 Q. You were questioned by Mr. Carr with respect to

1 differences in susceptibility between people?

2 A. Yes, sir.

3 Q. And, that was the next step I wanted to get to.
4 Which is more important in determining whether a toxic effect
5 will occur, is it the dose response relationship, or the
6 susceptibility aspect?

7 A. The susceptibility and the variability between
8 individuals is established by the dose response curve. The
9 sharper the dose response curve, the less variability of
10 effect between those who are less sensitive and those who are
11 very sensitive, where the acute response that we talk about
12 related to dioxin, that's relatively steep. If the effect is
13 very slow in effect, then the susceptibility becomes of a
14 greater importance.

15 Q. Of greater importance than it would be in the acute
16 response?

17 A. That's right.

18 Q. But it's still -- the dose response relationship,
19 that predominates?

20 A. That's right.

21 MR. HEINEMAN: Your Honor, it's two minutes to
22 twelve, I don't know if -- this would be a good place to
23 break for me.

24 THE COURT: Fine, if it's a good place to break, we

1 will do it at this time. We will recess at this time for
2 lunch. We will start again at one o'clock. I would remind
3 you that the admonishments, excuse me, that I gave you
4 earlier will apply during this lunch break. The Court is in
5 recess for lunch.

6 (Following a recess for the lunch hour, these proceedings
7 were had outside the presence of the Jury.)

8 MR. HEINEMAN: We were putting on the record the
9 fact that we have requested the opportunity to take the
10 deposition of Mrs. Diane --

11 MR. CARR: Nicks.

12 MR. HEINEMAN: N-i-c-k-s, who is the next witness
13 to be called by Mr. Carr, on Monday afternoon at 1:30, at Mr.
14 Carr's office in Belleville. He has agreed, and we came in
15 to get the permission of the Court for that discovery.

16 THE COURT: Fine. She is the person who --

17 MR. CARR: Prepared the Exhibit 1507.

18 THE COURT: All right, fine. We are scheduled to
19 be off for another reason Monday afternoon. I have no
20 problem with that. It's by agreement of counsel. I'll be
21 happy to concur in the agreement.

22 (The following proceedings were had in open court.)

23 THE COURT: Okay.

24 Q. (by Mr. Heineman) Doctor, let me hand you, sir,

1 what's been previously marked as Plaintiff's trial Exhibit
2 1255. I don't have the official copy of it, Your Honor, I
3 just have my own copy. Do you have it locally? Here's 1255,
4 Doctor. And would you tell us what that is, please?

5 A. This is a report by Dr. Kimbrough and Dr. Falk and
6 Dr. Stare of the Center for Disease Control. And by George
7 Friess or Friess from the Department of Agriculture, and it's
8 a report titled health implications of
9 2,3,7,8-tetrachlorodibenzo-dioxin, TCDD, Contamination of
10 Residential Soil. And it was published in the Journal of
11 Toxicology and Environmental Health, Volume 14, Page 47,
12 1984. Now, sir, this is the CDC study that we were talking
13 about before, is it not?

14 A. Yes, sir.

15 Q. Now, I'd like to direct your attention, please, to
16 Page 48, which is the second page of the exhibit, do you see
17 that, sir?

18 A. Yes, sir.

19 Q. And I'd like to direct your attention to the
20 sentence beginning in the middle of the second paragraph,
21 begins with the word in consideration, you see that?

22 A. Yes, sir.

23 Q. Would you read that aloud, please?

24 A. "In consideration of the range of the estimated

1 VSD, that means virtual safe dose, and because of the
2 unlikelihood of all of the conservative exposure assessment
3 assumptions will be realized on a continuous or lifetime
4 basis, we have concluded that residential soil levels greater
5 than one part per billion TCDD pose a level of concern."

6 Q. Would you go on, sir?

7 A. "The appropriate degree of concern for which
8 management decisions should be made also consider an
9 evaluation of the specific circumstances of shall
10 contaminated site."

11 Q. Now, would you read the next paragraph that goes
12 over onto the next page, please?

13 A. "Exposure in contaminated residential areas would
14 be greater than in only occasionally frequented commercial
15 areas. In residential areas, levels at or above 1 ppb in
16 soil cannot be considered safe and represent a level of
17 concern. In certain commercial areas, higher levels may be
18 may present --

19 MR. CARR: May present.

20 A. "May present an acceptable risk to
21 nonoccupationally exposed individuals. On ranges and
22 pastures, however, lower soil levels may still be of concern,
23 since TCDD accumulates in the tissues of grazing cattle and
24 rooting swine."

1 Q. Thank you, sir. Now, Doctor, now I'd like to
2 redirect your attention to Plaintiff's Exhibit 1507, that's
3 the summary that Mr. Carr had prepared of the Krummrich plant
4 health study, is it not, sir?

5 A. Yes, sir.

6 Q. And, yesterday we talked about the Chloracne and
7 the symptoms and the porphyrins and today I'd like to deal
8 with the other abnormal lab reports. Direct your attention
9 if I may, sir, first to the report that you have before you
10 with respect to Mr. James Bady.

11 A. Yes, sir.

12 Q. Now, sir, if I can direct your attention to the
13 last couple of pages which contain the METPATH lab results?

14 A. Yes, sir.

15 Q. And, you see a report there for globulin?

16 A. My copy is very faint on --

17 Q. I think it's on the last page.

18 A. Yes, sir.

19 Q. You see that that's reported at 4.40?

20 A. Yes, sir.

21 Q. And that would be beyond the reference range and
22 that would be high, would it not?

23 A. Yes, sir.

24 Q. And if you look at alkaline phosphatase?

1 A. I think I see it.

2 Q. It is there right below it?

3 A. Right.

4 Q. See that? And that's at a level of 60?

5 A. Yes.

6 Q. And that's beyond the reference range?

7 A. Yes, sir.

8 Q. And there -- so there are two that are listed as

9 high, there are two that are on there as high, is that

10 correct?

11 A. Yes, sir.

12 Q. Now, can you read the level reported for the

13 albumin globulin ratio?

14 A. I can't be sur, but it's something less than one, I

15 think.

16 Q. You think that's -- that would be below the

17 reference range?

18 A. Yes.

19 Q. Can you read the one for total protein?

20 A. No, I cannot.

21 Q. So on the copy you have, you can't tell whether

22 that's within the reference range or not?

23 A. No, sir.

24 Q. So there are three that you read that are within,

1 that are outside the reference range, and one that you are
2 unable to read, so you can't tell one way or the other?

3 A. That's right.

4 Q. Are there any other items in that laboratory report
5 that you can find that are outside the reference range?

6 A. Triglycerides are listed as being outside..

7 Q. They have an asterisk next to them, do they not,
8 sir?

9 A. Yes, they do.

10 Q. What does that asterisk -- that refers to an 04,
11 footnote four?

12 A. Yes, sir.

13 Q. What does footnote four tell you?

14 A. "Results greater than 300 milligrams per hundred
15 ml. on a fasting sample, I think. May -- I'm saying that
16 implies or something hyperlipidemia.

17 Q. All right. So there are four abnormal items that
18 you found there, is that correct?

19 A. Yes, sir.

20 Q. And, indeed if you look at 1507, there are four
21 abnormals checked, are there not?

22 A. No, there are five checked.

23 MR. CARR: You overlooked the lipids, counsel.

24 Q. I'm sorry.

1 A. You included the lipids.

2 Q. All right. So triglycerides would be the one
3 lipid, correct?

4 A. Yes.

5 Q. And then there are four other than lipids checked?

6 A. Yes.

7 Q. Is that right?

8 A. Yes, sir.

9 Q. You found three other than lipids and one that you
10 couldn't read, and that may be abnormal?

11 A. That's right.

12 Q. You can't tell by looking at it. So that -- all
13 right, sir. Would you pull -- the next one would be Mr.
14 Herman Bellm, B-e-l-l-m?

15 A. Yes, sir.

16 Q. Would you turn to the last page, sir?

17 A. Yes, sir.

18 Q. There is a value of 9.60 listed for uric acid, is
19 there not?

20 A. Yes, sir.

21 Q. And that's beyond the reference range?

22 A. Yes, sir.

23 Q. And are there any others listed that are beyond the
24 reference range?

1 A. No, sir.

2 Q. If you look at Plaintiff's Exhibit 1507, you see
3 that there are two checks for other?

4 A. Yes, sir.

5 Q. Abnormal lab results, and you only see one on the
6 report?

7 A. Yes, sir.

8 Q. Is that correct, sir?

9 A. Yes, sir.

10 Q. Would you look at Mr. Gregory Begs, please.

11 Q. Beys, Beys, I guess that is, not Begs?

12 A. Yes, sir.

13 Q. Turn to the last page, you'll see that there is an
14 abnormal.

15 MR. HEINEMAN: Excuse me, Your Honor.

16 Q. For Mr. Beys or Beys you see a BUN that's high?

17 A. Yes, sir.

18 Q. And a total protein that's high?

19 A. Yes, sir.

20 Q. And the cholesterol is high?

21 A. Yes, sir.

22 Q. And there are three listed?

23 A. Yes, sir.

24 Q. On the report, is that right?

1 A. Yes, sir.

2 Q. Now, would you look at Mr. Charles Boeckman.

3 B-o-e-c-k-m-a-n?

4 A. Yes, sir.

5 Q. Now, you look at the last page of that, you see a
6 total serum lipids as being high, correct?

7 A. Yes, sir.

8 Q. And there is one in the box for lipids, correct?

9 A. Yes, sir.

10 Q. And you see total iron as high?

11 A. Yes, sir.

12 Q. So there is one other type of lab report that's
13 abnormal, correct?

14 A. Yes, sir.

15 Q. And if you look at Mr. Boeckman on Plaintiff's 1507
16 they have two checkmarks for other abnormalities rather than one?

17 A. Yes, sir.

18 Q. Isn't that right?

19 A. Yes, sir.

20 Q. Let's look at Mr. Carter, Gaylord Carter, G.
21 Carter?

22 A. Yes, sir.

23 Q. And you see abnormalities listed for the lipids, do you
24 not, sir?

1 A. Yes, sir.

2 Q. And there are two checkmarks under Gaylord Carter?

3 A. Yes, sir.

4 Q. For abnormal lipids on 1507, correct?

5 A. Yes, sir.

6 Q. There is also a checkmark on 1507 for other

7 abnormal lab reports, correct?

8 A. Yes, sir.

9 Q. Is there another non-lipid, other abnormal lab

10 report listed there, sir?

11 A. No, sir.

12 Q. All right. Let's look at Louis Conte, please.

13 A. What was the name?

14 Q. Conte, C-o-n-t-e.

15 Q. We need to look at the next to last page on my

16 copy.

17 A. Yes, sir.

18 Q. You have a high triglyceride listed there, correct?

19 A. Yes, sir.

20 Q. And that would be a lipid?

21 A. Yes, sir.

22 Q. And there is a checkmark for high lipid for Mr.

23 Conte, correct, on 1507?

24 A. Yes, sir.

1 Q. And you have two other high results there?
2 A. Yes, sir.
3 Q. Protein and globulin, correct?
4 A. Right.
5 Q. Mr. Conte, 1507, lists three?
6 A. Yes, sir.
7 Q. When there are two?
8 A. Yes, sir.
9 Q. How about Joseph Crame, please, C-r-a-m-e?
10 A. Is that 007?
11 Q. Yes.
12 Q. Sir, I see from Mr. Crame on 1507 that there are
13 two lipids checked as abnormal?
14 A. Yes, sir.
15 Q. Two checkmarks in lipids?
16 A. Yes, sir.
17 Q. Do you see any abnormal lipids in the laboratory
18 result?
19 A. Yes, sir.
20 Q. You do?
21 A. Yes, sir.
22 Q. Where are they, down at the bottom there?
23 A. Yes.
24 Q. Those are abnormal lipids? How many do you see,

1 sir?

2 A. They list four, but the -- only two of them are
3 outside of the range as listed.

4 Q. Which two are outside the range, sir?

5 A. Cholesterol and the LDL.

6 Q. Isn't cholesterol 260, sir?

7 A. On my page it's 301. There is two ways of looking
8 at those elements, one is by chemical analysis, one is by he
9 electrophoresis. Yes, I read it from here.

10 Q. Oh, there is one over there, okay.

11 MR. CARR: Another page, counsel.

12 A. One is chemical method, the other is
13 electrophoresis?

14 A. So has an upper range of 300 and it's 301?

15 A. Right.

16 MR. CARR: On the same page it's also 311 counsel,
17 if you look a little lower.

18 A. Yes.

19 Q. All right. So there are two lipids that are
20 abnormal, is that correct?

21 A. Yes, sir.

22 Q. And there are two lipids checked on 1507?

23 A. Yes, sir.

24 Q. Now, what about the other abnormalities, sir?

1 A. That's all.

2 Q. You don't see any other abnormalities?

3 A. No, sir.

4 Q. And there is a check in the other column for Mr.

5 Crame?

6 A. Yes, sir.

7 Q. What about Glen Davis, sir?

8 A. Yes, sir.

9 Q. We see for Mr. Davis some lipids that are abnormal

10 and there are lipids checked as abnormal?

11 A. Yes, sir.

12 Q. Are there any other abnormalities listed for Mr. Davis

13 other than lipids, sir?

14 A. No, sir.

15 Q. 1507 has two checkmarks under others, correct?

16 A. Yes, sir.

17 Q. The others as listed on 1507 are under the category

18 of abnormal lab reports, are they not, sir?

19 A. Yes, sir.

20 Q. Now, could we look at Frances Esmon, please?

21 A. Yes, sir.

22 Q. Do you see any abnormal, other abnormal lab report?

23 A. No, sir.

24 Q. Listed on his lab sheet?

1 A. No, sir.

2 Q. And yet 1507 has two checks under other, correct?

3 A. No.

4 MR. CARR: Who are we talking about now, counsel?

5 MR. NASSIF: Esmon.

6 Q. I'm sorry, one?

7 MR. CARR: Who are we talking about now?

8 MR. HEINEMAN: Esmon.

9 Q. There are two, there are two checks for other
10 abnormal lab reports on Exhibit 1507, are there not?

11 A. For Esmon.

12 Q. E-s-m-o-n?

13 A. I don't think so.

14 Q. Well, my copy has two checks.

15 Q. Does the jury's copy show two checks or none?

16 (Jury panel indicates one)

17 MR. CARR: Counsel, you want to be told why yours
18 has two checks or do you want to just speculate?

19 MR. HEINEMAN: Why does mine have two checks?

20 MR. CARR: Because yours is not the exhibit that
21 was put in evidence. Your is another one. Yours is the one
22 that was received during the course of -- and yours was
23 revised, so you are using one that was not an exhibit in this
24 case, although you marked an exhibit in this case. It's not

1 the exhibit. You are using material that you received from
2 outside this courtroom. At an earlier time. It is not the
3 final exhibit that was marked and offered and introduced and
4 put into evidence. Mr. Nassif has a copy of the one that was
5 put in evidence. You are using an earlier copy that your
6 office received from --

7 MR. HEINEMAN: From you?

8 MR. CARR: Prior to the time that Nassif and
9 Snively and Roush went to see Suskind.

10 MR. HEINEMAN: Is this the one you sent the union?

11 MR. CARR: Yes.

12 MR. HEINEMAN: I've got the one you sent the
13 union?

14 MR. CARR: You've got the one that was filed in the
15 Supreme Court, as you know.

16 MR. HEINEMAN: This is the one you sent to the
17 union?

18 MR. CARR: This is the one I sent to the union and
19 you took to Cincinnati with Roush, Snively, Nassif. It is
20 not the exhibit that was put into evidence in this case.
21 You've been using all the time the wrong exhibit. You've
22 been using a non-existing exhibit.

23 MR. HEINEMAN: First time it disagreed with his.

24 MR. CARR: You'll find other times, counsel.

1 MR. HEINEMAN: Fine, let's pull the other one. All
2 right, sir, can I have a moment, Your Honor, and compare my
3 two documents, since I've got apparently two different ones.

4 THE COURT: Go ahead.

5 MR. HEINEMAN: I think I'm ready now Judge, thank
6 you.

7 THE COURT: Okay.

8 Q. (by Mr. Heineman) Can we look at Elizabeth Fay,
9 please?

10 A. Yes, sir.

11 Q. You find any abnormal, other abnormal lab results
12 listed on her chart?

13 A. No, sir.

14 Q. And on 1507 there is one checked, correct?

15 A. Yes, sir.

16 Q. We look at William -- I'm sorry, Randy Gary?

17 A. I can't read the first name. Is there more than
18 one? Is it 109?

19 Q. 109, sir, yes.

20 A. Yes, sir.

21 Q. You have any abnormalities there other than lipids?

22 A. No, sir.

23 Q. And there is a check for an abnormal on 1507, is
24 there not?

1 A. Yes, sir.

2 Q. Now, how about Lawrence Harper, sir?

3 A. Harper?

4 Q. Harper, yes, sir.

5 A. Harper. Yes, sir.

6 Q. Do you have any abnormalities there listed other than

7 lipids?

8 A. No, sir.

9 Q. And there is one checked for other on 1507?

10 A. Yes, sir.

11 Q. Dwayne Hergenroeder, please?

12 A. Yes, sir.

13 Q. I see four, I see a checkmark under Hergenroeder

14 for lipids?

15 A. Yes, sir.

16 Q. Do you see any of the lipids as being abnormal,

17 sir?

18 A. No, sir.

19 Q. I also see a checkmark on 1507 for Mr. Hergenroeder

20 under other laboratory abnormalities you see any other?

21 A. No, sir.

22 Q. All right. Will you look at Leonard Herman,

23 please.

24 A. Yes, sir.

1 Q. Can you tell me how many abnormal lipids you see
2 for Leonard Herman?
3 A. Two.
4 Q. But he has three checkmarks, correct?
5 A. Yes, sir.
6 Q. Under lipids?
7 A. Yes, sir.
8 Q. How about Joseph Heumann?
9 A. Yes, sir.
10 Q. How many other abnormal lab results are there on
11 Mr. Heumann's record?
12 A. One.
13 Q. How many checkmarks on 1507 for other?
14 A. Two.
15 Q. Next would be Clarence Hornbeck, please.
16 A. Yes, sir.
17 Q. How many abnormal lipids do you see for Mr.
18 Hornbeck?
19 A. Two.
20 Q. And how many checkmarks are there under lipids on
21 the Exhibit 1507?
22 A. Four.
23 Q. How about Richard Huntley, sir?
24 A. Yes, sir.

1 Q. How many other abnormal findings do you have for
2 Mr. Huntley, sir?

3 A. Besides lipids, including lipids?

4 Q. No, the others?

5 A. None.

6 Q. And how many are listed on 1507, sir?

7 A. Two.

8 Q. Let me point one thing out to you, sir, on the
9 Richard Huntley lab report itself, is his lymphocyte count
10 high?

11 A. Yes, it is.

12 Q. Okay, so there is one, but 1507 lists two?

13 A. Yes.

14 Q. All right, sir. Now, for Adrian Isaac, please?

15 A. Yes, sir.

16 Q. Now, with respect to the lipids on Mr. Isaac, he
17 has two lipids that are low, does he not?

18 A. No, sir. Wait a minute.

19 Q. Just one?

20 A. One.

21 Q. Just one that's low?

22 A. Yes.

23 Q. And he's got two checkmarks for lipids on 1507?

24 A. Yes.

1 Q. Now, the one that's low, is total cholesterol, is
2 that right, sir?

3 A. Yes, sir.

4 Q. Is it normally thought to be harmful to have your
5 cholesterol be a little low?

6 A. No, sir.

7 Q. Normally when cholesterol is high that it's thought
8 to be a problem, isn't it, sir?

9 A. Yes, sir.

10 Q. Now, how many abnormal other findings do you see
11 for Mr. Isaac, he's got a lot of things listed there, I
12 know.

13 A. His BUN, his albumin, his globulin, and his AG
14 ratio, and his bilirubin, and his SGOT.

15 Q. How about calcium, sir?

16 A. His calcium as well.

17 Q. Is that a total of eight?

18 A. I didn't keep track.

19 Q. Well, they are listed right there on the bottom of
20 that page?

21 A. Right.

22 Q. There are a total of eight, are there not, sir?

23 A. Eight.

24 Q. And how many are listed on Exhibit 1507 checked for

1 other?

2 A. Ten.

3 Q. How about Henry Jenkins, sir.

4 A. Yes, sir.

5 Q. How many other abnormal lab reports do you see in

6 the METPATH lab results?

7 A. One.

8 Q. And how many are listed on Exhibit 1507, sir?

9 A. Two.

10 Q. Next would be Jan Karsteter?

11 A. Yes, sir.

12 Q. How many are listed as being other abnormalities, sir,

13 on her actual METPATH lab results?

14 A. None.

15 Q. How many are on the Exhibit 1507?

16 A. One.

17 Q. How about Delbert Kirk?

18 A. Yes, sir.

19 Q. Now there are a number of lipids listed as

20 abnormal, are there not, sir?

21 A. Yes.

22 Q. How many of them are high, sir?

23 A. Three. I'm sorry, I didn't get them all, I just

24 took them as they were listed there.

1 Q. Aren't there four, sir, triglycerides listed at the
2 bottom?
3 A. Yes, four.
4 Q. Now, how many other abnormal lab reports are there,
5 sir?
6 A. Other than lipids? One.
7 Q. One?
8 A. Yes.
9 Q. That's the uric acid there, sir?
10 A. Yes.
11 Q. How many, sir, are listed on Exhibit 1507?
12 A. Four for lipids and three for other.
13 Q. And you found one other?
14 A. Yes.
15 Q. What about Lorraine Koehler, sir?
16 A. Yes, sir.
17 Q. How many other abnormal lab reports do you see
18 there, other than lipids?
19 A. None.
20 Q. And how many does Exhibit 1507 list?
21 A. One.
22 Q. Now, how about James Labanosky, sir?
23 A. Yes, sir.
24 Q. How many other abnormal lab reports are on the

1 METPATH report?

2 A. None.

3 Q. And how many are on 1507?

4 A. One.

5 Q. All right, sir, how about Joseph Lepp?

6 A. Yes, sir.

7 Q. How many abnormal other values are found on the

8 METPATH report?

9 A. None.

10 Q. How many on 1507?

11 A. One.

12 Q. Charles Lewallen, sir?

13 A. Yes, sir.

14 Q. How many other abnormal lab reports are listed on

15 the METPATH report, sir?

16 A. One.

17 Q. And how many on the Exhibit 1507?

18 A. Two.

19 Q. How about Pete McClellan, sir? I'm sorry, that's

20 the wrong one, it's Richard Moore.

21 A. Yes, sir.

22 Q. How many other abnormal lab reports are listed on

23 the METPATH report?

24 A. One.

1 Q. And how many are on 1507, sir?

2 A. Two.

3 Q. And Michael Picarella, how many abnormal other lab

4 results are listed on the METPATH report?

5 A. One.

6 Q. And how many are on Exhibit 1507?

7 A. Two.

8 Q. Next would be Ray Purkey, sir?

9 A. Yes, sir.

10 Q. How many other abnormal lab reports are listed on

11 the METPATH report?

12 A. None.

13 Q. And how many are on 1507?

14 A. One.

15 Q. Next would be Ray Reid, or Roy Reid, I'm sorry.

16 A. Yes, sir.

17 Q. How many other abnormal lab reports are set forth

18 on the METPATH results?

19 A. Two?

20 A. I guess that's three, I didn't count -- let's see.

21 Two.

22 Q. His white blood cells, his polys and his iron,

23 right, sir?

24 A. Yes.

1 Q. That's three?

2 A. Right.

3 Q. How many are listed on Exhibit 1507?

4 A. Four.

5 Q. How about Mark Rensing, sir, how many abnormal lab

6 reports are in the METPATH report?

7 A. None.

8 Q. 1507?

9 A. One.

10 Q. How about Ivan Richardson, sir?

11 A. Yes, sir.

12 Q. How many are on the METPATH report as other

13 abnormal lab reports?

14 A. One.

15 Q. And how many are on 1507?

16 A. Two.

17 Q. Next one would be Charles Sumoski?

18 A. Sumoski?

19 Q. Sumoski?

20 A. Yes, sir.

21 Q. How many other abnormal lab reports are listed on

22 the METPATH results?

23 A. Five -- four.

24 Q. Uric acid, total protein, STPT and magnesium,

1 correct?

2 A. Right.

3 Q. There were four, and how many are listed in Exhibit
4 1507, sir?

5 A. Five.

6 Q. Next would be Clinton Turner.

7 A. Yes, sir.

8 Q. How many abnormal other lab reports are in the
9 METPATH results?

10 A. One.

11 Q. And how many are listed in 1507, sir?

12 A. Two.

13 Q. The next would be Harvey Turner, sir.

14 A. Yes, sir.

15 Q. How many other abnormal lab reports are in the
16 METPATH results?

17 A. Two.

18 Q. And how many are listed on 1507?

19 A. Three.

20 Q. How about James Turner, sir?

21 A. Yes, sir.

22 Q. How many are listed in the METPATH results for
23 other abnormal lab reports?

24 A. One.

1 Q. How many are listed in 1507, sir?

2 A. Two.

3 Q. Next would be Fred Weber, sir.

4 A. Yes, sir.

5 Q. How many abnormal laboratory reports are listed in
6 the METPATH results?

7 A. None.

8 Q. And how many are listed in 1507?

9 A. One.

10 Q. And how about Kenneth Wilcox, sir?

11 A. Yes, sir.

12 Q. How many other abnormal laboratory reports are
13 listed in the METPATH results?

14 A. Five.

15 Q. And how many are listed on Exhibit 1507, sir?

16 A. Six.

17 Q. Now, sir --

18 THE COURT: Before you go into your next question,
19 is this a good point for a short break?

20 MR. HEINEMAN: It would be fine, Judge.

21 THE COURT: Ladies and gentlemen, we will take a
22 break at this time. The admonishments that I've given you
23 earlier will apply during this break also. Court is in
24 recess.

1 (Following a recess, these proceedings were had in open
2 court.)

3 Q. (by Mr. Heineman) Dr. Roush, in his examination of
4 you, Mr. Carr made reference to this blow-up which is 1267 A,
5 you recall that, sir?

6 A. Yes, sir.

7 Q. And you and he discussed whether or not this was
8 Northwestern University listing what the toxic effects are in
9 man or whether on the other hand they were just reciting what
10 had been repeated in another source, you recall that?

11 A. Yes, sir.

12 Q. Now, the source listed here, is Huff, Moore,
13 Saracci and Tomatis, 1980, correct?

14 A. Yes, sir.

15 Q. Let me hand you, sir, what's been marked as
16 Defendant's Exhibit number 909 and ask you if that isn't the
17 paper by J. E. Huff, J. A. Moore, R. Saracci, and L. Tomatis,
18 dated November 1980?

19 A. Yes, sir.

20 Q. And what this document does, this is a paper
21 printed in environmental health perspectives in Volume 36 in
22 1980?

23 A. Yes, sir.

24 Q. Now, I'd like to direct your attention, if I may,

1 to Table 6 on page 229. You see that, sir?

2 A. Yes, sir.

3 Q. Does that look familiar?

4 A. Yes, sir.

5 Q. You have listed there, do you not, the same items
6 that are listed here on Exhibit 1267 A, do you not, sir?

7 A. Yes, sir.

8 Q. And even so far as to show the footnote after liver
9 damage, you see that?

10 A. Yes, sir.

11 Q. There is a footnote in this Table 6, that is marked
12 by an asterisk, correct?

13 A. Yes, sir.

14 Q. And the same footnote is stated here as is stated
15 in this Smith, or Huff-Moore paper, correct?

16 A. Yes, sir.

17 Q. Now, one thing that is in Table 6 is not contained
18 here, is it in Exhibit 1267, and that is the reference list,
19 isn't that right?

20 A. That's right.

21 Q. Now, in Table 6, of the Huff-Moore paper, there is
22 across from each one of those effects a reference or a series
23 of references, is there not?

24 A. Yes, sir.

1 Q. And those references refer to, by number, to the
2 references that are listed at the back of the paper, do they
3 not, sir? As sources for that material?

4 A. Yes, sir.

5 Q. So that with respect to porphyria cutanea tarda
6 there is a reference to paper number 27, which is the
7 Bleiberg paper published in 1964, correct?

8 A. Right.

9 Q. There is also a reference to paper number 104,
10 which is the Jirasek paper published in 1973, correct?

11 A. Yes, sir.

12 Q. Also referenced is paper number 105, which is
13 another Jirasek paper published in 1974, and the last is
14 reference number 109 which is another Jirasek paper published
15 in 1976, correct?

16 A. Yes, sir.

17 Q. Now, the author of the Huff-Moore paper, those
18 authors, who were relied upon by the authors of Exhibit 1267
19 are themselves listing information from other authors?

20 A. That's right.

21 Q. Are they not?

22 A. Yes, sir.

23 Q. Now, the reference in the text of this paper, the
24 Table 6, is found, excuse me, on page 227 in the righthand

1 column, is it not, sir?

2 A. Yes, sir.

3 Q. And it is part of a portion of the paper entitled
4 toxic effects in humans, correct?

5 A. Yes.

6 Q. And the beginning of this portion of the paper
7 states, does it not, "Toxicity due to 2,3,7,8-tetra-CDD has
8 been reported after occupational exposure during the
9 industrial synthesis of 2,4,5-trichlorophenol, (TCP) and
10 2,4,5-T after exposure in factories and in the surrounding
11 environment due to accidents occurring during the synthesis
12 of TCP and after exposure to herbicides and other materials
13 containing 2,3,7,8-tetra-CDD." Correct?

14 A. Yes, sir.

15 Q. Says, "Exposed subjects have been found to develop
16 a wide variety of lesions and symptoms." And then it says
17 Table 6 in parenthesis, is that correct?

18 A. Yes, sir.

19 Q. And so what this document, this paper is saying, is
20 that those effects have been reported after occupational
21 exposure, correct?

22 A. Yes, sir.

23 Q. And if you go down to the next paragraph, it
24 states, does it not, "Other than the consistently found

1 clinical feature of acne, other findings in humans may
2 include neuromuscular symptoms, (weakness and pain with nerve
3 conduction abnormalities), porphyria cutanea tarda, hepatic
4 dysfunctions, hyperlipidemia, cutaneous hyperpigmentation and
5 hirsutism, chronic eye irritation, emotional disorders and
6 neuropsychiatric syndromes." Correct?

7 A. Yes, sir.

8 Q. Those are all things that may be included when
9 Chloracne is found, correct?

10 A. Yes, sir.

11 Q. Now, and the source of that information from,
12 obviously from Table 6 is a series of articles written by
13 people who were reporting on various incidents?

14 MR. CARR: Excuse me, did you read something that
15 says that those things are found when you find Chloracne,
16 maybe you were putting something in there, but I thought you
17 said that those things are found when you find Chloracne, did
18 you say that, counsel?

19 MR. HEINEMAN: It says sir --

20 MR. CARR: Excuse me, I don't see anyplace that
21 says that, and I ask unless counsel can find that quote for
22 me that the jury be instructed that this is counsel's
23 interpretation and not what the exhibit says.

24 MR. HEINEMAN: I'll be happy to read exactly what

1 the exhibit says, Your Honor.

2 THE COURT: Bring it to the bench I'd like to see
3 it, gentlemen.

4 (The following Side Bar conversation was had outside the
5 hearing of the jury.)

6 THE COURT: What paragraph are you reading from?

7 MR. HEINEMAN: Right here.

8 THE COURT: Okay.

9 MR. HEINEMAN: Clearly demonstrates to me, Your
10 Honor, that this paper is saying that when this symptom is
11 found those others may be found.

12 THE COURT: It's not saying that at all.

13 MR. CARR: Doesn't say that.

14 MR. HEINEMAN: I think it does.

15 MR. CARR: My objection is to interpreting, I don't
16 object to you reading it. My objection is you reading and at
17 the same time interpreting under the guise of reading it. It
18 doesn't say that.

19 MR. HEINEMAN: I think it does.

20 THE COURT: It does not say that, it says that this
21 is a consistent finding. The others are findings that can be
22 found and they are inclusive of the following list. It does
23 not link the one with the other as you interpreted. I will
24 so instruct the jury as per your -- as per your objection --

1 MR. HEINEMAN: It does say --

2 THE COURT: Does not say that.

3 MR. HEINEMAN: I'm sorry. Says may include the
4 others, does it not, sir?

5 THE COURT: It says other than the consistently
6 found if feature acne, others may include. The two are not
7 linked. They are in fact separated by the grammar of the
8 sentence. Stating first in the first clause that the one is
9 a consistent finding, the others are other possible
10 findings. It does not in anyway link the two, except as
11 possible findings in exposed human beings. Mr. Carr, your
12 interpretation is correct. I will so instruct the jury.
13 (The following proceedings were had in open court.)

14 THE COURT: Mr. Carr as per your objection, the
15 jury is so instructed that that remark of counsel was
16 counsel's interpretation of the document.

17 Q. Would you read that paragraph into the record,
18 Doctor, the one beginning other?

19 A. "Other than the consistently found clinical
20 features of acne, other findings in humans may include
21 neuromuscular symptoms, weakness and pain with nerve
22 conduction abnormalities, porphyria cutanea tarda, hepatic
23 dysfunctions, hyperlipidemia, cutaneous hyperpigmentation and
24 hirsutism, chronic eye irritation, emotional disorders, and

1 neuropsychiatric syndromes."

2 Q. According to the authors of this paper, Doctor, do
3 you agree that Chloracne is?

4 MR. CARR: Object to counsel leading the witness
5 and the witness should make his own statement. This is going
6 to be a suggestion from counsel and not going to be the
7 witness'.

8 THE COURT: Objection sustained.

9 Q. Doctor, would you read the beginning of the next
10 paragraph where it describes what Chloracne is?

11 A. "Chloracne, one of the most constant and prominent
12 features of 2,3,7,8-tetra-CDD exposure had been described as
13 a refractory acne characterized by inclusion cysts, comedones
14 and pustules with eventual scarring of the skin more
15 frequently originating on the face and sometimes spreading to
16 other parts of the body."

17 Q. All right, sir. Now, this Chloracne that is
18 described in the paragraph you just read, how does that
19 relate to the variations in acne which you described to the
20 jury yesterday?

21 A. Well, the Chloracne as described here with 2,3,7,8
22 includes, inclusion cysts, that's the gathering of the skin
23 inside of the cyst, comedones and pustules, which means the
24 accumulation of the sebaceous fluid that hadn't stopped being

1 produced. With eventual scarring of the skin, which means
2 it's more severe in that it produces the scarring such as you
3 see in juvenile acne when it's bad. And, originating in the
4 face. And if it's mild it will be associated with the face,
5 with heavier exposure, then the same reaction with bumps, big
6 bumps, one centimeter bumps or more are found on the other
7 parts of the body primarily over the back and sometimes down
8 into the chest, but sometimes down into the groin area as
9 well.

10 Q. So would the acne that's being described in this
11 paper as being associated with 2,3,7,8-TCDD, would you
12 characterize that acne as being described there as mild,
13 moderate, or severe?

14 A. Severe.

15 Q. Now, sir, you still have before you Exhibit 908,
16 Defendant's 908 which is the Marion Moses study that we
17 referred to yesterday?

18 A. Yes, sir.

19 Q. All right. Now, this was a study that was
20 commissioned by the United Steel Workers Union?

21 A. Yes, sir.

22 Q. In April of 1979?

23 A. Yes, sir.

24 Q. And, they went to Marion Moses and Irving Selicoff

1 at the Mount Sinai Hospital in New York City, is that
2 correct?

3 A. Yes, sir. Yes, sir.

4 Q. Now, the examinations -- well, tell me this, what
5 was it that Dr. Moses did in order to carry out this study?

6 A. She, the first thing is she had to contact all of
7 those who might possibly have been exposed to the
8 2,4,5-trichlorophenoxyacetic acid and therefore probably
9 exposed to 2,3,7,8 tetrachlorodibenzo-dioxin, so she
10 contacted them and she contacted them through the union, and
11 once she got that group together, she had to decide then how
12 best to characterize those who had exposure and those who did
13 not. And, in the process of doing that, trying to decide
14 what kind of dose. She fell back on the way to do it is to
15 compare those with Chloracne with those who did not have
16 Chloracne.

17 Q. That is the method as we read earlier that she used
18 to decide to characterize what?

19 A. The degree of exposure that they had.

20 Q. Because she couldn't determine it from other
21 records?

22 A. That's right.

23 Q. Now, indeed as a part of her paper, if you look at
24 page -- well, the fourth page of the exhibit, it's actually

1 164; page 164, she has the beginning of Table 1 that goes on
2 for some three pages, does she not?

3 A. I'm sorry?

4 Q. Beginning on page 164, sir, is Table 1, which goes
5 on for some three pages?

6 A. Right.

7 Q. And what is Table 1?

8 A. Table 1 is a listing of the reported episodes of
9 those people who have been working with those materials, the
10 same phenoxyacetic acid or with trichlorophenol, and develop
11 some kind of a symptom complex that was thought to be related
12 to that exposure.

13 Q. So those are industrial exposures?

14 A. Yes, sir.

15 Q. Either by accident or process?

16 A. Or just by chronic exposure.

17 Q. Just by chronic exposure through the process?

18 A. Yes.

19 Q. Industrial incidents, the first begins in 1936 and
20 the last one referenced is in 1978, correct?

21 A. Yes, sir.

22 Q. And with respect to each of those, she states the
23 chemicals that were involved, the place where the incident
24 occurred, the type of exposure, and the number of cases of

1 exposure in each one, does she not?

2 A. Yes, sir.

3 Q. She talks about the effects on the skin, and then

4 she lists various other effects that are reported with

5 respect to each of those incidents?

6 A. Yes, sir.

7 Q. And the righthand column is what?

8 A. References.

9 Q. That's the source of her information?

10 A. That's right.

11 Q. Now, what is the effect on the skin that is found

12 in every single one of those reported occupational exposures?

13 A. Chloracne.

14 Q. That's found in every one, sir?

15 A. Yes, sir.

16 Q. Now, if we look -- if I can direct your attention

17 briefly to page 176, I'm going to go back to more of it later

18 on, but I just want to talk briefly about this portion she

19 makes an effort in the discussion section, does she not, sir,

20 to assess the degree of contamination of the product to which

21 the subjects of this study were exposed?

22 A. Yes, sir.

23 Q. And what does she, what does she find?

24 A. That first of all, she got a sample of 2,4,5-T and

1 had it analyzed for 2,3,7,8-TCDD.

2 Q. And how much did she find, sir?

3 A. 6 parts per million of the 2,3,7,8 isomer.

4 Q. And that was found in -- from a sample in 1969?

5 A. Yes, sir.

6 Q. Took a 1969 sample, had it analyzed. Now, she
7 cites for that 6 parts per million somebody named Nordstrom
8 et. al. in 1980?

9 A. Yes, sir.

10 Q. Doesn't she? Now, it could be, could it not, that
11 indeed in 1980, Nordstrom was able to be isomer specific and
12 pick out 2,3,7,8-TCDD as a specific isomer?

13 A. It's possible.

14 Q. Now, she goes on to say that for comparison current
15 commercial grade of 2,4,5-T is claimed to have less than
16 .1 ppm TCDD?

17 A. Yes, sir.

18 Q. Correct?

19 A. Yes, sir.

20 Q. You note that she -- that's .1 would be a hundred
21 parts per billion?

22 A. Yes, sir.

23 Q. And she uses TCDD instead of 2,3,7,8-TCDD, does she
24 not?

1 A. Yes, sir.

2 Q. Now, if I can direct your attention back, sir, to
3 page 168, and to the middle of the -- I should say the last
4 part of the second paragraph on the page, where she is
5 talking about the tests that were done?

6 A. Yes, sir.

7 Q. What does she say with respect to the analyses
8 recited in the last two sentences of that paragraph?

9 A. When analysis of liver function test triglycerides
10 and urinary porphyrins, subjects whose weakly alcohol
11 consumption was equivalent to 24 beers or more, or who were
12 current or past problem drinkers were excluded. In addition,
13 diabetics and those subjects on medication known to induce
14 GGT were excluded from the analysis of GTT and triglycerides.

15 Q. Now, it says that with respect to anybody who was a
16 current or past problem drinker, or who had a weakly alcohol
17 consumption equivalent to 24 beers or more, which would be a
18 little over three a day, right?

19 A. Yes.

20 Q. She took them out with respect to making any
21 determination of liver function tests, triglycerides, and
22 urinary porphyrins?

23 A. Yes, sir.

24 Q. Correct. Do you know why she did that?

1 A. Yes, sir.

2 Q. Why is that?

3 A. Well, it's well recognized that alcohol will
4 influence the liver function test. It will influence the
5 triglycerides, and is well recognized to influence porphyrin
6 metabolism. 90 percent of people who have abnormality of
7 uroporphyrins without genetic disease are alcoholics. In
8 other words, those with the porphyria cutanea tarda, 90
9 percent of them will be heavy drinkers. Now, when we go onto
10 other subjects, the diabetics, of course, will have
11 abnormalities of triglycerides regularly, and depending on
12 the state of their diabetes and how well it's under control
13 will effects the liver profile as well. And those on
14 medication as well, those on alcohol will certainly effect
15 the GGT, so they want to get rid of the possible other
16 factors that could be influencing those analyses that were
17 going to be run.

18 Q. Now, when you do a test of this type, sir, don't
19 you just take your people as you find them, I mean, do those
20 substances have a sufficient effect on those functions or
21 those test results to mask or prevent an accurate
22 determination of them?

23 A. No, they will cause abnormalities, and since
24 abnormalities are caused by something we know, we want to

1 eliminate them as confounding factors and interpretation of
2 the results that will be obtained.

3 Q. So what they want to do is eliminate those people
4 who have those problems, alcohol consumption, or who may be
5 diabetic, or be on other medications so that they can find
6 out whether or not whatever function test they have is due to
7 something they are looking for as opposed to any other
8 confounding factor?

9 A. They just used that for those specific tests, they
10 didn't apply it generally.

11 Q. Okay. So that they left the people in for the
12 study in other respects?

13 A. Yes, sir.

14 Q. But took their results out when making decisions
15 about liver function triglycerides, urinary porphyrins, and
16 GGT?

17 A. Right.

18 Q. All right. So in all other respects, those people
19 are included in the study?

20 A. That's right.

21 Q. Now, what is GGT?

22 A. It's an enzyme that is found in many tissues
23 including skin, and when you find it in the blood, it has
24 escaped from the tissues in which it's found and it's a very

1 early indicator of liver effects, because we take in so many
2 foods and medicines that can influence the GGT, it's a very
3 sensitive liver index test.

4 Q. Now, if I can direct your attention, sir, to page
5 169.

6 A. Yes, sir.

7 Q. There at that page she describes the people that
8 did not participate.

9 A. Yes, sir.

10 Q. Now, those are Nitro workers?

11 A. Yes, sir.

12 Q. From the same plant that Dr. Suskind examined in
13 his morbidity study?

14 A. Yes, sir.

15 Q. And, she describes the 190 people who did not
16 participate in her test, and what does she say about them,
17 sir?

18 A. Those who did not decide to take part in the test,
19 35 of the 133, 18 percent indicated they just didn't want to
20 do it, didn't want to take the test. 22 of them, 11.6
21 percent indicated they wished to participate but then when
22 the test came, they failed to keep their appointment. A
23 systematic sample of 35 individuals, they didn't do the whole
24 190, were contacted by phone to determine why they didn't

1 participate. 19 were actively employed by the company, 16
2 were retirees, and two had recently died. The reason for
3 non-participation, seven said they were sick, five said they
4 had no health problems, four had no particular reason, three
5 were on vacation, three had to work, three reported that
6 their wife was sick, and three reported they had never worked
7 with 2,4,5-T. And then there were two who said they didn't
8 get the mailing. One said they had no time, another one said
9 I have another commitment, and the other one just said I
10 forgot.

11 Q. So of the 35, no-shows that she contacted, those
12 were the reasons given for not participating?

13 A. Right.

14 Q. And there were a number of other no-shows, of
15 course, whom she did not telephone?

16 A. That's right, just a sample that she checked.

17 Q. Random sample was taken, okay. Now, when she went
18 into the dermatological examination, sir, I take it she had
19 laboratory tests done?

20 A. Yes, sir.

21 Q. She did or had someone do a physical examination of
22 each of the people?

23 A. Yes, sir.

24 Q. And is that the same thing that Dr. Suskind did?

1 A. Almost the same.

2 Q. All right. How was it different?

3 A. I'm not sure -- I'm saying -- I can't say if it's
4 identical, but it apparently was about the same.

5 Q. Suskind did physical examinations and had
6 laboratory test, didn't he?

7 A. Yes, sir.

8 Q. Now, if I can direct your attention to Page 171
9 where she talks about her dermatological examination, she
10 says, does she not, there was no association between
11 Chloracne and other diseases of the skin, including skin
12 cancer, correct?

13 A. I don't know where you are reading.

14 Q. I'm sorry, let me show it to you, right down here.

15 A. I see. Yes, sir.

16 Q. Now, she did find, however, certain other
17 statistically significant differences between those with and
18 without Chloracne, did she not?

19 A. Yes, sir.

20 Q. If you look at Page 173, she says statistically
21 significant differences between those with and without
22 Chloracne were found for reported symptoms of muscle pain,
23 insomnia, decreased libido, sexual dysfunction, which she
24 defines as difficulty with erection or ejaculation, and

1 eyelid cysts, correct?

2 A. Yes, sir.

3 Q. And she reports that in a table?

4 A. Yes, sir.

5 Q. The next paragraph says, no significant differences
6 were found between those with and without Chloracne for the
7 following symptoms: Joint paint, abdominal pain, nausea,
8 vomitting, diarrhea, constipation, weakness, fatigue,
9 irritability, nervousness, depression, numbness, vertigo,
10 lightheadedness, or personality change. Correct?

11 A. Yes, sir.

12 Q. Now, what is the meaning of finding a significant
13 difference between those with an without Chloracne for
14 certain things, and not finding a significant difference
15 between those with and without Chloracne for other things?

16 A. Take the no significant difference first. What she
17 is saying or they are saying is that when she compared those
18 with Chloracne and those without Chloracne, that there was no
19 difference between those who got a bigger dose, and had
20 Chloracne for joint pain, abdominal pain, nausea, vomitting,
21 diarrhea, constipation, weakness, fatigue, irritability
22 nervousness, depression, numbness, vertigo, lightheadedness
23 and personality disorder?

24 A. In other words, those two groups had almost the

1 same number of people with those complaints, doesn't mean
2 they had none, but the ones who had Chloracne had no more of
3 those complaints than those who did not have Chloracne. Now,
4 going back to the first part, but when she did look at muscle
5 pain, insomnia, libido, sexual dysfunction and eyelid cysts
6 there was a difference. In other words, those who had
7 Chloracne had more of those complaints than did those without
8 Chloracne. That doesn't mean that it is real. It means when
9 she looked at this population of this size, just looking at
10 the numbers, those who had no Chloracne and those who do have
11 Chloracne, it was a difference, and statistics said it was
12 significantly different. That doesn't mean if they did it
13 again, that may go away, but if they did it again on another
14 population, it may confirm it. So, if it's confirmed the
15 next time, then it means it's real. If the next time they
16 did it and it doesn't turn out to be the same, then it means
17 that there is no correlation, so it can still happen by
18 chance if it's statistically significant. But you have to be
19 very careful, do it again and see if it is.

20 Q. Now, with respect to reproductive history, she says
21 that since 2,4,5-T production began in 1948, reproductive
22 outcome prior to that year was analyzed separately. In other
23 words, she analyzed reproductive outcome occurring before the
24 production of 2,4,5-T started, as compared to that which

1 occurred afterwards, right?

2 A. Yes, sir.

3 Q. She said that all but 19 of the study subjects had
4 been responsible for at least one pregnancy, 107 of those
5 with Chloracne, and 91 of those without, correct?

6 A. Yes, sir.

7 Q. Of the 717 total pregnancies reported, 435 or 60
8 percent had occurred during or after 1948. 54 percent of
9 them in those with Chloracne, and 46 percent in those
10 without. So, those with Chloracne fathered more children
11 than those without?

12 A. Yes, sir.

13 Q. She follows that by saying, no significant
14 differences between the two groups were found in rates of
15 birth defects, still births, or spontaneous abortion?

16 A. Yes, sir.

17 Q. Correct. Now, she further goes on to describe the
18 physical examination results, does she not?

19 A. Yes, sir.

20 Q. Now, what does she say with respect to that,
21 Doctor?

22 A. She analyzed the two groups, those with Chloracne
23 and those without. And there was no clinical difference.
24 That means what they looked at, there was no difference --

1 Q. Excuse me, no clinically significant --

2 A. No clinically significant difference between the
3 two groups on physical examination. That includes liver
4 size, and they talk about liver size, palpation of thyroid
5 gland, lymph nodes, examination of extremities,
6 musculoskeletal and cardiovascular system. She went on they
7 said, and did an extensive neurologic examination on 94
8 volunteers. The neurology found a decreased sensation to pin
9 prick and in 11 of the 60 with current or past Chloracne and
10 none in the 34 who never had Chloracne. That difference, 11
11 and 60 vs. none in 34 was very significant. In other words,
12 the chance of that happening just by chance is less than one
13 in a hundred. In other words, that makes it quite real.
14 Now, whether that's so doesn't prove it but that's a very
15 strong association. No other neurologic findings of
16 significant were found between the two groups. Should I go
17 on?

18 Q. Yes, sir, please.

19 A. There was one worker who had severe Chloracne and
20 multiple systemic manifestations in the past related to heavy
21 exposure, as a part of an accident that occurred in 1949.
22 And he had severe peripheral neuropathy. In him, the deep
23 tendon reflexes were absent. That's when they hit the arm at
24 the elbow, and at the knee, and his -- those reflexes were

1 absent and he had decreased sensation to pain and vibration
2 and he also had motor weakness, that means you just check to
3 see how strong the arm is. He was weak as compared to what
4 they thought it should be. So there is one man who had
5 severe effects, and whether it was related or not they
6 certainly couldn't -- but it seemed give --

7 Q. He was a man who had had severe Chloracne and
8 multiple systemic manifestations in the past related to what
9 she refers to as heavy exposure as part of the accident
10 clean-up crew in 1949?

11 A. Yes, sir.

12 Q. So he was involved in the '49 incident?

13 A. Yes, sir.

14 Q. Now, what does she say about the laboratory
15 findings, sir?

16 A. She said that, "Except for the gamma glutamyl
17 transpeptidase, which we have been calling GGT, there was no
18 statistical difference found between those with and without
19 Chloracne for any of the biochemical --

20 MR. CARR: Dr. Roush, you left out the word
21 significant. I think you ought to put that in.

22 Q. Yes, you did overlook that, no statistically
23 significant differences?

24 A. "Was found between those with and without Chloracne

1 for any of the biochemical or hematologic variables."

2 Q. All right. If you turn to Page 178 and you look at
3 the first full paragraph on that page, the first sentence in
4 that paragraph states. "It is not established that the GGT
5 abnormalities are due to induction by TCDD." Is that right,
6 sir, maybe I've lost you here, Page 178?

7 A. I was reading 177.

8 Q. I'm sorry.

9 A. My fault.

10 Q. 178, right here.

11 A. Right.

12 Q. It says it's not established that the GGT
13 abnormalities are due to induction by TCDD. Now, what does
14 that mean?

15 A. It means that the fact that they found those
16 abnormalities, doesn't mean that they have established that
17 they are related to the TCDD exposure that had taken place.

18 Q. Now, she goes on to say that in all cases it had
19 been ten years since the last occupational exposure, and in
20 the majority twenty years or more. Nor is cholestasis. What
21 is that, sir?

22 A. That's bile, not flowing and being held up in the
23 liver.

24 Q. All right. Nor is cholestasis or hepatic disease,

1 a likely explanation, since alkaline phosphatase,
2 transaminase and bilirubin were not elevated. It is possible
3 that the GGT and triglyceride abnormalities are a reflection
4 of a change in enzymes from exposures that occurred many
5 years before, just as changes in the skin persist although
6 TCDD is no longer present or present in amounts below the
7 limits of detection, and exposure ceased many years prior.
8 The failure to find TCDD in skin lipids or contents of
9 Chloracne cysts is of interest in this regard and she cites
10 another author, is that right?

11 A. Yes, sir.

12 Q. Now, she goes on to say in the next paragraph,
13 excuse me, the paragraph following that, where she talks
14 about a mortality study, does she not?

15 A. Yes, sir.

16 Q. Now, what mortality study is she referring to
17 there, sir?

18 A. That is the Zack-Gaffey study.

19 Q. All right. She says about the Zack-Gaffey study,
20 "A mortality study has been conducted by the company at this
21 plant. It was stated that of 163 deaths in '80 and '84,
22 workers at the plant from 1955 to 1977, a sub-group of 58
23 workers with 2,4,5-T exposure documented by company records
24 had a higher observed rate of coronary heart disease

1 mortality than expected from United States general population
2 death rates, although the difference was not statistically
3 significant." Correct?

4 A. Yes, sir.

5 Q. So she is reading the Zack-Gaffey study as
6 describing a cohort of workers who had 2,4,5-T exposure
7 documented by company records, correct?

8 A. Yes, sir.

9 Q. Now, she goes on to say, does she not, "Mortality
10 from cardiovascular disease is known to be higher than
11 national rates, in the Kanawha Valley of West Virginia where
12 the plant is located." Citing information from the State of
13 Virginia, correct?

14 A. Yes, sir.

15 Q. Now, Dr. Moses is an expert, is she not?

16 A. Yes, she is.

17 Q. She is a respected scientist?

18 A. Yes, sir.

19 Q. And she states what the Gaffey, Zack-Gaffey study
20 demonstrates, does she not?

21 A. Yes, sir.

22 Q. She also describes the Kanawha Valley mortality
23 from cardiovascular disease as being higher than the national
24 rate, does she not?

1 A. Yes, sir.

2 Q. Now, she was in West Virginia, she was there at the
3 plant to do those examinations?

4 A. Yes, sir.

5 Q. All you got to do is drive down the road there and
6 see all the chemical plants along the Kanawha River Valley
7 there?

8 A. Yes, sir.

9 Q. And she says that the mortality from cardiovascular
10 disease is known to be higher than national rates, right
11 after she recites what the Zack-Gaffey study finds with
12 respect to cardiovascular mortality being higher than
13 expected, correct?

14 A. Yes, sir.

15 Q. Now, do you know why she put those two statements,
16 one following the other, in her paper?

17 A. Because she thought they were related, I would
18 assume.

19 Q. Now, she further states that she found no
20 significant differences -- well, let me read it to you.
21 "Important negative findings in this study were the absence
22 of any significant differences between those with and without
23 Chloracne in serum cholesterol, total urinary porphyrins, or
24 in reproductive outcome." Correct?

1 A. Yes, sir.

2 Q. In regard to the latter, the cross sectional nature
3 of the survey, the small number of pregnancies and the fact
4 that information was obtained from the males only should be
5 recognized. However, with those limitations there is no
6 evidence that TCDD is a potent teratogen acting through the
7 male?

8 A. Correct.

9 Q. Now, what's a teratogen?

10 A. A teratogen is a substance, doesn't necessarily
11 have to be a chemical, can be a complex that is given to the
12 -- that is given to the female while she is pregnant. In
13 other words, the fetus is forming, and you give the chemical
14 or the substance during the time that that fetus is growing,
15 and the fetus will develop some abnormality, and the classic
16 one is Lytamide, that caused the absence of portions of the
17 arm and leg at that time.

18 Q. Now, she discusses a potent teratogen acting
19 through the male, how does a teratogen act through the male?

20 A. With difficulty.

21 Q. And she says there is no evidence that TCDD is a
22 potent teratogen acting through the male, does she not?

23 A. Right.

24 Q. She also says a recent study in which a larger

1 number of pregnancies were reported and spouses were
2 interviewed as well, also showed no differences in
3 reproductive outcome related to 2,4,5-T production exposure,
4 correct?

5 A. Yes, sir.

6 Q. That's a 1982 article that she cites?

7 A. Yes, sir.

8 Q. She goes on to say, "More other recent studies in
9 which male mice were exposed to phenoxy herbicides and TCDD
10 reported no significant dose related effects on sperm or
11 fertility, nor any teratogenic effects in offspring of
12 treated males."

13 A. Yes, sir.

14 Q. Now, this paper was published in 1984 and Dr.
15 Suskind's paper was published in 1984 after this one?

16 A. Yes, sir.

17 Q. She began this study in 1979, Dr. Suskind began his
18 study in 1979 shortly after she began hers, I gather, or was
19 it before?

20 A. After.

21 Q. Now, would you tell us, sir, how the Zack-Suskind
22 study was begun, what gave rise to it, how did it start?

23 A. Dr. Suskind was a part of the advisory group in the
24 Seveso episode. And when they got together to talk over the

1 implication, the possibility of an adverse effect from the
2 two kilograms of dioxin that was spread over the town of
3 Seveso, they were looking desperately for something they
4 could use to advise the people in Seveso what's going to
5 happen to them. And they listed almost like Moses did here,
6 the episode that had happened as well as how many people were
7 exposed, as well as a time in which the exposure took place,
8 and right at the top was the 1949 accident that happened at
9 Monsanto when there was a spill and a number of people
10 developed Chloracne. Since that was the longest, the oldest
11 study, it was thought that that was the biggest, the best,
12 and the oldest group of people who had been exposed and could
13 they look at that population to see whether there had been
14 any adverse effects of their being involved in that accident
15 and their mortality experience. And that's the basis for
16 them coming back. Suskind came back and said I've almost
17 promised them that I would do the mortality study on that
18 population involved in the accident in 1949.

19 Q. So Dr. Suskind came to you or came to Monsanto and
20 asked to be aloud to do the study?

21 A. Yes, sir.

22 Q. And what year was that, sir?

23 A. I think it was 1977.

24 Q. The Seveso incident occurred in '76?

1 A. Yes.

2 Q. And in '77 he came to you with his proposal?

3 A. Yes.

4 Q. What did you do with it?

5 A. We went to Nitro, not permanently, but we asked
6 them to find the cohort of those who were working at that
7 time, and to find who was exposed in the process of that
8 accident either in working there at the time of the accident
9 or participating in the clean-up of that accident, and as we
10 said before, we had no records before 1955. It was
11 impossible for us to define who had actually participated in
12 that clean-up or had been there at that time. The only thing
13 we could do reasonably was to look at that who had Chloracne
14 because that's obvious that they had it, and the reason we
15 could do that is because we had workman's compensation of
16 taking care of the men with their rash, and those workman's
17 compensation records were filed with the State of West
18 Virginia. In addition to that, we had the safety reports of
19 those who had developed Chloracne and we had the medical
20 records. We could pick out who had Chloracne. Ideally we
21 should have looked at those who didn't have Chloracne and
22 worked there, but we couldn't define that population. So
23 what we did, is we pulled out of those records, and pulling
24 out of those records mean they went to all those different

1 places. In addition, there was some records that had been
2 put away because they were not medical reports of those who
3 had had the accident. So between those three or four
4 different sources, they put together the population as best
5 they could, might have missed one or two, but they got the
6 best number of the total who had developed Chloracne from
7 that accident in 1949, and that group defined, just as I
8 said, those who had Chloracne as best we could with those who
9 were going to look and see what the mortality experience was.

10 Q. Now, what was Dr. Suskind's participation in that
11 process?

12 A. That participation when he called me and says can I
13 do that, I called down to Nitro and said can you define it
14 and those who are responsible could, in 1977, 1977, those
15 were not the same ones who were involved in that 1949
16 accident, and so they -- we couldn't -- I said I can't get
17 the data, so he then sent me those that he knew had been in
18 that accident. That was the basis for something like 50 of
19 them, I think were the records of those with Chloracne that
20 he had seen. I think he saw 53 of them. So we had that
21 list.

22 Q. He being whom, sir, Dr. Suskind?

23 A. Dr. Suskind.

24 Q. Because back in that period of time when the

1 accident occurred, he had treated those people?

2 A. He had come to because of the Chloracne was a
3 terrible problem, because as I described for you, some of
4 them had almost every single pore on their face with a little
5 tiny papule, those little tiny inclusion cysts, not big ones,
6 one millimeter fat, and so, it was a terrible problem because
7 those people where disfigured in their face for a long period
8 of time. So he came down to question us what can you do
9 about them. And the other one was is we had this Chloracne,
10 said what caused it? We weren't sure what it was. And, Dr.
11 Suskind took some of those different materials back to
12 Cincinnati and put some of the material on his own skin as
13 well as others in the Kettering laboratory to see if he could
14 reproduce the Chloracne, so he was a participate, and that's
15 how we got started. We had that base, I suppose that if we
16 had kept a persistent look we'd have gradually found it
17 without him, but that was a substantial, almost half of those
18 became the population of study.

19 Q. Now, so you didn't have any work records before
20 1955?

21 A. That's right.

22 Q. Dr. Suskind had records of the people whom he had
23 treated? Or had seen and examined?

24 A. Right some of those he didn't have to treat because

1 they were relatively moderate.

2 Q. But, between all of those sources including the
3 worker's compensation records of the state, with the State of
4 West Virginia, they were able to put together the group that
5 had Chloracne?

6 A. As best they could define, they were able to pick
7 up 122 that they quite well documented had Chloracne, whether
8 they missed several of them who had so minor acne that they
9 didn't become workman's compensation or something else is
10 they could have missed a couple of them, but as best they
11 could tell, they found all of those who did develop
12 Chloracne.

13 Q. So what we would get would be a list of names,
14 correct?

15 A. Yes.

16 Q. And since they were doing a mortality study, what
17 would they do next?

18 A. Well, the first thing they do is they now have that
19 defined cohort. And, they will then contact the social
20 security service and find out of those that are not still
21 working how many of them are dead. And you can get an answer
22 on that whether they are dead or not.

23 Q. And then you would go and get the copy of the death
24 certificate?

1 A. Yes, and then you have to go look for the death
2 certificate as best you can find it.

3 Q. And that was done?

4 A. Yes.

5 Q. By Judy Zack?

6 A. Yes, and Jan Young working with her.

7 Q. So they went and got death certificate.

8 Q. Where would they have to go, to the various
9 counties in West Virginia where those people had lived, or
10 what, could they just go to the State and get them?

11 A. They may have been out of state. All of them
12 didn't live in the state. They are right on the state line,
13 so they can, or close to the state line, and they could be
14 living out of the state, but they do follow up, of the 31
15 deaths I think in that population they were able to find
16 every single death certificate from those that had died.
17 That was remarkable. Usually in a study of this type, they
18 are quite satisfied if they were able to pick up 95 percent
19 of the deaths, and the death certificates.

20 MR. HEINEMAN: Your Honor, I see it's about four
21 o'clock.

22 THE COURT: Okay. Ladies and gentlemen, we will
23 adjourn for the day at this time. We will resume again
24 Monday morning, as I stated earlier, at nine o'clock. And I

1 would remind you on this overnight break, as I do on the
2 others, that you are not to read, listen to, or watch
3 anything about this case in particular or subject matter in
4 general in any of the media. Thank you for your attention
5 and cooperation, and your patience this week. I'll see you
6 Monday, Court is adjourned. Have a good weekend.

7 COURT ADJOURNED:
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STATE OF ILLINOIS)
)
TWENTIETH JUDICIAL CIRCUIT) SS
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COUNTY OF ST. CLAIR)

I, DEBRA M. MUSIELAK, certify the foregoing to be a true and accurate transcript of the testimony and proceedings in the above-entitled cause.

Dated this 22 day of July, 1985.

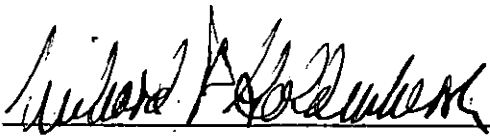
Debra M. Musielak

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

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I, RICHARD P. GOLDENHERSH, one of the Judges in and
for the Twentieth Judicial Circuit, do hereby certify that I
have examined the aforesaid transcript of proceedings, and
certify the foregoing to be a true and accurate transcript of
the testimony and proceedings in the above-styled cause.

Dated this _____ day of July, 1985.



HON. RICHARD P. GOLDENHERSH