

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. UDELL
taken on behalf of the
Plaintiffs.

Reporter: M. Joy Springer

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Corporation,

Defendant.

APPEARANCES:

Messrs. Calwell, McCormick &
Peyton,

by John H. Skaggs, Esq., and
W. Stuart Calwell, Jr., Esq. For Plaintiffs,

Messrs. Bowles, McDavid, Graff &
Love,

by Charles M. Love III, Esq. For Defendant.

IT IS STIPULATED AND AGREED by and between
counsel for the plaintiffs and counsel for the defendant
that the deposition of WILLIAM R. UDELL may be taken
pursuant to Rule 26(a) of the Federal Rules of Civil
Procedure, on July 18, 1983, at the Radisson Hotel,
Room 215, 9th Street and Convention Plaza, St. Louis,
Missouri, before M. JOY SPRINGER, a Notary Public within
and for the County of Madison, State of Illinois; that

1 the issuance of notice and dedimus is waived, and that
2 this deposition may be taken with the same force and
3 effect as if all Federal rules and statutory requirements
4 had been complied with.

5 IT IS FURTHER STIPULATED AND AGREED that any
6 and all objections to all or any part of this deposition,
7 except objections as to form of the questions asked or
8 answers given, are hereby reserved and may be raised
9 on the trial of this cause; and that the signature of
10 the deponent is not waived.

11 * * * * *

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16 WILLIAM R. UDELL

17 produced, sworn and examined on behalf of the plaintiffs,
18 deposes and says as follows:

19 EXAMINATION

20 BY MR. SKAGGS:

21 (Whereupon the reporter marked Plain-
22 tiffs' Deposition Exhibit #344 (Monsanto
23 #8314593 through #8314600) consisting of 8
24 pages; Exhibit #345 (Monsanto #8319226,
25 #8315347, #8315346, #8315345, #8315344,

#8315343, #8315342, #8315341, #8315340,
#8315339, #8315338, #8315337) consisting of
13 pages; Exhibit #346 (Monsanto #8321506
and #8321507) consisting of 2 pages; Exhibit
#347 (Monsanto #8307638 through #8307648)
consisting of 11 pages; Exhibit #348 (Mon-
santo #8321498 through #8321503, #8321415
through #8321430) consisting of 24 pages;
Exhibit #349 (Monsanto #055679, #055660,
#055662, #055683, #055688, #055689, #055691,
#055692, #055697, #055698, #055703, #055705,
#055706, #055708, #055709, #055710, #055712,
#055713 through #055716, #055726 through
#055729, #057327, #057325, #057330, #057339,
#057336, #057338, #057337, #055730, #057099,
#057162, #057400, #057411, #057420, #057554,
#057557, #057707, #057718, #057721, #057727,
#057730, #057737, #057747, #057749, #057761,
#057762, #057769, #057774, #057776, #057780,
#8317460 through #8317474) consisting of 68
pages; Exhibit #350 (Monsanto #69535, #69536,
#69562, #69563, #69564, #69566, #69539, #69540,
#69538, #69537, #69535, #69536, #69537, #69538,
#69539, #69540, #69564, #69566, #69562, #69563)
consisting of 38 pages; Exhibit #351 (Monsanto

1 #001564 through 001569) consisting of 6 pages;
2 Exhibit #352 (Monsanto #8314271, #8314272,
3 #8314305, #8314312, #057969, #8314313, #8314320,
4 #057971, #057972, #8314322, #8314324, #8314327,
5 #8314332, #8314333, #8314323, #8314357, #8314358,
6 #8314359, #8314541, #057981, #057982, #8314542,
7 #8314591, #8314592, #8314667, #8314668, #057864,
8 #057865) consisting of 28 pages; Exhibit #353
9 (Monsanto #8314585, #8314584, #8314582,
10 #8314581, #8314580, #8314579, #8314578,
11 #8314577, #8314576, #8314575, #8314574,
12 #8314573, #8314572, #8314571, #8314570,
13 #8314569, #8314568, #8314566, #8314565,
14 #8314564, #8314563, #8314562, #8314561,
15 #8314560, #8314559, #8314558, #8314557,
16 #8314556, #8314555, #8314554, #8314290,
17 #8314289, #8314288, #8314287, #8314286,
18 #8314285, #8314284, #8314283, #8314282,
19 #8314281, #8314280, #8314279, #8314278,
20 #8314543, #8314544, #8314551, #8314550,
21 #8314549, #8314548, #8314547, #8314546,
22 #8314545, #055515, #055469, #055468, #055467,
23 #055521, #055462, #8314553, #8314552, #8314292,
24 #8314294, #8314291, #055413, #055412, #055411,
25 #055410, #055409, #055408, #055407, #055406,

1 #055405, #055402, #055401, #055400, #055397,
2 #055381, #055380, #055377) consisting of 80
3 pages; and Exhibit #354 (Monsanto #004800
4 through #004847) consisting of 48 pages,
5 for the purposes of identification.)

6 Q (By Mr. Skaggs) Hi, Mr. Udell. My
7 name is John Skaggs. I'm going to be asking you a few
8 questions, and if there's anything you don't understand,
9 feel free to tell me and I will try and rephrase it.

10 Would you state your name for the
11 record, please.

12 A William F. Udell.

13 Q And what is your home address, sir?

14 A No. 60 Tealwood Drive, Creve Coeur,
15 Missouri.

16 Q And what is your business address?

17 A 800 North Lindbergh, St. Louis, Missouri.

18 Q And what is your occupation, sir?

19 A I'm a chemist, Research Manager, actually.

20 Q And where are you employed?

21 A Monsanto Company.

22 Q What is your job title?

23 A Manager of Research.

24 Q As a Manager of Research what are your
25 duties?

1 A My area of responsibility is in
2 process research, and I'm responsible for developing
3 processes for some of our herbicide and plant growth
4 regulator materials and through a group, through a rather
5 large group. I have several group leaders reporting to me.

6 Q How many people do you supervise
7 directly?

8 A Directly, six.

9 Q And who do you report to?

10 A Report to Mr. Rupel.

11 Q And what is his position?

12 A Director of Research.

13 Q I'd like to ask you a few questions
14 about your education. We are going to go back a ways,
15 so if you'll bear with us, please. Where did you grad-
16 uate from high school?

17 A In St. Louis at Southwest High School.

18 Q And what year was that?

19 A 1946.

20 Q Where did you go to college?

21 A At Washington University in St. Louis.

22 Q And what year did you graduate from
23 there?

24 A I got my B.S. in 1958.

25 Q What was your Degree in?

1 A Chemistry.

2 Q That wasn't Chemical Engineering,

3 but pure Chemistry?

4 A Chemistry.

5 Q Did you do any post-graduate work?

6 A Yes. I attained a Master's Degree

7 from Washington University in 1966.

8 Q And what field was that in?

9 A Organic Chemistry.

10 Q Do you have any further graduate

11 education?

12 A No.

13 Q I'd like to ask you a few questions

14 now about your work history. After graduating from

15 college what was your first job?

16 A After graduating from college -- Well,

17 I was working for Monsanto when I graduated from college,

18 and I continued working for Monsanto as a Research Chemist.

19 Q When did you first start with Monsanto?

20 A In 1948.

21 Q And what was your first position?

22 A Laboratory technician.

23 Q So, I guess, in essence, then, you

24 were going to college at night or some such thing?

25 A Yes.

1 Q Then after you obtained your under-
2 graduate Degree, Monsanto promoted you to --

3 A -- Research Chemist.

4 Q As a Research Chemist in, I guess,
5 what year would that be?

6 A 1958.

7 Q What were your duties?

8 A My duties were to develop processes
9 for various organic chemicals.

10 Q Who was your supervisor at that time?

11 A In 1958 I believe it was Collis Bryant.

12 Q Is that Collis?

13 A Collis, C-o-l-l-i-s, Bryant.

14 Q In 1958, then, did you have a respon-
15 sibility for working with the 2,4,5-T process?

16 A No.

17 Q What kind of processes did you work with?

18 A I was working on -rocesses for phthalic
19 anhydride at that time.

20 Q What plant did they manufacture that
21 particular chemical at?

22 A They manufactured it at the Queeny
23 Plant in St. Louis and at the Everett Plant in Massachu-
24 setts.

25 Q Well, all these questions are going

1 to be educational in a way for me. Is this chemical
2 a member of the family of chemicals known as phenolic
3 herbicides?

4 A No.

5 Q As you progressed along in your em-
6 ployment after 1958, what were your successive positions?

7 A I remained a Research Chemist. There
8 is a couple of grades of research chemists, and I don't
9 know exactly when my salary grade changed. My first
10 significant promotion to me was 1968, to me, anyway,
11 when I became Group Leader.

12 Q As a Group Leader what were your duties?

13 A Basically the same only with a number
14 of chemists reporting to me.

15 Q You'd be doing more management, I
16 suppose?

17 A Yes.

18 Q Would the next step up from Group
19 Leader, I believe, be your present position?

20 A Yes. Research Manager.

21 Q And when were you promoted to Research
22 Manager?

23 A 1978.

24 Q When did you first become involved
25 in the 2,4,5-T process?

1 MR. LOVE: Objection to the form
2 of the question. Go ahead and answer it.

3 A O.K. Do you include --

4 Q (By Mr. Skaggs) Well, we'll do it
5 this way.

6 MR. LOVE: The basis of my objection
7 is you have asked him a very broad question
8 and it assumes he was at one time involved
9 in the process. "Process" is a term of
10 art to these people, not necessarily to you
11 or me.

12 Q (By Mr. Skaggs) You're familiar
13 with the Nitro, West Virginia, Plant of the Monsanto
14 Company?

15 A Yes.

16 Q And you are aware, are you not, that
17 at that plant Monsanto manufactures a herbicide known
18 as 2,4,5-T?

19 A Did manufacture.

20 MR. LOVE: Objection to the form of
21 the question.

22 Q (By Mr. Skaggs) At one time Monsanto
23 manufactured 2,4,5-T in Nitro?

24 A Yes.

25 Q Did you ever have occasion to do any

1 work regarding the manufacturing process for 2,4,5-T
2 during the years that it was made at Nitro?

3 A Yes.

4 Q And would you please tell us when
5 you first had occasion to become involved in your work
6 with the 2,4,5-T process at Nitro.

7 A O.K. Again, I assume by 2,4,5-T
8 process you include the intermediates leading to 2,4,5-T.

9 Q Yes, sir.

10 A Because my first involvement was
11 with one of those intermediates rather than with the
12 finished product.

13 Q Would that intermediate be trichloro-
14 phenol?

15 A Yes.

16 Q When did you first become involved
17 with the intermediate trichlorophenol process?

18 A I believe it was '60. Could have been
19 '61, but I think it was '60.

20 Q How did you first become involved in
21 that process?

22 A I was assigned a small project to try
23 to determine better ways to make trichlorophenol, more
24 economical routes.

25 Q Was this job assignment, then, oriented

1 towards the economic problem of production rather than
2 safety problem?

3 A Yes.

4 Q What were the economic problems of
5 producing trichlorophenol in 1960 or 1961?

6 MR. LOVE: Objection to the form of
7 the question. If you can answer it, go
8 ahead.

9 A The same as any manufacture. There's
10 always the desire to improve the cost of your product.

11 Q (By Mr. Skaggs) Have you ever heard
12 of the term "dioxin"?

13 A Yes.

14 Q What does that term mean to you?

15 A Dioxin is, not common useage, is a
16 family of chlorinated dibenzo dioxins.

17 Q And you're familiar also, I assume
18 with 2,3,7,8 tetrachlorodibenzo-para-dioxin?

19 A Yes.

20 Q When did you first become aware of
21 the existence of that particular chemical?

22 A I don't know the exact year that that
23 occurred. It was some time in the early '60's is all I
24 can say.

25 Q You happen to recall the circumstances

1 under which you first became familiar with that chemical?

2 A No.

3 Q You do not recall whether it was in
4 the course of your employment or in casual reading of
5 some professional literature or in relation with a work
6 assignment? You just simply do not recall?

7 A It was in connection with information
8 that I read in doing my job. I don't recall whether it
9 was something that was circulated to me or what it was.

10 Q You don't recall whether it was a
11 professional journal or an in-house memo or something
12 of that nature?

13 A No, I really don't. It was not a
14 significant occurrence at the time.

15 Q I'd like to hand you what has been
16 marked for identification purposes as Plaintiffs' Exhibit
17 #344 (Monsanto #8314593 through #8314600), which consists
18 of several handwritten pages. It appears that your name
19 may be written across the top. It's Nitro microfilm docu-
20 ment #8314593. I'd like you to take a minute to review
21 that, please. I note for the record I'm tendering a
22 copy to Mr. Love for his examination.

23 Have you had an opportunity to review
24 that document?

25 A Yes.

1 Q Do you recognize the handwriting?
2 A Yes.
3 Q And how would you recognize the hand-
4 writing?
5 A It's my handwriting.
6 Q And did you then prepare this document?
7 A Yes.
8 Q You happen to recall what time you
9 prepared this document?
10 A No. Although, it's dated February
11 to August, '65, so it was some time after August of '65.
12 Q I notice at the top of the first page
13 of this document reads, "Progress Report, Job No. 9.23.
14 76001-2102." Is that part of your Monsanto's numbering
15 system?
16 A Yes. That's the code of accounts,
17 job number. The 2102, the last four digits, refers to
18 2,4,5-T.
19 Q Is this document in effect a rough
20 draft?
21 A Yes.
22 Q If one wanted --
23 A I would say it's a preliminary draft,
24 incomplete draft.
25 Q If one wanted to locate the final

1 draft, would it be filed under that same number that
2 appears as the job number?

3 A No. This report was never issued.

4 Q Did you ever make a final draft of
5 this report?

6 A No.

7 Q Did you ever do anything further,
8 did it ever appear in any other form other than the one
9 which is before you?

10 A Not to my knowledge, no.

11 Q And did this appear to be a complete,
12 full and accurate copy of the draft that you prepared?

13 A I don't believe so because I think
14 there were some tables and drafts in the original which
15 I don't see here.

16 Q Aside, then, from the tables and
17 drafts with regard to the textual material, is it a
18 true, full and accurate copy of the document you prepared?

19 A Well, I can't say with certainty.

20 Q To the best of your recollection.

21 A Yeah. Although, this was '65. I
22 don't remember if every page is here or not. There's no
23 way for me to know that.

24 Q I'd like you, if you would, to read
25 into the record the segment of the first page which begins

1 adjacent from the word "Problem."

2 A Do you want me to read starting with
3 "Problem"?

4 Q Yes, sir.

5 A "To reduce concentration of the
6 chloracnegenic 2,3,7,8-tetrachlorodibenzo-dioxin (TDD)
7 in our 2,4,5-T and to improve the color of the product."

8 Q You can stop there. I'd like to
9 ask you, first of all, who brought this problem to your
10 attention?

11 A I believe it was my supervisor at
12 the time.

13 Q And who would that be?

14 A John Stephens.

15 Q And do you recall how he brought that
16 matter to your attention?

17 A No.

18 Q Do you recall if he prepared any
19 written memorandum directing you to investigate this
20 problem?

21 A No, but that was not a normal thing
22 to do at the time, still isn't.

23 Q In the course of directing you to
24 investigate this problem did he describe for the chlorac-
25 negen 2,3,7,8-tetrachlorodibenzo-para-dioxin?

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A No.

Q Did he refer you to any literature to acquaint you with this process?

A No.

Q In the course of investigating this problem did you undertake to acquaint yourself with any literature regarding the chloracnegenic 2,3,7,8-tetrachlorodibenzo-para-dioxin?

MR. LOVE: I'm going to object to the form of the question on the simple basis you haven't elicited from this witness anything that suggests at this juncture that he was aware there was any chloracnegenic problem and is not suggested by the problem stated in the document.

MR. SKAGGS: You're going to let him answer, aren't you?

MR. LOVE: Sure.

A Would you repeat the question, please.

Q (By Mr. Skaggs) Well, what I want to know is did you undertake in the course of preparing this report to investigate the literature with regard to 2,3,7,8-tetrachlorodibenzo-para-dioxin?

A No, I don't believe I was aware of 2,3,7,8-tetrachlorodibenzo-para-dioxin at the time.

1 Q I believe we were talking about
2 whether you undertook to investigate the literature
3 with regard to TDD, and I believe your answer was you
4 did not, is that right?

5 A That's correct, because I wasn't aware
6 of that specific compound at the time.

7 Q So your testimony now will be that
8 the first time you became aware of TDD was when your
9 supervisor assigned you this task in 1965?

10 A No. I wasn't aware of -- Well, I
11 may have been aware that it existed, but I wasn't in
12 any way sure that it was present in our product in
13 February of '65; however, I was reasonably sure by the
14 time I wrote this document and some time after August
15 of '65 or during the course of this work I became aware.

16 Q I'd like to ask you a question about
17 this problem regarding the color of the product. What
18 was the problem with the color of the product?

19 A It was dark.

20 Q Why was that a problem?

21 A Because some of our customers objected
22 to the dark color.

23 Q Is that an esthetic problem or is
24 there significant problem with the quality of a darker
25 product?

1 A Well, my understanding is that it's
2 both an esthetic problem and the dark colors seem to
3 lead to solids precipitation from the product causing
4 pluggage in application equipment and that sort of thing.

5 Q Just so I understand, a darker product
6 which would come in the form of a powder, is that right?

7 A Well, again, I wasn't aware of all
8 the customer complaint correspondence and so forth, but
9 my understanding of this problem was that it carried
10 through to the final esterated products and the color
11 carried through and caused some problem with solids
12 deposition from the product when it was being applied.

13 Q Was the problem of color related to
14 the presence of TDD?

15 A No.

16 Q Did you ever find any evidence that
17 the color problem was at all related to the presence of
18 TDD?

19 MR. LOVE: Let me object again to
20 the form of your question. I assume that
21 you're talking about the time period Febru-
22 ary to August of 1965, but when you use a
23 word like "ever," it's a little broader
24 than that. I would like for you to deal
25 to the extent you can with specific time

1 periods, and that's the basis of my ob-
2 jection.

3 Q (By Mr. Skaggs) When you were per-
4 forming this study from February to August of 1965,
5 did you find any evidence that there was a correlation
6 between a darker color product and the presence of TDD?

7 A Oh, yes. I guess there was no cor-
8 relation. There was a connection in that the colored
9 material as well as the TDD are relatively high boiling
10 materials, and so they would be removed together in a
11 distillation process, so in that sense there is a cor-
12 relation.

13 Q So, then, would it be a fair statement
14 that if it's a lighter colored product, there would be
15 a lower degree of TDD because both those qualities appear
16 under the same or similar manufacturing conditions?

17 A No. There's no connection between
18 the causes, that I know of, between the causes of TDD
19 and coloring.

20 Q Did you at any later date find that
21 correlation between the color of the product and the
22 presence of TDD?

23 A Well, yeah, maybe that more drastic
24 conditions led to more colored products. I don't recall
25 making that conscious judgment, but it's not unrealistic.

1 Q Well, what is the basis of that
2 statement, that it isn't unrealistic?

3 A Well, I guess the darker colored
4 materials are the result of a less selective reaction,
5 maybe more drastic reaction conditions, and the same
6 is true of TDD.

7 Q I'd like you now, sir, to please
8 read the remainder of that first page which begins
9 following the word "Summary" that appears in the left-
10 hand margin of the first page of Exhibit 344.

11 A "A procedure has been developed for
12 the preparation, storage and use of distilled trichloro-
13 phenol to give 2,4,5-T a superior quality. The procedure
14 represents the most effective means of removing both
15 color and TDD."

16 Q Who developed that procedure?

17 A I did.

18 Q Were you working with anyone else in
19 the development of that procedure?

20 A I think there was a technician working
21 with me at the time doing analytical work.

22 Q And do you happen to remember his name?

23 A Jim Sims.

24 Q I'd like for you, if you would, please,
25 to turn to the next page, which is Nitro microfilm

1 #8314594, and I'd like for you to read that page into
2 the record.

3 A "The results of the analysis of
4 various process streams for TDD - in particular, the
5 recent analysis of intermediate autoclave samples -
6 have suggested that TDD formation might be minimized
7 or eliminated by a modification of the process at the
8 autoclave step. A program is being initiated to study
9 the effects of several variables on the formation of TDD,
10 trichlorophenol (TCP) and trichloroanisole (TCA)."

11 Q First of all, you make a reference
12 in there to process streams. What were those process
13 streams?

14 A They were samples of the sodium tri-
15 chlorophenolate solution.

16 Q Were these taken from specific manu-
17 facturing processes?

18 A Yes.

19 Q And what plants were those taken from?

20 A Just the Nitro Plant.

21 Q Who was responsible for taking the
22 samples?

23 A I don't recall. Someone at the plant.

24 Q How many samples were taken?

25 A I'm not sure. I think about three.

1 Q And what time period would these
2 have been taken?

3 A Again, I don't remember which month,
4 Some time between February and August, '65. Over a
5 short span of time. During that period, a day or two.

6 Q And were these samples taken from the
7 trichlorophenol process?

8 A Yes.

9 Q Are you acquainted with the 1949
10 explosion at the Nitro Plant of Monsanto?

11 A I'm aware of it, yes.

12 Q Were these samples taken from the
13 same process that exploded in 1949?

14 MR. LOVE: Object to the form of
15 the question on the basis that it's ex-
16 ceedingly vague. If you want to isolate
17 to the extent of this witness's knowledge
18 where these samples came from that are dis-
19 cussed in this particular document marked
20 for identification as #344, I don't have
21 any difficulty with that, and if you want
22 to then ask him if he knows something
23 with relation to the 1949 incident, I have
24 no trouble with that, but I think your
25 question as phrased is objectionable.

1 Q (By Mr. Skaggs) Well, if you want
2 to answer the question, we'll go on from there.

3 A Would you please repeat the question.

4 Q Let me go about it this way, you're
5 aware in 1949 the autoclave which was involved in the
6 manufacture of trichlorophenol at Nitro exploded?

7 A Yes.

8 Q And it was the same trichlorophenol
9 process that you took these samples from? In other
10 words, the chemical step in the manufacturing process
11 of 2,4,5-T process was the same?

12 MR. LOVE: I object once again to
13 the form of the question. If you can
14 answer it, answer it.

15 A Yeah, the step in the process was the
16 same. There may have been some changes as to the way
17 that step was performed between '49 and '65.

18 Q (By Mr. Skaggs) What about this pro-
19 gram that was initiated, who was responsible for initiat-
20 ing that program?

21 MR. LOVE: Which program are you
22 talking about?

23 MR. SKAGGS: I'm referring to the
24 program described in the last sentence of
25 page 2.

1 A Ag Research management.

2 Q (By Mr. Skaggs) What is Ag Research
3 Management?

4 A My superiors. I don't know exactly
5 who makes the final decision on what programs are initiated
6 and when. Certainly was not at that point in time.

7 Q And you were not responsible, then,
8 for the program that's described in that last sentence,
9 is that right?

10 MR. LOVE: Object to the form of
11 your question. Again, now are you talking
12 about the development of the program or
13 implementation of the program? I don't
14 know what you're talking about.

15 Q (By Mr. Skaggs), Do you understand
16 the question?

17 A No, not entirely. I was not respon-
18 sible for -- When the program was initiated, I did pursue
19 the program, yeah, if that's what you're asking. I'm
20 not sure.

21 Q What were your duties with regard
22 to that program?

23 A My duties were to find conditions
24 for the autoclave step which would minimize or eliminate
25 the formation of TDD, as we called it then.

1 Q In the course of doing that, then,
2 you, of course, had to familiarize yourself with the
3 manufacturing process in place at that time, is that
4 right?

5 A Yes.

6 Q Who was your immediate superior in
7 the work that you did on this program?

8 A I believe at that time it was Dexter
9 Sharp. There was a transition between John Stephens
10 and Dexter Sharp some time around that period. I
11 don't recall what year that occurred. In my case
12 John Stephens was either my immediate superior or second
13 level.

14 Q And what would his position have been?

15 A Manager of Research.

16 Q And who would he have reported to?

17 A John Speciali (phonetic).

18 Q And who was he?

19 A Director of Research.

20 Q What were the several variables that
21 you studied in the course of this program?

22 A The variables of time, temperature,
23 the ratio of several reactants.

24 Q Were there any other variables that
25 you studied?

1 A Well, there is an addition time and
2 there is a hold period. Those were studied as separate
3 variables.

4 Q What is trichloroanisolet?

5 A Trichloroanisolet is a methoxytrichloro-
6 benzene.

7 Q Is it a substance which throws off
8 2,3,7,8-tetrachlorodibenzo-para-dioxin or at some point
9 in the course of its manufacture could be contaminated
10 with 2,3,7,8-tetrachlorodibenzo-para-dioxin?

11 A I don't believe so. It's on the
12 other end of the spectrum. In other words, it's an
13 intermediate on the way to trichlorophenol. Something
14 that you have to react it to to get to trichlorophenol.

15 Q O.K. What ever happened to this pro-
16 gram?

17 A It was completed.

18 Q What were the results of the comple-
19 tion? Did you prepare a written report or make an oral
20 report, or what?

21 A Yes.

22 Q O.K. Which was it?

23 A Both.

24 Q And to whom did you address this
25 oral report?

1 A I don't recall. I think there was
2 an internal report, a group meeting type report. There
3 was a report made to manufacturing people at Nitro I
4 know at one point and then there was a final report
5 written.

6 Q So are you saying there were three
7 different documents?

8 A No. Just one document.

9 Q But it went to three different groups
10 of people?

11 A Well, it went to more than that. It
12 was a fairly widely distributed document. It was a final
13 report. They get a standard fairly wide distribution.

14 Q I'd like to direct your attention to
15 page 3 of this document, which is Agent Orange #8314595.
16 You refer to a sample of plant, I believe it's sodium
17 trichlorophenol, is that correct?

18 A Sample of plant sodium trichlorophenate,
19 yeah.

20 Q Is that a Nitro sample?

21 A Yes.

22 Q I notice then on the top of the next
23 page there is what appears in parenthesis the number
24 BA312, 2/21/64 in parenthesis. Is that a numbering system
25 for samples?

1 A That's 312. Yes. That's Nitro's
2 batch 312, and the other numbers, of course, are the date.

3 Q Is that a standardized numbering system
4 utilized by Monsanto?

5 A I think it's just a Nitro numbering
6 system, not a companywide one.

7 Q What were your recommendations after
8 the completion of this report?

9 A My recommendations were that this
10 process could produce very high quality 2,4,5-trichloro-
11 phenol but it did not seem to be a very desirable process
12 to operate because it would, it doesn't address the
13 problem of eliminating the formation of TDD and in
14 fact it concentrates the TDD in a much more concentrated
15 form which would present many more opportunities for
16 exposure.

17 Q I want to make sure I understand what
18 you're saying, and if my summary is wrong, correct me.
19 Are you saying that you came up with a process which
20 would cure this color problem but would not solve the
21 problem of the TDD?

22 A It would remove the TDD from the
23 product but it would not eliminate the formation of the
24 TDD in the ultimate handling of it.

25 Q You're going to have to clarify that

1 for me, please. I don't understand why it would remove
2 it from the product -- It sounds to me like you're say-
3 ing it would remove it from the product but it would
4 still be there.

5 A It didn't change the conditions of
6 manufacture at all. We still made TDD. All we did
7 was to take the mixture of product and impurities,
8 color bodies, TDD, et cetera and separate out the reason-
9 ably pure trichlorophenol from those colored materials
10 and TDD by distillation. Now that left those materials
11 in the distillation residue so they are still there and
12 still have to be handled and disposed of some way.

13 Q But as far as the final product goes,
14 it would eliminate TDD from the end product?

15 A That's right.

16 MR. LOVE. Objection to the form of
17 the question.

18 Q (By Mr. Skaggs) Do you know who
19 ultimately passed upon the desirability of this process?

20 A No.

21 Q Was it your recommendation, your
22 personal recommendation, that your proposed process not
23 be implemented?

24 A It was my belief. Yes, it was my
25 recommendation.

1 Q Did you make a recommendation one
2 way or the other as to whether this process should be
3 eliminated?

4 A You just asked me that.

5 Q I thought I heard you say it was
6 your belief but you didn't say one way or the other.

7 A I don't specifically recall saying,
8 I recommend we don't do this, but I believe we did.

9 Q I'd like to hand you now what has
10 been marked for identification purposes as Plaintiffs'
11 Exhibit #345 (Monsanto #8319226, et al). I'd like to
12 hand you Plaintiffs' Exhibit #345. I'd like you to
13 take a moment to review this handwritten document,
14 which the top page is Nitro microfilm #8319226, and I
15 would note that I'm tendering a copy to Mr. Love for
16 his review.

17 Do you recognize that page, sir?

18 A No, I don't.

19 Q Do you know the name -- It's very
20 difficult to read at the bottom. It appears to be Bal-
21 derson. Is that name familiar to you?

22 A Yes.

23 Q Do you agree that appears to be the
24 name at the bottom of the page?

25 A Yes.

1 Q Who is he?
2 A He's --
3 MR. LOVE: Are you asking about today,
4 his position?
5 Q (By Mr. Skaggs) Would you identify
6 him, please.
7 A He's an employee of Monsanto at the
8 Nitro Plant laboratories.
9 Q Has he always been employed there?
10 Well, in the course of time that you have known him
11 at Monsanto has he been employed at the Nitro Plant?
12 A Yes.
13 Q And what are his duties, are you
14 familiar with them?
15 A Now, I really don't know what his
16 duties are.
17 Q Do you recognize this page as being
18 out of some kind of a lab book of some kind?
19 A No, I'm not familiar with that.
20 Q Are you familiar with the record-
21 keeping procedures at the laboratory at the Nitro Plant?
22 A No.
23 Q I'd like to direct your attention to
24 what appears to be page 77 of this excerpt, and it's
25 document #8315343, and I would direct your attention to

1 the initials at the bottom of the page and ask you if
2 you recognize those.

3 A No, I don't.

4 Q Are you familiar with the testing
5 program at the Nitro Plant?

6 A No, I'm not.

7 Q You have any knowledge whether the
8 Nitro Plant on a regular basis tested for 2,3,7,8-tetra-
9 chlorodibenzo-dioxin at any time from 1949 to 1969?

10 A Yes. I was told they were doing
11 so and in fact supplied information for them to do that.

12 Q What period of time did they test for
13 dioxin?

14 A I don't know. It was to begin some
15 time in 1966, and I don't know how long it continued.

16 Q But you authored a procedure for them
17 to follow in testing for dioxin, is that correct?

18 A I believe Jim Sims probably authored
19 the procedure. I may have appeared as the co-author.

20 Q When you say you supplied them with,
21 did you pass it on to them or explain it to them, or what?

22 A We passed it on to them and discussed
23 it with them.

24 Q Did you travel to Nitro in assisting them
25 in implementing this testing program?

1 A No, sir, I did not.

2 Q At least this testing involves the
3 use of a gas chromatograph, is that correct?

4 A Yes.

5 Q I assume Nitro had gas chromatographic
6 capability when they initiated this program, is that
7 correct?

8 A Yes. I don't recall if they had to
9 purchase it for the purpose of this program or whether
10 they already had it. I don't know the answer to that.

11 Q Do you know when they first acquired
12 a gas chromatograph?

13 A No, I don't.

14 Q After you supplied them with the pro-
15 cedure to test for dioxin, did you have any responsi-
16 bility to continue to monitor that testing program?

17 A No.

18 Q Would you describe this procedure for us.

19 A Not in any detail. I was not the
20 analytical chemist actually doing the work. All I know
21 is it was a gas chromatographic procedure. I really
22 can't tell you what the details of the procedure were.

23 Q Was this procedure oriented strictly
24 towards taking a sample, running it through the machine,
25 producing a result, or did it include a protocol for a

1 testing program?

2 A I don't understand, testing program.
3 I don't understand what you mean by that.

4 Q Fine. What I want to know is did
5 your procedure merely advise a chemist how to test for
6 dioxin or did it include a program for routinely sampling
7 various parts of the 2,4,5-T manufacturing process and
8 so forth?

9 A The analytical method was specifically
10 for the final product 2,4,5-T and it was just a cookbook
11 description of how to analyze, how to prepare the sample
12 for analysis and how to analyze and calculate the result.

13 Q Did you list any recommendation for
14 a period of time a sample should be taken? For example,
15 did you say a sample should be taken every fourth batch
16 or every tenth batch or something along those lines?

17 A I don't recall. There may have been
18 discussion along those lines, but that escapes my memory.

19 Q Do you know if the Nitro testing
20 program was based on any kind of protocol like that or
21 was it catch-as-catch-can?

22 A I'm sure there was a protocol, but
23 I don't know that I ever was aware of the details of the
24 protocol.

25 Q Is it a Monsanto policy to have a

1 protocol such as that in its chemical manufacturing plants?

2 A Yes. There are specifications, there
3 are specification methods to be followed, and the specifi-
4 cation includes the frequency with which a sample is taken
5 and analyzed. Some are taken every batch, some are taken
6 at intervals and some are taken only upon request.

7 Q Are you familiar with that kind of
8 a policy at any Monsanto plant that would manufacture
9 phenoxy herbicides, in particular, 2,4,5-T?

10 A Am I familiar with that protocol?

11 MR. LOVE: I was going to object to
12 the form of the question both to this one
13 and to the preceding one on the basis of
14 a time situation. If you can be more
15 specific. There may be policies in effect
16 today that were not in effect 25 years ago.
17 Now, I think you limited your last question
18 to the 2,4,5-T which deals with a time
19 period, so that's the reason I did not
20 object to this.

21 Q (By Mr. Skaggs) We'll take it this
22 way. How about 1949?

23 A Were there protocols?

24 Q Yes, sir.

25 A I don't know.

1 Q Do you have any policy at any time
2 at any Monsanto plant regarding the taking of samples
3 for the use of analyzing for dioxin?

4 A I don't recall that I ever was in-
5 volved or aware of what those protocols were.

6 Q I'd like to hand you what has been
7 marked for identification purposes as Plaintiffs' Exhibit
8 346, which is Nitro microfilm #8321506 and #8321507.
9 I'd like you to take a moment to review that and I would
10 note I'm tendering a copy to Mr. Love.

11 Do you recognize that document?

12 A Yes.

13 Q And were you the author of that
14 document?

15 A Yes.

16 Q And does this appear to be a true,
17 full and accurate copy of the document that you authored?

18 A Yes, as far as I can tell.

19 Q I notice that it's dated January 29,
20 1971, and it regards 2,4,5-T. I'm a little confused
21 about it. Does this involve dioxin in an ongoing manu-
22 facturing process or dioxin in an inventory 2,4,5-T
23 that had earlier been manufactured?

24 A An inventory that had been manufactured
25 earlier.

1 Q Where was the inventory that's here
2 manufactured?

3 A I'm not certain. It was at the
4 Krummrich Plant and I believe it was probably -- the
5 last step, the esterification step was done at Krummrich.

6 Q Could any of this inventory have
7 included Nitro product?

8 A Well, it included the material from
9 which the ester was made was produced at Nitro, that is,
10 the 2,4,5-T acid.

11 Q So the 2,4,5-T acid was made at Nitro,
12 was shipped off to Krummrich for the further processing,
13 is that right?

14 A That's right.

15 Q And the inventory that we are dealing
16 with here is the end result of that long process?

17 A That's right.

18 Q I'd like you to read, if you would,
19 the sentence at the bottom of the second paragraph
20 under the detail section. In other words, there is a
21 sentence and the next paragraph is what I'm referring
22 to, and I'd like you to start the sentence that starts,
23 "The filter cake." It's the second to last sentence
24 in that paragraph, and I'd like you to finish reading
25 the paragraph.

1 A "The filter cake may contain up to
2 50 parts per million dioxin and should be considered
3 extremely toxic. Contact with the skin must be rigor-
4 ously avoided."

5 Q What is filter cake?

6 A Filter cake is the solid material
7 that remains on the filter after treatment of this product
8 with carbon and subsequent filtration. So it's primarily
9 carbon with some materials absorbed under the carbon.

10 (Whereupon a short break was taken,
11 after which the following proceedings were
12 had:)

13 Q (By Mr. Skaggs) I'm going to
14 hand you what has been marked for identification purposes
15 as Plaintiffs' Exhibit #347 (Monsanto #8307638 through
16 #8307648). Take a look at that. I note that I'm handing
17 a copy to Mr. Love.

18 A All right.

19 Q Do you recognize this document?

20 A Yes, I do.

21 Q And were you the author of it?

22 A Yes, I was.

23 Q And does this appear to be a true,
24 complete and accurate copy of the report that you prepared?

25 A I believe it is, although, I can't be

1 sure.

2 Q I realize it was a number of years ago,
3 so to the best of your recollection it is?

4 A Yes.

5 Q What was the purpose of this report?

6 A It was to report work done with the
7 purpose of trying to find a more economical route to
8 2,4,5-T.

9 Q And this is part of the ongoing prob-
10 lem to reduce manufacturing costs, is that right?

11 A That's correct.

12 Q In the course of preparing this report
13 did you have occasion to investigate the production of
14 tetra level chlorodibenzo-para-dioxins?

15 A No, no.

16 Q Did you review any literature regard-
17 ing the production of dioxins in preparing this report?

18 A No.

19 Q You didn't consider the problem of
20 the production of dioxins at all when you prepared this
21 document at all, then, is that right?

22 A I don't believe I was aware of dioxin
23 at this time in '61.

24 Q In the course of preparing this document
25 did you have occasion to review the literature with regard

1 to the production of 2,4,5-T in general?

2 A Yes. I would add, particularly as
3 it relates to the manufacturing process.

4 Q I'd like to hand you what has been
5 marked for identification purposes as Plaintiffs' Exhibit
6 #348 (Monsanto #8321498, et al), which is on Monsanto
7 Company letterhead, Agriculture Chemicals Division
8 Research Department, and at the lower righthand corner
9 it contains Nitro microfilm #8321498. I'd like you to
10 take a moment to review this multi-page document.

11 A O.K.

12 Q Do you recognize these documents?

13 A Not specifically. I recognize the
14 handwriting and I'm familiar with the subject matter.
15 I don't remember actually seeing the document before.

16 Q I notice at the top of it it has a
17 block where it says, "Prepared by." What's that name?

18 A F. L. Rupe.

19 Q And what is the name that appears at
20 the bottom of the page?

21 A O. C. Furuta.

22 Q Are you familiar with those people?

23 A Yes.

24 Q How are you familiar with them?

25 A They were both in my group in '71, '70.

1 Q Were you their supervisor?

2 A Yes.

3 Q And in the course of being their

4 supervisor did you become familiar with their work

5 product, including these kinds of documents?

6 A Yes.

7 Q And you said you recognized the hand-

8 writing here, is that correct?

9 A Yes.

10 Q And whose handwriting is that?

11 A Fred Rupel.

12 Q What is this document?

13 A It's notebook pages that relate to

14 the work that he did in the analysis of isooctyl 2,4,5-T

15 esters and in the carbon treatment process development

16 to reduce the development of dioxin.

17 Q Are these documents which you relied

18 upon in the preparation of the report which you authored

19 and has been identified as Plaintiffs' Exhibit #347?

20 MR. LOVE: I'm going to object

21 to that question unless you show us the

22 exhibit again.

23 A No, that's not the right report.

24 MR. LOVE: Wait a minute.

25 MR. SKAGGS: I note for the record

1 I'm tendering to you for your review #347.

2 MR. LOVE: You're asking him if he
3 relied on Exhibit 348 dated February 18,
4 1971, in preparing a report reflected as
5 Exhibit 347 that was prepared January and
6 May of 1961, some ten years earlier, is
7 that your question?

8 MR. SKAGGS: I guess the answer to
9 that is the document speaks for itself,
10 as you frequently say.

11 Q (By Mr. Skaggs) What report did you
12 rely on in preparing this?

13 MR. LOVE: I'm going to object
14 to the question again because I don't
15 have any idea what you're talking about.
16 There's a report in front of him.

17 Q (By Mr. Skaggs) O.K. You just tes-
18 tified, did you not, that these documents were prepared
19 by Mr. Rupel in the course of working on the problem of
20 reducing the dioxin that had accumulated in the 2,4,5-T
21 inventory at the Krumrich Plant, is that right?

22 A That's right.

23 MR. LOVE: You're talking about
24 Plaintiffs' Exhibit 348?

25 MR. SKAGGS: I have been referring

1 to Plaintiffs' Exhibit 348.

2 MR. LOVE: O.K.

3 Q (By Mr. Skaggs) Do you understand
4 the question?

5 A Yes, I understand the question.
6 And this Exhibit 348 does refer to, it's notebook pages
7 of Fred Rupel's in 1971 having to do with the rework
8 of the 2,4,5-T ester inventory of the Krummrich Plant.

9 Q And is, and I'll hand you for your re-
10 view Plaintiffs' Exhibit 346, the report that you just
11 mentioned?

12 A Yes. The data from 348 was used
13 in the preparation of the memo 346.

14 Q Is the form that appears there a
15 standard form that's used by Monsanto in its laboratories?

16 MR. LOVE: You're now talking about
17 348?

18 Q (By Mr. Skaggs) I'm referring now to
19 348.

20 A Yes. Those are copies of notebook
21 pages that are in standard useage in Research.

22 Q That's a rather elementary question,
23 but all we have seen is microfilm so I have no idea what
24 you mean when you say notebooks. Would you describe the
25 notebook that this page would come from, please.

1 A It's a bound book containing either
2 50 or 100 pages, depending on the date of it, and I
3 believe the page size is 8-by-11 and the form is shown
4 on this reduced Nitro microfilm copy you have here.

5 Q And is it the common practice for
6 all chemists to use these notebooks in performing their
7 various tests and so forth?

8 A In reporting their research results,
9 yes, this is the standard vehicle for reporting results.

10 Q Did you rely on any other reports
11 in preparing your two-page letter regarding the reduction
12 of dioxin in the Krummrich inventory, which was Plain-
13 tiffs' Exhibit #346?

14 A I don't recall.

15 Q Is it possible that you did?

16 A Yes.

17 Q Was Mr. Rupel's only connection with
18 the analysis of samples for TDD that on this particular
19 Krummrich inventory problem, is that the only time you
20 ever worked on this problem?

21 MR. LOVE: Object to the form of
22 the question.

23 Q (By Mr. Skaggs) That's a rather con-
24 fusing, double-barrel --

25 A I'm not positive, but I believe this

1 is the only involvement Fred had with 2,4,5-T. I guess
2 I better recant on that. See, Fred worked at Nitro
3 for a period of time, and I don't really know what his
4 responsibilities were prior to this date.

5 Q Are you familiar with his educational
6 background?

7 A He has a B.S. Degree. I don't recall
8 from where.

9 Q Is it a requirement that lab technicians
10 have a college Degree, or do you have some people who
11 have only a high school Degree? Do you have any kind of
12 minimum requirements?

13 A Well, no, there's no hard and fast
14 requirement. There are lab technicians that did not
15 have college Degrees. If they do have a college Degree,
16 we normally don't call them technicians. We call them
17 research chemists.

18 Q Do you have to have a college Degree
19 to run gas chromatograph samples and obtain reliable
20 results?

21 A No.

22 Q And that's a task that a lab technician
23 without a college Degree could satisfactorily perform?

24 A It depends on the complexity of the
25 analysis. Some analyses require a lot more detailed

1 ability than others. Some require sample preparation.
2 In general, a non-degreed technician can be trained to
3 do reliable chromatographic analyses.

4 Q Can he be trained to do reliable
5 chromatographic dioxin analyses?

6 A Yes.

7 Q Would that extend to tetra level
8 dioxin analyses?

9 A Yes.

10 Q Including 2,3,7,8?

11 A Yes.

12 MR. LOVE: I assume you're speaking
13 in terms of today, now?

14 Q (By Mr. Skaggs) We're speaking in
15 terms of today. How about back in 1965?

16 A Well, if I'm answering about today,
17 I'm not entirely sure that a non-degreed person could
18 be relied upon to do the more sophisticated analytical
19 procedures that are being used today. I'm not expert
20 enough to comment on that, but I know the procedures are
21 much more demanding. And I rather doubt that a technician
22 could be relied upon to do them. The methodology that
23 was available in the 1960's and early '70's was, at
24 least methodology that we used, could be done by a
25 trained technician.

1 Q I'm finished with that exhibit. I'd
2 like to hand you what's been marked for identification
3 purposes as Plaintiffs' Exhibit 349 (Monsanto #055679,
4 et al), and I'll note that I'm tendering a copy to Mr.
5 Love and Ms. King for their review.

6 Do you recognize the first page of
7 document 349?

8 A I'm sure I've seen it before. I
9 recognize the form, I recognize the writing and I recog-
10 nize the subject matter.

11 Q Now, are you familiar with Mr. James
12 Sims whose name appears in the "Prepared by" box at
13 the top of this page?

14 A Yes.

15 Q How are you familiar with him?

16 A He worked with me and for me during
17 the late '60's.

18 Q Do you happen to recall during what
19 specific period of time in the late '60's he worked for you?

20 A No, I can't really be specific.

21 Q In the course of supervising him you
22 became familiar enough with his handwriting to be able
23 to recognize it here today, is that right?

24 A That's right.

25 Q There is a name appears at the bottom

1 which says, "Read and understood by," with something
2 Bernard.

3 A That was Willie Bernard. She was
4 a lady that was a technician in the group.

5 Q What is the significance of her sig-
6 nature appearing at the bottom of the page?

7 A This, again, is a notebook page
8 copy, and there is a box at the bottom of all notebook
9 page copies which said "Read and understood by" and
10 that's signed by someone who can understand the subject
11 matter, and it's a requirement of our Patent Department
12 to do this. I'm not exactly sure of the reasons.

13 Q You'll have to excuse me. I'm just
14 kind of curious about that. Is she a proofreader?

15 A No, not a proofreader. I think the
16 main thrust is if you have something that's patentable
17 that you're inventing, you want to have a witness that
18 understands when that's done and understands the work.

19 Q What was Mr. Sims' duties?

20 A He was a technician, and his duties
21 were primarily analytical, analyzing samples.

22 Q In the course of his duties was he
23 responsible for analyzing samples for dioxin?

24 A Yes, he was.

25 Q Was he solely responsible for that or

1 did he share that responsibility with others?

2 MR. LOVE: Objection to the form.

3 Go ahead and answer it.

4 A O.K. At the time of these results
5 in '68, I believe he was the only one responsible. There
6 were others before and after in certain periods of time.
7 We talked about Rupel, for instance.

8 Q (By Mr. Skaggs) What was the mechan-
9 ism involved in providing Mr. Sims with the samples they
10 would analyze?

11 A The samples on the first page are
12 you referring to now?

13 Q Well, as his supervisor you're gener-
14 ally familiar with his work, isn't that right?

15 A Yes.

16 Q Could you describe for us, please,
17 the general procedures that were followed in your lab
18 in providing him with samples to analyze for dioxin?

19 A Well, you'll have to repeat the
20 question. Are you referring to the samples on the first
21 page? Now, these samples are from a particular source
22 and there was a certain procedure. There may have been
23 samples analyzed from other sources.

24 Q All right. How do you determine the
25 source from looking at this document?

1 A I can tell by looking at the first
2 line where it says W.R.U. and a number that this number
3 is one of my notebook pages and it came from my labora-
4 tory, probably from my laboratory investigation.

5 Q Can you determine from that number
6 what plant the samples came from?

7 A No, no, I can't. In fact -- It says
8 1-27. So, again, it looks very much like this was a
9 laboratory preparation that I made. Didn't come from a
10 plant.

11 Q All right. Now, we are making a
12 little bit of progress. Would you explain that, please,
13 the making of laboratory preparation for analysis by
14 Mr. Sims.

15 A We talked about a research program
16 that we carried out whose objective was to find conditions
17 that would reduce or eliminate the presence of dioxin
18 in 2,4,5-T. What I'm saying is that this was part of
19 that laboratory study, try to establish the conditions
20 that led to dioxin.

21 Q I want to make sure I understand it.
22 In 1968 Mr. Sims' responsibility was to analyze these
23 specimens that you prepared for dioxin, is that correct?

24 A That was part of his duties, yes.

25 Q Did he or anyone else in the lab at

1 that period of time analyze samples from production
2 plants for dioxin?

3 A Not on a routine basis. I think we
4 had a sampling program sometime with the plant where
5 samples were sent to St. Louis for analysis.

6 Q Do you recall any details at all
7 about that sampling plan?

8 A I think we discussed one of those
9 earlier this morning. I don't recall exactly. There
10 were either two or three occasions and went in and asked
11 the Nitro people to send us samples from the autoclave
12 process.

13 Q Do you remember the dates of those
14 occasions?

15 A Roughly. The first one, I believe,
16 was in '65, and the other one that I recall, it was in
17 '68. I do not recall if there was still another one.
18 There may have been only two.

19 Q As I recall your testimony earlier,
20 I'm sure or Mr. Love will correct me if I'm mistaken,
21 but I believe you said in '65 you took about three samples,
22 is that right?

23 A Yes.

24 Q And how many samples did you take in
25 1968?

1 A I don't recall. Again, something
2 like three. I guess the others -- Well, I'm sorry,
3 I just can't recall how many of these sampling programs
4 there were. Either two or three.

5 Q Are you able to take a guess as to
6 when that third sample might have been taken?

7 A Well, I'm thinking that we took some
8 samples in '68 and then we took some again in '69 when
9 we ran a plant test. So there were like a total of
10 maybe 10 different batches throughout all those programs.

11 Q Aside from those instances, then,
12 there was no other instance when you supervised the lab
13 at this time that you routinely tested manufacturing
14 samples?

15 A No. Well, wait a minute. Would you
16 repeat that again. There was a time -- There was a time
17 when we analyzed manufacturing samples back in '65.
18 We had a group of samples we analyzed. We never did
19 routinely take samples on a routine basis from the plant.

20 Q And in 1965, then, that wasn't part
21 of a routine practice but part of a research project,
22 is that right?

23 A Well, yeah. When we first analyzed,
24 learned how to analyze for dioxin, we analyzed some
25 retained samples.

1 Q About how many samples did you analyze
2 for dioxin in 1965?

3 A About 15 or 20. Maybe 25. I don't
4 recall.

5 Q You characterized these as retained
6 samples. What does that mean?

7 A The laboratory at Nitro and our
8 other plants have a sample retention program where ob-
9 viously there's no room to save every sample that's
10 taken, so they retain certain samples. The samples that
11 had been retained, we asked for portions of those and
12 they sent us either the portion or the full sample, I
13 don't know which.

14 Q Who decided whether a sample would
15 be saved or destroyed at the plant?

16 A I don't know. I presume it would be the
17 Chief Chemist at the plant.

18 Q And how would he go about making that
19 decision?

20 A I really don't know.

21 Q Do you know if there was a written
22 policy for him to follow?

23 A No, I don't know.

24 Q This sounds like it was a rather un-
25 usual occurrence in 1965. Did a memo or memorandum go out

1 to Nitro advising them of the purpose of these tests and
2 so forth?

3 A I don't recall.

4 Q Do you recall any specific correspon-
5 dence between St. Louis and Monsanto in 1965 when these
6 retained samples were analyzed by you regarding that
7 testing procedure?

8 A Regarding the procedure for analyzing
9 for dioxin?

10 Q Uh huh (yes).

11 A What time frame are you talking about?

12 Q In '65 when you undertook to test
13 these retained samples for dioxin, do you recall any
14 communications between St. Louis and Monsanto?

15 A St. Louis and --

16 Q Between you and the Nitro Plant.

17 A Do I recall any correspondence --
18 No, I don't recall. I don't remember. There was
19 communication, but whether it was in the form of cor-
20 respondence, I don't know.

21 Q Did you personally participate in
22 that communication?

23 A I spoke to Bill Balderson on several
24 occasions.

25 Q What were the nature of those

1 conversations?

2 A Well, it was a discussion of the
3 fact that we had obtained an analytical procedure,
4 analytical standard of dioxin from Dow and that we
5 wished to analyze whatever samples were still retained
6 in Nitro to see what the extent of dioxin in our samples
7 might be.

8 Q Did you advise him with regard to
9 selecting particular samples to be sent to St. Louis
10 for further analysis?

11 A I don't recall. I think what we said,
12 we asked whether there were any samples retained because
13 we didn't know, and I think he didn't know either probably
14 at the time. He got back to me and told me what was
15 available. Now, whether we got every sample that was
16 retained at that time or just selected ones I don't recall.

17 Q Do you recall discussing with him
18 disposal of existing samples?

19 A No.

20 Q Do you recall discussing with him
21 the toxicological characteristics of dioxin?

22 A I don't recall specifically, but I
23 know there was enough concern raised at the time that
24 the material could be hazardous that we were recommending
25 extreme care in handling the material.

1 Q Now, describe this extreme care.
2 Well, I'm not a chemist, see. You say to me extreme care,
3 well, I don't know what careless handling of chemicals is.

4 A Avoid contact with the material is
5 the basic.

6 Q And how do you do that?

7 A Well, you simply don't allow any to
8 get on your skin.

9 Q I'm ignorant about these things. I
10 want you to tell me how one goes about avoiding exposure
11 in the laboratory. As the line of my question suggests,
12 I'm still interested in these retained samples. How
13 when they came into the lab would you handle them?

14 A We weren't particularly concerned
15 about airborne exposure because we knew that the material
16 was a solid and was very high boiling. Our main thrust
17 was to prevent anyone from contacting their skin with it.
18 So to that end, we were very careful when we took the
19 material to weigh it out of the little vial that it
20 was in -- this is the pure dioxin standard that I'm
21 talking about now -- in order to make solutions of it
22 to use as standards for analysis. So just telling
23 people to use extreme care and not let it contact their
24 bodies.

25 Q Well, did you tell them to wear

1 impervious clothing?

2 A I don't know if we did or not, but
3 that's not a particularly good idea, I don't think.
4 I think it's much better when you're working in the
5 laboratory to have all of the feeling and touch that
6 you can have rather than to have a space suit on or
7 something like that where you can't handle materials
8 with a lot of dexterity.

9 Q And that includes dioxin?

10 A Yeah.

11 Q Then your preferred method for handling
12 dioxin is as much physical contact as you can achieve?

13 A As little physical contact.

14 Q O.K. The moon suit isn't appropriate
15 for handling dioxin?

16 A I don't think so, no.

17 Q Now, I'm still having trouble getting
18 a handle on how you dealt with these samples. Did you
19 wear surgical gloves?

20 A We didn't have any particular demand
21 upon our people that they should wear anything.

22 Q Did you advise them to wear surgical
23 gloves?

24 A I may have as a matter of course, yeah.

25 Q Did you advise them to wear lab coats?

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A I don't remember.

Q Did you discuss with Mr. Balderson the proper handling of these samples?

A No, I don't believe I did in any particular detail. I certainly mentioned to him probably in writing that samples, that he should avoid contact with the material.

Q But you didn't go any further than that?

A I don't recall.

Q Did Mr. Balderson seek your advice with regard to the handling of the samples?

A Not that I remember.

Q Some time back I believe you said, we were naming the dates on which you would have been analyzing manufacturing samples for dioxin and you used the phrase the plant's test.

A Yes.

Q Again, I'm ignorant. Is that referring to a specific occasion, or what does that term mean to you?

A There were some test batches made in, I believe, '69, early '69, in which the plant used the condition that I had developed in the course of my work to try to reduce dioxin level, so those conditions were tested in the plant over a period of several batches.

Q Excuse me. I missed the last several --

1 How long?

2 A Several batches.

3 Q We'll talk about that for a moment.
4 Who was the supervisor in charge of directing Monsanto
5 to test this procedure?

6 A I don't know that one person said,
7 you know, do this.

8 Well, then, how did it come about
9 that Nitro undertook to run a test of your proposed
10 procedure?

11 A Well, in the natural course of things
12 people at Nitro as well as people in Research were aware
13 that we were trying to develop methods that led to re-
14 duced dioxin. People in Nitro were quite interested
15 in this, so I discussed it with them frequently. I
16 went to the plant, as I mentioned earlier, and discussed
17 the conditions that I had developed. As a consequence
18 of this a plant test was planned by the people in the
19 plant. Now, I don't know that any particular individual
20 was responsible for it.

21 Q Who were the people at the plant that
22 you worked with on this test?

23 A Ed Taake, I believe -- I get a little
24 confused as to who was there. The names Edward Taake,
25 Gene Cutright, Vern Rhodes -- I think Vern was the

1 Department Supervisor at the time of the plant test.

2 Q You recall any other specific names?

3 A Balderson. Yeah, there were several
4 other people at the plant. Jack Strum. I'm trying to
5 think of others. There are others I can't recall right now.

6 Q Did you consult with Dr. Wallace re-
7 garding this test?

8 A No.

9 Q You're aware of who Dr. Wallace is?

10 A Not for sure. He may have been a
11 plant doctor at Nitro.

12 Q That's correct. Do you recall, and
13 I realize you may not remember names, do you recall
14 organizational positions you may have dealt with at
15 Nitro regarding this test?

16 A Yeah. Talked to the Superintendent
17 of Agricultural Products Manufacturing at Nitro, I
18 think that was Ed Taake, and to Vern Rhodes, who was
19 the Department Supervisor, and to some of the Technical
20 Service Department engineers.

21 Q Do you recall whether I have shown
22 you an exhibit which encompasses the procedures that
23 you were testing at that time, and I'll be happy to
24 make them available, the ones you reviewed so far for
25 your help.

1 MR. LOVE: I don't understand what
2 you're asking him.

3 Q (By Mr. Skaggs) Let me give you
4 the exhibits you have reviewed so far and ask you if
5 the procedure that was tested in 1965 was contained in
6 any of them.

7 A I don't believe it was.

8 Q Was that procedure in writing?

9 A Well, it was the subject of a final
10 report.

11 Q I have reviewed the exhibits so far
12 just briefly. Again, it's my ignorance. I'm handing
13 you Exhibit 347, which is a Progress Report. Now, is
14 that what you're talking about, or are you referring to
15 another document?

16 A No. This had nothing to do with that
17 work.

18 Q And that process that we are talking
19 about wouldn't appear on a form such as this, and I'm
20 referring to Exhibit 347?

21 A That's a Progress Report form. No.
22 It was on a Final Report form, which is somewhat different.

23 Q To whom was that report form addressed?

24 A I think we discussed that earlier.
25 It's rather wide distribution, and I don't recall exactly

1 who was on the distribution.

2 Q Well, what were the results of the tests?

3 MR. LOVE: Which tests are we talking
4 about?

5 Q (By Mr. Skaggs) What were the results
6 of the plant tests?

7 A The plant test results were that the
8 average level of dioxin on control batches, which means
9 the then existing process conditions, gave an average
10 of about 10 parts per million dioxin in that intermediate
11 autoclave stream. The test batches under the new con-
12 ditions gave about 3 parts per million on the average.

13 Q Was this proposed manufacturing
14 process formally adopted on a routine basis?

15 A No.

16 Q Why not?

17 A Because we shortly thereafter stopped
18 manufacturing it.

19 Q How soon after you ran the tests did
20 you stop manufacturing it?

21 A I don't recall. It was a matter of a
22 few months.

23 Q You mean five, six months, something
24 like that?

25 A I don't know. Possible.

1 MR. LOVE: I don't know whether
2 you're through with what's been marked
3 Exhibit 349 or not, but what this exhibit
4 appears, as best I can tell from the
5 numbering, that the pages are all kind
6 of put together in different fashion,
7 they are out of order, and the numerical
8 system located in the lower righthand
9 corner does not appear to be consecutive.

10 A The lower righthand corner wouldn't
11 have much to do with it. It's the upper righthand corner.

12 MR. LOVE: I don't know that that
13 means anything, but I mentioned it for the
14 purpose of the record.

15 MR. SKAGGS: I'm not at all sure
16 just what happened. There are some numbers
17 on this page which are stamped at the top
18 upper righthand corner and the lower right-
19 hand corner.

20 Q (By Mr. Skaggs) Now, do you recognize
21 those? I'm referring to 85310 and at the bottom right-
22 hand corner 055679.

23 A Well, the 85310 is the notebook page
24 number. I don't know what the 055679 is.

25 Q That's apparently an Agent Orange

1 identification number, so I'll refer in the future to
2 the number in the lower righthand corner.

3 MR. LOVE: I would suggest an
4 example of what I'm talking about, the
5 first page in the upper righthand corner
6 is 85310, the second page is 85311 and the
7 third page is 85313, suggesting that 85312
8 is not there. That's just a comment I have
9 to make, so the exhibit appears to be in-
10 complete.

11 MR. SKAGGS: Well, as you're aware
12 of the condition in which these documents
13 were delivered to us, there were a number
14 of pages which appear to be consecutive
15 that didn't appear as consecutive pages
16 in the rolls of microfilm so that may
17 have been the problem here.

18 Q (By Mr. Skaggs) In any event, to
19 return to the plant test results, what all you discovered,
20 then, was that the average level dropped from 10 parts
21 per million to 3 parts per million but you didn't insti-
22 tute the plan because in a few months the plant was shut
23 down?

24 A Right.

25 Q Did you have any input into the decision

1 to close the 2,4,5-T plant?

2 A No.

3 Q Did you anticipate the possibility
4 that dioxin levels might actually increase as a result
5 of this process?

6 Mr. LOVE: I'm going to object
7 to the form of the question.

8 C (By Mr. Skaggs) Process, of course,
9 I'm referring to is the proposed procedure that they
10 were testing during this plant test in 1969.

11 A Did I have any anticipation that
12 they would increase?

13 Q Yes, sir.

14 A No, none.

15 Q Did you view the necessity of taking
16 any special precautions regarding exposure to dioxin
17 during the running of this test?

18 A Nothing beyond what was standard in
19 the plant.

20 Q Was any other personnel there for the
21 specific purpose of viewing the production of these
22 batches, of supervising the employees there?

23 A I don't recall. Anyone outside of
24 the ordinary plant supervision, you mean?

25 Q Exactly.

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A Not that I know of.

Q Was it left to the ordinary plant supervisors to implement this procedure?

A Yes. Well, I don't really know.

Q Who else besides yourself in St. Louis was involved in this plant test procedure?

MR. LOVE: Object. It's been asked and answered but go ahead and answer him again if you can.

A Nobody that I know of that I can recall.

Q (By Mr. Skaggs) I'd like to return now to Exhibit 349. Off the record.

(Whereupon discussion was had off the record.)

Q (By Mr. Skaggs) Have you had an opportunity to review the pages which comprise document #349, which are the notebook sheets bearing Monsanto Company titlehead and signed by James Sims?

A Yes, briefly.

Q And did you recognize Mr. Sims' name on each and every page?

A Yes.

Q And did you recognize his signature on each and every page?

A Yes.

1 Q Did you recognize his handwriting
2 as his handwriting on each and every page of that exhibit?

3 A Yes, as far as I can tell.

4 Q You were, as you testified earlier,
5 his supervisor for a number of years. In the course of
6 supervising him, you became familiar with his handwriting,
7 is that correct?

8 A Yes, that's correct.

9 Q I'd like to hand you what has been
10 marked for identification purposes as Plaintiffs' Exhibit
11 #350 (Monsanto 69535, et al). I note for the record
12 that I'm tendering a copy to Mr. Love, and I would ask
13 you to take a moment and review that document, please.

14 MR. LOVE: I'm going to object
15 with regard to the first page of that
16 document in that it's clearly marked
17 attorney work product. It's a title
18 sheet that should not have been produced,
19 but, obviously, it was produced inadver-
20 tently. And you have my objection to that.

21 MR. SKAGGS: You're just making it
22 for the record? I assume you're not going
23 to instruct him not to answer the questions.

24 MR. LOVE: Well, I'll wait and see
25 what the questions are.

1 MR. SKAGGS: Does your objection only
2 go to the cover sheet of that document?

3 MR. LOVE: At this point. Yes,
4 it's the only one I've seen.

5 A You want me to go through all these
6 pages?

7 Q (By Mr. Skaggs) Well, why don't
8 you take a look at the first three pages of document
9 #350, it is labeled 2,4,5-T Process and it contains
10 an attachment, what appear to be two handwritten pages,
11 and the Agent Orange document numbers are 69535 and
12 69536. Have you had an opportunity to review those
13 documents?

14 A Just briefly.

15 Q Now, do you recognize them?

16 A No, I don't.

17 Q And, once again, I notice they are
18 signed by Mr. Balderson. Do you recognize that appears
19 to be a page from a notebook? Do you recognize that form
20 at all?

21 A No. It's the same form as on the
22 previous document. I think it's the laboratory, the
23 small laboratory books they use at Nitro, but I'm not sure.

24 Q Would you describe for me, please, the
25 kind of recordkeeping that they did at the laboratory at

1 Nitro.

2 MR. LOVE: If you know.

3 A I was not familiar with -- I know
4 that they had lab notebooks and I believe they had
5 perforated pages. I was never fully aware of their
6 reporting procedures.

7 Q (By Mr. Skaggs) Have you had an
8 opportunity to read Agent Orange page number 69535?

9 A Yes.

10 Q What's he doing there?

11 A He's analyzing samples of 2,4,5-T
12 for dioxin.

13 Q And do you recognize any figures
14 on that page which to you would be the results of those
15 tests?

16 A No. In fact, as I read it more care-
17 fully, he's analyzing autoclave samples and he's report-
18 ing, apparently, the total phenols in the autoclave
19 samples on this page.

20 Q But as I understand it, then, you
21 don't see there where he has arrived at a figure that
22 would represent a level of dioxin in those samples?

23 MR. LOVE: I'm going to object to
24 this line of questioning on what is a document
25 obviously prepared by another person which

1 this witness has stated he's never seen
2 before and in your inquiring of him about
3 the content of that document which pur-
4 portedly speaks for itself and asking
5 him to determine what the thought process
6 was of the writer in 1969. You can
7 answer his question.

8 MR. STAGGS: I may briefly clarify
9 for the record, what I'm asking him is
10 based on his education and experience and
11 familiarity with the recordkeeping and
12 laboratory procedures at Monsanto if
13 he's able to determine what process Mr.
14 Balderson was using and if he's able to
15 interpret this document as containing any
16 results as a result of a testing program.

17 Q (By Mr. Staggs) Now, do you recognize
18 any figures on there that represent dioxin?

19 A Yes. I believe that this second
20 column with the top number being 4.3, I think that's
21 a dioxin analysis, and in the last column I believe is
22 a total phenols analysis.

23 Q Do you see any indication that that
24 dioxin level is parts per million or parts per billion
25 or some other figure?

1 MR. LOVE: Once again, I'm going
2 to object to the question. You asked
3 him what he sees on a page. If you
4 can answer the question, go ahead and
5 do it.

6 A There's nothing on the page that
7 tells what the units are in either case.

8 Q (By Mr. Skaggs) Would it be a common
9 practice to indicate on the page what the units are?

10 MR. LOVE: I'm going to object to
11 the form of that question also. You're
12 now asking him about a common practice
13 at Nitro, and he's already testified
14 he didn't know what the practices were
15 at Nitro. If you can answer it, answer it.

16 A I don't know. That will be done
17 sometimes on a research notebook, and I assume in a
18 plant notebook you might do that sometimes. If you
19 had on an earlier page set the guidelines, say, that
20 in the future we won't say ppm but it will be inferred,

21 Q (By Mr. Skaggs) But you would agree
22 as a common practice in the field of chemistry it would
23 be the proper procedure to indicate the units those
24 figures should represent, is that right?

25 A I just explained that that is not

1 necessarily the case. That if you have set your pro-
2 cedures earlier and described them on a notebook page,
3 then there's no need to repeat it.

4 Q He said that the samples had been
5 analyzed in St. Louis. Are you able to determine from
6 your review of this document whether those samples would
7 have been analyzed by your office or from the date of
8 the document whether those were samples involved in any
9 of the process testing that you earlier described?

10 A I don't know of anyone else at the
11 time who would have been doing analyses but our group,
12 so I assume if they were analyzed in St. Louis, they
13 were analyzed by my group.

14 Q And I believe your testimony was that
15 if they are analyzed by your group at that period of time,
16 they would have been analyzed by Mr. Sims, is that right?

17 A Yes. In fact, I do recognize the
18 numbers now that I look at them more closely. They are
19 numbers from the batches taken during the plant tests,
20 I believe.

21 Q So if I may, referring to document
22 69535, about a third of the way down the page, which is
23 a reproduction of a notebook, a series of numbers that
24 begin at number 149 and end at number 157 and in columns
25 corresponding to each of those numbers are TDD figures

1 and total phenol figures, and it's your testimony that
2 these are samples that were taken in the course of
3 the plant tests that you earlier described?

4 A I can't be certain, but I believe
5 that to be the case.

6 Q I'd like to direct your attention
7 to Agent Orange #69536, and if you would take a moment
8 to review that.

9 A Uh huh (yes).

10 Q Likewise, are you familiar with what
11 Mr. Balderson is doing here?

12 A No, I'm not.

13 Q Do you understand the language
14 near the bottom of the page which reads, "Standard
15 solution produced a TDP peak"?

16 A Oh, yeah. I think it was TDA, but
17 it's TDD.

18 Q What do you think he meant by that?

19 MR. LOVE: Object to the form.

20 Q (By Mr. Skaggs) Based on your edu-
21 cation, experience of the area of analytical chemistry,
22 is that a term of art?

23 MR. LOVE: Objection. Again, what
24 do you mean, term of art? What is a term
25 of art?

1 Q (By Mr. Skaggs) TDD peak from
2 standard solution.

3 A I don't know what that means.

4 Q Well, you have no idea, then, what
5 he means by making that notation?

6 A I'd had to assume -- It looks like
7 he was having a problem with his analytical method.

8 Q What was that problem?

9 MR. LOVE: Objection to the form.
10 We are getting off in the area of surmise
11 and speculation. The answer to the preced-
12 ing question was, which I objected to,
13 was it looks like he had a problem, and
14 now you're asking him what that problem
15 appears to have been. If you can answer
16 it, answer it.

17 A It appears he's saying the standard
18 solution he's using did produce a TDD peak in the analysis.

19 Q (By Mr. Skaggs) In other words, it
20 got a very high rating for that, is that right?

21 A High rating?

22 Q The standard solution produced an
23 extremely high reading of TDD?

24 A I don't know how much. No, I have
25 no idea what kind of a reading.

1 Q Well, if it says peak, that could
2 have been the highest reading?

3 A No. A peak of any size is a peak.
4 It can be huge or extremely small. It means a response.
5 It doesn't mean in the sense of the highest level. It
6 simply means that there was a response.

7 Q Now, based on your familiarity with
8 the gas chromatograph process and how you analyze for
9 dioxin using that process, would you have expected the
10 standard solution to produce the highest value for the run?

11 A No, not the highest value.

12 Q Why not?

13 A Well, when one prepares a standard,
14 the best standards are those that approximate the same
15 size or same response that you're going to see in the
16 sample that you're analyzing, so you try to adjust your
17 standard concentration normally to be somewhat in the
18 same ballpark as the expected results from the samples.
19 So, therefore, size of the peak ideally is about the
20 same as the size of the peak that you see in the samples
21 of the anilines.

22 Q Are you able to express the opinion
23 regarding the accuracy of the figures listed on 69535
24 as a result of reviewing this document?

25 MR. LOVE: I'm going to object to

1 the form of the question. You're asking
2 him to express an opinion with regard to
3 numbers on a page prepared by someone
4 else which would appear to be of no
5 value to anyone at this point, but you
6 can answer the question if you can.

7 A These on 69535 the samples have been
8 analyzed in St. Louis, and I think those numbers are
9 ones that came from St. Louis, if I understand this
10 correctly. If that's the case, I can comment to some
11 degree on the accuracy of the method we were using in
12 St. Louis. I don't recall. I think it's documented
13 in the method. I don't recall what the standard
14 accuracy was.

15 Q (By Mr. Skaggs) I'd like to direct
16 your attention to the second group of pages that comprise
17 in part Exhibit 350 and again have a cover page, say
18 Process 2,4,5-T and they contain originator, title in-
19 formation and distribution information, and I'd like
20 to direct your attention to Agent Orange #69562, which
21 is attached to that page.

22 MR. LOVE: I'm going to object to
23 the first page on the same basis I objected
24 to the first page of the other document.

25 Q (By Mr. Skaggs) And ask you to read

1 that to yourself.

2 A O.R.

3 Q Do you recognize that handwriting?

4 A No.

5 Q Are you familiar with the name R.H.
6 Cooper which appears at the bottom of both 69562 and
7 69563?

8 A Yes, I'm familiar with the name.

9 Q Who was he?

10 A I don't know. He was the author of
11 several reports from Nitro, but I never did know him.

12 Q So the way you came to know his
13 name, though, was because he, I suppose, prepared docu-
14 ments at Nitro that came to your attention here in St.
15 Louis, is that right?

16 A That's right.

17 Q Who was R. A. Atkinson whose name
18 appears at the top of page 69562 and 69563?

19 A I don't know what Atkinson's position
20 was. I did know him. I did meet him at the plant. He
21 was, I believe, an engineer in the plant.

22 Q Did you recognize what they were doing
23 here?

24 A Yes.

25 Q What are they doing?

1 A They are evaluating an alternate source
2 of sodium trichlorophenate for use in 2,4,5-T.

3 Q Is that part of the plant test --
4 Well, this was two years earlier -- is that part of the
5 procedure that you recommended, I think, back in '65,
6 or do you have any knowledge of modification of the
7 sodium trichlorophenate process?

8 MR. LOVE: I'm going to object to
9 your question on the basis that I just
10 don't understand it.

11 Q (By Mr. Skaggs) Do you have any
12 familiarity with the process they are undertaking here?

13 A Yes.

14 Q What were they doing there?

15 MR. LOVE: I'm going to object to
16 the form of the question. You're asking
17 the witness to read a document prepared
18 by somebody else which he testified he's
19 never seen before and you're asking him
20 to interpret what people are doing. If
21 you can answer the question, answer it.

22 A It appears they obtained some sodium
23 trichlorophenate solution from another company, Hoffmann,
24 Hoffmann Laboratory, and then they put this material
25 through laboratory preparation of 2,4,5-T.

1 Q (By Mr. Skaggs; Did your laboratory
2 have anything to do with monitoring that process?

3 MR. LOVE: What laboratory you
4 talking about? The one at Nitro, the one
5 in St. Louis?

6 MR. SKAGGS: I'm speaking of the
7 laboratory he worked in in the course of
8 his duties that he's described to us earlier.

9 A Did we have anything to do with moni-
10 toring the process?

11 Q (By Mr. Skaggs) Yes, sir. Did you
12 have anything to do in any kind of manner in regard to
13 the experiment that's described on documents 89562 and
14 89563 which you have just read?

15 A 69 --

16 Q I apologize. The document which you
17 just read.

18 A Not to my recollection, we had no
19 knowledge or input into this.

20 Q I'd like you to take a moment to re-
21 view the remaining documents that comprise this exhibit
22 and advise me if you recognize any of them as being
23 reports made in the course of that plant test or the
24 1965 process test or if you recognize any of them as re-
25 garding your investigation of the 2,4,5-T process at Nitro.

1 A Of course, it may not be possible
2 to make that kind of identification as I go through them.
3 This is a repeat.

4 MR. LOVE: The document which I
5 believe you're suggesting is Agent Orange
6 #69535 and is found back in the body of
7 these documents as well as the second page,
8 same thing with 69536.

9 A Seems like several of these are repeats.
10 No, there's nothing else in there that seems to have any
11 connection.

12 MR. LOVE: I would, of course, have a con-
13 tinuing objection to any one of these
14 sheets that are stamped "Attorney Work
15 Product, Attorney-Client Privilege" that
16 appear within that exhibit.

17 MR. SKAGGS: I understand. They
18 are such informative documents.

19 Q (By Mr. Skaggs) I'd like to hand
20 you what's been marked for identification purposes as
21 Plaintiffs' Exhibit #351, which is a document bearing
22 Agent Orange #001564 and appears to be a memorandum from
23 you to E. F. Taake in Nitro. I'd like you to take a
24 moment to review that, please.

25 A Yes, I recognize this.

1 Q Is that your signature that appears
2 at the bottom of it?

3 A Yes.

4 Q And were you the author of this document?

5 A Yes.

6 Q And does it appear to be a true, full
7 and accurate copy of the memorandum that you wrote?

8 A As nearly as I can tell, yes.

9 Q The memorandum indicates some conclu-
10 sions that you made and they begin with number 1, and
11 I'd like you to read, if you would, the five conclusions
12 that you reached.

13 A "1, During April, 1965, production of
14 TDD rose to an all-time high and has remained much
15 higher than the previous norm current, about 50 ppm,
16 normal about 10 ppm. Number 2, The formation of TDD
17 takes place almost entirely during the hold period.
18 3, At the end of the hold period the TCA content accounts
19 for 2.0 to 2.5% of the yield. About one-half of this is
20 removed by areotropic distillation in the methanol still
21 and recycles with the methanol. 4, The TCB is essentially
22 gone at about one hour into the hold period. 5, Extend-
23 ing the hold period results in increased TDD formation
24 (batch 701)."

25 Q How did you reach those conclusions?

1 A By analysis of the samples that we
2 referred to earlier and the analysis of, I believe, three
3 batches that were withdrawn from the autoclave at about
4 this point in time.

5 Q Regarding number 5, did you intentionally
6 increase the hold period for batch 701?

7 A I don't recall specifically, but I
8 suppose we did. I would guess that we did.

9 Q And did you anticipate when you did
10 that that increasing the hold cycle would result in in-
11 creased TDD formation?

12 A At this time we didn't know what to
13 anticipate. We were simply trying to learn something.

14 Q Now, those autoclave batches were
15 made at Nitro, is that right?

16 A Right.

17 Q And that was in the regular manufactur-
18 ing part of the trichlorophenol process, is that correct?

19 A That's correct.

20 Q And did you take any extra precautions
21 regarding exposure to dioxin when you were performing these
22 tests?

23 A No, nothing beyond the plant norm.
24 Certainly not that I recall.

25 Q Would you read the final paragraph of

1 that memorandum.

2 A "The cause of the recent increase
3 in TDD formation is not obvious from the data. However,
4 since TDD formation has been relatively low in the past,
5 we feel that a detailed laboratory study of the autoclave
6 reaction has a reasonably good chance for success. Such
7 a study is now in the planning stage."

8 Q Was that the study that we have talked
9 about earlier?

10 A We talked about several studies, but
11 that's one of the studies we talked about earlier.

12 Q And which of the studies that we
13 talked about was that?

14 A It was the study of the conditions,
15 the important variables in the autoclave reaction.

16 Q Was that the study that was described
17 in the handwritten document which was exhibit --

18 A No.

19 Q Which was Exhibit 344?

20 A No.

21 Q It was not that?

22 A No.

23 Q What was the outcome of that study, then?

24 MR. LOVE: I'm going to object. I
25 don't know what study you're talking about now.

1 Q (By Mr. Skaggs) Well, I'm talking
2 about the study that's referred to in the last paragraph
3 of the memo from Mr. Udell to Mr. Taake dated September
4 14, 1965.

5 MR. LOVE: Which is marked for
6 identification as Exhibit #351.

7 A Right.

8 Q (By Mr. Skaggs) What was the outcome
9 of that study?

10 A The outcome of that study was we did
11 identify variables -- We identified conditions, let's
12 say, through which we expected to minimize the formation
13 of dioxin.

14 Q Having identified those variables,
15 what did you do then?

16 A Having identified the conditions?

17 Q Yes, sir.

18 A Well, then we proceeded into the
19 plant tests we discussed earlier.

20 Q On this September 14th, 1965, document
21 which is described as a study which began then and
22 culminated in that plant test that concluded in 1979?

23 A That's right.

24 Q Prior to 1969 did you reach any con-
25 clusions in that study?

1 A Oh, yes. Most of the conclusions
2 were developed during 1968.

3 Q But in any event, nothing was actually
4 done with it until 1969, is that right?

5 MR. LOVE: I'm going to object to
6 the form. I think it's purely obvious
7 from the questions asked and the answers
8 given that research was underway to develop
9 a process which would achieve the ends desired.

10 MR. SKAGGS: Well, I think that's --

11 MR. LOVE: If I may finish. And
12 that that study was completed. I think
13 the conclusions were reached in '68, and
14 when the conclusions were reached the
15 tests were run, which occurred in 1969.

16 MR. SKAGGS: I appreciate your
17 summary of the evidence on that point.

18 Q (By Mr. Skaggs) Who is Mr. Dunlap
19 whose name appears at the top of document 351?

20 A Mr. Dunlap was the, I believe, Manager
21 or Director of Manufacturing. I don't recall his exact
22 title.

23 Q And where was he located? Manager or
24 Director of Manufacturing of what?

25 A St. Louis. Of the Agricultural Research

1 Division -- not Research. The Agricultural Division of
2 Monsanto.

3 Q Who would he have reported to?

4 A He would have reported to the general
5 manager of the division.

6 Q Who was Mr. Stephens?

7 A Mr. Stephens was my boss. He was
8 Research Manager at that time, I believe. He was my
9 boss's boss. Dexter Sharp was on there, so Dexter was
10 my Group Leader and John Stephens was then his boss.

11 Q Does the Agricultural Division have
12 laboratories of its own?

13 MR. LOVE: You speaking in terms of
14 today?

15 Q (By Mr. Skaggs) Today does the
16 Agricultural Division have laboratories of its own?

17 A Well, it has laboratories that are
18 administrated by a Central Research Department, as do
19 all the Monsanto laboratories in St. Louis.

20 Q Has that been the organizational
21 structure since you have been with the company?

22 A Well, no.

23 Q What was it prior to the present
24 organizational structure?

25 A Prior to this organizational structure

1 there was no Agricultural Research Division or it
2 was formed, I guess, in 1960 and we had some borrowed
3 lab space from the old Organic Research labs at Second
4 Street in the Queeny Plant.

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

8 Q (By Mr. Skaggs) Before we took
9 the short recess what I was getting at is is there
10 another laboratory that the Ag Division might have that
11 would analyze process samples from the manufacturing
12 plants?

13 MR. LOVE: We're speaking now of 1965?

14 Q (By Mr. Skaggs) Well, let's start
15 in 1960.

16 A O.K. In 1960 was there another
17 laboratory where Nitro Plant samples might be analyzed?

18 Q Right.

19 A Well, 1960 was when the Ag Division
20 was formed. At that time I wouldn't think -- I think
21 they'd be analyzed either at Nitro or by the Research
22 function. Later on there were other laboratories that
23 could have run analyses.

24 Q What were these laboratories?

25 A Well, there's currently a laboratory

1 at Dayton that does environmental sampling of the
2 analyses. It's a corporate function. That's one I
3 had in mind.

4 Q Are there any others?

5 A Not that I know of, not that come
6 to mind.

7 Q Are there any others in the past that
8 might have analyzed process samples from the manufacturing
9 plants?

10 A Not that I know of.

11 Q So the only two laboratories that
12 would have analyzed samples either as an ongoing basis
13 or in the course of your research activities, special
14 occasion, would have been the Agricultural Research
15 laboratory in which you worked and the laboratory in
16 Dayton, is that right?

17 A Nitro, laboratory in Nitro.

18 Q And the laboratory at the plant in
19 Nitro?

20 A Dayton wouldn't have been involved
21 at that time.

22 Q When would it have been involved?

23 A Probably not until around the mid '70's
24 some time.

25 Q So it would have missed the 2,4,5-T

1 business all together?

2 A Yeah.

3 Q Again, this is going to be an educa-
4 tional question for me. I'd like to direct your atten-
5 tion to the graphs attached to Plaintiffs' Exhibit #351.
6 Just looking at it I notice that evidently the Agent
7 Orange identifying number has been cropped off, I
8 suppose, but there are five pages of graphs. What are
9 those?

10 A The first four represent the analysis
11 of samples taken from autoclave batches, I believe, and
12 analyzed for five different chemicals, and those results
13 are then plotted per cent or ppm versus time.

14 Q What were the five chemicals that
15 were analyzed for?

16 A Trichlorophenol, trichloroanisole, di-
17 methoxydichlorophenol, I don't recall exactly what the
18 name of that third one is, it's a dimethoxy impurity
19 made in the trichlorophenol process, then the fourth
20 one is TDD and the last one is tetrachlorobenzene.

21 Q The third chemical which for my sake
22 I'll call DMEQ, is that an impurity that's associated
23 to tetrachlorodibenzo-para-dioxin?

24 A Not to my knowledge.

25 Q Is there any correlation between the

1 production of it and the production of tetrachloropara-
2 dibenzo-dioxins?

3 A I think not. Not that I know of.

4 Q What about the fifth graph, what
5 does it represent?

6 A The fifth one is the plotted analyses
7 of the 2,4,5-T retained samples that we mentioned earlier,
8 we discussed earlier. Samples that had been retained at
9 Nitro and then sent to St. Louis for analysis of TDD.
10 This is a graphical representation of the TDD results
11 versus time.

12 Q Who prepared this chart?

13 A I did.

14 Q And does the reproduction of that
15 chart that's before you represent a true, full and
16 accurate copy of the graph that you prepared and attached
17 to your memo?

18 A Yes, as far as I know.

19 Q Who prepared the four preceding graphs?

20 A I did.

21 Q And do those likewise appear as true,
22 full and complete copies of the graphs that you prepared
23 and attached to your memo which is Exhibit 351?

24 A It's not very legible in places, but
25 they are basically complete, as far as I can tell.

1 Q Is my understanding correct, then,
2 from a review of this chart that the highest concentra-
3 tion of dioxin that you found in these retained samples
4 was 55 parts per million which occurred in, I guess --
5 Well, perhaps you can clarify that. I can't read exactly
6 when that peak is.

7 A It looks like the end of April. Yes,
8 that's correct. 1965.

9 Q That graph of the history of dioxin
10 T-acid is based solely upon those retained samples?

11 A Yes.

12 Q So it's possible that there are
13 samples which contain different values of dioxin that
14 you did not consider in making that chart?

15 A There are definitely samples that
16 contained different levels of dioxin that are not on this
17 chart.

18 Q You have any idea what those other
19 values might have been?

20 A No.

21 Q Why did you direct this to Mr. Taake
22 as the addressee?

23 A Because Mr. Taake was in charge of the
24 operation at Nitro for Ag and he was my contact there,
25 and it was information that should be of use to him.

1 Q When you say he was in charge, I be-
2 lieve, of the operation, what exactly do you mean, what
3 was he responsible for?

4 A Well, he was the superintendent of
5 Ag manufacturing operations at Nitro. We manufactured
6 several products at Nitro, and he had responsibility
7 for not all of Nitro but all of the Ag products that
8 were manufactured there.

9 Q I see. So he was responsible for the
10 2,4,5-T, there would be another comparable person res-
11 ponsible for the petroleum products, and they would all
12 report to the Superintendent or the Plant Manager?

13 A Yeah.

14 Q I'd like to direct your attention now
15 to Plaintiffs' Exhibit 352 (Monsanto #8314271, et al).
16 I ask you to take a moment to review the pages of that
17 document. I note that I'm handing a copy to Mr. Love
18 for his review.

19 MR. LOVE: Do you want him to go
20 through the entire document?

21 MR. SKAGGS: Well, they all bear his
22 signature, so he can begin with the first
23 one and I'll, of course, give him adequate
24 time to review the page to which I refer.

25 Q (By Mr. Skaggs) Do you recognize the

1 first page of Exhibit 352?

2 A I recognize my handwriting and the
3 subject matter.

4 Q Is that indeed your signature that
5 appears in the block "Prepared by"?

6 A Yes.

7 Q Does that appear to be a true, full
8 and accurate copy of the document that you originally
9 wrote?

10 MR. LOVE: You asking him now about
11 all pages of the document?

12 Q (By Mr. Skaggs) Well, right now
13 I'm referring to what's Nitro microfilm #8314271.

14 A I note there is no signature on the
15 bottom where it says, "Read and understood by," which
16 is rather unusual unless it was cut off in the reproduction.

17 Q Aside from that, does it appear to be
18 complete?

19 A Yes, it does.

20 Q When you made this particular document
21 in March of 1965, were you at that time research chemist
22 or had you moved into a supervisory position?

23 A I was a research chemist at that time.

24 Q Who was your supervisor then?

25 MR. LOVE: Collis Bryant.

1 A No. That was earlier. I believe
2 Dexter Sharp by that time.

3 Q (By Mr. Skaggs) And would it have
4 been his practice to review the pages that you had pro-
5 duced in your position as a research chemist?

6 A No, not routinely.

7 Q Is that a page out of the notebook
8 that you described earlier or is it a different document?

9 A This is a page out of a research
10 notebook, out of my research notebook.

11 Q I'd like to direct your attention to
12 document #8314312, which is the fourth document down.
13 I'd like you to take a moment to review that document.

14 Have you had an opportunity to read it?

15 A Yes.

16 Q Is that document in your handwriting?

17 A Yes.

18 Q In fact, that's your signature at the
19 top of the page in the block that reads "Prepared by"?

20 A Yes.

21 Q And does that appear to be a true,
22 full and accurate copy of the original document that you
23 prepared?

24 A Yes, it appears so.

25 Q I'd like you to read, if you would,

1 the first line that appears on that document. It's in
2 the second blank down in that draft.

3 A Beginning with "GLO"?

4 Q Yes, sir.

5 A "GLO of 2,3,7,8 tetrachlorodibenzo-
6 1,4 dioxin on F and M 720 with TC detector."

7 Q Is 2,3,7,8-tetrachlorodibenzo-1,4
8 dioxin the same as 2,3,7,8-tetrachlorodibenzo-para-dioxin?

9 A Yes.

10 Q Can you determine from your review of
11 that document what you were testing for dioxin?

12 A I don't know what it was. It was
13 some material from A. J. Burns, it's described in A. J.
14 Burns' notebook. I can't tell what it was from this and
15 I don't remember.

16 Q Where is the particular language you're
17 referring to there? Is that up here in the second line?

18 A It says, "Samples prepared by A. J.
19 Burns contained anthraquinone internal standard," and
20 goes on to describe the column, the conditions, and it
21 says, "Injected 100 microliters of AG 28435-1 (AJB)."
22 So the sample came from that source. I don't recall
23 what that was.

24 Q What kind of sample would that have
25 been? Would that have been a standard you were trying

1 to evaluate or a product or sample, of what exactly?

2 A I suspect that it was a standard,
3 probably standard material that we received from Dow
4 or a solution of it.

5 Q A couple of times we have touched
6 upon briefly the Dow samples. What was your involvement
7 with that?

8 A My supervisor, may have been Dexter
9 Sharp or Stephens, gave us the procedure that had been
10 received from Dow and gave us a small sample that was
11 labeled, I believe, 1,2,3,4-tetrachlorodibenzo-dioxin.

12 Q And what would that have been?

13 A It would have been in March of '66.

14 Q Did they give you any other material
15 along with that analytical method or those samples?

16 A Not that I remember.

17 Q Did you discuss with them the procedure
18 for handling these Dow samples?

19 MR. LOVE: Objection. Did he discuss
20 with whom?

21 Q (By Mr. Skaggs): With Mr. Sharp and
22 Mr. Stephens.

23 A I don't recall. It's been a long time
24 ago.

25 Q Do you recall discussing these Dow

1 samples with anyone?

2 A Well, ultimately or some time after
3 that they were discussed with the people at Nitro, but
4 I don't recall any other.

5 Q When were these conversations with
6 people at Nitro?

7 A I don't remember.

8 Q Do you recall the content of those
9 conversations with people at Nitro?

10 A Yes. Just a general discussion of
11 the fact we had these samples, the procedure, we were
12 testing it and we would be working with them to do some
13 tests and transfer the method to them.

14 Q Did you discuss the toxicology of
15 handling 2,3,7,8-tetrachlorodibenzo-pars-dioxin with
16 the people at Nitro?

17 A Again, I can't recall the specific
18 conversations, but I'm sure I did.

19 Q Do you recall discussing the toxicology
20 of TCDD with Mr. Sharp or Mr. Stephens?

21 A I don't remember any specific occasions
22 doing that, no.

23 Q Did they advise you of any special
24 procedures to follow when you were handling these samples?

25 A Not that I recall.

1 Q Did they advise you that it was ex-
2 tremely toxic?

3 A It was labeled toxic, and the method
4 documentation discussed the fact that it was a toxic
5 material.

6 Q When you were handling it in the labora-
7 tory, did you use any extraordinary procedures when you
8 were handling the sample?

9 A Extremely careful not to let it con-
10 tact us, again.

11 Q Well, we went through that once before,
12 so basically you did the same thing?

13 A Yes.

14 Q What did you do with these Dow samples
15 when they came in, what was the purpose? You started
16 analyzing them --

17 A There was one sample, one standard
18 small vial, as I recall, of material.

19 Q And what were you to do with this vial?

20 A We were to reproduce or repeat the
21 conditions that they gave us for the analysis as nearly
22 as we could with the equipment that we had and establish
23 whether we could in fact repeat the results that Dow
24 described in the method and then, further, we were to
25 look at our samples from process material made at Nitro

1 to determine whether the same material was present and
2 to what extent.

3 Q Now, the process samples you just
4 referred to, are those these retained samples you re-
5 ferred to earlier?

6 A Well, it was undefined at that point
7 in time. I notice here that I have determination of
8 dioxin in sodium NAT cake, 39-pound sample. I remembered
9 that was a sample that we had gotten for other studies
10 unrelated to dioxin and happened to be the only Nitro
11 sample we had on hand in St. Louis. And so that was
12 the first one we analyzed and then we got others we
13 discussed before, the retained samples and the autoclave
14 samples.

15 Q Aside from the incident that occurred
16 here on the March 15th, 1965, lab report, did you use
17 any other samples from Nitro that you happened to have
18 lying around to analyze for dioxin?

19 A Not that I recall.

20 Q As a matter of course did your labora-
21 tory have samples from Nitro that were to be used for
22 other purposes other than dioxin analysis?

23 A Not as a matter of course, no.

24 Q Did you often have samples at Nitro
25 that you used for other purposes?

1 A No.

2 Q So it was on unusual occasion that
3 you happened to have this sodium trichlorophenate --

4 A This was a sodium- T. In other words,
5 a cake of the 2,4,5-T acid before it was nitrated.

6 Q But it was unusual you happened to
7 have that 39 pounds of it sitting there?

8 A Uh huh (yes).

9 Q I'd like to direct your attention now
10 to document #8314320 in the same Exhibit #352, which on
11 my stack is the sixth page, and I'd ask you to take
12 a moment to review that document.

13 Have you had an opportunity to review it?

14 A No, not yet.

15 Q.O.K.

16 Q And, once again, is that your handwriting?

17 A Yes, it is.

18 Q And that's indeed your signature in
19 the "Prepared by" block?

20 A Yes, it is.

21 Q And that's a true, full and accurate
22 copy of the document you originally prepared?

23 A To the best of my knowledge, yes.

24 Q I would like for you, if you would,
25 to read the first two sentences of that form into the record.

1 A "Discussed hypo treatment and dioxin
2 problem with Vern Rhodes from Nitro, prepared treated
3 T as follows."

4 Q First of all, what was the hypo treat-
5 ment?

6 A That was a treatment with sodium hypo-
7 chlorite, as I recall.

8 Q Is that unrelated to the 2,4,5-T process?

9 A Not entirely. It had been studied as
10 a way of improving the color of the product. We wanted
11 to determine whether it had any influence on the dioxin
12 as well.

13 Q Did you find that it had any influence
14 on the dioxin?

15 A As I recall, it was either completely
16 ineffective or not very effective. I don't remember
17 exactly.

18 Q The date of this document is March 31st,
19 '65, so is the dioxin problem you discussed with Mr. Rhodes,
20 as you recall, the Dow letter and so forth?

21 A Yes.

22 Q Do you recall the details of that con-
23 versation?

24 A No, I don't.

25 Q Do you recall anything about it?

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A No.

Q Do you recall whether you and Mr. Rhodes would have talked about the toxicological hazards associated with dioxin?

MR. LOVE: Objection to the question.

He said he doesn't recall anything about the conversation. If you can answer him, answer him.

A I don't know. I would have to add that I was aware of the reports of the toxicity of the materials, so I'm quite sure I would have discussed the animal toxicity of this material with anyone that I discussed dioxin with.

Q (By Mr. Skaggs) And, again, and I apologize, but it's been some time, why would you have contacted Mr. Rhodes about this?

A Mr. Rhodes was the person directly responsible for the operation of the Nitro Plant. He was the Plant Supervisor, so he was one of my primary contacts in matters of this type.

Q You have here notations regarding, I guess, this is the same 39-pound sample?

A Yes.

Q Would you explain what follows on that page? What does that notation indicate you would have

1 advised him regarding the sample that you refer?

2 A There's nothing in what follows that

3 would have advised Mr. Rhodes about anything.

4 Q I'm having trouble reading the last

5 sentence. Can you make that out? It begins, "Product

6 given to Rhodes."

7 A "Product given to Rhodes to be

8 analyzed at Nitro."

9 Q What product were you referring to?

10 Was that the Dow product or the cake?

11 A That's the product from the hypo-

12 chlorite treatment that's described in the three lines

13 starting with "200."

14 Q O.K. So those notations deal, then,

15 with the hypo treatment problem rather than the Dow

16 dioxin situation?

17 A Yes.

18 Q A few minutes ago you said that your

19 job was to check those Dow samples to see if you could

20 reproduce their results. Were you able to do that?

21 A Yes, to our satisfaction we were.

22 Q Were your results, then, substantially

23 the same as theirs?

24 A Yes.

25 Q I'd like to direct your attention now

1 to document #831432, which you should find to be the
2 very next page, and I'd like you to again take a moment
3 to review it.

4 A It's three pages later.

5 Q Have you had an opportunity to read it?

6 A Yes.

7 Q Once again, is that your signature
8 that appears in the "Prepared by" block?

9 A Yes, it is.

10 Q And does that page contain your hand-
11 writing?

12 A Yes, it does.

13 Q And does it appear to be a true, full
14 and accurate copy of the document you prepared on April
15 1st, 1965?

16 A Yes, it does.

17 Q It appears here that you're still
18 dealing with this cake sample, is that correct?

19 A Yes.

20 Q And it appears you have two categories,
21 untreated and treated. What exactly do you mean by that?

22 A The untreated is material as received,
23 which is the sodium T-acid which is then put through
24 the rest of the process, that is, it's acidified, fil-
25 tered and dried. That's the standard process and conducted

1 at Nitro. Treated one is the same sample which is first
2 given a soft sodium hypochlorite treatment, and then put through
3 the same procedure as that being used at Nitro to iso-
4 late the 2,4,5-T acid.

5 Q Does the segments of document 8314322
6 that contrasts, I suppose, the untreated and the treated
7 samples, does it describe samples from the Nitro process?

8 A The original sample that was used
9 was the same in each case, and it was a sample obtained
10 from Nitro.

11 Q O.K. This is that case, then. You
12 used this as a source of the samples?

13 A Yes.

14 Q The untreated samples show that the
15 dioxin analysis came out at 10 parts per million, is that
16 correct?

17 A That's correct.

18 Q And the treated sample which had gone
19 through this hypo treatment, the purpose of which in part
20 was to improve the color, showed dioxin value at 18
21 parts per million, is that right?

22 A Well, the purpose here was to determine
23 whether dioxin reacted with sodium hypochlorite. At
24 this time we are not concerned about the color any more.
25 We were working on dioxin.

1 Q Well, it's obvious to me the value
2 went up, but I don't know if that means it reacted with
3 or didn't react with it. What was your conclusion on
4 the basis of that test?

5 A Well, my conclusion was that dioxin
6 was not described by the hypochlorite, that there may
7 have been an analytical problem somewhere in the con-
8 duction of the analytical method. It's quite possible
9 that materials that give a response at the same time
10 as dioxin were formed and contributed to the higher
11 number, to the 18 parts per million, and opposed to the
12 10 in the untreated sample. There was no way for us
13 to determine exactly whether it was variability in
14 method or whether there was actually something else
15 present that gave a response that would look like dioxin.

16 Q So you couldn't definitively say
17 that this hypo treatment threw off dioxin, if you will,
18 or if it didn't?

19 A No. At the time analytical methodology
20 was not at the highest state of development that we would
21 be able to be entirely sure of the specificity of the
22 method, whether it's analyzing dioxin and nothing else
23 but dioxin. That methodology was not advanced enough
24 at that stage to be able to make that kind of determination.

25 Q But you were looking for 2,3,7,8-

1 tetrachlorodibenzo-para-dioxin?

2 A That's the one we were looking for.

3 Q I'd like to direct your attention

4 to 8314327. Take a moment and look at that.

5 A Yes.

6 Q And is this document in your handwriting?

7 A Yes, it is.

8 Q And you signed it in the "Prepared by"

9 box?

10 A Yes.

11 Q And it's a true, full and accurate

12 copy of the document that you wrote, is it not?

13 A It would appear so.

14 Q I notice here you have "Anal," which

15 I assume is for, "Analysis of chloracnegen," is that what

16 that reads?

17 A That's correct.

18 Q So in 1965 you were aware of the

19 chloracnegenic products of tetrachlorodibenzo-para-dioxin?

20 A Yes.

21 Q It says here, "3/16/65 to Galbraith

22 for single CHC."

23 A CL.

24 Q CHCL. Who is Galbraith?

25 A Galbraith was an analytical laboratory

1 Q And what was it sent to him for analyze
2 for?

3 A Well, we sent the Dow sample to Galbraith
4 to determine the element or compound, the chlorohydrogen chlorine,
5 and we compared those to what the theoretical quantities
6 should be.

7 Q That was a further check on the Dow
8 information?

9 A Yes. Again, that's a rigorous iden-
10 tification, but another step.

11 Q Did you personally send that sample
12 to Galbraith?

13 A I don't recall.

14 Q Would you recall whether Galbraith
15 was advised of the chloracnegenic properties of TCDD?

16 A Again, I'm not entirely certain, but
17 I would certainly expect that they would have been.

18 Q I'd like to direct your attention to
19 Nitro microfilm #8314542.

20 A O.K.

21 Q Would you please review that document.

22 A O.K.

23 Q And, once again, is this a document
24 in your handwriting?

25 A Yes, it is.

1 Q And is that your signature in the
2 "Prepared by" box?

3 A Yes, it is.

4 Q And is it a true, full and accurate
5 copy of the document that you prepared?

6 A It appears to be.

7 Q On the lower lefthand corner of that
8 block of figures it appears to read, results, or an
9 abbreviation for the word results, 400 parts per mil-
10 lion TDD. Is that accurate?

11 A No. It's residue.

12 Q What is the significance of that?

13 A This is an experiment that describes
14 some of the work that we discussed earlier which is in
15 the handwritten report.

16 Q The handwritten report you're referring
17 to is document #344?

18 A Yes. I believe that 8343312 is some
19 data that's part of the handwritten report.

20 Q And it says residue, 400 parts per
21 million TDD, what does that mean, what is the residue?

22 A That's the material left after dis-
23 tillation of the trichlorophenol. So you first acidify
24 the sodium trichlorophenate and that permits one to distill
25 the phenol, and the material that was left behind after

1 that distillation was analyzed for TDD, and that's called
2 a residue.

3 Q What happened to the residue?

4 A I don't recall.

5 Q Just out of curiosity, how did you
6 all handle laboratory waste?

7 A Pardon?

8 Q In your laboratory what did you do
9 with the waste?

10 A There was, as I recall, there was a
11 toxic landfill at the time where toxic wastes were sent.

12 Q Where was that?

13 A I don't know.

14 Q Was it here in St. Louis, Missouri?

15 A I don't know. If you had materials
16 that were toxic, they should be packaged and put in a
17 location where they were picked up and taken to a toxic
18 landfill.

19 Q And those wastes from your dioxin ex-
20 periments, you considered that toxic?

21 A Yes. Almost any chemical that we
22 worked with we considered toxic unless proved otherwise.

23 Q Speed it up a little bit, what I'd
24 like to do now is to take document 352 and review each
25 page and confirm that you did indeed author each document

1 that comprises that exhibit.

2 A Yes.

3 Q Each and every page of Exhibit 353
4 contains your handwriting?

5 A That's correct.

6 Q And your signature?

7 A That's correct.

8 Q And each and every page is a true,
9 full and accurate copy of the documents that you prepared?

10 A Appears to be.

11 MR. LOVE: Through with this one?

12 MR. STAGGS: Yes.

13 Q (By Mr. Staggs) I'd like to hand
14 you now what's been marked Exhibit 353 (Monsanto #3324585,
15 et al), which is another series of laboratory reports
16 with the letterhead Monsanto Chemical Company. I'd like
17 you to take a minute and review the first page of those
18 exhibits and note that I'm tendering a copy to Mr. Love.

19 A O.K.

20 Q Now, do you recognize that document?

21 A No, I don't recognize it, although,
22 I recognize the author, subject matter.

23 Q And who was the author?

24 A A. J. Burns.

25 Q And are you familiar with his handwriting?

1 A Yes.

2 Q And you recognize that as his signature?

3 A Yes.

4 Q And were you his supervisor?

5 A Yes. Well, let me take that back.

6 Yes, I think that he was reporting to me on an interim

7 basis. I was not a supervisor at the time, but he was

8 assigned to me for the duration of this project.

9 Q In the course of him reporting to

10 you on an interim basis for this project, did you be-

11 come familiar with his handwriting and his notations?

12 A Yes.

13 Q And does this first document appear

14 to be his handwriting, his notation?

15 A It appears so.

16 Q You mentioned that he was reporting

17 to you on an interim basis in the course of a project.

18 What was that project?

19 A Well, that was a long time ago. I

20 don't recall exactly in weeks with how many things we

21 worked together. Certainly he did some of the early

22 analysis of 2,4,5-T samples.

23 Q Well, it sounds as if you had a specific

24 project in mind. Was there a project you worked with

25 him on regarding 2,4,5-T analysis?

1 A Yeah. I believe, as I recall, he
2 did the analyses for another study that I did on reaction
3 times of preparing 2,4,5-T.

4 Q And we have gotten several studies
5 into the record here. Is this a study we have discussed
6 already?

7 A No.

8 Q What was the nature of this study?

9 A It was a study of the reaction condi-
10 tions and reaction variables that were important in the
11 manufacture, to get the most economical process for 2,4,5-T.

12 Q When was this particular study?

13 A I believe, that was in '64.

14 Q And what particular variables were you
15 interested in in that particular study?

16 A Reaction time, addition time, reactant
17 variables, temperature, pH, water concentration.

18 Q Did you concentrate --

19 MR. LOVE: Excuse me. Have you
20 finished your answer?

21 A Yes.

22 Q (By Mr. Skaggs) Did you concentrate
23 on any particular variable?

24 A No.

25 Q In 1964 when you were doing this study,

1 were you interested in or looking for toxicological
2 problems with 2,4,5-T?

3 A No.

4 Q In 1964 when you performed this study,
5 were you aware of the existence of tetra level dioxins?

6 A I may have heard of them by then.
7 Probably had.

8 Q But were tetra level dioxins to you
9 of interest in performing that study?

10 A No.

11 Q As to the other studies, did you re-
12 view the literature of 2,4,5-T in the course of analyzing
13 the 2,4,5-T process?

14 A Yes. Process literature, right.

15 Q Were you having color problems with
16 the 2,4,5-T in 1964?

17 A Yes. Let me qualify that. I don't
18 recall exactly. I think color was a constant problem that
19 we had while we were manufacturing 2,4,5-T. It was not
20 something that was always under study.

21 Q But in the 2,4,5-T process Monsanto
22 experienced a continuing problem with color?

23 A Yeah. Customer complaints, I understand.
24 That was the main cause of customer complaints.

25 Q Was this color problem ever resolved?

1 A I don't think so, not entirely.
2 I think some of the solids problems was partially re-
3 solved and was probably more important to the customer
4 than color, per se.

5 Q Did it ever improve?

6 A Solids content improved.

7 Q What I'm getting at is this, it
8 seems to me these documents just talk about color prob-
9 lems, color problems, color problems. I understand now
10 you didn't resolve it. Did it ever even get better?

11 A Yeah.

12 Q When did it start getting better?

13 A I don't really know.

14 Q How long did Burns work under your
15 direction on this 1964 study?

16 A I don't recall. Probably the better
17 part of the year, six months to a year.

18 Q Do you recall if Mr. Burns ever had
19 responsibility for analyzing samples for dioxin?

20 A I believe he did, yeah.

21 Q Do you recall when he had that respon-
22 sibility?

23 A No. In fact, I'm not even sure about
24 that. I was just looking at the dates. I don't know
25 whether he analyzed dioxin or not. I think he did.

1 Q How was it decided whether you
2 analyzed dioxin or not?

3 MR. LOWE: You talking about an
4 analysis for dioxin or an analysis of
5 dioxin?

6 MR. SKAGGS: For.

7 A In which particular samples? If the
8 thrust of the program was to find out how much dioxin
9 was there, then the decision was made, that was the
10 thrust of the program. I don't entirely understand
11 the question, I guess.

12 Q (By Mr. Skaggs: Well, we see here
13 at some point Sims analyzed dioxin and at some point
14 you analyzed for dioxin, at some points Mr. Burns
15 analyzed for dioxin. How was it decided who did what?

16 A Oh, I believe the sequence there,
17 and, again, I could be a little off on this because this
18 is in the dim distant past, but when we first got the
19 sample and the method, I worked on it myself. I
20 wanted to see how it worked and I was responsible. I
21 believe that shortly after that Mr. Burns analyzed
22 for samples and I believe that he transferred to another
23 organization in Monsanto at some point in '65 or so and
24 Mr. Sims then took his place.

25 Q I'd like to get back for just a second

1 to your analysis. Who did you report your findings to
2 that the New report was in essence correct?

3 A To my boss.

4 Q And that was Stephens?

5 A I think, Sharp.

6 Q Did you make that report in writing?

7 A I don't recall.

8 Q Would you have made it in writing?

9 A Let's see, I'm trying to remember if
10 we made weekly reports at that time. I certainly would
11 have made it in a monthly report, yes.

12 Q Tell me about the monthly reports.
13 When did you make those or over what period of time,
14 how many years?

15 A That's something that's been going
16 on as long as I can remember since the Ag Division was
17 formed and even prior to that in the Organic Division.
18 I think essentially every chemist prepares a monthly
19 summary.

20 Q And have you seen in any of the
21 documents that I have given you thus far the form of
22 the monthly summary?

23 A No.

24 Q Was a monthly summary different from a
25 progress report?

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A Yes.

Q And was it different from a final report?

A Yes.

Q And you have been working with Monsanto, I think you said, since 1940 --

A --'8.

Q Since that time to the present date has it been a corporate policy of Monsanto that these monthly reports were prepared?

A No, it's not a corporate policy, I don't believe.

Q Well, have you observed it to be the practice that these monthly reports were prepared?

A Yes. Monthly report, you must understand, is a working -- not a working document -- a status document. It does not report the results of finished projects, conclusions, wrapped up packages. It's what you have done. It's a way for your boss to see that you have been working during that month. "What did you do during the month? I did this, this and this." You don't necessarily put conclusions and final results in it.

Q What about the weekly reports, what's the purpose of that document?

1 A I think we can probably dispense with
2 that because I don't believe we had weekly reports back
3 in the '60's.

4 Q Or the '50's or the '40's?

5 A No.

6 Q But you had them in the '70's?

7 A In the '80's, yes.

8 Q When did they begin, approximately?

9 A Oh, I don't know. I'd say in the
10 early '70's. Again, it depends upon what level one is.
11 Even now not everyone writes a weekly report, but I must.

12 Q What level is that, the higher up?

13 A The higher you get the less reports
14 you have to write.

15 Q And I haven't shown you anything that
16 resembles a weekly report, have I?

17 A No.

18 Q I'd like to return for a second again
19 to your laboratory records that you have identified as
20 Exhibit 352, and I'll return them to you if you'd like
21 to review that document. What I want to know is who
22 would have seen these lab reports aside, of course, from
23 yourself?

24 A Well, the only person who would have
25 necessarily seen these is the person who signs the block

1 down in the lower righthand, and I notice there isn't
2 any signature on many of these.

3 Q Was it your practice to have your
4 supervisor review these documents?

5 A Yes.

6 Q Would you characterize this, then,
7 as a personal workbook, if you will?

8 A Yes.

9 Q Does Monsanto have any written policies
10 or procedures regarding these laboratory books?

11 A Yes.

12 Q And do those procedures provide for
13 what happens to them when you're finished with them?

14 A Yes.

15 Q And what happens to them?

16 A They are microfilmed and retained, I
17 think, indefinitely.

18 Q How long do you keep one of these note-
19 books in your personal possession?

20 A Well, I think there's also a policy
21 with regard to that. The library takes care of the
22 microfilming and they call you and say, we'd like to
23 have notebook such and such number. That's usually
24 when the notebook is a couple of years old, as I recall.
25 See, many people will take many months to fill a notebook.

1 Others might take only weeks.

2 Q What other records do you keep in
3 the course of your work in the research laboratory?

4 A You mean besides the one we mentioned
5 before?

6 Q Yes, sir. Aside from the laboratory
7 notebooks that you have been referring to here on several
8 occasions.

9 A The laboratory notebook, the progress
10 reports, the final reports, process reports. Those are
11 the documents that are retained, as far as I know.

12 Q Is there some kind of a printout
13 from the gas chromatograph?

14 A Yes.

15 Q And what happens to that printout?

16 A Frequently it's probably thrown away.
17 Often it's stored with the notebook if it's considered
18 to be worthy of retention, I guess.

19 Q That would depend on the individual
20 operators?

21 A Yeah.

22 Q I'd like to refer you to document
23 #8314285 in Exhibit 353, which is the Burns documents.

24 A Yes.

25 Q Have you had an opportunity to read it?

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A. Yes.

Q The top line of this, which appears to be another in a series of lab reports, reads, "2,4,5-T, Chloracne Studies," is that correct?

A Yes.

Q What were these chloracne studies? Is this another study or is it one of the several that we have talked about?

A It's simply analysis of TDB, dioxin.

Q So it isn't in reference, to the best of your knowledge, to any kind of ongoing study or report?

A I don't exactly understand the question, but it's simply reporting the analyses of different samples for dioxin.

Q Well, what I'm asking is it says at the top, "Chloracne Studies," and I'm asking do you know if that's related to a particular group of studies, and if so, what, so on?

A Well, I don't know how else to answer it. This is simply reporting analytical results on dioxin. I think what he meant by chloracne is analysis of the chloracnegenic material 2,3,7,8 tetrachlorodibenzo-para-dioxin.

Q In the course of your work with the

1 Agricultural Research Laboratory did you all conduct
2 toxicological studies regarding dioxin?

3 A No. In our research labs?

4 Q Yes, sir.

5 A No. We did not ever have a toxicology
6 lab.

7 Q Why would this lab report say chloracne
8 studies?

9 MR. LOVE: I'm going to object.

10 It's been asked several times in several
11 different ways with regard to a document
12 that has not been identified as having
13 been prepared by the witness. It seems
14 to me he's answered your question each
15 time, but I would ask him if one more
16 time he can answer your question, please
17 do so.

18 A I believe that the reason it says
19 chloracne studies is a means of describing the analysis
20 of the dioxin materials that was believed to be chlor-
21 acnegenic.

22 Q (By Mr. Skaggs) Was this at the
23 period of time when Mr. Burns was working under your
24 direction?

25 A Yes. I mean, again, I believe so.

1 Q I'd like to refer to the small part,
2 I guess, that appears in the middle of the page, has
3 sample numbers. There is an abbreviation there, CLAC.
4 What's that stand for?

5 A As I recall, that was Artie Burns'
6 abbreviation for dioxin.

7 MR. LOVE: I'm going to object to
8 the form of the question because you're
9 asking this witness to speculate upon
10 an abbreviation used by another person
11 in a document which he has indicated he
12 knows nothing about.

13 A I knew at one time, but I don't recall
14 what now that was.

15 Q (By Mr. Skaggs) So rather than being
16 a term of art or standard abbreviation, it was Mr. Burns'
17 shorthand?

18 A That's right. Of course, any TCDD is
19 somebody's abbreviation for something.

20 Q What is that?

21 A I don't recall what that is.

22 Q CLAC is one you don't recall the
23 abbreviation for?

24 A Yes.

25 Q What is the one on the left?

1 A Anthraquinone. That's a chemical that
2 was used as a standard to quantify the amount of dioxin.

3 Q Can you go on a little more about that.
4 That's a new word for me. What did it represent?

5 A A standard is a term which gives a
6 response on the analytical method that you're using,
7 so at some point in time when you're running a chromato-
8 gram anthraquinone presents a peak and one can use, if
9 one knows exactly how much anthraquinone is there and
10 what its relative response is to other materials, then one
11 can use that in response to calculate how much of the
12 other material is present.

13 Q Was that a standard practice or was it
14 an alternative means of analysis or what exactly? Did
15 you always use this anthraquinone or were there other
16 methods?

17 A There were other methods studied.

18 Q Were some methods more preferable
19 than others?

20 A Yes.

21 Q And how does anthraquinone fall into
22 that spectrum?

23 A I don't recall.

24 Q Do you happen to recall if it was
25 frequently used or occasionally used?

1 MR. LANE: Speaking now of anthra-
2 quinone"
3 MR. SKAGGS: Right.
4 A I don't know. It was investigated.
5 Whether it was adopted and used routinely, I don't recall.
6 Q (By Mr. Skaggs) Do you happen to know
7 where the samples he referred to there came from?
8 A Again, it looks like we have the 39-
9 pound sample that we referred to earlier.
10 Q Would all of the samples involved in
11 this run have come from this one sample?
12 A No. Just the last one.
13 Q Do you happen to know where the others
14 came from?
15 A I can only guess based on the identifi-
16 cation. One says 1961 T. I would guess that was a
17 sample of 2,4,5-T that was made in 1961. The other
18 two, I wouldn't even hazard a guess.
19 Q This cake that's represented in the
20 final group, then, is analyzed as having 17.4 parts per
21 million of dioxin, right?
22 A Right.
23 Q This 1961 T that you referred to, that
24 would be the sample which had 5.4 parts per million, do
25 you happen to know if that came from Nicro?

1 A I would have to assume it did. I
2 don't know where else it could have come from.

3 Q Why would you say you have to assume?

4 A That's the only place we made 2,4,5-T.

5 Q Is this one of the samples that you
6 used in making your 1965 report which we had earlier
7 identified as Plaintiffs' Exhibit #351? I'll be happy
8 to furnish a copy to you.

9 MR. LOVE: The first part of your
10 question is -- I don't know which sample
11 you're talking about.

12 Q (By Mr. Skaggs) Do you understand the
13 question?

14 A I think you're referring to the
15 sample on 8314285.

16 Q Right.

17 A The answer is I don't know.

18 Q The 1961 T, you don't know if that
19 was one of the old samples you had at Nitro that you
20 used in making that '65 report?

21 A No, I don't know.

22 Q Would you know what procedure Mr. Burns
23 used in 1965 to locate this 1961 T sample?

24 A No, I don't.

25 Q If you were to want to find samples

1 of product made some years ago, how would you do it now?

2 A The same way we did it then. Go to
3 the plant, ask them if they retained any samples. Quite
4 likely that's how this one was discovered.

5 Q So what you're testifying now is what
6 Mr. Burns probably did is call up Nitro and ask if
7 they had any samples to send him?

8 A Either that or is one of the group of
9 samples that we requested.

10 Q On the righthand side of the page
11 almost directly under the date 4/9/65 and down about
12 five rows on the graph paper, can you make out that
13 notation?

14 A It says "recheck"?

15 Q No, sir. Above that.

16 A "2,4,5-T from"?

17 Q Right.

18 A That's where I thought it said, "2,4,5-T
19 from 39-pound sodium T" something. I can't read the
20 last part.

21 Q I'd like to refer now to document
22 #8314547, which is about three-quarters of the way
23 through Plaintiffs' Exhibit 353, is a continuation of
24 the lab reports from Mr. Burns. I'd like you to take a
25 moment when you locate it to read it.

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A O.K.

Q Once again, I see here it says, "Chlor-
acne Studies." There are a couple of numbers on this
document.

MR. LOVE: I don't see where you're
talking about.

Q (By Mr. Skaggs) I'm referring to the
second line down from the dark dividing line.

MR. LOVE: All right.

Q (By Mr. Skaggs) There are a couple
of numbers on here I want to ask you about. First of
all, in the upper righthand corner there are two words,
"AG: 32727." What's that number represent?

A AG 32727?

Q Yes.

A That's the notebook page number.

Q To the right of Mr. Burns' signature
in the "Prepared by" block there is another number,
which is 2102. What does that number refer to?

A That's the job number we discussed
earlier. It was the job number used for 2,4,5-T process
studies.

Q I'd like you to read, if you would,
the first line underneath the dark dividing line on this
page.

1 A "Batch number 636, 7/21/65 from Nitro
2 sodium TCM chlorine studies."

3 Q And was this at the period of time,
4 again, when Mr. Burns was still working under your
5 temporary direction on this study?

6 A I believe so.

7 Q What was batch number 636? What was
8 your system that you used in getting these samples?

9 A Well, this, I believe, was a sample,
10 one of the Nitro manufacturing batch numbers and samples,
11 it says, were obtained from Nitro.

12 Q Is this batch number 636 sample
13 different from the retained samples that we talked about
14 a while ago?

15 A Yes.

16 Q Would that sample have been taken on
17 the date that's indicated there, July 21st, 1965?

18 A Yes.

19 Q Were you responsible for coordinating
20 with Nitro over the taking of these samples?

21 A Yes. In the sense that I was Artie
22 Burns' supervisor. I imagine he did this.

23 Q How many samples did you take? Let
24 me go about it this way since we have been over a lot
25 of this material. I'll summarize to you what my

1 understanding is. If it's incorrect, you tell me it's
2 wrong. Is this baget number 636 on 7/23/65 one of the
3 three or four samples that was described to me earlier
4 today as being taken in 1965 in the course of this
5 production study?

6 A Yes.

7 Having read this document and thought
8 about it, do you have any recollection of the meaning
9 of the term CIAC?

10 A Well, again, I believe, although I'm
11 not sure, it appears that and more that it refers to
12 2,3,7,8 tetrachlorodibenzo-p-dioxin.

13 Q Based on your experience in the
14 laboratory in performing these studies and reviewing
15 these documents and given the context of the figures
16 that appear on this page, are you able to state whether
17 that CIAC is an abbreviation for TCDD?

18 MR. LOVE: I'm going to object to
19 the form of the question. You're asking
20 the man to give you an opinion as to what
21 another man meant by his own shorthand,
22 an abbreviated term for something that
23 appears on a document that another person
24 authored. For that reason I object to
25 the question. If you can answer it,

1 answer it.

2 A Again, I knew at one time, and I be-
3 lieve it does refer to the dioxin but I'm a little
4 confused because in several references there were two
5 sets of numbers and one of them seemed to say CLAC
6 and the other said ppm. I don't know exactly what
7 that meant. I'd have to study them in more detail to
8 have it all come back.

9 Q (By Mr. Skaggs) They have figures here
10 from, I suppose, they represent samples from A through
11 G, is that correct, that those are individual samples?

12 MR. LOVE: Again, I object to the
13 form of the question. You're asking the
14 man to answer after looking at a document
15 he did not prepare and no foundation's been
16 laid whether he's ever discussed with the
17 man who prepared it or anything else. If
18 you can answer it, do so.

19 A I believe these are individual samples
20 taken at different times during the batch.

21 Q (By Mr. Skaggs) So when it says
22 batch' number 636, we aren't talking about one batch?
23 We are talking about several?

24 A Apparently.

25 Q How would you determine when those

1 particular samples would be taken?

2 Q You didn't pro-actively
3 when they were taken or is there a method-
4 ology for taking samples, or what? Your
5 question's unclear to me. If it's clear
6 to you, you can answer it.

7 A I understood you to ask me how would
8 we decide when to take samples?

9 Q (By Mr. Skaggs) Right. You took
10 samples at different times in the batch, how and who,
11 for that matter, decided when samples were taken?

12 A I don't recall who decided. The
13 intent, I believe, was to take samples throughout the
14 batch which could be used to profile what was happening
15 at each stage of the batch.

16 Q Did you see? Nitro written directions
17 to follow when taking the various samples?

18 A I don't recall.

19 Q Do you recall whether you gave them
20 oral instructions on when to take those samples?

21 A I don't specifically recall, but I'm
22 sure we must have discussed it.

23 Q Would it make a significant difference
24 when they were taken?

25 A Within limits it would not.

1 Q As Mr. Barnes' supervisor or supervisor
2 for a limited period or period of time in 1965, did
3 you have occasion to review his work?

4 A Yes.

5 Q In the course of reviewing his work
6 would that involve reviewing his laboratory notebook?

7 A No, not necessarily.

8 Q Could it?

9 A Yes.

10 Q Would he give you written reports?

11 A Yes.

12 Q How else would he communicate with you
13 in writing? What was his ultimate work product that you
14 would review?

15 A His work product would have been
16 probably a progress report that might have been jointly
17 written with me.

18 Q Aside from that progress report, and
19 we have seen an example of that, would he give you
20 anything else in writing?

21 A At that time I don't think so. We
22 had discussions on a daily basis.

23 Q I'd like to direct your attention to
24 document #2314546, and although the pattern hasn't al-
25 ways followed, it should be the next page in your stack.

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Q Yes, please. I want to review that, please.

A O.K.

Q Are you able to identify the samples that are described on that page?

A Only by number. I don't know what the numbers refer to.

Q And do you know if those numbers would refer to samples from Nitro?

A Well, I believe the numbers refer to the notebook page that is 8314547, and the notebook page the identity of the samples should be.

Q The same. I don't see that. Where are you referring to on the page?

A Sample 2102 refers to a sample that's identified on that notebook page.

Q That's the number that appears next to "sample" at the top?

A Right.

Q The fact that it says here the job number on the preceding page, which was 8314547, as 2102, that indicates that both of these dealt with the same ongoing piece of work, is that right?

A They deal with 2,4,5-T in some respects,

1 yes.

2 Q Could you read off his result on TCDD
3 for sample 32724-A.

4 A Well, I'd have to presume it's TCDD
5 because it doesn't state so anywhere on here, I believe.

6 Q It's the same job number.

7 A 3102 is a job number that's used for
8 all process research having to do with 2,4,5-T, whether
9 it's dioxin, a process study or whatever it is, color
10 and sludge, you know. It appears that these would
11 refer to dioxin, given the time frame they were done
12 and our results, I strongly suspect these are dioxin.

13 Q And what are those figures?

14 A There are three on the page. One
15 of them is 22 ppm, one is 32 ppm and the other is 31 ppm.

16 SEN. LOVE: You have any substantive
17 questions about the answer to the last
18 question?

19 MR. SKAGGS: Well, what I'm doing,
20 his testimony is that the sample should be
21 identified on the book page 32724, and I'm
22 now reviewing my documents to see if I can
23 locate that page which would lead me to my
24 followup question.

25 Q (By Mr. Skaggs) Would you please refer

1 to document page #00141/44.

2 A Yes.

3 Q Are you able to determine from that
4 page the identity of the samples?

5 A There are some identifications at
6 the top of the page which apparently describe these
7 samples. They are in the form NE and then a number.

8 Q Do you recognize that numbering?

9 A I'm not entirely positive, but I believe
10 that's a Nitro numbering system.

11 Q Are you familiar with it enough to
12 advise us of the significance of the numbers and letters
13 that make up those identifying numbers?

14 A No, I'm not.

15 Q I notice here also that the apparent
16 term that CLAC stands for is chloracne compound.

17 A Yeah, CLAC. Again, that's further
18 evidence that it's TCDD.

19 Q I'd like you to take a moment, if
20 you would, and review these documents, looking as we
21 have in the past, recognizing whether you recognize Mr.
22 Burns' signature and his handwriting on each of those pages?

23 A To the best of my knowledge, these are
24 all signed by Artie Burns.

25 Q And you recognize his handwriting on

1 each and every document that comprises Plaintiffs'
2 Exhibit 353.

3 A I can't be sure, but it appears so.

4 Q I'd like to hand you what's been
5 marked as Plaintiffs' Exhibit 354 (Monsanto #004800
6 through #004847), which is a Monsanto Company Agri-
7 cultural Division report bearing your name as co-author.
8 I note that I'm tendering a copy to Mr. Love also.
9 I'll ask you to take a moment to review that document.

10 O.K. Have you had an opportunity to
11 review Plaintiffs' Exhibit 354?

12 A Yes.

13 Q And were you in fact the author of
14 that document?

15 A Yes.

16 Q And does this appear to be a true,
17 full and complete copy of the document which you authored
18 which is titled Agricultural Research Report No. 150,
19 Final Report on 2,4,5-trichlorophenol, Optimization of
20 the Hydrolysis of 1,2,4,5-tetrachlorobenzene?

21 A It appears so.

22 Q I'd like to direct your attention to
23 the introduction to this report which appears on page 1.
24 I'd like you to begin at the introduction and read that
25 introduction into the record, please.

1 MR. LOVE: All four paragraphs of it?

2 MR. SKAGGS: Off the record.

3 (Whereupon discussion was had off
4 the record.)

5 Q (By Mr. Skaggs) I'd like to mark
6 from "A" to "B" and ask you to read that into the record,
7 please.

8 A (Refer to Exhibit.)

9 Q I'd like to refer you to the second
10 paragraph where it mentions Dr. Oettel at Badische.
11 Who was he?

12 A I don't know.

13 Q Well, do you recall the source of
14 your sentence that he expressed the opinion that tetra-
15 chlorodibenzo-dioxin was the chloracnegenic material?

16 A I don't recall where I got that in-
17 formation.

18 Q Do you recall the event which Dr.
19 Oettel was describing?

20 MR. LOVE: Object to the form of the
21 question. There's no event mentioned in
22 that sentence.

23 A I don't know what event you mean.

24 Q (By Mr. Skaggs) What is your under-
25 standing of what Dr., the basis of Dr. Oettel's opinion?

1 A The basis of his opinion, if I knew
2 at one time I don't know any more. He presumably did
3 some test work with tetrachlorodibenzo-para-dioxin
4 and established that it was a chloracnegenic material,
5 but I don't know the details of that.

6 Q Are you familiar with Badische?

7 A Yes. A large multi-national chemical
8 company headquartered in Germany.

9 Q Aside from that you have no other
10 recollection of Dr. Oettel?

11 A No.

12 Q Now, would you describe for me, please,
13 the program that's described in the last two sentences
14 of that paragraph which was monitoring various process
15 streams at the Nitro Plant.

16 A You want me to explain what those
17 sentences mean?

18 Q Yes, sir.

19 A They mean at this time we had the
20 analytical method for TCDD and we began to determine
21 where in the process TDD might be present and where
22 it might be formed and to monitor the product 2,4,5-T
23 for TCDD.

24 Q How often did they test the various
25 process streams at the Nitro Plant?

1 A Well, we went through this, of course.
2 The ones that I was directly involved with are the ones
3 that we have already discussed and appeared in one
4 of the earlier exhibits.

5 Q When you wrote this sentence, did you
6 have in mind other testing programs than those that you
7 described to us earlier?

8 A Yes. I had in mind the continuing
9 program that was to be done at Nitro.

10 Q And would you describe that continuing
11 program, please.

12 A I cannot because I'm not aware of
13 exactly what the sampling frequency was.

14 Q What was your basis of the statement
15 that the analyzation continued to the date of this
16 paper, which was in 1969?

17 A That was my understanding, that the
18 Nitro Plant would continue to analyze. I don't know
19 if it was on an every-batch basis or period basis for
20 dioxin.

21 Q What was the source of that under-
22 standing?

23 A I don't recall.

24 Q What about the next paragraph where
25 you say in 1967 our Medical Department stated the

1 chloracnegen in the 2,4,5-T process was indeed TDD,
2 who in the Medical Department said that?

3 A I believe that was Carl Bowles that
4 wrote me a memo to that effect.

5 Q Do you recall the approximate time
6 of that memo?

7 A 1967.

8 Q Do you recall the substance of that
9 memo?

10 A No further than it's stated here.

11 Q You said that that opinion led directly
12 to the present work investigating the chloracnegen in
13 products of tetrachlorobenzene?

14 A Yes.

15 Q Did it direct you to do that?

16 A No.

17 Q How did that opinion lead directly
18 to that investigation?

19 A I think we discussed some earlier
20 exhibits that I felt there was a good chance that such
21 a study could lead to lower levels of TDD, and when the
22 Medical Department stated that they were convinced that
23 the chloracnegen was TDD, it seemed a logical step to
24 see what we could do about it.

25 Q Did you work with the Medical Department

1 in your study?

2 A In which study?

3 Q Well, in your study that constituted
4 the present work that you described in this 1969 document.

5 A Well, the Medical Department didn't
6 have any input into the details of the research program,
7 if that's what you're asking.

8 Q Did you advise Carl Bowles of the status
9 of your study?

10 A Did I advise him of the results of this
11 study?

12 Q Did you advise him of the progress of it?

13 A Not on any routine basis. I may have
14 discussed it with him from time to time.

15 Q Why was it that he wrote his opinion
16 letter to you?

17 A I think that's probably factual.
18 Probably because he and I had discussed the subject before.

19 Q And would you describe those conversa-
20 tions, please, such as when did you discuss it.

21 A I don't recall.

22 Q Do you recall how often you discussed it?

23 A No. It was a very small number of times,
24 like, two or three.

25 Q Did you contact him?

1 MR. LOVE: With regard to what, when?

2 MR. SKAGGS: I'm referring to the
3 conversations that he just testified about.

4 Q (By Mr. Skaggs) Did Dr. Bowles con-
5 tact you or did you contact Dr. Bowles first?

6 A I don't recall.

7 Q Were you able to meet your objective
8 to determine the important process variable that in-
9 fluenced the formation of TDD?

10 A Yes. I think we were fairly successful.
11 We weren't able to eliminate TDD, but we were able to
12 describe conditions which would lead to a consistent
13 low, what was felt to be a low level at that time.

14 Q In fact, that condition was the hold
15 period, wasn't it?

16 A No.

17 Q What were they?

18 A Well, the most important variable
19 turned out to be the ratio of methanol to the other
20 reactants.

21 Q Did you ever issue an amended process
22 document that incorporated your findings from this study?

23 A Process document?

24 Q The cookbook.

25 A You mean the plant manufacturing process?

1 Q Right.
2 A No. Research did not write those.
3 Q To your knowledge, were your recommenda-
4 tions from this study ever incorporated into the manuals
5 that governed the production of these chemicals in the
6 plant?

7 A Well, I think this is the subject
8 matter we covered earlier about were these conditions
9 incorporated into the standard plant operation. The
10 answer was no, they were not. They were only done
11 during a test period.

12 Q What were the environmental hazards
13 that were associated with working with the 2,4,5-T
14 department?

15 MR. LOVE: Object as to the form.
16 There's been no foundation laid as to the
17 expertise of this witness, knowledge or
18 background in terms of your discussion
19 of environmental hazards in the workplace
20 in the manufacturing process of 2,4,5-T.
21 If you can answer the question, answer it.

22 A To my knowledge, the environmental
23 hazard was the incidence of chloracna.

24 Q (By Mr. Skaggs) To your knowledge,
25 in 1969 was there any other hazard involved with working

1 with 2,4,5-trichloroethane?

2 A Yes.

3 Q I'm referring to page 2 here. In
4 the references you describe a memo and the initials are
5 WRU/EFT. What does that mean? It's reference number 1
6 under section 5 on page 2.

7 MR. LOVE: Off the record.

8 (Whereupon discussion was had off
9 the record.)

10 Q (By Mr. Skaggs) I'd like to refer
11 you to page 2 under the references, and would you read
12 reference number 1, please.

13 A "Memo, WRU/EFT, September 14, 1965."

14 Q Who is WRU?

15 A Myself.

16 Q And who is EFT?

17 A Ed Taake.

18 Q And Mr. Taake is your contact at Nitro,
19 is that correct?

20 A That's correct.

21 Q Do you have any recollection of that
22 memorandum dated September 14, 1965?

23 A I believe that's one of the earlier
24 exhibits that we discussed.

25 Q I'm going to hand you what's been

1 marked Plaintiffs' Exhibit #211 and ask if that is the
2 memo you referred to in that reference?

3 A Yes.

4 Q Would you please read the second
5 reference under section 5 on page 2.

6 A "Memo, WRU/VLR, July 3, 1968."

7 Q And, once again, WRU is you?

8 A Yes.

9 Q Who is VLR?

10 A Vern Rhodes.

11 Q And do you recall that piece of
12 correspondence?

13 A No, I do not.

14 Q Have I shown you that piece of
15 correspondence in the earlier exhibits?

16 A Not to my knowledge.

17 Q Was that about the same time you
18 were having the conversations with Mr. Rhodes regarding
19 the dioxin problem at the Monsanto Plant at Nitro?

20 A Yes.

21 Q Would you read reference number 3,
22 please, under section 5 on page 2.

23 A Reference 3 is, "Shein, S. M., and
24 Evetifeev, A.V."

25 Q It's obviously Russian.

1 A "Investiva." O.K. I read it to myself.

2 Q Did you get that out of Monsanto's
3 reference library?

4 A I don't recall.

5 Q Do you read Russian?

6 A No, I don't.

7 Q Under number 4, would you please
8 read those references.

9 A "Notebook pages, AG 72101, AG 85501."

10 Q You can read them to yourself just
11 so you know what I'm going to be asking you about.

12 A I've read them.

13 Q Are those the laboratory notebooks
14 we have been discussing earlier, is that what that has
15 reference to?

16 MR. LOVE: If you know the answer,
17 you can answer. We have looked at a great
18 many pages of documents. Whether those
19 specific pages are ones we have looked at
20 or not, that would be difficult to ascertain.

21 MR. SKAGGS: I understand that, but
22 I'm asking him if that's standard notation
23 for the laboratory notebook we discussed
24 earlier.

25 MR. LOVE: That was not your question

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before.

A That's standard notation for laboratory notebook.

Q (By Mr. Skaggs) Do you recall those notebook pages that you cite there as references?

A No.

Q Could you tell us what kind of material from a notebook you might be citing in preparing this statement?

A Yes. The research results, experimental as well as analytical related to this project.

Q I'd like you to read, if you would, figure 2 on page 6. You don't have to read it into the record, but familiarize yourself with it so I can ask you some questions about it.

A O.K.

Q Did that figure 2 summarize your findings here regarding the correlation between hold hours and the production of TCDD or TDD?

A I'm sorry, but I have to read more to know exactly what these represent.

Q Well, read whatever you need to.

A O.K. Figure 2 compares two different laboratory runs, run 19 and run 32. Run 19 were conditions similar to those currently used at Nitro and run 32

1 represented conditions that we were recommending as
2 improved conditions.

3 Q I'd like you, if you would, to look
4 at half hour 3. What was the difference at half hour
5 3 between the conditions used on run 19 in the laboratory
6 and in the conditions used in Monsanto at Nitro?

7 A The differences were that under the
8 Nitro simulated conditions we had about 5% TCA and
9 under the research conditions we had nearly 0 TCA after
10 three hours. Under Nitro conditions we had about 20 ppm
11 of TCA, and under the research conditions we had some-
12 where around 5 to 7 ppm.

13 Q Now, what was the percentage TCA
14 represented?

15 A That's the percent of trichloroanisole,
16 which is an intermediate in the hydrolysis of tetra-
17 chlorobenzene.

18 Q And it's the lower curve, is that
19 right, or it ends up lower?

20 A That's the one that's decreasing, yes.

21 Q Look at the figures on table 3. What
22 do those represent?

23 A Those are a representation of the,
24 well, the Y's are the dependent variables that were
25 measured and the X's are the independent variables, in

1 other words, the things that were controlled in the
2 laboratory. This is representation of the effect of
3 those independent variables on the things we were
4 measuring, TDD, for instance, as well as the effect
5 of the square of those variables and the effect of
6 interaction between the variables. The X1, X2 cross
7 product terms are measures of the synergistic effect of
8 two variables.

9 Q On this measurement, then, how do
10 you read the table? What is the significance of the
11 fact that constant in Y1 is 3.5371 and in Y2 is 1.6641?
12 What does that mean?

13 A Well, those are simply the coefficients
14 and equations, and if one wanted to write out the entire
15 equation to get a yield, one would say 3.5371 plus
16 .53147 X1 plus .062191 makes 2, minus .57546 makes 3
17 and so on, represents the yield of Y1. I don't remember
18 how I defined Y1.

19 Q This synergistic effect that you talked
20 about, is that the relationship between TCA and TDD?

21 A No.

22 Q What did you mean by that?

23 A I meant the interrelation between
24 variables 1 and 2, like, X1 and X2 and, again, I don't
25 recall what X1 is. If it was temperature and addition

1 time, it would be a -- in other words, the interaction
2 in the final equation between temperature and addition
3 time.

4 MR. SKAGGS: Off the record.

5 (Whereupon discussion was had off the
6 record.)

7 Q (By Mr. Skaggs) Would you please
8 read the material between "A" on page 7 and "B" on page 8
9 to the jury.

10 A (Refer to Exhibit.)

11 Q Again, here, this is recapping some
12 things we have done earlier. These were samples that
13 you described earlier as being the third or fourth
14 samples that you took in 1965, is that correct?

15 A No. Total of 13 batches in three
16 different programs since 1965, starting in '65.

17 Q And those were the three programs that
18 you were responsible for and that you described earlier?

19 A Three programs I discussed earlier, yes.

20 Q And, again, we discussed earlier the
21 time that the hold period was extended for a period of
22 time. Is that the 5.5 hours that's reflected here?

23 A I believe so.

24 Q And it deals with the concentration
25 of 70 parts per million?

1 A Yes. That was a lab result.

2 Q Was that not the result of an actual

3 process at Nitro?

4 A Yeah, lab and plant.

5 Q Well, when you say lab, that's the

6 regression equation, isn't that right?

7 A Yes.

8 Q Because that's the model, I suppose?

9 A Right.

10 Q The first paragraph describes an

11 actual event that happened at the Nitro Plant?

12 A That's correct.

13 Q And this is a reference, again, to

14 your 1965 memo, periodic samples for the past ten years,

15 those were the retained samples that you described earlier?

16 A Yes.

17 Q Those weren't new samples or a different

18 set or anything like that?

19 A No.

20 Q What were the highest concentrations

21 you say have occasionally been observed?

22 A What were the higher concentrations?

23 Q Yes.

24 A The ones we saw earlier on the exhibit

25 that had a maximum of 55 parts per million.

1 Q Your conclusion that the production
2 of 122 is relatively constant at 30 to 50 parts per
3 million was based on your review of those retained
4 samples and that graph that was earlier examined by
5 you, is that correct?

6 A No.

7 Q What is your basis of that conclusion?

8 A The only thing I can base that on is
9 the analysis of the autoclave batch samples.

10 Q Well, now, those were the samples
11 taken in 1965 in relation to this and the 13?

12 A 13 batches taken in three separate
13 programs.

14 Q You say here a significant fraction
15 was lost in the aqueous waste streams. What do you
16 mean by that?

17 A I mean that the difference between
18 the amount that's analyzed in the autoclave samples
19 and the amount that was analyzed in the finished product
20 samples had to be lost in those aqueous waste streams.

21 Q Is the aqueous waste streams the sewer?

22 A I don't know. I'm not familiar enough
23 with the plant.

24 Q Well, then, could you give me a general
25 definition of aqueous waste streams. Are you talking about

1 the drain or some part of the process, or what exactly?

2 A Well, there are at least two different
3 steps where a product is isolated. The sodium trichloro-
4 phenate is isolated by a filtration step and the material
5 that goes through the filter, some of it's recovered
6 and recycled but some is disposed of. And what I'm
7 talking about is the amount that's disposed of in that
8 waste stream would contain some TDD. Likewise, when
9 the sodium 2,4,5-T product is filtered and when the
10 2,4,5-T acid is filtered, there are waste streams that
11 would contain some of the TDD that was formed in the
12 hydrolysis of it.

13 Q And the difference is if it's a sewer
14 that runs into the river, it goes into the river; if
15 it goes to a waste water treatment plant, it goes there?

16 A Right. Or whatever other pre-treatment
17 there is. I'm just not aware what's there.

18 Q I'd like to refer you to page 17 and
19 in particular capital letter D, number 1, sub-paragraph
20 small a. I'd like you to read those two sentences
21 into the record.

22 A "Into a 1 liter volumetric flask
23 is weighed 0.0900 to 0.1000 gram of 2,3,7,8-tetrachloro-
24 dibenzo-p-dioxin (TDD). Care should be taken in this
25 procedure so as not to allow any TDD to contact the skin

1 or eyes."

2 Q I'd like to refer you, please, to
3 page 22 of your report and in particular Roman Numeral
4 number IX under Toxicity and Hazards and I'd like
5 you to read into the record the last paragraph of that
6 section.

7 A "The acute toxicity of tetrachloro-
8 dibenzo-p-dioxin (TDD) cannot be overly emphasized.
9 It is recommended that safety glasses, gloves, safety
10 shoes and face shields constitute the very minimum
11 safety requirement. Care should also be taken to avoid
12 back-slashing from a poor septum in the GLC instrument."

13 Q What was the source of your informa-
14 tion for that statement?

15 A I did not write this part of the
16 report. The analytical section was written by Jim
17 Sims. I reviewed it but did not write it.

18 Q He was responsible for writing that
19 paragraph?

20 A No. The entire analytical section
21 starting on page 12, section B, until page 22, section 10.

22 Q In reviewing his contribution to the
23 report did you look at his sources?

24 A No, I don't believe there was any
25 source. I don't know. I don't recall, really.

1 Q Do you recall discussing that toxicity
2 and hazard section with him?

3 A I don't remember.

4 Q And do you recall if you discussed
5 it with any member or representative of Monsanto Medical
6 Department?

7 A I don't recall.

8 Q You think it's possible that you
9 discussed it with a member of the Medical Department?

10 MR. LOVE: Objection. Go ahead and
11 answer it if you can.

12 A Yes, it's possible, but I don't re-
13 member.

14 Q (By Mr. Skaggs) Would you have wanted
15 to ask a physician about that?

16 MR. LOVE: Objection as to the form.
17 I don't understand the question. For
18 what purpose, what time or anything else.
19 If he can answer it, answer it.

20 A Would I have wanted to talk to a
21 physician about that statement? Probably not, no.
22 I'm definitely struck by safety shoes.

23 Q (By Mr. Skaggs) The extent of your
24 knowledge about toxicity of TDD was limited, then, to
25 that Dow letter and the warning that was on the sample

1 when you received it, is that right?

2 MR. LOVE: Objection as to the form.

3 With specific regard to this exhibit and
4 this time frame and those kinds of things?

5 A You're asking whether I had any other
6 information on toxicity when I wrote this letter?

7 Q (By Mr. Skaggs) Yes, sir.

8 A I don't recall. I may have seen
9 other references.

10 Q When you were preparing the report,
11 did you undertake a search of the literature regarding
12 the toxicity of TDD?

13 A No.

14 Q Did you undertake a search of the
15 literature regarding the possible toxicity of 2,4,5-T?

16 A No.

17 Q And did you undertake a search of the
18 literature regarding the possible toxicity of trichloro-
19 phenol?

20 A No.

21 Q Attached as exhibits to this are a
22 number of gas chromatograms. What was the source you
23 used in preparing these which appear, for example, on
24 figure 1 on document #004826?

25 A Again, I can't say where that particular

1 example came from at this particular time. It refers
2 to a notebook entry.

3 Q When you were preparing this, would
4 you have used the material provided by Dow or would
5 you have used a sample you all put together? If you
6 wanted to make a sample chromatogram to show dioxin
7 contamination, how would you have gone about it?

8 A I would think it would have been simply
9 a typical sample from the laboratory study, but I'm not
10 sure.

11 MR. SKAGGS: I don't have any further
12 questions.

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William R. Udell

1 STATE OF ILLINOIS)
2) SS.
3 COUNTY OF MADISON)
4

5 I, M. JOY SPRINGER, a Notary Public, duly
6 commissioned and qualified in and for the County of
7 Madison, State of Illinois, do hereby certify that
8 pursuant to notice came before me on the 18th day
9 of July, 1983, at the Radisson Hotel, Room 215, 9th
10 Street and Convention Plaza, St. Louis, Missouri,
11 WILLIAM R. UDELL, who was by me duly sworn to testify
12 to the truth and nothing but the truth of his knowledge
13 touching and concerning the matters in controversy in
14 this case; that he was thereupon carefully examined
15 upon oath, and his examination reduced to writing
16 under my supervision; that the deposition is a true
17 record of the testimony given by the witness; and
18 signature of the witness was not waived.

19 I FURTHER CERTIFY that I am neither attorney
20 nor counsel for nor related to nor employed by and
21 of the parties to the action in which this deposition
22 is taken; and further, that I am not a relative or
23 employee of any attorney or counsel employed by the
24 parties hereto, or financially interested in the
25 action.

IN WITNESS WHEREOF, I have hereunto set my

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hand and affixed my notarial seal on this _____
day of _____, 1963.

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