

IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF WEST VIRGINIA
CHARLESTON, WEST VIRGINIA

JAMES M. ADKINS, Administrator)
of the Estate of Ralph E.)
Adkins, deceased, et al.,)

Plaintiffs,)

vs.)

No. 81-2098

MONSANTO COMPANY, a Delaware)
Corporation,)

Defendant.)

Deposition of
WILLIAM R. GAFFEY,
taken on behalf of
the Plaintiffs.

Reporter: M. Joy Springer

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of Ralph E. Adkins,)
Deceased, et al.,)

Plaintiff,)

-vs-

No. 81-2098

MONSANTO COMPANY,)
a Delaware Corporation,)

Defendant.)

APPEARANCES:

Messrs. Calwell, McCormick & Peyton,
by W. Stuart Calwell, Jr., Esq.,

On Behalf of the Plaintiff;

Messrs. Bowles McDavid, Graff & Love,
by P. Michael Pleska, Esq.,

On Behalf of the Defendant.

IT IS STIPULATED AND AGREED by and

between counsel for plaintiff and counsel for
defendant that the deposition of WILLIAM R.

GAFFEY may be taken pursuant to the Rule 26(a) of
the Federal Rules of Civil Procedure, on February

1 24, 1984, at the the Clayton Inn, 7759 Carondolet
2 Avenue, Clayton, Missouri, before M. JOY
3 SPRINGER, a Notary Public within and for the
4 County of Madison, State of Illinois; that the
5 issuance of notice and dedimus is waived, and
6 that this deposition may be taken with the same
7 force and effect as if all Federal Rules and
8 statutory requirements had been complied with.

9 IT IS FURTHER STIPULATED AND AGREED
10 that any and all objections to all or any part of
11 this deposition, except objections as to the form
12 of the questions asked or answers given, are
13 hereby reserved and may be raised on the trial of
14 this cause.

15 * * * * *

16
17 WILLIAM R. GAFFEY,
18 produced, sworn and examined on behalf of the
19 Plaintiffs, deposes and says as follows:

20
21 EXAMINATION

22 BY MR. CALWELL:

23 Q. State your name, please.

24 A. William R. Gaffey.

25 Q. What is your address?

1 A. 11269 Pineside Drive, St. Louis,
2 Missouri, 63146.

3 Q. What is your business or occupation?

4 A. I am manager of epidemiology for the
5 Monsanto Company.

6 Q. Are you a epidemiologist?

7 A. Yes.

8 Q. What degrees do you have?

9 A. I have a Ph.D. in mathematical
10 statistics.

11 Q. Do you have any course work in
12 epidemiology as such?

13 A. I've taken a course in epidemiology. I
14 have had extensive course work in physiology and
15 zoology, and I have functioned as an
16 epidemiologist for about 10 years.

17 Q. Is there a field of study called
18 epidemiology?

19 A. Yes.

20 Q. And can one be awarded degrees in
21 epidemiology?

22 A. Yes.

23 Q. Do you know what those degrees are?

24 A. One of them would be a Master of Public
25 Health Degree. The other would be Doctor of

1 Philosophy, a Ph.D.

2 Q. In epidemiology?

3 A. In epidemiology.

4 Q. You do not have either one of those
5 degrees?

6 A. I do not.

7 Q. Is there some board certification or
8 licensing or other type of certification for
9 epidemiologists?

10 A. No.

11 Q. Is there some association of
12 epidemiologists?

13 A. Yes.

14 Q. Do you know what the name is?

15 A. The Society for Epidemiological
16 Research.

17 Q. Is that the only one?

18 A. To the best of my knowledge, yes.

19 Q. Are you a member of that association?

20 A. Yes.

21 Q. How long have you been a member?

22 A. For approximately six years.

23 Q. What are the requirements for
24 membership?

25 A. Interest in and practice in

1 epidemiology.

2 Q. Could I join?

3 A. Yes.

4 Q. So there are, as far as you know, no
5 academic requirements or experience requirements
6 to be a member of the association?

7 A. Not that I know of.

8 Q. How long have you worked at Monsanto?

9 A. Since July of 1979.

10 Q. And have you been in your present
11 position since that time?

12 A. Yes.

13 Q. And prior to your employment with
14 Monsanto I believe you testified in an earlier
15 hearing that you were employed by Stanford
16 Research?

17 A. Stanford Research Institute, yes.

18 Q. And that's in Palo Alto, California?

19 A. In Menlo Park, California.

20 Q. And at the time you were employed by
21 SRI, were you also teaching someplace?

22 A. Yes. I had teaching appointments at
23 the School of Public Health, the University of
24 California in Berkley and at University of the
25 Pacific at their San Francisco campus. Oh, and I

1 also had an appointment at the University of
2 California Medical Center.

3 Q. At the University of California at
4 Berkley?

5 A. Yes.

6 Q. How long did you have a teaching
7 appointment there?

8 A. For approximately 20 years.

9 Q. Was that a continuous appointment?

10 A. Part of the time as full-time faculty
11 and part of the time as part-time appointment.

12 Q. I would assume that over that 20 year
13 period you taught a variety of courses?

14 A. Yes.

15 Q. Did they fall within a general field?

16 A. In the field of biostatistics.

17 Q. Were those undergraduate courses?

18 A. Most of them were graduate courses.

19 Q. In a Masters program?

20 A. A Masters and Ph.D. program.

21 Q. And the people that would be taking
22 those courses, what kinds of degrees would they
23 be working on? Is there some generalization you
24 could make?

25 A. Master of Public Health and Ph.D.'s.

1 Q. Ph.D. in epidemiology?

2 A. In epidemiology or in biostatistics.

3 Q. And that was your general teaching
4 experience at the University of California at
5 Berkley for the 20 year time period that you were
6 there?

7 A. That is correct.

8 Q. Where did you receive your Ph.D.?

9 A. From the University of California at
10 Berkley.

11 Q. And upon receiving the Ph.D. from the
12 University of California at Berkley did you
13 continue to teach?

14 A. I then joined the faculty.

15 Q. No break in time, then?

16 A. No.

17 Q. All right. You also had teaching
18 appointments at the University of the Pacific,
19 did you say?

20 A. That's right.

21 Q. And that's located in San Francisco?

22 A. There is a San Francisco campus.

23 Q. Is that where you had your appointment?

24 A. Yes.

25 Q. And how long did you have your teaching

1 appointment there?

2 A. For approximately two years.

3 Q. Prior to the time that you came to work
4 for Monsanto?

5 A. Yes.

6 Q. And were you teaching the same kinds of
7 courses that you taught for 20 years at Berkley?

8 A. No.

9 Q. What were you teaching?

10 A. Elementary statistics to nurses and
11 other groups.

12 Q. Those were undergraduate courses?

13 A. Yes.

14 Q. All right. You mentioned another
15 school.

16 A. The University of California Medical
17 Center in San Francisco.

18 Q. How long was your teaching appointment
19 there?

20 A. To the best of my recollect,
21 approximately 10 years.

22 Q. Now, would that be 10 years preceding
23 the time you went to work for Monsanto?

24 A. Yes.

25 Q. And what general kinds of courses did

1 you teach there?

2 A. Occasional courses in elementary
3 statistics to medical students.

4 Q. Since you have been employed at
5 Monsanto you have published as a co-author at
6 least one epidemiological study, is that true?

7 A. Yes.

8 Q. And that would be a mortality study?

9 A. That is correct.

10 Q. That you co-authored with Judith Zack?

11 A. Yes.

12 Q. I'm going to hand you a copy of what
13 has previously been marked Deposition Exhibit No.
14 3 in a deposition of Shirley Conibear whose
15 deposition was earlier taken in this case, and it
16 purports to be a copy, in fact was identified in
17 that deposition as a copy of what I will call the
18 Zack-Gaffey mortality study of workers employed
19 at the Monsanto plant in Nitro, and I would hand
20 a copy to you and your lawyer and ask you to take
21 a look at that and see if it is what it purports
22 to be.

23 A. As far as I know, this is the study
24 that you refer to.

25 Q. I think I'm going to mark it as an

1 exhibit to this deposition.

2 (Whereupon Gaffey Deposition
3 Exhibit No. 1, consisting of
4 18 pages, and Gaffey
5 Deposition Exhibit No. 2,
6 consisting of 4 pages, was
7 marked for identification
8 by the Reporter.)

9 Q. Dr. Gaffey, I'm going to hand you
10 what's been marked Gaffey Exhibit No. 1 and ask
11 you if that is the study you identified a moment
12 ago as the Zack-Gaffey study?

13 A. Yes, it is.

14 Q. I'm going to hand you another document
15 that's been marked Gaffey Exhibit No. 2, and it
16 purports to be a copy of "The Mortality
17 Experience of Workers Exposed to
18 Tetrachlorodibenzodioxin in a Trichlorophenol
19 Process Accident." It was done by Judy Zack and
20 Raymond R. Suskind. I'm going to ask you to take
21 a look at that and see if you recognize it.

22 A. Yes. It appears to be a copy of the
23 article.

24 Q. Are you familiar with that study and
25 article?

1 A. Yes.

2 Q. Looking for a moment at Gaffey Exhibit
3 No. 2, did you do any work on this study?

4 A. No, I did not.

5 Q. Had it been completed at the time that
6 you became employed by Monsanto?

7 A. Data collection was completed and I
8 believe a draft report had been written.

9 Q. If you will look on page two of Exhibit
10 2 in the right-hand column under "Population and
11 Methods." Towards the end of that first
12 paragraph, in fact, the last sentence in that
13 paragraph reads, "analysis of the chloracne cases
14 and exposures not associated with this accident
15 but rather with the normal TCP, 2,4,5-T processes
16 will be the subject of a future paper." Do you
17 see that?

18 A. Yes.

19 Q. Does Exhibit 1 cover the areas that are
20 referenced to in that last sentence as the future
21 paper?

22 A. To the extent that the available data
23 made it possible.

24 Q. As far as you know, your study, the
25 Zack-Gaffey study, was an attempt to fulfill the

1 prediction in Exhibit 2 that you have there
2 before you?

3 A. Not exactly.

4 Q. Can you explain what you mean?

5 A. The first study was a study of acute
6 exposure. The second study was a study of
7 chronic exposure.

8 Q. Both papers deal with exposure to TCDD?

9 A. Yes.

10 Q. And both papers deal with Nitro workers
11 who had an exposure to TCDD?

12 A. Yes.

13 Q. Can you tell me generally what you did
14 in connection with the Zack-Gaffey study which
15 has been identified here as Exhibit 1 from the
16 beginning and if you'll just kind of give me a
17 rundown of what you did?

18 A. A population of workers was identified
19 who had spent at least one year as an hourly
20 employee sometime between 1955 and 1966, if I
21 recall correctly. Those people were identified
22 from government social security reports and other
23 sources. They were traced to determine their
24 vital status as of the end of 1977. The observed
25 deaths by cause found during that period were

1 compared with expected causes based on the
2 experience of similar population of U.S. white
3 males. Then those who had died who were found to
4 have been deceased were divided into two groups,
5 one of which had been exposed to 2,4,5-T as
6 evidenced by work history assignments in that
7 area and another group for whom there were no
8 such work history assignments. In each of the
9 two groups distribution of causes of death was
10 calculated and compared with what one would have
11 expected to find in a similar collection of death
12 certificates from the general population.

13 Q. What kinds of things would you look for
14 in a work history to determine that a individual
15 had a potential exposure to 2,4,5-T, and I assume
16 that the exposure to 2,4,5-T was the key as to
17 whether or not they had a potential exposure to
18 TCDD, was that the idea?

19 A. Yes.

20 Q. So what kinds of things did you look
21 for in the work histories to ascertain that you
22 had a person who should be a part of the cohort?

23 A. People whose work histories indicated
24 an assignment to one of the buildings where
25 2,4,5-T was produced or to an area in which

1 trichlorophenol had been produced.

2 Q. Do you know if you included in your
3 study some of the people or all of the people
4 that were included in the Zack-Gaffey cohort?

5 A. Some of them were included.

6 Q. And on what basis were they included?

7 A. If they subsequent to 1955 had worked
8 for one year or more as a hourly worker and the
9 determination of whether or not they were exposed
10 in the study was based on whether or not their
11 work histories had included an assignment to one
12 of the areas that I've just mentioned.

13 Q. In other words, if a member of the
14 Zack-Suskind cohort of 121 otherwise fit the
15 criteria for the cohort you were developing in
16 the Zack-Gaffey study, then they would be
17 included?

18 A. That is correct.

19 Q. What you were after was people who
20 worked at the plant during the time period you
21 were concerned about and people who worked in
22 areas of the plant that you were concerned about
23 and who had a potential for exposure to TCDD, is
24 that correct?

25 A. Based on what we found in their work

1 histories, yes.

2 Q. If you will look at table 2 on Exhibit
3 No. 2, which is the Zack-Suskind study, what does
4 that table show?

5 A. It lists the individuals in that
6 original cohort who had died of cancer and gives
7 specifics such as their year of birth, year of
8 hire, year of death and death certificate
9 statement as to the cause of death and smoking
10 history.

11 Q. And does that table likewise indicate
12 that those nine individuals whose information
13 appears there were individuals that were
14 determined to have been exposed to
15 tetrachlorodibenzodioxin?

16 A. They were people who were determined to
17 have had an acute exposure on the basis of the
18 1949 incident.

19 Q. Now, if you would turn to table 10 of
20 Gaffey Deposition Exhibit No. 1?

21 A. Yes.

22 Q. What does that table show?

23 A. It lists the deaths due to malignant
24 neoplasms among Nitro plant workers exposed to
25 2,4,5-T and, again, gives such specifics as their

1 year of birth, year of hire, year of last
2 exposure, year of termination, year of death and
3 details such as the cause of death and smoking
4 habits.

5 Q. By looking at the five bases that are
6 identified there in the tables, such as year of
7 birth, year of hire, year of death, cause of
8 death and smoking history, you're able, are you
9 not, to make a match between persons identified
10 in table 2 and persons identified in table 10?

11 A. With a fairly high degree of
12 confidence, yes.

13 Q. And likewise, we would expect to find
14 in your study, the Zack-Gaffey study, all of
15 those persons who were a part of the cohort in
16 the Zack-Suskind study who otherwise met your
17 criteria, is that right?

18 A. No.

19 Q. All right. Can you explain that?

20 A. Some of the people in the Zack-Suskind
21 study were salaried employees, therefore, who did
22 not meet the criteria as having had one year's
23 employment as an hourly worker. They further did
24 not meet the criteria for exposure in the second
25 study which was a measure of chronic exposure by

1 work assignment to 2,4,5-T.

2 Q. I understand, but that would mean they
3 didn't meet your criteria?

4 A. That is correct.

5 Q. So my question to you was that if these
6 people otherwise met your criteria in the
7 Zack-Suskind study, you would expect to find them
8 in the Zack-Gaffey study?

9 A. Yes.

10 Q. Now, in table 10 there are some nine
11 people identified, is that correct?

12 A. Yes.

13 Q. If you will look at table 10 and table
14 2 of the Zack-Suskind study, can you tell me if
15 there are any matches based on year of birth,
16 year of hire, year of death, cause of death and
17 smoking history?

18 A. I would have to take some time to
19 examine both tables before I could answer your
20 question.

21 Q. Take all the time you need.

22 A. I believe I find one match.

23 Q. All right. If you would count down on
24 table 10 and tell me the number that is the
25 match?

1 A. Number six.

2 Q. And would that be the person whose year
3 of birth was 1922?

4 A. That is correct.

5 Q. Year of hire, 1945?

6 A. Yes.

7 Q. And year of last exposure, 1948?

8 A. Yes.

9 Q. Year of termination, 1972?

10 A. Yes.

11 Q. Year of death 1973?

12 A. That is correct.

13 Q. Person was a non-smoker?

14 A. Correct.

15 Q. And died, according to the death
16 certificate, of bronchiogenic carcinoma with
17 metastasis. Can you explain if your study was
18 one concerned with chronic exposure as opposed to
19 acute exposure how it is that this gentleman's
20 last year of exposure was 1948?

21 A. No, I can not. I would have to review
22 the original data to see if there is a
23 typographical error there.

24 Q. You'll notice the last two people on
25 table 10 indicates 1948 also.

1 A. I can't without a further review
2 explain the 1948.

3 Q. Is there somewhere in your paper where
4 it states that you're concerned with chronic
5 exposure as opposed to acute exposure?

6 A. Only implicitly by the definition of
7 exposure as being place of employment, that is,
8 those exposed were defined in the second study as
9 having been exposed by virtue of their
10 employment.

11 Q. Can you find some language that enables
12 you to make that statement that it is implied
13 that you're dealing with a chronic exposure as
14 opposed to acute exposure?

15 A. I think you can find it on page 577 in
16 the first paragraph under "Population and
17 Methods." The first sentence I believe describes
18 the cohort in terms of duration of employment.

19 Q. Is there any reason why if your initial
20 intent was to do a study on chronic exposure, you
21 wouldn't have just said this study is to, among
22 other things, determine the effects of chronic
23 exposure?

24 A. I can't now remember why we did or did
25 not say that.

1 Q. When did you decide that it was a
2 chronic exposure paper?

3 A. Before we did the study.

4 Q. Now, if you would turn to table 11 of
5 Exhibit 1, can you tell me what that table 11 is?

6 A. That is a list of the deaths due to
7 cancer among Nitro plant workers not exposed to
8 2,4,5-T giving essentially the same sort of
9 information as was provided in table 10 for each
10 such person.

11 Q. And is it fair to infer from the title
12 of that table that those are persons who were not
13 exposed to TCDD?

14 A. People who were not exposed to TCDD by
15 the criterion established in this particular
16 subject.

17 Q. So you would agree with what I said?

18 A. Yes.

19 Q. If you will look at table 2 on Exhibit
20 2, the Zack-Suskind study, can you find any
21 matches between the persons identified there and
22 the persons identified on table 11, again, using
23 the criteria of the five bits of information
24 provided in both tables, that is, year of birth,
25 year of hire, year of death, type of death,

1 smoking history. If you'd like to make some
2 notes on these exhibits, Doctor, go ahead.

3 A. That's quite all right.

4 (Whereupon a recess was taken,
5 after which the following
6 proceedings were had:)

7 Q. Doctor, have you completed your
8 comparison of the data contained in table 2 of
9 the Zack-Suskind study with the data contained in
10 table 11 in the Zack-Gaffey study?

11 A. Yes, I have.

12 Q. Do you find any matches?

13 A. Yes. I found four matches.

14 Q. And would the four matches, can you
15 tell me what four matches you find?

16 A. If we count down from the top of the
17 list, the fifth and sixth ones, the ninth one and
18 the twenty-second one, which is four from the
19 bottom of the list.

20 Q. And they match, do they not, with the
21 persons identified on table 2 of Exhibit 2 in the
22 one position, the two position, the five position
23 and the seven position?

24 A. Yes.

25 Q. All right. Now, can you explain why it

1 is that the four people contained in table 2 of
2 Exhibit 2 who are identified as having been
3 exposed to tetrachlorodibenzodioxin appear in
4 your study as persons who were not exposed to
5 tetrachlorodibenzodioxin?

6 A. Because two different definitions of
7 exposure were being used.

8 Q. Well, tell me about that.

9 A. The earlier study identified exposure
10 as being acute exposure during or immediately
11 after the 1949 incident. The second study
12 defined exposure as having worked in an area
13 which there was production of 2,4,5-T or TCP.

14 Q. Is there any other explanation for
15 that?

16 A. Not that I'm aware of.

17 Q. How did you define chronic exposure in
18 the study that you performed?

19 A. We defined it as having been assigned
20 to a work area in which 2,4,5-T or TCP was
21 produced.

22 Q. Would a length of time be important in
23 determining chronic exposure in that instance?

24 A. It could be.

25 Q. If a person was assigned to work in the

1 time period that you were concerned about, 1955
2 through 1977 and met all the other criteria with
3 reference to being an employee of the plant
4 during the times that you were concerned about,
5 would he have been included if he had worked one
6 day in a 2,4,5-T unit?

7 A. He could have been.

8 Q. How is that chronic exposure?

9 A. In the sense that there was no
10 accidental extreme release of large amounts of
11 any of the substances under consideration.

12 Q. So it's your testimony as a
13 epidemiologist that in your study a person could
14 be exposed one time in the normal course of
15 events at the plant to 2,4,5-T that may have been
16 contaminated with tetrachlorodibenzodioxin and be
17 a chronically exposed person?

18 A. This is the definition that NIOSH used
19 in establishing their Dioxin Registry.

20 Q. And that is the definition that you
21 used in your study?

22 A. Yes.

23 Q. Now, tell me how you defined acute
24 exposure.

25 A. Those persons who were exposed -- I beg

1 your pardon. I have not defined acute exposure
2 myself. There are two studies here, one of which
3 studies acute exposure but which was done by
4 other persons.

5 Q. Did you not in determining who was
6 chronically exposed and not acutely exposed have
7 to have some understanding of the difference
8 between acute and chronic for purposes of your
9 study?

10 A. Only in the sense that we needed a
11 definition of chronic exposure.

12 Q. You had no definition of acute
13 exposure, I take it?

14 A. Not in the second study.

15 Q. Well, why did you tell me just a minute
16 ago that you would differentiate a chronically
17 exposed person who was exposed on one day from an
18 acutely exposed person because a chronically
19 exposed person would not have been exposed to any
20 accidental release?

21 A. There is in my opinion a difference
22 between the two kinds of exposure. Having
23 studied the acute exposures in one study it
24 seemed appropriate in order to complete the
25 picture to look at those people other than the

1 ones who had been involved in the 1949 accident.
2 Q. Do you know whether the persons who
3 were exposed in connection with the 1949 accident
4 suffered repeated exposures to those materials?

5 A. I don't know.

6 Q. If they were, would that be a chronic
7 exposure?

8 A. I'm unable to speculate because I don't
9 have any knowledge in detail of the kinds of
10 exposures that are involved in the '49 accident.

11 Q. Why did you decide to begin at year
12 1955?

13 A. Because the record system at the plant
14 did not retain the records of all people who
15 terminated before 1955. Had we included those
16 people, there would have been no way to identify
17 a considerable number of those who had terminated
18 and whose records had then been lost.

19 Q. Why did you exclude the 122 or the 121?
20 You had adequate records on them, didn't you?

21 A. They were not excluded.

22 Q. They were excluded to the extent they
23 didn't meet your 1955-1977 time criteria?

24 A. Nor exposure criteria.

25 Q. So what I'm saying to you is why didn't

1 you expand your criteria to encompass those
2 individuals?

3 A. Because the acute exposures had already
4 been studied and found to have turned up nothing
5 and, therefore, the purpose of the second study
6 was to complete the picture by looking at chronic
7 exposure.

8 Q. But you didn't know whether the acutely
9 exposed persons were also subject to chronic
10 exposure, did you?

11 A. No, we did not.

12 Q. And it's true, isn't it, that the more
13 numbers you have in your cohort as a
14 epidemiologist, the more accurate the
15 conclusion's going to be, isn't that right?

16 A. No.

17 Q. Why do you disagree with that?

18 A. Because if one increases the sample
19 size by including a different exposure or people
20 who's not exposed, the results may not be
21 accurate and may indeed be deceptive.

22 Q. My question was you made no effort to
23 determine whether the members of the 122 could
24 have properly been included as chronically
25 exposed persons because you cut them off at 1955?

1 A. Would you repeat that?

2 MR. PLESKA: Read it back.

3 (Whereupon the requested
4 portion of the record was read
5 by the Reporter.)

6 A. That is correct.

7 Q. Why did you do that?

8 A. Because if we had made an effort to
9 determine whether they were includable, we would
10 have been biasing it because those people were
11 people we happened to have information on for the
12 pre-1955 period. There was an indeterminant
13 number on who we did not have information.

14 Q. Do you know if each person identified
15 in table 2 of Exhibit 2 is an hourly worker?

16 A. Are you referring to table 2 of the
17 Zack and Suskind study.

18 Q. Yeah.

19 A. No, I do not know.

20 Q. Do you have records that would tell you
21 that?

22 A. I believe so.

23 Q. Do you know if all the persons
24 identified by data in table 10 of the Zack-Gaffey
25 study are hourly workers?

1 A. Not necessarily.

2 Q. Do you have data available to you that
3 would allow you to know who on table 10 was an
4 hourly worker and who was a salaried worker?

5 A. Excuse me. You said was?

6 Q. Or is?

7 A. All of these were hourly workers at one
8 time or another.

9 Q. And would that be true for the people
10 identified on table 11?

11 A. Yes.

12 Q. And you have information available that
13 would allow you to make the same determination
14 for the people on table 2, is that right?

15 A. I believe that is the case.

16 Q. When you undertake a epidemiological
17 study, and I suppose that is what your study, the
18 Zack-Gaffey study is, is that right?

19 A. Yes.

20 Q. Do you identify some kind of control
21 group?

22 A. Yes.

23 Q. What is a control group?

24 A. Beg your pardon. Did you say what is a
25 control group?

1 Q. Yeah.

2 A. It is a group of people who do not have
3 the exposure which is under study but who are
4 otherwise comparable to the exposed group that is
5 being studied.

6 Q. Why do you have to have a control
7 group?

8 A. There is no other way to determine
9 whether what is observed is in excess of what
10 would be expected.

11 Q. And did you have a control group in
12 connection with your study, the Zack-Gaffey
13 study?

14 A. Yes.

15 Q. Could you define it?

16 A. The control group was the U.S. white
17 male population suitably adjusted to the age
18 distribution of the people who were under study.

19 Q. Did you make any other adjustments
20 other than age adjustment?

21 A. Age, race, sex, date of birth in
22 addition to age.

23 Q. There is language in your study that
24 indicates you made no effort to ascertain 2,4,5-T
25 exposure in the entire cohort of some eight

1 hundred people.

2 A. That is correct.

3 Q. And that you only ascertained 2,4,5-T
4 exposure in so far as the decedents were
5 concerned, is that correct?

6 A. Yes.

7 Q. What do you mean by the word
8 "ascertain"?

9 A. To determine whether the exposure in
10 fact existed or did not exist.

11 Q. Does that mean you went beyond just
12 what appeared in the work histories?

13 A. No, because our original definition of
14 exposure was exposure as measured by the
15 appropriate entries in the work history.

16 Q. Did every member of the cohort have a
17 work history of 2,4,5-T?

18 A. Every member of the cohort had a work
19 history.

20 Q. I don't doubt that if they were
21 employed at Monsanto. Did they have a work
22 history of 2,4,5-T?

23 A. I don't know..

24 Q. Can you explain to me how it was you
25 came up with eight hundred and, what was it,

1 eighty-four people?

2 A. Those were all the people who fit our
3 definition in terms of duration of employment and
4 dates of employment.

5 Q. With no consideration given to whether
6 they were assigned to work in 2,4,5-T or not?

7 A. None.

8 Q. And how is it that you only came up
9 with 884?

10 A. Well, I can only repeat my answer that
11 those are the people who met the criteria that we
12 set up.

13 Q. And out of that 884, and I hope I'm
14 using the right number -- is that the right
15 number, 884?

16 A. Yes, I believe it is.

17 Q. You then only ascertained 2,4,5-T
18 exposure for the decedents, is that right?

19 A. That is correct.

20 Q. Now, why was that?

21 A. There were approximately 160 decedents
22 which is about one-fifth of the total cohort of
23 884. At that time our work histories were not
24 computerized, so in order to determine exposure
25 we had to look manually through the individual

1 records of as many people as we set ourselves a
2 task of looking. At that time there was one
3 epidemiologist employed at that time other than
4 myself and pressure of other duties made us look
5 for ways to expedite the study. The method we
6 chose was to do a proportional mortality analysis
7 on those that were deceased.

8 Q. When was this study undertaken?

9 A. To the best of my recollection, I
10 believe it was undertaken in 1980, late 1980.

11 Q. Do you recall when it was completed?

12 A. Probably in 1981.

13 Q. You now have all of the Nitro work
14 force computerized in terms of work history, do
15 you not?

16 A. All of the hourly employees.

17 Q. When was that completed?

18 A. To the best of my knowledge, probably
19 in early or mid-1982.

20 Q. Would your study have been more
21 reliable had you ascertained the 2,4,5-T exposure
22 for the entire cohort?

23 A. Yes.

24 Q. You wouldn't be surprised if a study of
25 the cohort where 2,4,5-T was ascertained in the

1 entire cohort had conclusions different than the
2 ones you reached?

3 A. I would be extremely surprised.

4 Q. Or disappointed?

5 A. Surprised.

6 Q. Why were the salaried people excluded?

7 A. Salaried people do not have work
8 histories in the sense that their histories give
9 their titles rather than the place to which they
10 were assigned. There is, therefore, no way to
11 determine from a work record whether a salaried
12 person was exposed to 2,4,5-T or not.

13 Q. Did your cohort include salaried
14 persons who at one time were hourly?

15 A. Yes.

16 Q. Could you have asked the salaried
17 people where they worked?

18 A. Not the dead ones.

19 Q. I understand that, but if you were
20 going to, if they had been included in your
21 entire cohort and if you're going to ascertain
22 2,4,5-T exposure on the entire cohort, you could
23 have asked them, couldn't you?

24 A. At the time we did the study a
25 substantial number of them would have been dead

1 another substantial number would have left
2 employment.

3 Q. How did you determine whether the dead
4 people smoked or not? Did you ask them?

5 A. We inquired of probably their
6 co-workers at the plant.

7 Q. That won't have worked, I suppose, for
8 the dead salaried people as to where they worked?

9 A. It might have, although, the numbers
10 would have been large and it would have been
11 correspondingly less reliable because we couldn't
12 have made the --

13 Q. How do you know the numbers would have
14 been large. Weren't there more hourly people
15 than salaried people and presumably more hourly
16 people that smoked?

17 A. I don't know.

18 Q. Did you want to exclude as many people
19 as you could to get the number down, make the
20 number smaller and smaller?

21 A. No. The real idea was to get people
22 who had exposure unequivocally and not
23 subjective--

24 Q. Your position as a epidemiologist is it
25 doesn't bother you to exclude as many people as

1 possible to get the cohort down to a small size,
2 that doesn't concern you?

3 A. It depends whether the people excluded
4 were exposed and whether their exposure could be
5 ascertained.

6 Q. But you didn't determine that in this
7 case?

8 A. We determined we could not ascertain
9 their exposure by objective means. The only way
10 we could have done it was by the method you
11 suggested which has been criticized by people in
12 other studies.

13 Q. You could have done it by determining
14 the 2,4,5-T exposure with the raining members of
15 the cohort you did identify, couldn't you, by
16 objective means?

17 A. Yes.

18 Q. Why was it presumed that people who had
19 plant-wide responsibility such as mechanics and
20 pipefitters and electricians, were not exposed?

21 A. Because some of them were not and some
22 were and there was no way to distinguish between
23 these two groups on the basis of their work
24 histories which did not identify the areas in
25 which they worked.

1 Q. Wouldn't it have been just as valid to
2 assume they were as to assume that they weren't?

3 A. No.

4 Q. Why?

5 A. By assuming that they weren't, we had a
6 study group we knew was exposed. If we had
7 assumed that they all were exposed, then we would
8 have had a study group consisting of some exposed
9 people diluted by people without exposure.

10 Q. By the same token, you also had a study
11 group that excluded people who did in fact meet
12 your criteria by arbitrary exclusion by deciding
13 people who had plant-wide responsibility simply
14 did not have exposure?

15 A. No.

16 Q. Did you make some determination that
17 people who had plant wide responsibility in fact
18 did not have exposure?

19 A. No.

20 Q. How can you say by making your
21 arbitrary decision to exclude them you did not in
22 fact exclude people who had exposure?

23 A. Because our definition of exposure was
24 identification of the appropriate work area.

25 Q. Tell me about the time period 1955 to

1 1977, why did you choose that time period?

2 A. I have already explained why we didn't
3 include people before 1955. At the time the
4 study was done the principal means of follow-up
5 was through the Social Security Administration,
6 and at that time the most recent data they could
7 give us was the vital status as of the end of
8 1977.

9 Q. Is there any other reason?

10 A. No.

11 Q. Does the fact that by choosing that
12 time period you necessarily must have considered
13 people who were perhaps hired in 1976?

14 A. Yes.

15 Q. And you necessarily must have included
16 people who were hired in 1969?

17 A. Yes.

18 Q. Providing for a ever-shortening latency
19 period, isn't that true?

20 A. Only among the unexposed.

21 Q. And as far as you're concerned, that
22 reality about your study does not materially
23 affect its conclusion?

24 A. That is correct.

25 Q. What do you base that on?

1 A. The fact that for the exposed people
2 the minimum latency period was approximately 11,
3 10 or 11 years. Whether or not the unexposed
4 people were hired more recently or not doesn't
5 affect -- we had a latency period for the exposed
6 people.

7 Q. From 11 to 12 years on the average?

8 A. No. Minimum.

9 Q. If you would look at tables 5, 6 and 7
10 of Gaffey Exhibit, I think it's 1, which is your
11 study, the Zack-Gaffey study.

12 A. Uh huh (yes).

13 Q. Can you explain those to me?

14 A. Excuse me, those are tables 5, 6 and 7?

15 Q. 5, 6 and 7.

16 A. In each case we have looked at observed
17 and expected deaths and at their ratio and we
18 have done it for different subject groups of the
19 study population. Table 5 we did it by the years
20 in which people died, table 6 we did it by age at
21 death and in table 7 we did it by the year in
22 which they were hired.

23 Q. So these were subject groups that you
24 sought to test?

25 A. That is correct.

1 Q. And the subject groups were generally
2 identified by calendar time, age at death and
3 year of hire for purposes of testing, is that
4 right?

5 A. That is correct.

6 Q. Was there any other limitation? Did
7 you have to have a certain number of malignant
8 neoplasms appearing before you would?

9 A. Yes, in the sense that I believe there
10 was some causes where if we had no observed
11 deaths, they were left out of the table.

12 Q. Was there some cutoff number, a minimum
13 number that you had to have before you considered
14 them?

15 A. No.

16 Q. You didn't test anything that had fewer
17 than five expected deaths, did you?

18 A. No, I did not.

19 Q. Why is that?

20 A. It is considered good practice by many
21 epidemiologists, including several that work for
22 NIOSH.

23 Q. Can you tell me who some of those good
24 epidemiologists are?

25 A. Doctor James Beaumont (phonetic).

1 Q. Does he have some publication you rely
2 on for that bit of information?

3 A. No.

4 Q. He just tell you that?

5 A. If I am not mistaken, he's included
6 that same structure in one of his publications,
7 but I can't remember what it is.

8 Q. You don't know why he did it that way?

9 A. Yes.

10 Q. Because it's considered good practice?

11 A. Yes.

12 Q. How do you know that it is considered
13 good practice if he didn't tell you and you
14 haven't read anything that he wrote that said it
15 was good practice?

16 A. The assumption used in doing
17 statistical tests of this kind is that the
18 observed deaths follow a prosaun (phonetic)
19 distribution. It's been verified in several
20 publications that that is not true but it is
21 approximately true as the number of expected
22 values gets larger, and in similar situations of
23 that kind five has been used as a cutoff point.

24 Q. Any other reason?

25 A. No.

1 (Whereupon a recess was taken,
2 after which the following
3 proceedings were had:)

4 Q. Doctor, I believe you have been
5 identified as an expert witness by
6 Monsanto?

7 A. Yes.

8 Q. Do you know what you are going to
9 testify about?

10 A. No.

11 Q. You have not been briefed about any
12 opinions you're expected to give?

13 A. Only that if they are professional
14 opinions that I have already arrived at, I'm to
15 respond and give you those opinions.

16 Q. Well, what professional opinions have
17 you already arrived at?

18 A. About what, Mr. Calwell?

19 Q. Well, about this case.

20 A. In so far as the case concerns dioxin
21 exposure, I have come to the conclusion that
22 there is no evidence of any untoward effect from
23 dioxin exposure based upon both on the studies
24 that we have been discussing and several studies
25 done in other times and places.

1 Q. All right. Now, the studies that you
2 and I have been discussing have been the
3 Zack-Suskind study and the Zack-Gaffey study?

4 A. Yes.

5 Q. Now, tell me about the other studies
6 that support your opinion that there are no
7 untoward effects in humans resulting from dioxin
8 exposure. When you say dioxin, that is 2,3,7,8?

9 A. Yes.

10 Q. And does that also extend to any other
11 isomer of dioxin?

12 A. Most of the studies have concerned
13 themselves either explicitly or implicitly with
14 2,3,7,8, although, in some others there were
15 exposures to others well.

16 Q. You were about to tell me the names of
17 some of these other studies that you arrived on
18 your opinion that there are no adverse health
19 effects in humans from dioxin exposure.

20 A. A mortality study of 2,4,5-T workers
21 done by Dow Chemical, cohort mortality study.

22 Q. Can you identify that study a little
23 more particularly, time frame?

24 A. The senior author was a Gerald Ott,
25 O-T-T. I can't further identify it at the

1 moment.

2 Q. I think that is sufficient.

3 A. Finnish study, cohort mortality study
4 of forestry workers whose senior author's last
5 name is Riihimaki, R-I-I-H-I-M-A-K-I. A study of
6 New Zealand pesticide applicators. The senior
7 author's name is Allen Smith. NIOSH
8 investigation of soft tissue sarcomas, in
9 particular at Nitro and at one of the Dow plants,
10 which established that half of them had been
11 misdiagnosed.

12 Q. Does that have any more particular
13 identifying information?

14 A. It has not yet been published. It was
15 presented at a symposium in Rockwell University
16 last October 22.

17 Q. Do you know who presented the paper?

18 A. No. The senior authors, I forgot the
19 order in which they appear, are William Halperin,
20 H-A-L-P-E-R-I-N, and a Merlin Fingerhut,
21 F-I-N-G-E-R-H-U-T.

22 Q. Can you think of anything else, any
23 other studies?

24 A. Yes. A study by a Dr. Samuel Milham,
25 M-I-L-H-A-M, of forestry workers in the State of

1 Washington. I can't recall when or where it was
2 published. Those are the only ones I can recall
3 at the moment.

4 Q. Do those constitute the principal ones
5 you would rely on?

6 A. Yes.

7 Q. Now, is it your opinion that dioxin has
8 no effects on humans?

9 A. No.

10 Q. What is your opinion as to effects?

11 A. Acute effects from heavy exposures have
12 been observed, most particularly in the 1949
13 incident at Nitro and in other places. I
14 therefore must conclude that dioxin in large
15 exposures does create acute effects and
16 chloracne.

17 Q. All right. Now, tell me what heavy or
18 large dose is, I mean, how would I know. You
19 tell me a large dose will produce acute effects.
20 Tell me what "large" is.

21 A. A dose that would cause chloracne might
22 be enough to cause other acute effects.

23 Q. Well, how big is that dose?

24 A. I don't know.

25 Q. Is it your opinion that unless there is

1 chloracne present, there could be no other acute
2 effects?

3 A. That is my opinion, yes.

4 Q. And do you have some bit of literature
5 that you base that on?

6 A. No. I have opinions expressed by
7 dermatologists who are experts in chloracne.

8 Q. All right. And tell me who they are.

9 A. Dr. Raymond Suskind.

10 Q. Is he a dermatologist?

11 A. Yes.

12 Q. Is that the same fellow that examined
13 the people in Nitro?

14 A. Yes.

15 Q. And far as you know it's his opinion
16 that unless there is chloracne there is not going
17 to be any other acute effects, right?

18 A. That is correct.

19 Q. And so you base your opinion in part on
20 this opinion, right?

21 A. On his opinion and other people's
22 opinions.

23 Q. Tell me who the other people are?

24 A. One of them is a Dr. Edward Crow from
25 Great Britain, another dermatologist with some

1 experience in chloracne, and a Dr. Taylor whose
2 first name I forget from Cleveland, a third
3 dermatologist, again, with some experience in the
4 area of chloracne.

5 Q. And it is your opinion that if you
6 would observe chloracne in a person who gives a
7 history of being exposed to some substance that
8 is capable of being contaminated with dioxin or
9 dioxin itself, that unless chloracne was present,
10 there would not be a heavy exposure, is that
11 right?

12 A. That is my opinion.

13 Q. Will chronic exposure amount to heavy
14 exposure in time?

15 A. I don't know.

16 Q. If you had a person who had chloracne
17 but no history of any acute exposure by a history
18 of chronic exposure, what would be your opinion
19 as to whether or not he had a heavy dose of
20 dioxin?

21 A. This is not a medical opinion but one
22 based on my observation. I would say he probably
23 had a heavy dose of dioxin.

24 Q. It is cumulative, then?

25 A. I don't know.

1 Q. But in your opinion a man who had a
2 history of chronic exposure and no acute heavy
3 exposure history could, in your opinion, have
4 what you call a heavy dose?

5 A. My opinion is based on exposure defined
6 as working in the 2,4,5-T unit, so I cannot say
7 with certainty that that exposure was uniform or
8 wasn't at sometime higher than others.

9 Q. You have no opinion, then?

10 A. I have no opinion in that area.

11 Q. Tell me what other acute effects dioxin
12 will cause when it is present in a heavy dose as
13 you have defined the circumstances that would
14 lead you to believe a person had a heavy dose of
15 dioxin?

16 A. I'm not able to recite those symptoms
17 in detail, but they are described in one or both
18 of the papers we discussed.

19 Q. Tell me generally.

20 A. Aches and pains, insomnia, some liver
21 function abnormalities. Those are the ones that
22 I recall.

23 Q. Now, are those acute effects -- when
24 you say an acute effect, what do you mean by that
25 term?

1 A. I mean something that has a
2 well-defined onset short time after the exposure
3 and which then goes away over a period of days or
4 weeks.

5 Q. How many weeks?

6 A. I don't know, but a condition that
7 resolves itself over time rather than one that
8 persists.

9 Q. Is there any time limit that you're
10 willing to recognize?

11 A. No. I think that is a medical question
12 that I'm not competent to answer.

13 Q. You don't have any idea how much time
14 you're talking about, right?

15 A. No.

16 Q. By your definition, then, acute effect
17 could last three years?

18 A. Oh, I would say no.

19 Q. Two years?

20 A. Perhaps.

21 Q. You're not going to go three years,
22 right?

23 A. I'm not certain because what I think of
24 as acute is a situation that resolves itself
25 spontaneously.

1 Q. In a matter of a few days or weeks?

2 A. Or possibly longer.

3 Q. But not as long as three years?

4 A. I don't think so.

5 Q. All right.

6 Q. What's your opinion about any permanent
7 effects that dioxin may cause?

8 A. It may cause chloracne lasting over a
9 good many years.

10 Q. And that is all, in your opinion?

11 A. In my opinion, that is all.

12 Q. Have you formulated an opinion
13 regarding any of the other substances that these
14 lawsuits concern? You told me about your general
15 opinions regarding dioxin and it's effects on
16 humans. Have you formulated opinions about
17 carbon disulfide and its effects on humans?

18 A. No.

19 Q. You're not prepared to testify about
20 that?

21 A. No.

22 Q. Do you know anything about carbon
23 disulfide?

24 A. No.

25 Q. Have you ever studied carbon disulfide

1 A. No.

2 Q. Have you read any literature on carbon
3 disulfide?

4 A. Yes.

5 Q. Can you tell me what you have read?

6 A. No. It was long enough ago so that I
7 can't remember the publications or the papers
8 that I read.

9 Q. Do you have any general idea of what
10 health effects, if any, carbon disulfide may
11 exert on human beings?

12 A. No.

13 Q. You're just not qualified to talk about
14 carbon disulfide, is that what you're telling me?

15 A. That is correct.

16 Q. What about hydrogen sulfide, would that
17 be your answer for hydrogen sulfide, that you're
18 just not qualified to talk about it?

19 A. Yes.

20 Q. And are you not qualified to talk about
21 chlorine?

22 A. My answer would be the same.

23 Q. You haven't studied it, is that true?

24 A. Only in the sense that I have studied a
25 Nitro population, some of whom were exposed to.

1 all of these substances.

2 Q. But your study wasn't calculated to
3 take into account those exposures, was it?

4 A. No.

5 Q. So aside from the fact you might have
6 known that those substances were present in the
7 Nitro plant and presenting potential exposure
8 problems, you don't know anything more about it
9 than that, right?

10 A. That is correct.

11 Q. Would that be true of parathion also?

12 A. Yes.

13 Q. And that would be true also of aniline?

14 A. Yes.

15 Q. And para-aminobiphenyl?

16 A. No.

17 Q. Well, tell me what you know about
18 para-aminobiphenyl?

19 A. It was discovered in the 1950's to have
20 been a bladder carcinogen.

21 Q. In human beings?

22 A. In human beings.

23 Q. And are you prepared to render some
24 expert opinion at the trial of these cases in
25 connection with para-aminobiphenyl in any

1 epidemiological sense?

2 A. Not beyond the clinical accounts that I
3 have read which were not epidemiologic studies.

4 Q. Well, you're just not qualified to give
5 an opinion about para-aminobiphenyl, are you?

6 A. Not of my personal knowledge.

7 Q. How about benzene?

8 A. Yes, I think I am qualified to have an
9 opinion about benzene.

10 Q. What is the basis of your
11 qualifications to have an opinion about benzene?

12 A. I'm familiar with some of the
13 epidemiology studies in the literature and I have
14 been on the Oversight Committee for industry-wide
15 study of workers exposed to benzene.

16 Q. And are you prepared to give some
17 opinion in this case on benzene?

18 A. Yes.

19 Q. Do you know what that opinion is?

20 A. The evidence as to the carcinogenicity
21 of benzene, particularly its relationship to
22 leukemia, seems to be that benzene in large doses
23 can cause leukemia by initially causing anemia or
24 other blood disorders which then progress to
25 leukemia.

1 Q. What is a large dose?

2 A. Literature on Turkish shoemakers where
3 this relationship was first detected suggests
4 that their exposures were four or five hundred
5 parts per million.

6 Q. Is that the way you talk about doses in
7 terms of exposure, parts per million?

8 A. Normally, yes.

9 Q. I mean, other epidemiologists and
10 people involved in these related fields would
11 know what you're talking about if you talked
12 about an exposure dose in parts per million?

13 A. Yes.

14 Q. You're not aware of exposure doses to
15 dioxin in parts per million?

16 A. No.

17 Q. Do you have an opinion as to whether or
18 not someone exposed to 50 parts per million
19 dioxin would be a heavy dose?

20 A. No, I do not.

21 Q. Ten parts per million?

22 A. Since dioxin exposure is primarily
23 through ingestion or skin, the concept of parts
24 per million, which is applied to air levels, is
25 not really relevant here.

1 Q. Well, what would be relevant here in
2 terms of talking about doses of dioxin?

3 A. Probably some indication of how many
4 milligrams per kilogram of body weight was taken
5 in a day.

6 Q. Do you have any idea of dioxin dosage
7 in those terms?

8 A. No, I do not.

9 Q. Have you reviewed the medical records
10 of the plaintiffs in these cases?

11 A. No.

12 Q. You do not know what their medical
13 conditions are, do you?

14 A. No.

15 Q. You didn't have anything to do with the
16 setting up of Dr. Suskind's morbidity study, did
17 you?

18 A. No, I didn't.

19 Q. That was before your time that that got
20 under way, wasn't it?

21 A. To the best of my recollection, it took
22 place about a month before I came to Monsanto.

23 Q. The actual physical?

24 A. Yes.

25 MR. CALWELL: That is it, Doctor.

1. Thank you.

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1 STATE OF ILLINOIS)
2) SS
3 COUNTY OF MADISON)

4 I, M. JOY SPRINGER, a Notary Public
5 within and for the County of Madison, State of
6 Illinois, do hereby certify that pursuant to
7 stipulation there appeared before me on February
8 24, 1984, at the Clayton Inn, 7750 Carondelet
9 Avenue, Clayton, Missouri, WILLIAM R. GAFFEY, who
10 was first duly sworn by me to testify to the
11 whole truth of his knowledge touching the matter
12 in controversy aforesaid, so far as he should be
13 interrogated concerning the same; that he was
14 examined and his examination was taken down in
15 shorthand by me and afterwards transcribed by
16 computer-aided transcription, and his deposition
17 is herewith returned.

18 I FURTHER CERTIFY that I am neither
19 attorney nor counsel for nor related to nor
20 employed by any of the parties to the action in
21 which this deposition is taken; and further, that
22 I am not a relative or employee of any attorney
23 or counsel employed by the parties hereto, or
24 financially interested in the action.
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IN WITNESS WHEREOF, I have hereunto set
my hand and affixed my notarial seal on this 29th
day of February, 1934.

Notary Public within and
for the County of Madison
in the State of Illinois.