

1

1 IN THE CIRCUIT COURT OF THE CITY OF ST. LOUIS

2
3 STATE OF MISSOURI

4
5
6 CECIL SCOTT, et al.,)

7)

8 Plaintiffs,)

9)

10 vs.) Cause No. 902 02008

11)

12 MONSANTO COMPANY,)

13)

14 Defendant.)

15
16
17 DEPOSITION OF R. EMMET KELLY, M.D., produced,
18 sworn and examined on behalf of Defendant, October 24 and
19 25, 1990, between the hours of eight o'clock in the
20 forenoon and six o'clock in the afternoon of that day, at
21 the offices of Communitronics Corporation, 1907 South
22 Kingshighway, St. Louis, Missouri, before FAITH A.
23 OLLIGES, a Registered Professional Reporter and a Notary
24 Public within and for the State of Missouri.
25

A P P E A R A N C E S

The Plaintiffs were represented by Mr. Joseph Murray of the Murray Law Firm, 650 Poydras Street, Suite 1450, New Orleans, Louisiana 70130.

The Defendant was represented by Mr. Thomas M. Carney and Ms. Carol A Rutter of the law offices of Husch, Eppenberger, Donohue, Cornfeld & Jenkins, 100 North Broadway, St. Louis, Missouri 63102.

Also present was Ms. Marie Schneider, videographer.

1 IT IS HEREBY STIPULATED AND AGREED by and
2 between Counsel for the Plaintiffs and Counsel for the
3 Defendant, that this deposition may be taken in shorthand
4 by FAITH A. OLLIGES, a Registered Professional Reporter
5 and Notary Public, and afterwards transcribed into
6 typewriting.

7
8 o o o

9
10 R. EMMET KELLY, M.D.,
11 of lawful age, being produced, sworn and examined on the
12 part of the Defendant, deposes and says:

13 DIRECT EXAMINATION

14 QUESTIONS BY MR. CARNEY:

15 Q. Would you state your name, please, for the
16 record?

17 A. R. Emmet Kelly.

18 Q. And where do you live?

19 A. 665 South Skinker, St. Louis, Missouri,
20 63105.

21 Q. And how long have you lived in St. Louis?

22 A. All my life with the exception of three and a
23 half years in the service.

24 Q. And are you a medical doctor?

25 A. Yes, I am.

1 Q. Tell the jury whether you've ever been
2 employed by Monsanto.

3 A. I originally was employed as a plant
4 physician in January starting in January of 1936. I
5 stayed there in that capacity with some added duties until
6 I went in the service in March of 1942. I returned in
7 February or March of 1946 with the position as Medical
8 Director of a newly formed Central Medical Department.

9 Q. And this was employment at Monsanto?

10 A. All at Monsanto, yes.

11 Q. So you were employed by Monsanto for almost
12 40 years?

13 A. Yes. I was part time until the service and
14 then full time on my return from the service.

15 Q. Would you tell the jury, Dr. Kelly, your
16 educational and professional background

17 A. Yes.

18 Q. starting with college?

19 A. Yes. I received a Bachelor of Science degree
20 from St. Louis University, received an M.D. degree in
21 1932. I spent three years as intern, assistant resident
22 and resident of medicine at St. Louis City Hospital. I
23 have taken quite a few one and two week courses in either
24 internal medicine or in occupational medicine since that
25 time.

1 Q. And where did you do your internship and
2 residency?

3 A. St. Louis City Hospital in St. Louis.

4 Q. And that was for how long?

5 A. Three years.

6 Q. And for what period of time have you been
7 licensed by the State of Missouri as a medical doctor
8 authorized to practice medicine?

9 A. Since 1933.

10 Q. And are you licensed in any other state other
11 than Missouri?

12 A. I'm licensed in Illinois. I was licensed in
13 Arizona, but I dropped that.

14 Q. Doctor, could you explain what it means to be
15 board certified?

16 A. Board certified means that you are approved
17 as a specialist by a group of individuals set up in that
18 particular specialty and approved by the American Medical
19 Association. It means that you have to have certain
20 qualifications to be able to take that examination, a
21 certain amount of training. You then have to submit to
22 two examinations, a written and an oral examination, and
23 after that is done you are accepted as a specialist by
24 your peers.

25 Q. Are you board certified in any medical

1 specialty?

2 A. I'm board certified in internal medicine. I
3 was originally in 1955, and I was recertified, I believe,
4 in 1964. I was certified in the specialty of preventive
5 medicine with a subspecialty of occupational disease in
6 either 1955 or 1956.

7 Q. What is internal medicine?

8 A. Internal medicine is that branch of the
9 general field of medicine that relates to the non surgical
10 treatment and the diagnosis of diseases in the post young
11 child age, the post pediatric age.

12 Q. So you diagnose adult illnesses primarily in
13 that specialty?

14 A. Adolescents and adults.

15 Q. What is occupational medicine?

16 A. It's that branch of medicine that deals with
17 the examination and treatment and prevention of disease in
18 the working community in relationship to its working
19 environment and to its outside environment.

20 Q. Doctor, could you briefly summarize for us
21 what hospitals you're on the staff of and any teaching
22 positions you have held or hold?

23 A. Well, I'm an emeritus assistant professor of
24 political medicine at St. Louis University as well as an
25 assistant professor of community medicine at St. Louis

1 University. I'm on the staff of St. John's Mercy Medical
2 3 Center, the University Hospital of St. Louis University,
3 and St. Mary's Health Center, all in St. Louis.

4 Q. And have you been a professor in any school
5 of medicine?

6 A. Assistant professor at St. Louis University
7 School of Medicine.

8 Q. Have you given lectures at any other
9 universities?

10 A. I've given lectures on occupational medicine
11 at Baylor, Harvard, Washington University, University of
12 Cincinnati.

13 Q. Have you published any articles on medical
14 subjects?

15 A. Well, yes. I published four that I recall.

16 Q. Okay. What publications did you publish
17 articles in?

18 A. Well, the "New England Journal of Medicine,"
19 the "American Public Health Journal," the "National Cancer
20 Institute Journal," and the "Missouri Medical Association
21 Journal".

22 Q. Could you please summarize some of the
23 professional organizations that you belong to or have
24 belonged to?

25 A. Well, I'm a fellow of the American Medical

1 Association. I'm a member of the American Society for
2 Clinical Therapeutics and Pharmacology. I'm a member of
3 the American Heart Association, Industrial Medical
4 Association, the American Academy of Occupational
5 Medicine, and the usual A.M.A., American Medical
6 Association, St. Louis Medical Society, and the Missouri
7 Medical Association.

8 Q. Have you held any offices in any of those
9 organizations?

10 A. Well, I was the assistant chairman of the
11 board of the American Society for Pharmacology and
12 Therapeutics, and it was called the American Therapeutics
13 Society at that time.

14 Q. How old a man are you, Dr. Kelly?

15 A. I'm 80.

16 Q. Are you still active in the practice of
17 medicine?

18 A. Yes. In the field of occupational medicine I
19 am. I'm not doing general internal medicine with the
20 exception of seeing the occasional consult that has a
21 bearing on an occupational condition. I'm an associate
22 physician of the Barnes Sutter Health Service in St.
23 Louis, which is the oldest and largest occupational clinic
24 in St. Louis. It's associated with Barnes Hospital, which
25 is the teaching hospital of Washington University and

1 probably one of the top five rated hospitals in the United
2 States.

3 Q. Have you been a consultant for any other
4 company other than Monsanto?

5 A. I was a consultant for the Consolidated
6 Aluminum Company for about ten years. I was sort of the
7 medical director there, although I was listed as a
8 consultant, and I retired from that in January of this
9 year.

10 Q. Okay. Let's get back to your employment at
11 Monsanto. I believe you indicated you were a part time
12 employee when you started in 1936?

13 A. Yes. May I make a suggestion? I did not
14 mention that I had been a member of and chairman of the
15 Medical Advisory Committee of the Manufacturing Chemical
16 Association. I was a consultant for the Poison Control
17 Center in Washington, and I had been a chairman of the
18 medical committee of the National Agricultural Chemical
19 Association.

20 Q. Okay. Thank you, Doctor. What were your
21 duties, your job duties, when you first started work at
22 Monsanto back in 1936?

23 A. Well, I was a company physician at this one
24 plant. It was mainly the treatment and diagnosis the
25 diagnosis and treatment of occupational injuries and any

1 occupational conditions that were there, and I carried out
2 a preventive medical program that consisted of examining
3 the working environment of the plant as well as physical
4 examination program for the workers.

5 Q. And that was at what plant?

6 A. Plant A or the St. Louis plant.

7 Q. Was that also called the Queeny plant?

8 A. Later on. When I started, it was A. Public
9 relations people later changed it.

10 Q. When did you officially become Monsanto's
11 Medical Director?

12 A. Officially in probably March of 1946,
13 although from around '38 till '42 when I went in service
14 I was sort of Medical Director without a portfolio.

15 Q. What branch of the military were you in when
16 you served in the military during World War II?

17 A. Well, most of the time I was I was with a
18 medical department, Medical Corps they called it the
19 Medical Corps at that time all the time. But I was
20 stationed at two chemical warfare arsenals: the first at
21 Pine Bluff, Arkansas, and the second at Edgewood Chemical
22 Center, which was the research branch of the Chemical
23 Warfare Service, as well as they had a production plant
24 there where they manufactured war gases and other chemical
25 warfare agents.

1 Q. And that was in the Army?

2 A. Yes.

3 Q. The Medical Corps?

4 A. Yes.

5 Q. In what capacity did you return to Monsanto
6 after the war in 1946?

7 A. As Medical Director of the Director of the
8 Central Medical Department.

9 Q. And what were the duties that you had as
10 Monsanto's Medical Director?

11 A. Well, I was supposed to set up My duties
12 included setting up a medical organization in each of the
13 plants. At that particular time, we might have had 15, 20
14 plants. So it was to see that each plant had a medical
15 organization. Of course, it varied with size. Secondly
16 was to obtain toxicological information on all our raw
17 materials and our products in order to prevent any injury
18 to the workers or the customers who used Monsanto
19 products. And, number three, I was to set up an
20 industrial hygiene survey of the various plants.
21 Industrial hygiene means that you check by analytical
22 means the presence of any contaminants in the air.

23 Q. Was one of your duties to supervise all of
24 the plant doctors at all the Monsanto plants?

25 A. Yes. The plant doctors, they varied a great

1 deal in the amount of their time they spent. As it turned
2 out, in some of our larger plants we had two or three
3 full time doctors. In some of the small plants where we
4 only had 40 or 50 people, the doctor was just an
5 individual whom we sent people to for examinations and
6 treatments. But, yes, it was to survey, to supervise the
7 documents, supervise our medical departments.

8 Q. Would you please define for the jury the term
9 "toxicology"?

10 A. Toxicology is that science that determines
11 the harmful or unwanted effects of a product.

12 Q. What size company was Monsanto when you first
13 went to work there in 1936?

14 A. Probably five to 6,000 people with about
15 seven plants and sales of \$80 million a year.

16 Q. During your years at Monsanto, did you
17 implement any policies or practices to help promote
18 product safety?

19 A. Oh, yes.

20 Q. Could you

21 A. Well, I would say that the two main ones were
22 that we obtained information on any possible harmful
23 effects of our products to people who came in contact with
24 them, either worked with them or used them. Number two, I
25 was responsible for disseminating this individual I

1 mean this information to the individuals, the management
2 of the people who used these products.

3 Q. When you say you obtained all the information
4 on the products, how did you go about doing that?

5 A. Well, it all depends on the product. In
6 other words, if we made Product A and it was used had
7 been made previously by Product B by other companies,
8 in other words, we were a "me too" company, we started to
9 manufacture something that had already been existing, I
10 would call the medical directors of these other companies
11 and say, "We're going to start making this stuff. Have
12 you had any problems with it? What do you know about it?"
13 And I would get information from that. That was a very
14 It was a very free give and take among industrial
15 physicians as far as product safety is concerned because
16 what hurts one hurts all. So that was easy if the product
17 had been in use.

18 Number two, if there were We went through the
19 medical literature to find out whether any toxicity
20 information existed on it. Now, that varied in the early
21 days, 1938, 1945. There wasn't an awful lot of
22 toxicological information around. But still we went
23 through that. There were government publications on some
24 of the products. There was some information in the
25 medical literature. And third, as a last resort, if there

1 wasn't anything known, we had animal experimentation done
2 at outside laboratories.

3 Q. When you went about trying to obtain all the
4 information you could about Monsanto products, would that
5 entail looking at all the scientific and medical journal
6 articles that were available?

7 A. Oh, yes. All those things are indexed, and
8 you check it out in the index to see if there's anything
9 available.

10 Q. Did you as Medical

11 A. And the third thing I mean, a fourth thing
12 which was sort of important on new products was the
13 information you received from the individuals who were the
14 research people who were working in the laboratories with
15 these things, whether they had any rashes, ill effects or
16 any harmful effects or noticed any symptoms while they
17 were working at the laboratory bench with these products.
18 That was quite impeded any symptoms while they
19 were working at the laboratory bench with these products.
20 That was quite important because here we've got a new
21 product, nobody knows anything about it, and the first
22 people who are exposed to it are the laboratory workers.

23 Q. Did you have any practice with regard to
24 visiting the various plants of Monsanto while you were
25 Medical Director?

 A. Yes.

 Q. What was that?

1 A. Well, I went at least once a year. If there
2 were anything important, either of a personnel matter or
3 any other problems, that could be oftener than a year.
4 Sometimes it was twice a year. Could be oftener. At the
5 time of our Texas City explosion where the ship blew up
6 outside our Texas City plant, I was down there probably a
7 half dozen times. Some of the smaller plants If we had
8 a plant that was making cocoa butter or something like
9 that, with 40 people, it might be every two years. But I
10 tried to do it every year.

11 Q. To each plant?

12 A. That's correct.

13 Q. Did you have any policy

14 A. With the one exception in the early days I
15 did not go to the We had three plants in England, and I
16 didn't go there until later on.

17 Q. Did you have any policies while you were
18 Medical Director from the early '40's until you retired in
19 1974 about periodic physical examinations of the plant
20 workers?

21 A. Yes. Well, some of the plants already had
22 it. The plant at which I started in St. Louis, the Queeny
23 plant or Plant A, did have a medical program of examining
24 people, and that continued. I instituted it in the other
25 plants, especially some of the plants that came into the

1 Monsanto organization through buy out or amalgamation or
2 something of the sort.

3 Q. Would you have annual physical exams at most
4 of the plants?

5 A. Well, it all depends on the ages. If the
6 person got up to 40, it might be every two to three years.
7 If they got up to 50, it would be every 18 months to two
8 years. If the man were over 50, it would be annually.
9 Some of the departments where we thought a hazard might
10 exist, regardless of the age it would be once a year,
11 sometimes oftener even.

12 Q. What did you do with regard to industrial
13 hygiene? Did you do any kind of a survey of the plants in
14 that regard?

15 A. When I first came with Monsanto, I went
16 through all the plants. It was important to know how a
17 man is working and what products he's working with and
18 what his particular exposure is. If he's in a plant
19 similar to an oil refinery, for example, where everything
20 is inside a pipe and it's out in the open, there isn't an
21 awful lot of exposure because no matter how toxic a
22 product is, if the man isn't exposed, he hasn't got any
23 problem. So I went through the plants and watched the men
24 at work. I would go through with either the safety man,
25 and in each department the manufacturing superintendent of

1 that department, and he'd tell me what the raw materials
2 were and showed me the various steps in the procedure of
3 the plant so I could familiarize myself when somebody came
4 in and said, "I was working with paracloranaline, and it
5 did this and this. Is this liable to be serious?" I'd be
6 able to know exactly how he worked. Well, then
7 afterwards, I recognized the fact that I'm not a chemical
8 engineer and there needed to be more of an engineering
9 aspect to these inspections, and there needed to be more
10 of an analytical method. In other words, if there's some
11 dust in the plant, we had to find out what kind of dust it
12 was and how much the man was exposed to. So at that
13 particular time we engaged a man who had been an
14 industrial hygienist in one of the New England states, a
15 Mr. Elmer Wheeler. That was about 1947 I think, around
16 then. And he was an industrial hygienist. He did this
17 work. He went around to the plants on frequent
18 inspections or regular inspections. So that industrial
19 hygiene aspect grew. I think when I left we had four
20 people. When I left in '74, we had four industrial
21 hygienists.

22 Q. And Dr. Wheeler was the first one?

23 A. It's a Mr. Wheeler. He had a Master's or
24 something like that.

25 Q. Okay. And did you also add toxicologists to

1 your Medical Department staff when you were

2 A. Yes. When I came in, in the early days there
3 were very few people that were called toxicologists. They
4 were usually pharmacologists or something like that. Now
5 they have people that are specialized in the toxicological
6 discipline, but they are basically pharmacologists.

7 Pharmacologist is a person who understands how chemicals
8 work on the body. That's really And that's what a
9 toxicologist is mainly, too. So, yes, after the
10 toxicological interest became quite prominent we engaged a
11 toxicologist, and that was later. I guess that was in the
12 '50's. And when I left, I believe we had four, three or
13 four toxicologists, and we had started planning to do
14 our to build our own toxicological laboratory. I left
15 in '74, and I think the building, the laboratory, was
16 finished in '75 or '76, and God knows they have probably
17 ten toxicologists now.

18 Q. Was there any policy at Monsanto while you
19 were Medical Director as to what would happen if somebody
20 inquired about a product or any health problems with a
21 product?

22 A. Yes. At first, in the days before the war
23 when I was part time, it was mostly on an informal basis.
24 After the Here I was in this one plant, the Queeny
25 plant building here. Here's the general office right next

1 to it. Well, there wasn't too much contact at first
2 between myself and the people in the general office, but
3 as they got to know that there was a doctor over at the
4 Queeny plant and they would get in a question related to
5 health aspects, they were very happy to either buck this
6 letter down to me or call me up and say, "What about
7 this?" Well, when I came back after the service and the
8 Medical Department was set up, one of the directives from
9 the executive committee, the group that ran the company,
10 was that any toxicological question or any question
11 relating to health matters would be handled by the Medical
12 Department. In other words, if a salesman out of Detroit
13 office got a call from Fort Ord that we were using this
14 particular oil in our hydraulic system, what's the
15 toxicological problems that might be associated with it,
16 that would be bucked to St. Louis. So all telephone calls
17 that came into

18 Q. I thought to St. Louis.

19 A. To the St. Louis office, to me, or to the
20 Medical Department. And that situation obtained through
21 all the time I was with Monsanto and may very well still
22 do still occur. All letters that went out to customers
23 and to doctors, private doctors, who would write up, write
24 in, and all telephone calls were handled by the Medical
25 Department.

1 Q. What about information such as safe handling
2 information that went out from Monsanto? Was there any
3 policy on approval with regard to that information?

4 A. Any publication that dealt with the
5 toxicological problem aspects or properties of a
6 Monsanto product or any safe handling procedures with the
7 exception of safe handling procedures for fire or
8 explosion, which were carried out by the Safety
9 Department. But anything as far as the safe handling of
10 the material from the medical aspect was approved by the
11 Medical Department. It was either written by It was
12 most of the time written by the Medical Department. It
13 could be changed in the sense of a lay out or something in
14 a publication or on a label, but there could be no change
15 in the

16 Q. Wording?

17 A. Wording of the material.

18 Q. Could you define the term "toxicity"?

19 A. Well, toxicity is the potential of a compound
20 to do harm to people, to animals or people. It's a
21 property that exists in everything depending upon how it's
22 used. In other words, salt, which is used Every
23 compound has a certain amount of toxicity, but it's the
24 amount of use, it's how it's used and the exposure that a
25 person has that really is the important thing. For

1 example, butter is certainly not considered a toxic
2 property, but if you take an awful lot of butter you're
3 going to have a tendency towards heart disease. Salt is
4 not a toxic not considered toxic, but in people with
5 high blood pressure it's quite toxic. So, true, there are
6 industrial compounds Any industrial compound has toxic
7 properties, but it varies. Some are extremely toxic, that
8 a small amount, a tenth of a teaspoonful to a man can
9 cause very serious problems. Others might take a half a
10 pint. Alcohol, for example, there's no question alcohol
11 is a toxic compound by anybody's deposition definition,
12 but you take two beers a day, that's not toxic to you. So
13 the toxicity There's an inherent quality of the
14 possibility of doing harm, but it always has to be in
15 relationship to how much you're getting of it.

16 Q. So most compounds are toxic; it just depends
17 on how much you get?

18 A. Sure. Oxygen. If you get too much oxygen in
19 a baby, it's extremely toxic. Well, oxygen we're
20 breathing 14 times a minute.

21 Q. When did you first begin studying all the
22 significant medical and scientific articles relating to
23 Monsanto products?

24 A. 1936 when I started with them. I had never
25 heard of Monsanto before then.

1 Q. Okay. And for how long did you continue that
2 practice?

3 A. Till today.

4 Q. So you were doing it at the time of your
5 retirement in 1974?

6 A. Yes.

7 Q. And you've continued to read the literature
8 since then?

9 A. That's correct.

10 Q. Can you give me some examples of some of the
11 publications you reviewed with regard to Monsanto products
12 prior to World War II?

13 A. There were only a couple that were strictly
14 occupationally oriented, strictly dealt with occupational
15 matters. There was one called "A Journal of Industrial
16 Hygiene and Toxicology," which was published in the United
17 States, and that went defunct after awhile. I don't think
18 it survived through the war. But that was basically
19 devoted to industrial hygiene, as the name implied, and
20 articles on animal toxicity and on human toxicity, if
21 there were any cases of illness or harm from industrial
22 chemicals. There was also a journal called "Journal of
23 the Industrial Medical Association," which also dealt
24 mostly with case reports of individual illnesses, either
25 alleged or actually due to occupational conditions. Then

1 there were publications of the government. There was a
2 Department of Mine Safety that dealt with products. The
3 Public Health Service would come out with irregular
4 bulletins on materials. Then there were isolated case
5 reports in the various medical journals, like the "New
6 England Journal of Medicine," the "Journal of the American
7 Medical Association".

8 Q. Why did you review the scientific articles
9 regarding Monsanto products?

10 A. To find out all I could about any possible
11 harmful properties so that I could advise our workers and
12 our customers as far as safe handling procedures is
13 concerned.

14 Q. And I believe you indicated you made these
15 plant inspections sometime annually or at least every
16 other year of all the plants in the United States for
17 Monsanto while you were Medical Director. What was the
18 purpose for these periodic plant visits?

19 A. Well, I think it was two purposes. One to
20 see the medical organization was running all right, that
21 the doctor was doing a good job. Secondly, to familiarize
22 myself with the plant manufacturing process to see if
23 there were any changes or any uncontrolled hazards there.

8

24 And Let's see. That's two. There was another one,
25 another particular

1 Q. I guess Well, let me ask you this. Was
2 part of it to check to see if the safe handling procedures
3 were being followed?

4 A. Oh, yes. That was part of the inspection as
5 far as the industrial hygiene aspect of it was controlled.
6 Most of the time the safe handling procedures in a plant
7 were directed and supervised by the safety department.
8 These were plant employees. They were not They were
9 Monsanto employees, but they were under the line direction
10 of the plant,, and they have their own safety department,
11 they have their own foreman and manufacturing
12 superintendent of the individual departments. They had
13 their own safety meetings where they brought up all of
14 these things. It wasn't really my function to see that a
15 man wore a respirator when he was told. That was I
16 would tell the plant what safety precautions should be
17 carried out, what safe handling procedures should be
18 carried out. It was up to the plant to do it. If I saw
19 something at the time that was a flagrant violation,
20 obviously I would tell the plant manager.

21 Q. Did you talk to the plant physicians and
22 nurses about any to inquire about any unusual health
23 problems?

24 A. Oh, yes. I talked to the plant physician and
25 nurse all the time. I would see the nurse Whether the

1 plant physician was a full time plant employee or a
2 part time plant employee or just a plant consultant, I
3 would see them everytime I went there. I would talk to
4 the nurse, spent quite a bit of time at the dispensary. I
5 would check with her as to whether there were any grouping
6 of any illnesses, any particular amount of complaints from
7 any particular department, and I would do random
8 examination of some of the employee records, pull them out
9 to see what sort of an examination the doctor was doing.

10 Q. How long would these plant visits usually
11 take?

12 A. From a half a day in a small plant to three
13 days in a large plant.

14 Q. Did you visit any plants in the United States
15 that manufactured PCBs?

16 A. Yes, I did.

17 Q. Which plants were those?

18 A. Anniston, Alabama, and the Krummrich plant,
19 which let's call the East St. Louis plant. It's located
20 at Sauget, S a u g e t, Illinois, which is right across
21 the river from Monsanto, and it's been From St. Louis,
22 rather. And it's been termed First it was Plant B.
23 Then it was Krummrich plant. Then it was Monsanto
24 Illinois plant. Then it was Sauget plant. They all
25 referred to the same plant. Let's call it East St. Louis.

1 It's right over there.

2 Q. So there were two plants that manufactured
3 PCBs, one in Anniston, Alabama, and then one in East St.
4 Louis?

5 A. That's correct.

6 Q. Okay. And we'll just talk about East St.
7 Louis rather than the other names so we can keep it
8 straight.

9 A. Fine.

10 Q. Were there any products manufactured other
11 than PCBs in the Anniston, Alabama Plant?

12 A. Yes, it varied. They never manufactured more
13 than three or four. They manufactured parathion, which is
14 an insecticide. They manufactured some abrasives and they
15 manufactured some phosphorous compounds at Anniston. They
16 only had about three or four or five. They manufactured a
17 plasticizer down there. Not too many.

18 Q. What about East St. Louis? Were there other
19 products?

20 A. They manufactured everything from phenol,
21 which is carbolic acid, to chlorine. They manufactured
22 about 75 different products. Anniston was small. It
23 might have had It varied from 75 to 200 people. East
24 St. Louis varied from 600 to 1400.

25 Q. During what period of time did you visit the

1 Anniston plant in Anniston, Alabama?

2 A. I went there first before the war, probably
3 in '37, and then, of course, all the time from '46 to '74.
4 East St. Louis, I'm not exactly sure when I first went to
5 East St. Louis. I certainly went to them every year after
6 1946. I may have gone there before the war, but I'm not
7 too sure about it.

8 Q. And you visited those two plants through your
9 retirement in 1974?

10 A. Yes.

11 Q. For what period of time did Monsanto
12 manufacture PCBs?

13 A. They started in Anniston sometime before I
14 came with the company. As I said, I came with the company
15 I think January 15th, 1936. But they bought a company
16 that was called Swann, S w a n n, Chemical Company, which
17 had manufactured PCBs from 1933 on. They continued
18 manufacturing these PCBs until 1977, or they were
19 manufacturing them when I left. I don't know when they
20 started the manufacturing in East St. Louis. I don't
21 remember. But they continued manufacturing that certainly
22 through 1974. They started manufacturing it at one of the
23 plants in England, but I'm not sure of the dates of that.
24 It was certainly after World War II.

25 Q. But in the United Well, the PCB

1 manufacture started by Monsanto in 1936 or about then?

2 A. Yes. It started Monsanto became involved
3 in it. It was not started by Monsanto.

4 Q. No. I

5 A. It was started by Swann. We took over Swann,
6 so we were making it.

7 Q. So Monsanto bought Swann, which had been
8 manufacturing PCBs for about three years?

9 A. That's correct.

10 Q. What was Monsanto's policy with regard to
11 physical examination of employees at the Anniston, Alabama
12 plant and the East St. Louis plant while you were Medical
13 Director?

14 A. We had a full time doctor at Anniston, which
15 is a little bit strange because of the size of the plant,
16 but at that particular plant he did non occupational
17 conditions also. In other words, he was sort of like what
18 would be called today an HMO. He took care of
19 non occupational conditions as well as occupational
20 conditions.

21 Q. Let me ask it Did you have the same policy
22 of periodic physical exams at the Anniston, Alabama and
23 the East St. Louis plants that you had at the other
24 plants?

25 A. Yes. There were regular examinations.

1 Q. What was the purpose of these regular or
2 periodic physical exams of the Monsanto workers, including
3 the PCB workers?

4 A. Well, it was to all workers. I mean, PCB
5 people were not treated any differently than people
6 manufacturing phosphorous or people manufacturing
7 chlorine. It was to see to detect any beginning or
8 early illnesses, whether of a private nature, beginning
9 high blood pressure, early diabetes, or to see if there
10 were any condition that could be attributable to the
11 chemicals with which they were working.

12 Q. Did you monitor or check the health of
13 Monsanto employees involved in the manufacture of PCBs
14 over the years?

15 A. You mean did I physically examine the people?

16 Q. Well, either that, or did you monitor the
17 exams?

18 A. Well, I didn't examine the people except for
19 one occasion, which I guess you'll come to later. That
20 was in 1972 or '73 where I examined the PCB workers. But,
21 yes, I talked to the doctors, I examined the records. I
22 saw the records at Anniston because, as I said, it was a
23 small department with PCB. And I saw the records
24 individually in East St. Louis. Their workers rotated
25 around, but I talked to the dispensary people and I talked

1 to the plant physician and monitored through them.

2 Q. Did any of the plant physicians or workers
3 report any health problems they were having with PCBs?

4 A. Not while Monsanto had it. They had Dr.
5 Martin, who was at the Anniston plant, was the doctor who
6 took care of the Swann Chemical employees.

7 Q. Okay. I'll get to that situation in a
8 minute.

9 A. To answer your question, no.

10 Q. While Monsanto manufactured PCBs from, say,
11 1937 until your retirement, you heard of no problems,
12 health problems, with PCB workers?

13 A. That is correct.

14 Q. You mentioned that you did examine some PCB
15 workers at one particular time where you got involved.

16 A. Yes. Either '72 or '73 there was quite a bit
17 of interest in the environmental aspects of PCB.

18 Q. Well, let me ask you I'm going to get to
19 that in a minute.

20 A. Oh, okay. The answer is yes.

21 Q. Okay. Yeah. Let me cover that a little bit
22 10 later in the sequence because that was 1972, I believe.

23 A. Okay.

24 Q. Who did the plant physicians at Monsanto
25 report to?

1 A. Well, they reported from the medical aspect
2 to me. They reported as far as They were plant
3 employees, they were paid from the plant payroll, so in
4 that sense they reported to the plant manager. But
5 medically they were under my supervision and direction.

6 Q. Did you give the plant physicians any
7 instructions concerning what they were to report to you?

8 A. Yes. Any occupational condition with the
9 exception if a fellow got a burn he wasn't supposed to
10 call me up and say this man burned his forearm with a hot
11 chemical or something like that. But anything that was of
12 any importance, they were supposed to report it to me.

13 Q. And what do you mean by anything of
14 importance?

15 A. Well, if several people in the department
16 developed pulmonary problems from chlorine, for example.
17 We had a Chlorine Department where we made chlorine. If
18 we were getting a group of dispensary visits from the
19 Chlorine Department, he was supposed to let me know about
20 it, and we'd get our industrial hygienist down there and
21 see what's going on.

22 Q. Who was the plant doctor at the Anniston,
23 Alabama plant that manufactured PCBs?

24 A. A Dr. Martin.

25 MR. MURRAY: At what time?

1 Q. When you started.

2 A. When I started?

3 Q. Yeah.

4 A. Dr. Martin.

5 Q. And did you personally hire or approve the
6 hiring of the plant physicians while you were Medical
7 Director?

8 A. Well, if they were there Dr. Martin was
9 there obviously.

10 Q. For new ones.

11 A. New ones, yes. I interviewed them, and the
12 final decision was made by the plant manager. But he
13 couldn't hire anybody without my approval. He might say,
14 "I don't think this man will get along with the employees"
15 because of personality or anything else, and he might say,
16 "No, I don't think I can use him. We'll get somebody
17 else." But the plant manager could not go out and get his
18 own physician.

19 Q. What type of credentials or qualifications
20 did you look for in plant doctors?

21 A. A good doctor, an intelligent doctor, an
22 honest doctor.

23 Q. Did the During your 38 years at Monsanto,
24 or roughly 40 years actually at Monsanto, did the plant
25 physicians at the Anniston, Alabama plant or the East St.

1 Louis plant ever report any PCB related health problems in
2 the Monsanto PCB workers?

3 A. No, they did not.

4 Q. How did it come to be Monsanto's policy that
5 all inquiries concerning possible adverse health effects
6 be directed to the Monsanto Medical Department?

7 A. I told the executive committee, "This is what
8 we ought to do." After all, the Medical Department is the
9 authority on the medical aspects of any Monsanto products,
10 and we were the people who knew what to do to prevent any
11 problems.

12 Q. And did management agree with your
13 recommendation?

14 A. Yes. They sent out a directive to all the
15 plants and all the sales offices.

16 Q. And that policy was consistent throughout
17 your time at Monsanto?

18 A. Yes, it was.

19 Q. What was the purpose of the policy that you
20 mentioned about having all of the complaints of unusual or
21 serious complaints of health problems come to the Medical
22 Department?

23 A. We knew more about it than anybody else.

24 Q. Was there Was that also a policy with
25 regard to customer complaints as well as employee

1 complaints?

2 A. Oh, yes. I thought when you said "all
3 complaints," that referred to customers, yes, certainly.
4 In the plants, the person would obviously first go to the
5 plant doctor. And then he wouldn't call me if he had a
6 problem. He'd go to the plant doctor. And if the plant
7 doctor had any problem, he'd call me. But we had
8 instructed the plant doctor as to what the toxicological
9 properties of the raw materials were and the finished
10 products. But all customers, they didn't have that
11 intermediary, so they came right to us.

12 Q. You mentioned also the policy of the company
13 that all safe handling information be approved by the
14 Medical Department. What was the purpose of that policy?

15 A. The purpose was to prevent any injury to our
16 customers due to the use of Monsanto products. And the
17 Medical Department was the fountain head, as it were, of
18 the knowledge of this knowledge as to what the
19 toxicological properties, if any, were and how to and
20 the safe handling procedures be used. I have to repeat, I
21 did not function for fire or explosion. That's something
22 else.

23 Q. How did Monsanto typically publish toxicity
24 and safe handling information in relation to its products?

25 A. Well, it all depends. Typically it would be

1 in a section in the bulletins that are put out. First of
2 all, there's a technical bulletin. Suppose Product X is
3 found. Here we've got a compound, we've got a bunch of
4 suggested uses for it, and it's not on the market yet, so
5 they send this bulletin out to a bunch of potential
6 customers. In that they list the product, the properties,
7 they list what the company thinks it's good for, and they
8 also list what the safe handling procedures are to be used
9 to handle it. Then once the thing got into production and
10 use, there would be application bulletins and sales
11 bulletins, which would also include a section on safe
12 handling procedures for use with the product. In
13 addition, there were some letters that were more involved
14 that we would send out to bulletins that we would send
15 out for the Medical Department that were somewhat more
16 detailed. If people were asking about specific problems,
17 like "We heat this up to 100 degrees, what's the problem?
18 We heat it up to 500 degrees, what's the problem?" Then,
19 of course, there's the labels. The information of the
20 safe handling precautions to be taken were put on all
21 labels.

22 Q. Once the safe handling information was put on
23 a label or a bulletin of some kind, did Monsanto have a
24 policy concerning which customers received the materials?

25 A. Everybody did.

1 Q. Why did Monsanto want to ensure that all its
2 customers got this safe handling information about its
3 products?

4 A. They didn't want anybody hurt, whether it was
5 a big company or a little company.

6 Q. Why didn't Monsanto give this safe handling
7 information directly to the employees of the customers?

8 MR. MURRAY: I just object to the form of the
9 question, and you've asked him several times why did
10 Monsanto do this and why did Monsanto do that, and I'm not
11 sure he's qualified to speak on behalf of Monsanto. You
12 can ask him about what his the reasons why he wanted it
13 done if, in fact, he did want it done, but I don't believe
14 you can ask him questions regarding what Monsanto wanted
15 what Monsanto why Monsanto did something. You can
16 answer.

17 Q. Do you remember the question?

18 A. No.

19 Q. Okay. Let me try to repeat it. Why did
20 Why didn't Monsanto

21 A. Why did or didn't?

22 Q. Why didn't Monsanto give this safe handling
23 information directly to employees of customers? If you
24 know.

25 A. Well, yes. I consider myself part of

1 Monsanto. First of all, we have no right to go directly
2 to an employee of a different company. Number two, and
3 this is more important, we don't know how it was used. We
4 don't know the exposure that the employee may have in a
5 customer's plant. So we give this information to their
6 management, who then has what we know, and they know how
7 the employee is exposed, and we know I mean, they know
8 what our advice is as to prevent any harmful effects.

9 Q. And if a customer or user of a Monsanto
10 product wrote a letter to Monsanto with a question about
11 the toxicity or safe handling of a Monsanto product, what
12 would happen to that letter? Where would it go?

13 A. Come to the Medical Department, and we would
14 answer it either by telephone or by letter.

15 Q. During the time that you were Medical
16 Director at Monsanto, what was the company policy
17 concerning communication of safe handling information to
18 Monsanto employees who were engaged in the manufacture of
19 various products?

20 A. We would send the information, and that was
21 in various forms. I mean, it might be a memorandum, it
22 might be a Monsanto Safety Data Sheet, which listed the
23 physical properties and the toxicological properties and
24 the safe handling procedures. We would send that to the
25 plant manager, the manufacturing superintendent, the

1 dispensary and the safety man, the safety director. They
2 had regular safety meetings in all departments, and this
3 information then was transmitted by either the foreman or
4 the safety director to the individual employees.

5 Q. Doctor, did you keep track of any statistics
6 in relation to any particular diseases occurring in
7 Monsanto employees?

8 A. Yes.

9 Q. Any kind of an index of that?

10 A. Yes, I did. There was one illness or one
11 condition that existed in three of Monsanto's plants that
12 had nothing to do with PCBs. I mean, this was a bladder
13 condition. And they didn't These people did not work
14 with PCBs; they worked with an entirely different
15 chemical. And that was a specific illness that we kept
16 very close track on. In addition to that, we had
17 quarterly reports of any workmen's compensation cases that
18 would include any illness that was occupational in nature
19 that we spent any money for, that we had a doctor's bill
20 or a hospital bill or a lost time of employees. That was
21 a quarterly report that I saw and reviewed quarterly from
22 all our plants. Third, sometime after the war the
23 question of whether or not cancer could be caused by
24 chemicals became interesting to an awful lot of people,
25 and myself included. So I set up a program in which our

1 own health insurance, to which 95 percent of Monsanto
2 employees belonged to at first, and then when it became
3 non contributory, in other words, they gave it to the
4 employees, everybody had it. So I had our general office
5 get send me a list of any malignancies that occurred in
6 any Monsanto employee in any plant, whether salaried or a
7 wage earner, and I kept that list from sometime I guess in
8 late '40's or '50's to the time I retired.

9 Q. Was this cancer index limited to any
10 particular plant at Monsanto?

11 A. No. Any plant or office. Anybody, whether
12 he's a salaried person or worked in the Medical
13 Department, was listed.

14 Q. Did you commence this cancer index because
15 you were concerned with any particular chemical exposure?

16 A. No. I was interested just in any possible
17 connection of any chemical in a worker, exposure to a
18 worker, with any malignancy.

19 Q. And I don't know if you mentioned this in
20 your answer, but did you review that periodically, that

21 A. Oh, sure. There was no reason to do it
22 unless I reviewed it.

23 Q. How often would you review it?

24 A. Oh, I can't say every Probably quarterly
25 is a pretty good answer. At least quarterly I think.

1 Q. Four times a year?

2 A. Something like that.

3 Q. Did you find any groupings of cancer that
4 were related to PCBs during that period?

5 A. No, I did not.

6 MR. CARNEY: Why don't we take a break? The
7 tape is about to expire.

8 (Brief recess.)

9 Q. Doctor, I believe you indicated that your
10 department expanded over the years by adding industrial
11 hygienists and toxicologists. How did you supervise your
12 Medical Department?

13 A. We also expanded by adding more doctors, too.

14 Q. Okay.

15 A. But still we were a small department. We
16 were in one section of the complex, the office
17 headquarters complex. We all had offices around a central
18 secretarial pool. And we went to lunch together. We were
19 very close. Well, I was Medical Director. There was a
20 Dr. Morris Johnson, who was Assistant Medical Director,
21 and under him was Mr. Wheeler, who handled industrial
22 hygiene. He had his industrial hygienists there. We had
23 a Dr. Levinskas. We had a toxicological department.
24 First Mr. Wheeler was in charge of the toxicologist
25 department, but then he became administratively in charge.

1 Mr. Wheeler handled a good part of the toxicology until
2 we until our toxicologist came onboard.

3 Q. Did you have periodic department meetings?

4 A. We met every week. We also had a system in
5 which we had any carbons that were sent out I mean, any
6 letters that were sent out, carbons were checked off to
7 the relevant individual so that I was familiar with every
8 correspondence of Mr. Wheeler or Dr. Levinskas carried out
9 as far as toxicology was concerned.

10 Q. Did you in your role as Medical Director have
11 access to the top management at Monsanto?

12 A. Very frequently. As I say, we were almost a
13 first name company, and I was able to talk to Mr. Queeny,
14 who was the president, calling him Edgar. And so I was
15 very frequent.

16 Q. Was the management at Monsanto responsive to
17 your requests and recommendations?

18 A. Completely. I never had a medical request
19 for any policy that was directed towards safety or medical
20 conditions turned down by management. Now, there would
21 be For example, in toxicology, if somebody came up with
22 a product and said, "I'd like to have this examined," I
23 would go up and check out Suppose it were an
24 agricultural chemical. And I'd go up and say, "This is
25 going to cost \$200,000," I'd go back to the person and

1 say, "Look, we can have this done, but it's going to cost
2 you \$200,000." He'd say, "Well, I don't believe this
3 product has that much potential. I don't think we'll do
4 it." Well, that's not a question of turning it down. But
5 any medical condition, any medical procedure or medical
6 statement that I wanted to carry out, medical policy I
7 wanted carried out, was never turned down.

8 Q. Dr. Kelly, what were PCBs used for in the
9 1930's?

10 A. The main use was a dielectric. That means a
11 compound that does not conduct electricity. They were
12 used in electrical applications, primarily in transformers
13 and then in capacitors. I do not know exactly when the
14 use of capacitors started, but they had been used in
15 transformers certainly when I came with Monsanto.

16 Q. Who were some of the Monsanto customers for
17 PCBs that were used in transformers and capacitors?

18 A. Well, the big ones were General Electric,
19 Westinghouse, Allis Chalmers. There were smaller, Maloney
20 Electric. Monsanto was the only manufacturer of PCBs in
21 the United States.

22 Q. What were some of the trademark names for
23 PCBs used by Westinghouse or General Electric?

24 A. Westinghouse used the trademark Inerteen,
25 I n e r t e e n e (sic). General Electric used Pyranol,

1 P y r a n o l.

2 Q. Those were the names for PCBs for
3 Westinghouse and General Electric?

4 A. That is correct.

5 Q. Over the years, Dr. Kelly, were other uses
6 developed for PCBs?

7 A. Oh, yes. They were used as a plasticizer.
8 They were used in lubricants. They were used in waxes.
9 They were used Those are relatively small uses. They
10 were used in paints. Again, a small use. Large uses were
11 in carbonless carbon paper and hydraulic fluids. That's a
12 fluid that you use to carry pressure from one vessel to
13 the other I mean, one pump to the other, like in
14 die casting or airplane hydraulic fluids they were used,
15 although PCBs were not used in airplanes. I was just
16 using that as an example of an hydraulic fluid. And they
17 were used in heat transf agents. In other words, if
18 you've got a source of heat there and you want the heat
19 over there, but you don't want the furnace inside the
20 building, you put a pipe system filled with PCBs where
21 it's being heated and it transmits the heat over here
22 where you want the heat.

23 Q. What were the names of the PCBs that were
24 used as hydraulic fluids?

25 A. Pyranol. Monsanto had a name Aroclor. I

1 mean Hydraulic fluids?

2 Q. Yes.

3 A. Sorry. Not Pyranol. Pydraul. Pydraul's
4 P y d r a u l. Monsanto had a generic name for compounds,
5 PCBs, that were Aroclors. All Aroclors were not PCBs, but
6 all PCBs fell under the classification of Aroclor. It's
7 A r o c l o r.

8 Q. What was the name, PCB name, that was used in
9 the heat transfer systems that you mentioned?

10 A. Therminol, T h e r m i n o l. Now, there
11 were other names that crept in. Some were called OS, then
12 some are called MCS. Then they put a number afterwards.
13 But the main name was Therminol for heat transfer agents
14 and Pydraul for hydraulic fluids.

15 Q. Were there benefits to using PCBs in
16 transformers and capacitors?

17 A. Oh, a tremendous benefit. They were fire
18 resistant. Previously They combined good dielectric
19 qualities, that's good electrical properties, with fire
20 resistance. Some things had Some fluids, like
21 hydrocarbons, which was a refinery comes from an oil
22 refinery, a cut of oil before you take the gasoline off or
23 after you take the gasoline off, this has good dielectric
24 products properties, but it catches on fire readily.
25 And that's the most important thing, because if you've got

1 a transformer in a hospital, in a school, in the White
2 House, you put a flammable substance in there and you
3 catch on fire, you transform a small fire into a
4 conflagration. If you have it in a subway

5 Q. A what?

6 A. To a big A big fire.

7 Q. Okay.

8 A. A big fire. If you have a subway, it's awful
9 to have a big fire in a subway. In trains. Suppose Busch
10 Stadium, they've got these transformers up near the
11 lights, if there's a fire there from a lightning strike or
12 God knows what fire, you get a bunch of flaming oil
13 dropping down on the people in the grandstands, that's
14 bad. So the inflammability was very important. Now, they
15 did have products that had silicates and other products
16 that were not inflammable, but they weren't good
17 dielectrics. So that accounts for the fact that the PCBs
18 were sold one year almost a hundred million pounds of
19 them.

20 Q. So was there a material substitute that could
21 perform the job in transformers and also be fire retardant
22 like PCBs during the time you were Medical Director?

23 A. Not as good

24 MR. MURRAY: I'm going to object to the
25 question as beyond this witness' expertise. He's a

1 doctor.

2 Q. Okay. If you know, Doctor.

3 A. Well, I don't know except that I know that
4 one year they sold a hundred million pounds of the stuff
5 to transformer people, and there seemed to be no
6 competition for particular uses.

7 Q. Okay. Did you review the pre World War II
8 literature relating to a substance called chlorinated
9 naphthalene?

10 A. Yes. In fact, chlorinated naphthalene was
11 the substance that they mentioned in medical school. It
12 had been around since, oh, the turn of the century,
13 1890's.

14 Q. Was there a lot of medical literature
15 available about PCBs before the late 1930's?

16 A. No. I don't know of any. There was very
17 little.

18 Q. Was there any literature

19 A. There might have been one or two isolated
20 articles where they might have run an acute toxicity on
21 the stuff, but there was no important literature in the
22 toxicological libraries.

23 Q. Are PCBs similar to chlorinated naphthalenes?

24 A. Oh, no. They're I mean, they're both
25 chlorinated, they both start from benzene, but they are a

1 lot different. Just like diamonds are made of carbon,
2 coal is made of carbon, but there's a big difference
3 between diamonds and coal.

4 Q. Did Was there some early literature that
5 discussed both PCBs and chlorinated naphthalenes?

6 A. It depends what you mean by early.

7 Q. In the '30's, say.

8 A. Well, in 1938, there was quite a bit of
9 literature, '38 and '39, by a Dr. Drinker at Harvard.

10 Q. How is it that you recall studying some of
11 this literature in the late 1930's about PCBs?

12 A. Well, I recall it because it was quite a big
13 deal at the time. Swann Chemical Company You want me
14 to go into all of this stuff to answer it? Swann Chemical
15 Company, which was bought by Monsanto in 1935, sometime
16 before I came there, in 1933 Swann Chemical Company had an
17 incident in which around 20 people had chloracne.
18 Chloracne is a condition somewhat similar to teenage acne,
19 only it's different in several areas. One, it doesn't
20 occur in the same places. It may or may not, but quite
21 often it doesn't. It is accompanied by pigmentation,
22 which does not occur in teenage acne. And it's caused by
23 a variety of chlorinated compounds: wood preservatives,
24 penachlorophenol, herbicides, 245 T, and chlorinated
25 naphthalene, and in PCBs, which and its contaminants.

1 The Swann people had this epidemic. They had been making
2 this material for

3 Q. By "this material"?

4 A. PCBs. They had been making PCBs for I guess
5 three or four years. They changed the supply. They made
6 it from benzene. You make PCBs by taking benzene, joining
7 two molecules of benzene together and chlorinating them.
8 They changed the supplier of benzene and they found out
9 later they got a bum supply of benzene. So when they
10 chlorinated it, they got a PCB This is Swann now. They
11 got a PCB

12 Q. Now, Swann was the company that Monsanto
13 bought later on?

14 A. That's right. And this occurred two years or
15 so before Monsanto bought it, at least two years. So they
16 came out with a PCB that was a different color than the
17 standard PCB, different dielectric quantities, but they
18 still sold it. Why I don't know. But during the course
19 of this manufacture, they developed the workers at
20 Swann developed chloracne. It was treated and then went
21 away. But it was pretty prominent for awhile. Well,
22 obviously I was interested because when I came with the
23 company the people were happy to unload their files on
24 anything they had related to Medical Department. They
25 bumped it down to me. So I was interested.

1 Well, then in '37, some of one of Monsanto's
2 customers, Hallowax, H a l o w a x, which was making wire
3 coatings You're too young to remember the old wire that
4 you would pull it, pull on it and it would give you a
5 brownish stain on your hands instead of the nice clean
6 rubber or vinyl extension cords we have today. But,
7 anyway, Hallowax manufactured this coating from chlorinated
8 naphthalene.

9 Q. Let me get to that in a minute.

10 A. I thought you were asking me how I got going
11 on this.

12 Q. Well, but it was the Swann Chemical outbreak
13 of chloracne and then Monsanto bought Swann that peaked
14 your interest in

15 A. That's correct.

16 Q. the PCB literature?

17 A. That's correct.

18 Q. You mentioned the chloracne can be caused by
19 various compounds, including PCBs. Is chloracne the only
20 known health problem which can be caused by industrial
21 exposure to PCBs?

22 A. You could get acute atoxic hepatitis if you
23 were exposed to inhalation of the fumes at elevated
24 temperature for a prolonged period of time, yes. There
25 have been reports. One case of three people that

1 developed jaundice from They had a . .

2 Q. Okay. So there's What's hepatitis? Could
3 you put that in layman's language so I can understand it?

4 A. It's an inflammatory disease of the liver.
5 Chemical hepatitis is inflammatory is a disease of the
6 liver due to chemicals. And there are other hepatitis,
7 obviously from eating fish or infected needles.

8 Q. Is this hepatitis, is that a permanent
9 condition if you're exposed to PCBs at elevated
10 temperature?

11 A. It has not been with the PCBs. I mean, but
12 you can get a chemical hepatitis. You get chemical
13 hepatitis from chlorinated naphthalene that proceeds to a
14 very serious liver condition, even death.

15 Q. What about the situation with PCB exposure
16 that might cause hepatitis or a liver problem? Is that
17 permanent?

18 A. No. No reports of any permanent injury from
19 industrial exposure to PCBs. In the two instances that I
20 know about, they cleared up without any problem.

21 Q. And so the chloracne that could be caused by
22 various products, including PCBs, is that a permanent
23 condition?

24 A. I think it depends on the extent. You could
25 get scarring from it, and you can get inclusions like

1 blind blackheads that may have to be opened. If they
2 don't open, you can consider it permanent.

3 Q. By permanent, what do you mean?

4 A. It lasts a long time.

5 Q. But if you remove the PCBs from the person,
6 what happens to the chloracne?

7 A. Well, as I say, if it's mild, it goes away.
8 If you've got cysts, they can persist until they are
9 opened. If they are opened, you get scars from it. But
10 you don't get any more. In other words, if you got
11 chloracne from PCBs, you take out the PCBs, you aren't
12 going to get any more. If you take away the PCBs, you
13 aren't going to get any more chloracne.

14 Q. So you won't get any more pimples or acne?

15 A. That's correct.

16 Q. But you might have a scar, like a teenage
17 acne, that would be permanent?

18 A. Yes. Or you may have a cyst. In other
19 words, like a blocked up sweat gland. There it is.
20 Unless you open it, it's not going to disappear.

21 Q. You mentioned that there were a few reported
22 cases of this hepatitis from exposure to PCBs if they were
23 overexposed at high temperatures. What do you mean by
24 overexposed?

25 A. Well, if you stay around them Here you've

1 got these fumes that are coming out, they are irritating,
2 and if you're inhaling them and you stay around them for
3 all day, that's overexposed. These people I only know
4 of two instances. One was reported in the medical
5 literature, in some obscure journal like the journal of
6 some Midwestern state occupational I mean, state
7 medical journal. I talked to a Dr. Spolyer, who was the
8 Chief of Public Health of some Midwestern state. I'm not
9 certain about it. And I saw the reprint, but I couldn't
10 find it anyplace. He had three cases. They had a
11 jury rigged heat transfer system that leaked. There was
12 no indication of how much it leaked, but it was hot. It
13 was a heat transfer system. These people worked in there
14 for I'm not sure of the details about a week. And
15 these three people got jaundice. And obviously they
16 pulled them out when they started getting jaundiced,
17 stopped the situation, plugged up all the leaks, and
18 watched the people. I don't know if they were
19 hospitalized. I don't think so. But they all got well
20 because I talked to Spolyer, who isn't living anymore, at
21 that time, and that was about in the early '50's or the
22 late '40's, a long time ago. And then there was another
23 one, I had call from a Crown Chemical Company in New York
24 from this doctor who was treating some people who were
25 nauseated from being exposed to PCBs, again in a heat

1 transfer system where there were leaks, and I told him,
2 well, watch out for jaundice, that this can occur, and he
3 had one or two people, and he called me in a week or so
4 later and said, "Yeah, you're right. They do have
5 jaundice. What do we do?" I said, "Well, just watch
6 them. They'll get well." And I checked with him in a
7 month, and they got over it with no problem.

8 Q. Those are the only two cases you can recall
9 where there was any kind of a hepatitis or jaundice
10 problem relating to PCBs that were reported to you?

11 A. Yes. To the best of my knowledge, yes.

12 Q. What were the Monsanto safe handling
13 procedures for PCBs?

14 A. There were two. Avoid repeated or prolonged
15 skin contact. If it gets on your skin, wash it off. If
16 your clothes are contaminated, soaked, change. Avoid
17 breathing the material in confined spaces or at elevated
18 temperatures. PCBs have very low pressure. That means
19 you don't get fumes from them. If we had set a pan of
20 PCBs in the middle of this room, you might be able to
21 smell it maybe, but you wouldn't get anything close to any
22 harmful condition. You could sit there for a week, a
23 month, with the stuff open. You wouldn't get any problem.

24 Q. If these Monsanto safe handling procedures
25 are followed, is there any risk of getting chloracne or

1 hepatitis?

2 MR. MURRAY: Object to the form of the
3 question in that I assume you're asking his opinion, but
4 you did not phrase it in that manner.

5 Q. Well, let me ask you this, Doctor. If the
6 Monsanto safe handling procedures are followed, do you
7 have an opinion based on a reasonable degree of medical
8 certainty as to whether there'd be any physical problems
9 like chloracne or hepatitis?

10 A. Well, yes, I do.

11 Q. What is that opinion?

12 A. That they wouldn't occur because I have I
13 said with the exception of those two cases where obviously
14 the procedure was not followed, where the material was
15 breathed at elevated temperature, with the exception of
16 those two cases, we had no problems. We did not have I
17 have never received a letter or a complaint from any
18 Monsanto customer that their workers had either hepatitis
19 or chloracne. In the medical literature in the United
20 States, there's been one instance of chloracne resulting
21 again from a heat transfer agent in New England. That's
22 the only one. There have been no reports to the best of
23 my knowledge of chloracne occurring in the electrical use
24 in the United States due solely to PCBs.

25 Q. Did Monsanto PCB workers ever have problems

1 with chloracne or liver problems caused by PCBs?

2 A. They did not have any of those problems,
3 those two problems.

4 Q. And you mentioned the chloracne problem at
5 Swann, but that was before Monsanto bought the company?

6 A. Yes.

7 Q. Have you ever seen chloracne?

8 A. Lots of it.

9 Q. Under what circumstances?

10 A. Under people exposed to penachlorophenol,
11 under people exposed to 245 T. I saw the workers, quite a
12 few of the workers, the Swann workers, three or four years
13 after their chloracne. They really didn't have any
14 residue that I can talk about. It appeared to be quite
15 well. I have seen I saw one case of industrial
16 chloracne. This was I know it was the '40's. It was a
17 transformer I mean, not a transformer. It was a
18 thermometer company up in New York, I believe. Anyway, it
19 was in the East. These people were making oven
20 thermometers. An oven thermometer at that time was sort
21 of like a bellows, that's a little sack made out of
22 leather or something of the sort, which they dipped the
23 PCB they filled these with PCBs, and they would dip
24 these things, these little sacks, into liquid PCBs at room
25 temperature. Well, some of the women, two or three of the

1 women, had chloracne from it. Well, that was new to me,
2 and I In fact, I hadn't seen chloracne at that
3 particular time, so I went up there and talked to them.
4 And I said, "Why don't you get some sort of a gimic that
5 they don't have to put their hands in, a fork or a forceps
6 or something?" Well, they had no other symptoms outside
7 of the chloracne. And they did, and then on follow up
8 they didn't have any problems. I mean, the chloracne went
9 away. Nobody else got it. Does that answer the question?

10 Q. Yes.

11 A. It went so long, I forgot what the question
12 was.

13 Q. I think so, Doctor. Let me hand you some
14 documents that we've marked previously, and I think you
15 have the documents next to you, exhibits we've marked K 1
16 through K 5. I've got a set with me, and, Mr. Murray, I
17 believe you have a set there you can look at. Just for
18 the record, we did agree before this deposition that we
19 would each exchange the documents we were going to use
20 today, and we did that yesterday. So I think, Mr. Murray,
21 you've at least had a chance to see these documents
22 yesterday. Is that correct?

23 MR. MURRAY: For the record, that's
24 absolutely correct, and I appreciate the hospitality.

25 MR. CARNEY: Okay.

1 Q. We've marked the exhibits with the letter K
2 first and then a number to stand for Kelly. So we have in
3 front of you now Exhibits K 1 through K 5. Can you
4 identify briefly those exhibits?

5 A. Yes. You want me to take these individually?

6 Q. Yeah. If you'd just identify them by the
7 author and date.

8 A. K 1 is a reprint that was of a publication by
9 Dr. Henry Smith on the toxicity of certain benzene
10 derivatives and related compounds. It was a 1930 document
11 in the "Journal of Industrial Hygiene". Did I give you
12 the title?

13 Q. Yeah. Why don't you go on to K 2?

14 A. You just want me to identify them?

15 Q. Yeah. If you just very briefly identify
16 them. We'll get into a little more detail later.

17 A. Number two is an article by Dr. Jack Jones in
18 the "Archives of Dermatology and Syphilology,"
19 S y p h i l o l o g y, published probably in 1935,
20 called entitled "Acneform," a c n e f o r m, and I'll
21 have to spell this next one because this is a word I don't
22 know much about either, "Dermatargosis,"
23 d e r m a t e r g o s i s. Freely translated, that means
24 an acne type of skin trouble. The third is K 3 by Dr.
25 Cecil Drinker, entitled "Symposium on Certain Chlorinated

1 Hydrocarbons". That was published in the "Journal of
2 Industrial Toxicology". The symposium was in '37, in
3 1937, so presumably this was published around that. The
4 next one

5 Q. It's K 4?

6 A. K 4 is another article by Drinker's group
7 called "Morphological Changes in the Livers of Rats
8 Resulting from Exposure to Certain Chlorinated
9 Hydrocarbons," also published in the "Journal of
10 Industrial Hygiene and Toxicology," February 1938. K 5 is
11 also by Drinker, "Further Observations on the Possible
12 Systemic Toxicity of Certain of the Chlorinated
13 Hydrocarbons with Suggestions for Permissible
14 Concentrations in the Area (sic) of Workrooms".

15 Q. In the air, I think, in workrooms?

16 A. In the air, I'm sorry. In the air.
17 Reprinted from the "Journal of Industrial Hygiene and
18 Toxicology," 1939.

19 Q. Doctor, did you personally review these
20 articles that we've marked as Exhibits K 1 through K 5
21 sometime between January of 1936 and the time you left
22 Monsanto for the Army in 1942?

23 A. Yes, I did.

24 Q. And I take it you've also reviewed these
25 articles more recently?

1 A. Quite recently and quite often.

2 Q. Doctor, were these articles, K 1 through K 5,
3 readily available for anyone who conducted a reasonable
4 search for them from 1942 forward?

5 A. Oh, yes. They are all indexed. They are all
6 reputable journals, and they were put in the index. Every
7 medical school had them. Most of the medical societies,
8 the larger medical societies, would. St. Louis Medical
9 Society had it.

10 Q. Let's take a look at K 1. That's the Smith
11 article. What did you in your capacity as Monsanto
12 Medical Director learn from your review of this 1931
13 article by Professor Smith?

14 A. Well, this article was just a grab bag. I
15 mean, an acute toxicity of a grab bag of chemicals, one of
16 which was diphenyl, which is a basic thing basic
17 building block for PCBs, and the chlorinated diphenyl.

18 Q. Okay. Just if we could refer to When
19 we're talking about PCBs, if you could use the word
20 "PCB"

21 A. PCBs, okay.

22 Q. I'll know what you're talking about, and I
23 think the jury will also.

24 A. Well

25 Q. So did they test PCBs? Were they reported in

1 this article?

2 A. They tested four PCBs, and they stated that
3 two were slightly toxic and two proved nontoxic in doses
4 of four grams per kilogram. Now, there are 30 grams in an
5 ounce, and so you have to sort of do a little
6 transposition of grams per kilogram in an animal to a
7 human, but 70 pound kilogram man is 150 pounds. So this
8 person took four grams per kilogram. That's

9 Q. You mean the animal?

10 A. The animal took four grams per kilogram.
11 That's four times 70, 280 grams. Four grams in a
12 teaspoonful. That's 70 teaspoonfuls or two ounces of the
13 stuff.

14 Q. So these animals were fed roughly 70
15 teaspoons full of

16 A. Yeah.

17 Q. PCBs?

18 A. And they were called nontoxic and proved
19 nontoxic in one case by his definitions of toxicity, I
20 guess, and the other slightly toxic. So what I gathered
21 from it was here we've got an industrial compound of some
22 toxicity, but nothing unusual for an industrial chemical.

23 Q. Okay. Take a look at K 2. Did this article
24 describe the Swann chloracne outbreak that you've
25 mentioned before in your testimony?

1 A. Yes, it did.

2 Q. Do you have any personal knowledge about the
3 chloracne outbreak at the Swann Chemical plant, which was
4 the plant that Monsanto bought a few years later?

5 A. Well, I wasn't there when it happened, but I
6 talked to the people who were there, and I talked to the
7 employees who were there. I may have talked to Jones or
8 not. I don't recall that. But I have certainly that much
9 knowledge. I saw articles I mean, memoranda concerning
10 it.

11 Q. Did you talk to the plant physician that was
12 the plant physician at Swann

13 A. Oh, yes.

14 Q. at the time of the outbreak?

15 A. Dr. Martin was the plant physician both at
16 Swann and both at Monsanto until he retired.

17 Q. Was it part of your job for Monsanto to
18 familiarize yourself with the details of this chloracne
19 outbreak that occurred prior to Monsanto buying the plant?

20 A. Wait a minute. I didn't familiarize
21 myself Maybe I am misunderstanding you. I did not
22 familiarize myself with the details before Monsanto bought
23 the plant.

24 Q. No. I mean after you joined Monsanto.

25 A. After I joined Monsanto, certainly I was

1 interested both from the standpoint that here we were, we
2 have this plant that had this trouble in the past, and I
3 was obviously very much interested, and I was also
4 scientifically interested in it. So I did familiarize
5 myself quite markedly.

6 Q. Were the plant physicians at the Anniston,
7 Alabama plant, which was the Swann plant, and we've
8 referred to it as the Anniston, Alabama plant after
9 Monsanto purchased it, were those plant physicians at that
10 plant knowledgeable about chloracne?

11 A. Oh, certainly. Martin back in 1936 knew more
12 about it than I did because he had been there when these
13 23 people or so had chloracne. Over in East St. Louis, I
14 had talked to the doctors about the fact that a long time
15 ago PCB manufacturing at Swann had been associated with
16 chloracne. They had also seen chloracne in insecticides
17 and wood treating chemicals. They had quite a few
18 chlorinated compounds in East St. Louis. So they were
19 knowledgeable about it.

20 Q. Did the plant physicians at the Anniston,
21 Alabama plant or the East St. Louis plant ever report to
22 you any chloracne in the PCB workers?

23 A. They did not.

24 Q. When did you review Exhibit K 2, the article
25 by Dr. Jones?

1 A. Sometime in 1937 or '36. Probably '37.

2 Q. Do you recall approximately how many workers
3 had chloracne at the Swann plant, which was the Anniston,
4 Alabama plant, back in the early '30's?

5 A. I thought there were about roughly 20 or 23,
6 and of which three, six, nine, ten, 16 were sent to Jones
7 or Jones reported on 16.

8 Q. And I believe you said that when you got to
9 Monsanto in '37 these workers didn't have any active
10 chloracne at that time?

11 A. That's correct. Correct. When I got to
12 Monsanto in '36, I got to Anniston I went down to
13 Anniston in '37, and they didn't have it.

14 Q. And I believe you started to mention to me
15 the cause of this chloracne outbreak at the Swann plant.
16 Could you just briefly mention what you concluded that
17 chloracne outbreak was caused by?

18 A. Well, I think I can conclude by quoting from
19 Jones, who got the history from the plant and the
20 employees at that time. He said, "The appearance"

21 MR. MURRAY: What page, Doctor?

22 THE WITNESS: Beg your pardon?

23 MR. MURRAY: What page are you on?

24 THE WITNESS: 1029, second paragraph.

25 MR. MURRAY: Thank you.

1 A. "The appearance of the eruption" the
2 eruption is the chloracne "coincidentally with the
3 production of a poor grade of chlorinated di phenyl"
4 that's PCB "seemed to indicate a relationship. On due
5 chemical investigation, styrene," s t y r e n e, "was
6 assumed to be the offending substance causing the low
7 grade of the finished product."

8 Q. What is

9 A. So I concluded they got some bum benzene,
10 made some bum PCBs, and they got So there must have
11 been a contaminant in the PCB from the bum benzene that
12 gave the people the chloracne because they didn't have it
13 before or after during the manufacturing of the PCBs.

14 Q. What do you mean by bum benzene?

15 A. Off spec. Well, it wasn't up to standard.
16 It was a different color, poor dielectrics. It caused
17 PCB

18 Q. Bum, you mean b u m, like bad?

19 A. Yeah. Bad.

20 Q. I just wanted to make sure I was on the same
21 wavelength.

22 A. You know, I mean, the good kind is a good
23 dielectric that has a regular color and doesn't give you
24 chloracne.

25 Q. When the Anniston, Alabama plant quit using

1 this bum or bad benzene in their PCBs, did they have any
2 problem with chloracne?

3 A. No.

4 Q. Was there ever any chloracne outbreak at the
5 Anniston, Alabama plant since that time in the early
6 '30's?

7 A. Not only there hasn't been an outbreak, there
8 hasn't been any cases.

9 Q. Did Jones, Dr. Jones, in his article which is
10 K 2, Exhibit K 2, did he recommend any safe handling
11 precautions?

12 A. Yes, he did.

13 Q. Could you tell me what those were?

14 A. I'm looking it up. Well, he

15 Q. What page? Are you on page 1030?

16 A. 1030.

17 Q. Okay.

18 A. He said that they tried to prevent the
19 condition by being especially careful that all men engaged
20 in the manufacture of PCBs should have a thorough bath
21 after working hours and they should wear freshly laundered
22 clothing. Then he started talking about treatment. He
23 also then said Well, he didn't recommend it, but that
24 was studied. So the employment of enclosed distilling
25 apparatus and ventilation fans, there's a gradual

1 improvement in the eruption. So the first time I was
2 there, I didn't see any open distilling apparatus, so
3 obviously if you were distilling stuff you're getting it
4 hot, and if it's open you're getting fumes, so they must
5 have been getting fumes there.

6 Q. Dr. Kelly, did you attend in June of 1937 a
7 symposium presented by Dr. Drinker?

8 A. Yes, I did.

9 Q. And are you familiar with these three
10 articles by Dr. Drinker? I think you've already said
11 you're familiar with them. Exhibits K 3, K 4 and K 5.

12 A. Yes, I am.

13 Q. What types of tests did Dr. Drinker perform?

14 A. He did three types of tests. He fed animals.
15 He had animals inhale the material. And then he fed
16 animals and subsequently fed them a known liver poison,
17 carbon tetrachloride.

18 Q. Can you take a look at these three exhibits,
19 and maybe you can tell me which one of these what order
20 you want to take discussing these three exhibits that
21 would be simplest to understand.

22 A. Well, I really don't think we ought to
23 need to talk about number two, which is K 4. That just
24 discusses the microscopic pathology of what happened to
25 the animals.

1 Q. Okay.

2 A. I mean, I don't really I'll be happy to
3 discuss it, but it just talks about one detail of it.

4 Q. Okay.

5 A. But Drinker talks about what happens, so
6 that's included. I think we have to start with number
7 K 3, number one, and what do you want me to say? What are
8 you asking me?

9 Q. Well, take a look You know, you've got K 3
10 and K 5 in front of you?

11 A. Yes.

12 Q. Okay. And why don't you talk about them? I
13 think they are related. Why don't you talk about them
14 together?

15 A. Okay. Drinker starts off with a statement of
16 the problem. He relates three employees of

17 Q. Was this K Let me ask you this. Was K 3,
18 the Drinker article, was it primarily focused on PCBs or
19 chlorinated naphthalenes?

20 A. It's primarily focused on chlorinated
21 naphthalenes because they were the majority of the
22 products tested. The only They tested halowaxes.
23 Halowaxes are primarily chlorinated naphthalene. In some
24 cases, there is ten percent of a compound which Halowax
25 called PCB and which Drinker, following Halowax'

1 definition, called PCBs, but which subsequently were
2 proven not to be PCBs but to be chlorinated diphenyl
3 benzene, which is an entirely horse of an entirely
4 different color. I mean, they're somewhat related, but
5 they're, again, a lot different. So that's the There
6 are also a lot of different chlorinated naphthalenes,
7 depending upon the amount of chlorination. So he tested
8 about ten different compounds, one of which had ten
9 percent what he called chlorinated a PCB which
10 subsequently proved not to be PCB, and another one Halowax
11 with ten that he tested the .

12 Q. Let's stick with PCBs because that's what I
13 think we're most interested in in this case.

14 A. Well

15 Q. Did he

16 A. Okay.

17 Q. Did he test in K 3 PCBs?

18 A. No, he didn't. He tested what he called
19 PCBs, but he

20 Q. Why don't you explain that?

21 A. That's We have to go back to No. 5.

22 Q. Okay. Well, then

23 A. Here he says Drinker is testing what he
24 says is PCBs. He said it's got 65 percent chlorine in it.

25 Q. And by "here," you mean K 5?

1 A. In K 3.

2 Q. Okay. K 3.

3 A. He comes out with a statement saying this is
4 real toxic. Mr. Murray, that's page 288, where he says
5 "Chlorinated diphenyl. Chlorine" that would be a PCB.
6 "Chlorine content 65.0 percent." Then he says Then we
7 turn to page 297.

8 Q. Of Exhibit K 3?

9 A. Huh?

10 Q. Of

11 A. Exhibit KC K 3. In which he said that he
12 found that chlorinated PCB was quite toxic. Then when
13 he says that, I talked to him. I didn't raise my voice at
14 the symposium. I was up there. But I talked to him, and
15 I said, "Look, this is news to us. We don't believe that
16 our PCBs are that toxic, what you're getting here." And I
17 said, "Where did you get the PCBs? We didn't send you
18 any." And he said, "I got it from Halowax." I said,
19 "Well, are you sure they sent you the right stuff? In
20 fact, I'm not even sure we sell Halowax PCB. We sell
21 chlorinated diphenylbenzene." I said, "Why don't I send
22 you some PCB and you test it?" So we sent him some PCB
23 with as close to a chlorine content as he talked about.
24 He had 65 percent chlorine. We sent him chlorinated at 68
25 percent, which was the closest we had. And usually the

1 higher the chlorine, the more toxic it ought to be. So he
2 tests this.

3 Q. And that's Exhibit K 5?

4 A. In K 5 he tests what is honest to goodness
5 PCB which we got right from our production run at
6 Anniston. Then I'll quote now from page 153. This is the
7 third paragraph, Mr. Murray, at the bottom of the left
8 column. The six

9 MR. MURRAY: Wait a minute. I'm sorry. K 5?

10 MR. CARNEY: We're on K 5.

11 MR. MURRAY: I don't have 153.

12 THE WITNESS: 153?

13 Q. 158 I think. It's the second to last page of
14 that exhibit.

15 A. 158, sorry.

16 Q. Yeah.

17 A. The sixth compound, which had been previously
18 listed as chlorinated diphenyl, a PCB I'll add that.
19 He didn't add that. It contains 65 percent of chlorine
20 and proved very destructive to the liver. Later
21 experiments with Compound 13, which contains 68 percent of
22 chlorine, which is also labeled chlorinated diphenyl, was
23 a surprise to us since the second compound was almost
24 nontoxic. On inquiry, it was found that Substance 6,
25 which he had tested proved so toxic, one, was in reality a

1 mixture of chlorinated diphenyl and chlorinated
2 diphenylbenzene, and that No. 13, the number two compound,
3 was actually chlorinated diphenyl.

4 Q. If you would just explain to the jury what that
5 means, because there are a lot of big terms.

6 A. Sure. It means they tested apples in one
7 case and oranges in the other. They tested apples,
8 which in the first case, which proved toxic because it
9 was chlorinated diphenylbenzene, which is an entirely
10 different compound than chlorinated diphenyl, which is
11 PCB. In the second case, they tested the oranges, which
12 is pure PCB, and he came out with practically nontoxic.
13 So everything he has reported in his first article to
14 channel as far as testing chlorinated diphenyl is wrong
15 because he didn't test chlorinated diphenyl or PCBs, as he
16 explained in the second article.

17 Q. I got confused with your apples and oranges
18 analogy.

19 A. Well, he tested two different products.

20 Q. Okay. And just talk about Rather than use
21 the Use PCBs or wasn't PCBs so I can understand it
22 because I'm confused a little.

23 A. In his first article he tested what he called
24 PCBs that were not PCBs. They were chlorinated
25 diphenylbenzene. He found quite toxic. The second

1 article

2 Q. And the second article is K 5?

3 A. K 5. He tested honest to goodness PCBs, and
4 he said it's practically nontoxic. So then he says, in
5 essence, "I was wrong calling this toxic stuff PCBs when
6 it wasn't."

7 Q. So he was wrong when he called what he
8 thought were PCBs in K 3 fairly toxic?

9 A. He was right in the fact that it was toxic,
10 quite toxic, but it wasn't PCBs.

11 Q. Okay. I understand. And he finally tested
12 honest to goodness PCBs in Exhibit K 5 and found them
13 almost nontoxic?

14 A. That's correct.

15 Q. Did Dr. Drinker or the others attending the
16 June 1937 symposium at Harvard University suggest any
17 safety precautions for working with chlorinated
18 hydrocarbons such as PCBs?

19 A. Yes, they did.

20 Q. What were those?

21 A. If the material gets on you, wash it off.
22 Don't breathe the material at elevated temperatures.

23 Q. Could you describe or tell me some of the
24 occupational physicians who attended this Dr. Drinker's
25 symposium at Harvard University back in 1937?

1 A. Sure. If you'll look starting on page 300,
2 first there is Drinker.

3 Q. Page 300 of K what?

4 A. K 3.

5 Q. Okay.

6 A. First there was Drinker. Drinker is a
7 well known toxicologist. He was a fellow that either
8 along with his brother invented the Drinker respirator,
9 iron lung, rather, so he was in the business a long time.
10 Then there was Dr. von Oettingen, who was a Ph.D. and an
11 M.D., really a top notch toxicologist, probably one of the
12 fathers of toxicology in the United States, who was the
13 director of the Haskell Laboratory in Wilmington,
14 Delaware, who was a consultant for Westinghouse Electric.

15 Q. Was there anybody from General Electric
16 there?

17 A. Yeah. I'm getting there.

18 Q. I don't know that you need go through all the
19 names again.

20 A. Oh, I thought you asked. Okay. Vosburgh,
21 who was a medical director of General Electric.

22 Q. Okay. And there were other doctors,
23 prominent doctors from around the country?

24 A. Most of them doctors, directors of labor and
25 directors of public health of the various states, mostly

1 New England, Massachusetts, Connecticut, and New York.
2 Those people.

3 Q. Doctor, were the PCB workers at the Anniston
4 plant in Alabama and the East St. Louis plant examined on
5 a periodic basis for chloracne or any other potential
6 work related health effect?

7 A. They were examined the same examination that
8 all the wage roll employees got. We did not do any
9 special examination on these people. We obviously The
10 examining physician looked at them for chloracne because
11 he was interested in it because that had occurred with PCB
12 workers at Anniston during the Swann time, so

13 Q. Did chloracne ever occur in any of the PCB
14 workers at Anniston and East St. Louis during the time
15 that you were employed at Monsanto?

16 A. No, it did not. Obviously I looked at them.
17 Chloracne, you know, you look at them. When you're
18 examining a fellow you look, and they were particularly
19 interested to see whether or not there was any, and there
20 wasn't.

21 Q. Did any of the workers at the Anniston,
22 Alabama plant or the East St. Louis plant ever demonstrate
23 any ill health effect related to their work with PCBs?

24 A. No, they did not.

25 Q. I'm about to go into a little bit different

1 subject matter, and the tape is about to run out, so we'll
2 take a break.

3 (Brief recess.)

4 Q. Dr. Kelly, in addition to the regular
5 periodic examinations of the Monsanto workers, did you
6 perform any other examinations yourself personally?

7 A. Anytime while I was at Monsanto?

8 Q. Yeah. Did you ever have a special situation
9 where you examined the workers?

10 A. Well, remember, I was a plant physician at
11 the Queeny plant for four years part time, so I examined
12 the workers then.

13 Q. Okay. Other than that.

14 A. Yes. I mean, there would be occasional times
15 when I would examine a person for a particular reason.
16 But as far as PCB is concerned, on one occasion I examined
17 all the workers at the East St. Louis plant who were
18 currently employed in the PCB Department. I examined
19 those myself.

20 Q. Why did you personally perform those exams of
21 PCB workers? Was this In what period of time again?

22 A. Probably 1972 or '73.

23 Q. Okay.

24 A. Sometime the two years before I retired.

25 Q. Okay. Why did you do that?

1 A. Well, there was a lot of interest in PCBs at
2 that time because they were found in the environment and
3 they were affecting birds, and there was a question came
4 up again about, well, are these liable to be affecting
5 people, these PCBs? So to allay any possible workers'
6 apprehensions and also to solidify my own thought that I
7 had always believed that these were not really
8 particularly toxic, I thought I'm going to do this myself
9 and read everything we can on it. So that's what I did.
10 We took these people, gave them a quite thorough
11 examination. We did

12 Q. Why don't you just describe what kind of an
13 exam you performed.

14 A. Well, obviously any exam like you do when you
15 go into a doctor for a thorough examination. You do a
16 history on them, on the person. These were all men who
17 had worked there for five years, ten, 12, 15 years in PCB
18 Department.

19 Q. How many workers were there approximately
20 that you examined?

21 A. Around 20, give or take three or four.
22 Probably 20 to 25 I think. And you do a history, then you
23 do a physical. You strip them down. You do a physical.
24 You check them all over from their eyes to their toes, and
25 I especially looked for any enlargement of the liver. I

1 looked for chloracne. Then we did a battery of tests on
2 them. We did EKG's, we did chest x rays, we did liver
3 function tests. We did blood counts. We did the whole
4 battery of clinical tests. I think at that time the limit
5 was 12 SMA. Twelve They call it SMA 12. Now I think
6 it's either SMA 23 or something like that. But we did
7 every clinical test that you usually get if you go into a
8 hospital. Then we also did blood analysis for PCBs.

9 Q. Okay. What level of PCBs did the employees
10 have in their blood?

11 A. Well, using the methods we used then, which
12 were not as sophisticated as they were in the '80's or as
13 they are now in the late '80's or '90's, about half of
14 them had nothing. Some had a tenth of a part per million.
15 Some had two tenths of a part and one person had
16 five tenths of a part per million. Now, that I have to
17 say again that the methods were not sophisticated, as good
18 as they are now. Now they are talking about finding parts
19 per billion, not million, in the blood. So I'm not so
20 sure how good our analyses were, not anybody's analyses in
21 those days, in '72, how good they were in the blood.

22 Q. Were there any abnormal findings that you
23 found as a result of your exams and the laboratory work
24 that was done on these PCB workers in 1972?

25 A. Well, there was some abnormality. You take

1 23 people, middle aged people, middle aged, forties and
2 fifties, you have some with high cholesterol. One fellow
3 had gout. He had a high uric acid. Nothing In fact,
4 the person with the high cholesterol had no PCBs in his
5 blood. So there was no relation. I could draw no
6 relationship. These people looked like a healthy
7 cross section of any of our plant employees. If we had
8 taken 25 people from any department, I think I'd have
9 gotten the same results.

10 Q. Did you provide the results of your
11 examinations and your lab work to anyone?

12 A. Oh, we told the workers obviously. I told
13 the plant manager, and I sent it into the government
14 because they were interested. I sent it into I don't
15 know which department, but it was some doctor I mailed
16 information to.

17 Q. Take a look at Exhibit K 6. Can you identify
18 that document?

19 A. Yes. That's the letter I wrote to this
20 doctor in whoever the Council of Environmental Quality
21 was, whatever they whoever they reported to. That was
22 I think before the days of the EPA. And EPA probably
23 Whether he was I don't know who he was with. But,
24 anyway, he was with the government, the United States
25 Government. The copy to Dr. Osland. Dr. Osland was a

1 plant physician at East St. Louis.

2 Q. And just for the record, this is your letter
3 to the doctor with the U.S. Government dated May 10, 1972?

4 A. That's correct.

5 Q. And did this report Did you report in this
6 letter the results of your examinations and your
7 laboratory tests on the East St. Louis PCB workers?

8 A. Yes. And I think I'll have to correct my
9 previous statement when I said a high cholesterol
10 didn't had no PCB. It was the liver enzymes that were
11 elevated on one person, and they didn't have they had
12 no PCB in the blood. But I didn't correlate I didn't
13 check on their alcoholic history particularly.

14 Q. And I note I don't want to be critical of
15 you, Doctor, but you said 23 workers, and the letter says
16 27. Does that refresh Was it 27?

17 A. There were 27, but 18 years ago coming within
18 four is not bad.

19 Q. What did you tell Dr. Davis, the U.S.
20 Government doctor, about the PCB workers' health?

21 A. Well, I think it's summarized in the last
22 paragraph. "In summary, I can say that these workers were
23 as healthy as any cross section of our plant workers of
24 the same age."

25 Q. Did Monsanto cooperate fully with the

1 government in relation to their inquiries about the East
2 St. Louis PCB workers?

3 A. Oh, certainly. In fact, I think sometime
4 some of the government people came down. They were going
5 to see whether it was worthwhile to do a full blown
6 investigation, and they said, "I don't think so," "they"
7 meaning the government said. So they never came. But
8 they had sent two or three people down to go through the
9 plant.

10 Q. I think you mentioned earlier in your
11 testimony that you reviewed workmen's compensation
12 records. Are you aware of any workmen's compensation
13 claim that was filed by a Monsanto worker relating to a
14 PCB related health claim?

15 A. I'm aware of none.

16 Q. And I think you've also testified that you
17 reviewed during the time you were Medical Director of
18 Monsanto all of the customer or user complaints that were
19 health related concerning Monsanto products. Did you
20 receive any customer or user complaints about chloracne or
21 any other claimed health effect in relation to PCBs?

22 A. No, I didn't, but let me correct your When
23 you say I reviewed them, your preamble to that question
24 was "Did you review the customer letters?" I didn't At
25 the end of the year, I didn't look up all the letters.

1 When they came in, they came in to me, and I saw them.

2 Q. Okay. I'm sorry.

3 A. And they were So I didn't collect them,
4 you know, look, see what have I got this year. As they
5 came along, I looked at them. But, no, there were none.
6 Wait. With the one exception that this Crown Chemical was
7 one, and obviously What was the last part of your
8 question? I want to be sure.

9 Q. Well, I'm Do you remember approximately
10 over the years how many customer complaints or user
11 complaints there were with regard to health problems?

12 A. I could count on the fingers on one hand. I
13 remember two, this Crown Chemical and this thermometer
14 outfit.

15 Q. You've mentioned I think you've already
16 covered those.

17 A. Yes.

18 Q. So you think it was

19 A. Less than five.

20 Q. Okay. Have you ever had any complaint from
21 anyone in the transformer or capacitor industry regarding
22 a PCB related health problem?

23 A. I have not that I can remember, and I do not
24 believe I had.

25 Q. Have you ever had a complaint or a report

1 from Westinghouse or General Electric concerning a PCB
2 health related problem?

3 A. No, sir. Not that I can remember, and I
4 don't believe I did.

5 Q. Have you ever received any complaint
6 regarding a fatality or a serious long term health illness
7 related to PCBs?

8 A. No, sir, I have not.

9 Q. Dr. Kelly, at the time of your retirement
10 from Monsanto in 1974, did you have an opinion to a
11 reasonable degree of medical certainty concerning the
12 toxicity of PCBs in relation to human health?

13 A. Yes, I did.

14 Q. And what was that opinion?

15 A. Well, that PCBs do have a certain amount of
16 toxicity, which is not unusual for an industrial chemical,
17 but that its use both in our plants and our customers'
18 usage has not been connected with any illnesses as far as
19 any information that I could gather from the published
20 literature or from the customers themselves.

21 Q. Do you have an opinion on whether it can be
22 used safely in the workplace if the Monsanto safe handling
23 instructions are followed?

24 A. Oh, no question. I'm sure it has for the
25 past 40 years.

1 Q. What is that opinion based on?

2 A. It's based on several things. One, the
3 moderate toxicity of the product from an industrial point
4 of view. Two, the experience that I have with the
5 Monsanto workers. Three, the experience that I've had in
6 talking to like the people who were using the material.
7 Four, the absence of any clinical case reports in any
8 significant amount. Four, the fact that government
9 epidemiologists have carried out studies and stated that
10 there has been no clinical disease associated with the use
11 of it.

12 Q. Did that opinion of yours vary at all during
13 the time you were at Monsanto?

14 A. No, sir, it did not.

15 Q. Have you continued to review the available
16 medical and scientific literature on the subject of PCBs
17 from your retirement to the present?

18 A. In the English language, yes, sir. I may not
19 get all of them, but the prominent journals I see.

20 Q. And are your opinions with regard to the
21 safety of PCBs in the workplace if the Monsanto safe
22 handling procedures are followed, is that your opinion
23 today?

24 A. Yes. I think it's been strengthened by the
25 years.

1 Q. Is there any recent medical or scientific
2 literature that supports your conclusion?

3 A. Oh, quite a bit.

4 Q. Can you give me that?

5 A. I'll give you one.

6 Q. Okay.

7 A. Do you mind me reading from Exhibit K 7?

8 Q. Okay. That's the next exhibit I was going to
9 show you anyway. Why don't you identify K 7 for the
10 record?

11 A. This is a report by Dr. Renate, R e n a t a
12 (sic.), Kimbrough, K i m b r u g h (sic.), published in
13 1987, the "Annual Review of Pharmacology and Toxicology".

14 Q. That's the publication?

15 A. That's the publication. The "Human Health
16 Effects of Polychlorinated Biphenyls," that's PCBs, "and
17 Polybrominated Biphenyls," PBB. That's a different
18 compound completely. One has got chlorine in; the other
19 has got bromine in. One is used for an insecticide, I
20 believe, and some agricultural products. That's the PBB.
21 And PCBs are the things we've been talking about all day.

22 Q. And just for the record, who is Dr. Renate
23 Kimbrough?

24 A. She has been working with PCBs for 20 years
25 at least, I think. She is with the Center for

1 Environmental Control for the Public Health Service.

2 Q. That's the U.S. Government?

3 A. Oh, that's the U.S. Department of Health and
4 Human Services, Atlanta, Georgia. She is the They've
5 moved her around from different departments, but she is
6 the number one government expert on PCBs. She is the
7 individual who did two year toxicological work on some
8 PCBs. In fact, she found, according to her work with her
9 pathologists that there were liver tumors developed in
10 animals. So she certainly takes an independent point of
11 view as far as toxicity of PCB is concerned. In animals,
12 she's We don't agree with her, but she's an independent
13 person and a government person of high repute, and she's
14 good.

15 Q. Okay. What does she say in her article about
16 the human health problems associated with PCBs?

17 A. Well, I Go to page 106, Mr. Murray.

18 Q. Okay. And let me If you're going to read
19 from page 106, I'd like to take a blow up of that so I
20 can the jury can read along with you on that. Can you
21 get this in?

22 A. She says in her second to last

23 Q. Hold on till we make sure the camera is
24 focused. Okay.

25 A. This quote's from this article. It's the

1 second to last paragraph on page 106. She states in
2 humans "When humans were exposed only to PCBs or
3 PBBs" that's polybrominated "the only acute effects
4 have generally been minor. So far, no significant chronic
5 health effects have been causally associated with exposure
6 to PCBs or PBBs."

7 Q. What does "chronic" mean?

8 A. Long term.

9 Q. Okay. So she's saying that there's no
10 significant long term health effects associated with PCBs?

11 MR. MURRAY: Object to the question as
12 leading and as rephrasing the article itself, which has
13 already spoken for itself.

14 Q. Okay. Maybe Rather than me rephrase it,
15 Doctor, can you indicate in more lay language what Dr.
16 Kimbrough is saying?

17 MR. MURRAY: Object to paraphrasing what Dr.
18 Kimbrough is testifying to. You can go ahead, Doctor.

19 Q. Go ahead, Doctor.

20 A. I can't hear the objection. Does it make a
21 difference?

22 Q. You don't need to hear the objection I don't
23 think unless Mr. Murray wants to repeat it. That will be
24 taken up later by the court.

25 A. What was your question, Mr. Carney?

1 Q. Could you just in more lay language tell me
2 what Dr. Kimbrough is saying?

3 A. Sure. What she is saying is when people were
4 exposed to PCBs, there have been a few minor acute
5 effects.

6 Q. By "acute effects," what do you mean?

7 A. Got sick.

8 Q. What does "acute" mean?

9 A. Short term, or it happens Like you get a
10 cold, that's an acute illness.

11 Q. Okay.

12 A. That's the hepatitis I was talking about
13 earlier. So far no chronic significant chronic health
14 effects have been associated. In other words, nobody got
15 sick while working with PCBs.

16 Q. Okay. Take a look at Exhibit K 8. Can you
17 identify Exhibit K 8?

18 A. Yes. This is an article by Dr. Kimbrough.
19 She was at that time the same Dr. Kimbrough I talked
20 about with the EPA the Director of the Health and Risk
21 Capabilities.

22 Q. And what's the date of that article?

23 A. That's August 1988. That means she's the
24 person that's supposed to go over health risk, what sort
25 of a risk do we have to the people or to the workers. She

1 was with the APA EPA. Now, what she says

2 Q. By "EPA," that's the Environmental

3 A. Environmental Protection Agency of the United
4 States Government.

5 Q. Okay.

6 A. She says on page three of this report, "Thus,
7 despite positive laboratory data animal data, and
8 except for chloracne" It's the last paragraph, sir.
9 I'll repeat.

10 Q. Why don't you start over again?

11 A. "Thus, despite positive laboratory animal
12 data and except for chloracne, exposure to PCBs has led to
13 no convincing, clinically demonstrable, chronic health
14 effects in humans."

15 Q. That's Dr. Kimbrough's last sentence and
16 conclusion of her article in August of '88?

17 A. That's correct. And I want to emphasize that
18 here's a woman that found laboratory damage in rats with
19 giving them one PCB. So she did that work, she's
20 knowledgeable about it, been knowledgeable for 20 years,
21 but she's an honest government worker, a very competent
22 worker, and says, "We haven't had any problems."

23 Q. Has Dr. Kimbrough had any affiliation with
24 Monsanto?

25 A. None at all.

1 Q. Has she had any affiliation or employment by
2 private industry?

3 A. Not that I know of.

4 Q. Take a look at Exhibit K 8A. I'll ask you if
5 you can identify that exhibit.

6 A. This is a Health Hazard Evaluation Report by
7 the National Institute for Occupational Safety and Health,
8 also called N.I.O.S.H, N I O S H, which is an arm of the
9 U.S. Government that's situated I think in North Carolina
10 that deals with health effects of various chemicals on I
11 guess both workers and the human population at large.

12 Q. This is I don't know if you gave a date.

13 A. Dated June 1990. It's an analysis of the
14 workers of the Westinghouse Electric Company in
15 Bloomington, Indiana.

16 Q. And could you just briefly describe what type
17 of study N.I.O.S.H. performed on these Bloomington,
18 Indiana Westinghouse PCB workers?

19 A. Yes. They went through an analysis, an
20 examination of these workers, their medical records. They
21 had a questionnaire. They did something like 20 blood
22 tests. They did urine tests. I'm trying to look to see
23 if they did physical examinations also. They took all the
24 symptoms. They assessed liver functions, kidney
25 functions. They did a pretty thorough examination on

1 these people.

2 Q. What did N.I.O.S.H. conclude in June of 1990
3 about the Bloomington PCB workers' health?

4 A. They said on the summary on the first page,
5 "No clinical abnormalities attributable to exposure to
6 PCBs were observed." Clinical abnormalities means you
7 examine a person, he has no sickness. I mean, a clinical
8 abnormality, if you're normal, you're well. If you have
9 an abnormal clinical If you have an abnormality in your
10 clinical makeup, you're sick.

11 Q. Okay.

12 A. They said, when the prevalence of symptoms
13 and overt overt means obvious clinical disease were
14 investigated by exposure group, there was no difference
15 between the exposures, no difference between the groups.
16 In other words, people who had higher exposures weren't
17 any different than people with lower exposures. And there
18 was just a positive association with one GGTP, that's a
19 liver enzyme, and a negative association with urinary
20 creatinine. That really doesn't mean anything. The GGTP
21 just meant that people in the higher exposure group might
22 have more positive findings with this liver enzyme, which
23 is a very sensitive liver enzyme. If you had two drinks
24 the night before, it would show up in changes in your
25 GGTP. So, in essence, what these people said was we

1 examined these workers and could find no connection
2 between their work and their illness.

3 Q. They found no evidence of any sickness
4 attributable to exposure to PCBs?

5 A. That's correct.

6 MR. MURRAY: Object to the question.

7 Q. I'd like to hand you now, Doctor, Exhibits
8 K 9 or Actually I'll let you hand yourself those. They
9 are right beside you. Look at K 9 and K 10.

10 A. Yes, sir.

11 Q. Can you identify those two exhibits?

12 A. Yes. They are two exhibits called "The
13 Aroclors, Physical Properties and Suggested Applications".
14 They both carry the number P 115.

15 Q. I don't know that you need

16 A. One seems to be 1946. There's a statement on
17 it it's 1946. I don't know the basis of the other one,
18 but it's a little later.

19 Q. Okay. Are these Monsanto bulletins on PCBs
20 called Aroclors?

21 A. Yes. They are official Monsanto bulletins
22 that were published by Monsanto and disseminated to
23 customers.

24 Q. Take a look at Exhibit K 11.

25 A. Yes, sir.

1 Q. Can you identify that exhibit?

2 A. Yes. That's a memorandum. It looks like
3 it's a memorandum to file by an L. A. Watt. Linn Watt was
4 an individual He was a chemist in Organic Division,
5 which manufactured Aroclors.

6 Q. He was a Monsanto employee?

7 A. He was a Monsanto employee. It's dated
8 October 11th, 1937, a year and a half after I came with
9 the company, and he This memorandum deals with a
10 conversation I had with him, and it appears we were
11 writing information concerning the toxicity and safe
12 handling procedures to be used with Aroclors or PCBs so
13 that it could be used in the Aroclor booklets and quoted
14 in correspondence as it might be necessary.

15 Q. Did you as early as 1937 approve the safe
16 handling wording for technical bulletins and other
17 materials published by Monsanto?

18 A. Well, as I said, it was not formalized. If
19 they came to me I did, obviously, what came to me, so I
20 can't say that in '37 I did it in all the ones, but

21 Q. After you became Medical Director, you were
22 the one to approve that language?

23 A. That's right. But certainly from '37 on the
24 Aroclor bulletin booklets were approved by me because Watt
25 and I were pretty close on this.

1 Q. Is the language that appears on K 11 language
2 that you approved in 1937 with regard to safe handling for
3 PCBs?

4 A. Yes, I probably wrote it.

5 Q. Could you read that approved language that
6 you approved back in 1937?

7 A. Yes. "Experimental work in animals shows
8 that prolonged exposure to Aroclor vapors evolved at high
9 temperature or by repeated oral ingestion will lead to
10 systemic toxic effects. Repeated bodily contact with the
11 liquid Aroclors may lead to an acne form skin eruption.
12 Suitable draft ventilation to control the vapors evolved
13 at elevated temperatures as well as protection by suitable
14 garments from extensive bodily contact with the liquid
15 Aroclors, should provide prevent any untoward effect."
16 Now, let me mention, Mr. Carney, that this takes care of
17 Aroclors. Some Aroclors are not PCBs. The chlorinated
18 diphenylbenzene is an Aroclor. That's the one that was
19 proven toxic by Drinker. But it is not a PCB. But this
20 would go into all Aroclor bulletins, which would include
21 chlorinated diphenylbenzene.

22 Q. And it would include PCBs?

23 A. It would include PCBs, but also it would
24 include things that were not PCBs.

25 Q. I understand. Could you review the toxicity

1 section in Exhibits K 9 and K 10, the ones you were just
2 looking at?

3 A. Whoops! Go back.

4 Q. Are they on the table there?

5 A. Oh, here we are.

6 Q. And if you could just tell the jury the
7 source of the safe handling information that appears in
8 the toxicity section in those two exhibits.

9 A. Well, the source was R. E. Kelly. I mean, I
10 wrote it.

11 Q. The source was you?

12 A. Yes.

13 Q. Okay. And was the safe handling information
14 that was in Exhibits K 9 and K 10 identical to the safe
15 handling information you just read that was in K 11?

16 A. That's correct.

17 Q. Are the technical bulletins that we've marked
18 as K 9 and K 10, are they directed to any particular
19 industry?

20 A. No, I don't think so. I think it's pretty
21 widespread because they talk about the applications that
22 go from adhesive, electrical equipment, hydraulic fluids,
23 lubrication, possible uses which hadn't been developed so
24 far, but paints, plastics, varnishes, et cetera, coatings,
25 rubber substitutes. It's the whole gamut. This bulletin

1 was directed to anybody who thought they could use it or
2 anybody who thought that Aroclor could be fitted into
3 their products.

4 Q. Let's next, Doctor, look at Exhibits K 12
5 through K 15.

6 A. Yes, sir.

7 Q. Are those various product bulletins published
8 and distributed by Monsanto over the years relating to
9 PCBs?

10 A. Yes, sir, they are.

11 Q. And are these exhibits, K 12 through K 15,
12 directed to any particular industry?

13 A. Yes, sir. The electrical industry.

14 Q. Is there safe handling and toxicity
15 information in relation to PCBs in all of these bulletins,
16 K 12 through K 15?

17 A. I'm sure they are. I'll go through them and
18 find the pages. We start with K 12. There's a page on
19 page 17 that describes the toxicity and describes the safe
20 handling procedures to be used.

21 Q. Okay. Why don't you go to the next one?

22 A. K 13, that's got two pages, pages 75 and 76,
23 which describes some toxicity information and describes
24 what should be done on various operations in the
25 electrical industry, and they talk about what should be

1 done when you're sampling tank cars. They say what if
2 you're exposed to Aroclor vapors at relatively high
3 temperatures, such as opening a heated capacitor
4 impregnating chamber, sort of like a bake oven, I suppose,
5 a respirator should be worn during short intervals. They
6 give the gamut of safety precautions for workers in the
7 electric industry.

8 Q. Okay. And does Exhibits 14 and 15 also
9 include safe handling information? You don't need to go
10 into detail on it, but I just want to know

11 A. Yes.

12 Q. whether they include that.

13 A. Yes, they do.

14 Q. Okay. And did the Monsanto Medical
15 Department approve of the safe handling information about
16 Aroclors which or PCBs in these Exhibits K 12 through
17 K 15?

18 A. Yes. Well, we wrote them. I mean, if there
19 was some engineering additions, we approved that.

20 Q. Did the safe handling and toxicity
21 information about PCBs in these technical bulletins vary
22 greatly from year to year?

23 A. No. With the one exception, two exceptions.
24 One, when the stuff started PCBs were started to be
25 used as a plasticizer, we had run some patch tests on it

1 to be sure that the addition of PCBs to, say, a plastic
2 seatcover in an automobile wouldn't cause any trouble to
3 somebody sitting on there with shorts, wouldn't cause any
4 irritation or sensitivity to the skin. So we ran some
5 patch tests, which is just a type of test which doesn't
6 isn't intended to deal with the inherent toxicity or lack
7 of toxicity but with the possibility of causing skin
8 irritation. So we added that. Then another large, sort
9 of good size change was when the environmental aspect of
10 PCBs became prominent we put information in the bulletins
11 about how to control the release of it to the environment
12 and the possibility of harm to birds and fish or something
13 of that sort.

14 Q. Okay. We'll get to that a little later.

15 A. But, I mean, that's where it changed. Those
16 are the two changes I think.

17 Q. But with the exception of those two changes,
18 did the language about safe handling and toxicity in these
19 technical bulletins concerning PCBs stay relatively the
20 same?

21 A. Oh, yes. I'm not sure whether the language
22 was just the same, the phraseology, but the basic
23 information was the same. Whatever was in there was
24 approved by us. It wasn't edited by anybody. Before the
25 final thing went to the printer, we saw it, we okayed it.

1 Q. Take a look at Exhibit K 13. Why don't you
2 read the title of K 13?

3 A. K 13 is a memorandum of mine on Monsanto
4 letterhead, dated March the 4th, 1941, "Toxicity and Safe
5 Handling of Askarel".

6 Q. I think you're looking at the wrong K 13.

7 A. I'm up to 16.

8 Q. I'm sorry. I may have misspoke, but if you
9 could look at K 13.

10 A. Oh, sorry.

11 Q. Give me the title of that.

12 A. K 13.

13 Q. It's a thick

14 A. Oh, I see it. "The Proper Handling of
15 Aroclors and Their Mixtures in the Electrical Industry".

16 Q. And, again, Aroclors can be PCBs; is that
17 right?

18 A. Oh, yes. All PCBs are Aroclors.

19 Q. Okay. And

20 A. Dated May the 1st, 1956.

21 Q. Okay. And would you take a look at page 75
22 of that rather thick exhibit, and does the last paragraph
23 of page five give information concerning safe
24 concentration of PCB vapors in the workroom air?

25 A. Yes, it does. It states

1 Q. And is that I don't know that you need to
2 read it unless you want to. And was that safe handling
3 information about safe air levels written by you or
4 someone else in the Monsanto Medical Department?

5 A. Yes, it was.

6 Q. Where did you get that information concerning
7 suggested safe levels of concentration of vapors?

8 A. Well, I arranged for a long term When I
9 say "long term," it was a period of weeks or a couple of
10 months, I suppose, of inhalation of Aroclor vapors at
11 University of Cincinnati Medical School in 1955. That was
12 published. That was the maximum safe concentration that
13 was recommended by the by Dr. Treon, who did the work.
14 Afterwards we cut the level down to half that.

15 Q. Okay. But in order to get the safe levels of
16 vapors in the air, you had some testing done by Dr. Treon?

17 A. Oh, yes. I mean, to find it out. In order
18 to get these levels up, we had to heat the material to get
19 it up there.

20 Q. Okay. And why did Monsanto use Dr. Treon at
21 the He was at what laboratory?

22 A. Kettering Laboratory, K e t t e r i n g, at
23 the University of Cincinnati Medical School.

24 Q. Why did Monsanto use that laboratory?

25 A. Well, here's an independent research

1 laboratory at a prominent medical school and a man who
2 knew his business and was completely dissatisfied. He was
3 an independent scientist, and he had high standing.

4 Q. Take a look at K 14 and K 15. I think K 14
5 is right there.

6 A. Yeah. I have them.

7 Q. Could you read the title for K 14, if you
8 can? My copy isn't very good.

9 A. Well, the second page I guess it's the
10 same. "Askarel," A s k a r e l, "Inspection and
11 Maintenance Guide".

12 Q. What's Askarel?

13 A. Askarel is the general name used by the
14 electrical industry for PCB containing transformer fluids.
15 I'm not sure if it includes all transformer fluids or not.
16 But I know it refers also to PCB containing fluids.

17 Q. So Askarel is a PCB?

18 A. Yes. Well, yes. They Yeah, they Yeah,
19 it's a generic name, that means the usual name, for fire
20 resistant liquid insulation. That means transformer
21 fluids. Askarel is Transformer Askarel is manufactured
22 by Monsanto.

23 Q. And Askarel is a PCB?

24 A. PCBs, yes.

25 Q. Okay. And then read the title for K 15.

1 A. "Transformer Askarel Inspection and
2 Maintenance Guide".

3 Q. And K 14 then and K 15 both are PCB
4 inspection and maintenance guides put out by Monsanto

5 A. That's correct.

6 Q. for Monsanto?

7 A. That's correct. The second one, the K 15, is
8 dated March 1975.

9 Q. Did anyone Did Monsanto in K 14 or K 15
10 acknowledge any contributors to the information about the
11 PCBs in K 14 and K 15?

12 A. Yes. I think I've seen them someplace. Yes.
13 On page one of K 14, "Monsanto gratefully acknowledges the
14 assistance, guidance, and the contributions of certain
15 data by the following: Frank M. Clark. . ."

16 Q. Just read the company names, if you would.

17 A. General Electric.

18 Q. I don't think the names will mean anything
19 other than company names.

20 A. Two people from General Electric, one from
21 Westinghouse, one from Allis Chalmers. That's it in K 14.
22 K 15

23 Q. Did anyone contribute to the information in
24 K 15, any company?

25 A. Someplace in here. I've seen it. Yes.

1 Q. I think it's on page

2 A. Yes. On page one they gratefully acknowledge
3 the assistance, guidance, and contributions by the
4 following. A man from G.E. and a man from Westinghouse.

5 Q. And G.E. meaning?

6 A. General Electric.

7 Q. Okay. Now let's go on to Exhibit K 16.

8 A. Yes, sir.

9 Q. Can you identify that document?

10 A. This is a memorandum or really a letter of
11 mine or a statement of mine

12 Q. Let me stop you. I forgot to ask you one
13 thing about these exhibits, K 9 through K 15, these
14 product bulletins on PCBs that Monsanto put out. Would
15 those bulletins have gone to Westinghouse and General
16 Electric?

17 A. Oh, yes. Certainly.

18 Q. Now let's go to K 16. Can you identify that?

19 A. This is a statement by me in the form of
20 well, almost in the form of a letter, a general one page
21 bulletin, as it were, on the toxicity and safe handling of
22 Askarel, A s k a r e l, again.

23 Q. Again, a PCB?

24 A. PCBs, dated March the 4th, 1971.

25 Q. And what Can you just summarize briefly

1 the safe handling recommendations of Monsanto for PCBs in
2 that bulletin?

3 A. Yes. I stated there about my impression of
4 the general toxicity saying it's only slightly toxic from
5 the standpoint of accidental ingestion, if you swallow it,
6 or single accidental massive skin exposure, if you get it
7 on you and you wash it off, you're all right. Single
8 exposures of vapors aren't bad, aren't serious. Because
9 it's irritating, nobody is going to stand around there too
10 long. And I said repeated or prolonged skin exposure
11 should be avoided. I said it may be absorbed if it's
12 allowed to remain on unbroken skin, so we recommend it be
13 washed off with soap and water if there's contact. We
14 talk about when it's hot how you treat it. And then I
15 said there's no significant vapor inhalation at room
16 temperature, but if its vapors are allowed to be heated it
17 can be injurious, and I gave threshold levels for it.
18 That's the amount that could be safely used.

19 Q. And who would get a document like K 16?

20 A. Everybody in the electrical industry.

21 Q. Let's go to Exhibits K 17 And by
22 electrical industry, you would include Westinghouse and
23 General Electric?

24 A. They are very big in the electrical industry.

25 Q. Okay. Let's go to Exhibit K 17 through K 20.

1 A. Yes, sir.

2 Q. Are these various product bulletins published
3 and distributed by Monsanto over the years relating to
4 Pydrauls or PCB containing hydraulic fluids?

5 A. Yes, they are.

6 Q. Is there safe handling and toxicity
7 information in relation to PCBs in all three of these
8 in all four of these bulletins?

9 A. I feel sure there is, but I'll have to look
10 it up. Yes, there is, at page 11 and 12.

11 Q. And you're looking at K 17?

12 A. K 17, yes, sir.

13 Q. Is there also toxicity and safe handling
14 information in K 18, 19 and 20?

15 A. There is in 18 on page K 18 on page 18.
16 That's convenient. On K 19, it's on page 12. On K 20
17 I can't make the page out, but it's the second to last
18 page. Page 13, yes.

19 Q. Did your Monsanto Medical Department approve
20 the safe handling and toxicity information in each of
21 these bulletins, K 17 through K 20?

22 A. Yes, we did.

23 Q. And who received the bulletins which
24 contained the information on safe handling of the PCBs
25 called Pydrauls? That's K 17 through 20.

1 A. Anybody who bought the material. Anybody who
2 was interested in using it.

3 Q. So all of the customers that Monsanto sold
4 Pydrauls to would get these bulletins?

5 A. Yes, sir. To the best of my knowledge.

6 Q. Let's take a look at K 21 and K 22. Can you
7 identify those two exhibits?

8 A. I've got K 22, but K 20 who?

9 Q. K 21 and K 22.

10 A. Okay. Oh, yes. Yes, I have it. I'm sorry.
11 K 21.

12 Q. Are those two exhibits product bulletins
13 published and distributed by Monsanto relating to
14 Therminol, a PCB containing heat transfer fluid for closed
15 heat transfer systems?

16 A. Yes. The title page on mine is not very
17 remarkable. I can't make it out.

18 Q. On K 21?

19 A. On K 21. But they talk about it on the third
20 page. They talk about it being used as a heat transfer,
21 for general heat transfer, so they talk about it.

22 Q. Okay. What about K 22? Is that a product
23 bulletin published by Monsanto on Therminol?

24 A. Yes. That's entitled "Therminol Fluid Heat
25 Systems".

1 Q. And, again, Therminol was the PCB?

2 A. Heat transfer. Is a PCB, yes, sir. It
3 contains PCB.

4 Q. Did these two bulletins, K 21 and K 22,
5 contain safe handling and toxicity information relating to
6 PCBs?

7 A. I'm sure they do, but I'll have to look it
8 up. It's going to take me a little time because there's
9 no index. Yes. I can't make a page out, but there's
10 safety of operation that has safety of handling. It's
11 page 16 on K 21.

12 Q. Okay.

13 A. We go to K 22. That's easier. That's got an
14 index. That's on page 46.

15 Q. Okay. Did the language in these bulletins
16 regarding the safe handling information vary from year to
17 year except for that environmental information that was
18 added?

19 A. No, not as far as the basic information is
20 concerned. I mean, it may vary in the length of it or the
21 phraseology or something like that, but the basic
22 information is the same.

23 Q. And what was that basic information?

24 A. The basic information was, as far as safe
25 handling procedure is concerned, avoid repeated or

1 prolonged skin contact and avoid breathing the fumes in
2 confined spaces or at elevated temperatures.

3 Q. Who received these bulletins containing the
4 information on safe handling of Therminols, Exhibits 23
5 or 21 and 22?

6 A. Every customer, potential customer, anybody
7 interested in heat transfer systems. Certainly customers,
8 anybody who was being approached by one of our salesmen,
9 was given one of these.

10 Q. So customers of Therminol would get Exhibits
11 K 21 and K 22?

12 A. Yes, sir.

13 Q. Let's take a look at Exhibit K 24. Can you
14 identify that document?

15 A. Yes. This is another bulletin of mine dated
16 January the 23rd, 1967.

17 Q. Did you read You said '67?

18 A. '69.

19 Q. Okay.

20 A. "Toxicity and Safe Handling of Therminol
21 FR 1, FR 2, FR 3".

22 Q. And you prepared that exhibit?

23 A. Yes, I did. These different Therminols have
24 varying percentages of PCB in it. There might be some
25 little different PCB in it. May be mixtures. But they

1 are all PCBs.

2 Q. And what was done with a document like K 24
3 about safe handling of Therminols?

4 A. Well, this was sent by the Medical Department
5 to all the various sales offices. Whether or not the
6 individual salesmen used this or a bulletin giving it to
7 the customers, I can't be sure. But it certainly is
8 something we sent out to anybody that inquired about the
9 toxicity and safe handling of these various Therminols.

10 Q. Are these technical bulletins that I've
11 that you've reviewed in the last 10 or 15 minutes, K 9
12 through K 24, all of the bulletins which Monsanto
13 published and distributed on the topic of PCBs?

14 A. I wouldn't know. I think there may have been
15 more, but I don't know. I mean, they are certainly
16 representative of them.

17 Q. Okay. Okay. Why don't we take a break? The
18 tape's about to run out.

19 (Luncheon recess.)

20 Q. Okay, Dr. Kelly, if you now take a look at
21 Exhibits K 23 through K 33A.

22 A. K 20?

23 Q. I'm sorry. I gave you the wrong number.
24 K 25 through K 33A.

25 A. Yes, sir.

1 Q. Can you identify those documents?

2 A. These are Material Safety Data Sheets. That
3 is a sheet put out by the Department U.S. Department of
4 Labor. It was put out primarily at first for use in
5 transportation, but then it was adapted or accepted by
6 asked for by any number of customers. They would send
7 these to a supplier and say, "Fill these out and send them
8 back to us."

9 Q. And did Monsanto Company fill out the
10 information on the Material Data Safety Sheets that are
11 Exhibits K 25 through 33A?

12 A. Yes, we did.

13 Q. And these Material Safety Data Sheets relate
14 to what relate to PCB material?

15 A. These particular group, K 25 to 33, relate to
16 PCBs. We filled them out on probably every chemical we
17 made at all.

18 Q. Okay. And did someone And there is
19 safe product safety information on these Material
20 Safety Data Sheets?

21 A. Yes. That's the purpose of it obviously,
22 safety. Data means information. Safety information. And
23 there's health hazard data and fire and explosion hazard.
24 We filled out the health hazard data. We filled out the
25 section on precautions.

1 Q. By "we," meaning?

2 A. We being the Medical Department.

3 Q. Monsanto Medical Department?

4 A. Monsanto Medical Department.

5 Q. Just so it's clear to the jury, what
6 information did the Monsanto Medical Department fill out
7 on these safety data sheets?

8 A. Section five, health hazard data. Section
9 nine, special precautions.

10 Q. And did you approve the language that appears
11 in those sections?

12 A. Yes, I did.

13 Q. Who did you send these sheets to?

14 A. I think they were really sent in response to
15 inquiries from customers. I don't believe we sent these
16 out willy nilly to everybody at all of our customers.
17 Usually a customer would ask for the safety data sheets.

18 Q. Okay.

19 A. I'm not too clear on that, whether they were
20 sent out, whether they accompanied the salesman into a
21 customer's plant or not.

22 Q. And were these sheets sent to shippers as
23 well?

24 A. Oh, yes. Primarily it started as a safety
25 data sheet in transportation.

1 Q. Let's take a look now at Exhibits K 34, 35
2 and 36, and I'll ask you if you can identify those
3 exhibits.

4 A. Yes, I can. K 34 is a label for Aroclor,
5 which is a chlorinated a PCB. They use a little
6 different technical term on it, but it's a PCB. K 35 is
7 the same, a caution label. K 36 is a caution label which
8 has been used on Aroclor, which is a PCB but is also a
9 chlorinated hydrocarbon.

10 Q. Are these early labels that were used for
11 PCBs by Monsanto?

12 A. Yes, they were.

13 Q. Okay. And let me We've got a blowup of
14 two of these labels, K 34 and K 36, and I'll ask you is
15 K 34 is the label that's down here at the lower corner
16 that I'm pointing to?

17 A. Is it what?

18 Q. Is that K 34?

19 A. Yes. That's equivalent to K 34. That's the
20 same thing.

21 Q. That's just a blowup of it. Could you read
22 what the label for PCBs says for this Exhibit K 34?

23 A. Yes. It says, "This package contains Aroclor
24 (a chlorinated diphenyl, technical)." Now, that diphenyl
25 is an old term for biphenyl. But it's still PCB.

1 Q. Okay.

2 A. "Avoid repeated contact with skin and
3 inhalation of the fumes and dusts."

4 Q. Okay. And then is K 36, Exhibit K 36, on the
5 blowup?

6 A. Yes, sir.

7 Q. And that's the upper portion of the blowup?

8 A. Yes. It's the label, but it's also on the
9 right hand side, too.

10 Q. Okay. So the same information is in yellow
11 on the blowup, and it's also in white on this side?

12 A. That is correct.

13 Q. Okay. Would you read that label, K 36?

14 A. "Caution! Contains chlorinated hydrocarbons.
15 Avoid prolonged breathing of vapors or mists. Avoid
16 contact with eyes or prolonged contact with skin. If skin
17 contact occurs, remove by washing with soap and water.
18 Following eye contact, flush with water. If clothing
19 becomes soaked with fluid, launder before wearing again."

20 Q. When did Monsanto first start using labels on
21 PCBs?

22 A. I can't answer that. They had them when I
23 came.

24 Q. So they were using them in 1936 when you
25 came?

1 A. Yes.

2 Q. And I don't know if we read Exhibit K 35. Is
3 that another label?

4 A. Yes. That's a label. It says, "Chlorinated
5 Diphenyl Technical. Caution! Avoid prolonged or repeated
6 contact with skin. Avoid prolonged breathing of vapor and
7 fumes." I'm not so sure what the "Diphenyl Technical"
8 meant, but it was certainly chlorinated It was a PCB,
9 but I don't think there was a very big usage of
10 chlorinated diphenyl technical, whatever that was.

11 Q. Were labels like Exhibits K 34, K 35 and K 36
12 used at Monsanto from 1936 until you retired in 1974 for
13 PCBs?

14 A. Yes, they were.

15 Q. And let's go on to Let me ask you this.
16 What types of Where were these labels put on PCB
17 products?

18 A. Well, it all depends what the size of the
19 package was. It all depends on what the PCB was. If you
20 had a liquid PCB, it was shipped in a drum, and you put it
21 on the outside of a drum. If it were shipped in a tank
22 car, you'd put it in some sort of a picture frame on the
23 tank car. If it were a solid PCB, which some of them
24 were, I don't know if they were shipped in fiber drums or
25 in sacks, but they were put on the outside of the

1 container.

2 Q. Okay.

3 A. I should say for the jury a drum contains 55
4 gallons. It's a good sized container.

5 Q. Okay. And the labels would be put on the
6 drums?

7 A. That's correct.

8 Q. Let me just ask you to look at Exhibits K 36A
9 and K 36B and ask you to identify those documents

10 A. These are two

11 Q. if you can.

12 A. I'll start with K 36A. It's a letter from
13 Robert Sido, who was sort of the He was located in St.
14 Louis. He was the administrator for the labeling of
15 Monsanto products. And he sent this to somebody I don't
16 know, a Dr. Seppala, talking about the use of Aroclor. I
17 mean the use of labeling for Aroclors.

18 Q. It's dated June 19, 1963?

19 A. Yes. And also this thing clears up my lack
20 of knowledge about chlorinated diphenyl technical. In
21 other words, he says here in paragraph three that where
22 they didn't want to put an Aroclor on it, they put on
23 chlorinated diphenyl technical. So it's still referring
24 to PCBs.

25 Q. Now, Mr. Sido, and that's S i d o, what was

1 his job at Monsanto?

2 A. He was head of the administrative label
3 group. In other words, he was the fellow that was
4 responsible to get the information from the marketing
5 people, the medical people, the legal people, and the
6 advertising people together and draw up the format or the
7 art work for the label and get it approved by everybody
8 and then put on the product, send it out to the plants to
9 put it on the material that was packaged.

10 Q. So he was the label man at Monsanto?

11 A. That's right.

12 Q. And can you identify Exhibit 36B?

13 A. Yes. That's a letter to the two plants from
14 Sido in 1964, to the two plants that manufactured PCBs,
15 W GK plant. That was the East St. Louis plant. And
16 Anniston was the other plant.

17 Q. I don't know if you gave the date.

18 A. April 1964.

19 Q. And did this memo concern the subject of
20 precautionary labels being put on all drums of
21 PCB containing products, such as Aroclors, Pydrauls,
22 Inerteens and Pyranols?

23 A. Yes. That's correct.

24 Q. And was the policy followed of putting PCB
25 labels on all PCB drums that were shipped out?

1 A. Oh, yes.

2 Q. What was the purpose of placing these labels
3 on the PCB containers that were sent out to Monsanto's
4 customers?

5 A. Well, I think there were two reasons. One,
6 to tell them what was in the drum. You had to tell them
7 what was inside it. That's one very good reason. And how
8 much was in there. And, secondly, what to do to avoid any
9 problem with it. There were safe handling procedures
10 listed on the label so the worker who finally got the
11 drum, the customer's worker, would be warned as to what to
12 do or not do.

13 Q. Let's take a look at Exhibit 37.

14 A. Yes, sir.

15 Q. Through I'm going to take a big group of
16 documents, 37 through 64.

17 A. Yes, sir.

18 Q. Can you identify what this group of documents
19 contain?

20 A. Yes. This is a group of documents that are
21 labels for various PCBs. They have them listed sometime
22 with a G.E. copyright name, sometime with a Westinghouse
23 copyright name.

24 Q. G.E. did you say?

25 A. General Electric.

1 Q. Okay.

2 A. General Electric and Westinghouse. Sometime
3 they have on Pydraul, the hydraulic fluids, which is a
4 PCB. Sometimes they have a capacitor fluid, which is also
5 a PCB. Then they have heat transfer compounds, which is a
6 PCB, the Therminols. And some just plain Aroclors, which
7 don't have any particular other designation but is still a
8 PCB.

9 Q. So Exhibits K 37 through 64, just to
10 short circuit things, are representative samples of
11 caution labels with safe handling instructions that were
12 put on PCB containing products?

13 A. Yes, sir.

14 Q. Did you or someone in your Medical Department
15 write or approve the cautionary and safe handling language
16 on these labels?

17 A. Yes, sir.

18 Q. Let's just take a look at a couple some of
19 these here. K 37, can you identify K 37?

20 A. That's transformer Pyranol, and there's an
21 asterisk saying this is a trademark of General Electric
22 and also states that Monsanto made this compound for
23 General Electric. So according to Well, I know it was
24 according to their specifications, but it doesn't say that
25 on there. But it was made for General Electric. It was

1 their trademark name. We had to give them that
2 designation. And it contains the safe handling procedures
3 or the cautions, things that should be watched for or
4 should be carried out.

5 Q. And, again, Exhibit K 37 has safe handling
6 procedures for Pyranol, which is a PCB?

7 A. That's correct.

8 Q. And what precautions did Monsanto put on this
9 label to tell people for safe handling?

10 A. Avoid prolonged breathing of vapors or mists,
11 avoid contact with eyes or prolonged contact with skin.
12 If skin contact occurs, remove by washing with soap and
13 water. Following eye contact, flush with water. If
14 clothing becomes soaked with fluid, launder before wearing
15 again.

16 Q. Take a look at Exhibits K 38, 39, 40, 41 and
17 42. Are these Monsanto's cautionary labels for Pydraul, a
18 PCB?

19 A. Yes, they are. They're representative.
20 There's several different Pydrauls. These talk about two
21 of them. There's Pydraul 135 and Pydraul 312. These are
22 both PCBs. There are some other Pydrauls that are also
23 PCBs. But they're representative of Monsanto labels for
24 their Pydrauls which contain PCB.

25 Q. And rather than read the safe handling

1 information, is it fair to say that the safe handling
2 information for the Pydrauls is similar to the one you
3 just read?

4 A. Yes, it is.

5 Q. Doctor, next look at the Exhibits 43, 44, 45
6 and 46.

7 A. Yes, sir, I have.

8 Q. Are these the Monsanto cautionary labels for
9 the Westinghouse Inerteen PCB fluid?

10 A. Yes, it is. For three different Inerteens.

11 Q. Okay. And, again, do the safe handling
12 instructions on these labels are they the same or very
13 similar to the one you just read?

14 A. Well, they are in one sense, as far as to
15 avoid any injury to the people, but on 100 42, an
16 Inerteen

17 Q. Well, read the Refer to the exhibits.
18 Otherwise we won't

19 A. Exhibit K 43 and Exhibit K 46, there's a
20 statement about how to protect the environment from this
21 product.

22 Q. And I think K 44 has the same information on
23 the environment?

24 A. Oh, yes. Yes.

25 Q. And take a look, for example, at K 45.

1 A. Yes, sir.

2 Q. Is that in color?

3 A. Yes. It's red and white.

4 Q. Let me Maybe you can hand it to me and I
5 can just I've got a Xerox. It doesn't come out in
6 color. But this is What's showing now is Exhibit K 45?

7 A. Yes.

8 Q. And that's the label for Inerteen, which was
9 a Westinghouse PCB?

10 A. Yes. It was a product made for
11 Westinghouse,, and the name is a Westinghouse copyright,
12 yes. It's PCB transformer fluid.

13 Q. Okay. And were some of these labels in other
14 colors other than the orange or red that I just showed?

15 A. Yes. They are here all in black and white,
16 but I'm sure I've seen some in yellow and blue. I think I
17 have a couple of blues in here. They were in different
18 colors.

19 Q. Okay. Can you identify Exhibit 47A?

20 A. 47A? Wait a minute. I'm up in the 60's
21 here.

22 Q. Yeah. You put that last group away, and I
23 haven't finished with it yet. That's too far. You've got
24 them in your hand now.

25 A. I've got these pretty messed up.

1 Q. Put those Material Safety Data Sheets down.
2 I'm finished with those.

3 A. That's 63. 64. Wait a minute.

4 Q. You've got It's underneath the material
5 It's in your lap.

6 A. What are you looking for now?

7 Q. It's in your lap, Doctor.

8 A. What number are we looking for?

9 Q. We're looking for 47A.

10 A. Oh, I haven't even started

11 Q. No. No.

12 A. Okay. Here I am.

13 Q. Okay. Can you identify Exhibit 47A?

14 A. Yes. This is a stick on label or an addendum
15 label or an additional label which refers to the
16 environmental contamination that should be avoided with
17 PCBs. Before we After we realized that there was a
18 possibility of environmental contamination, before we
19 could get the new labels, we had these stick ons put on
20 all the labels that we had I mean, all the drums that
21 we had in our warehouse, and we shipped this out to our
22 distributors so they put it on the labels, on PCBs that
23 had already been marked.

24 Q. Take a look Do you have the I think
25 they are on your table there Exhibits 43 and 44?

1 A. I'll give you those back. That's 63.

2 Q. No.

3 A. I've got 43.

4 Q. Oh, you've got that?

5 A. I've got 43, yes.

6 Q. Okay. Take a look

7 A. Am I through with these safety data sheets?

8 Q. Hand them to me because I think you've got
9 some labels mixed in there with them. Yes. I think I'm
10 finished.

11 A. They go over here unless

12 Q. Well, we'll just keep them here for now.
13 We'll get them over there eventually. You've got 43 and
14 44 now in front of you?

15 A. Yes, I do.

16 Q. Okay. In addition to the safe handling
17 procedures about avoiding prolonged breathing of vapors,
18 et cetera, there's some environmental warnings on those
19 two exhibits. Could you describe those?

20 A. Yes. There's a slight bit of difference
21 between 44 and 43 and 44. This paragraph is the same
22 on both of them. No. I better read them separately
23 because their wording is a little different. K 43 is
24 talking about Inerteen 100 42, the Westinghouse product,
25 their trademark product, which we made for them. Contains

1 a statement, "This product contains polychlorinated
2 biphenyls," that's PCBs, "which some studies have shown
3 may be an environmental contaminant. Extreme care should
4 be taken to prevent any entry into the environment through
5 spills, leakage, use, disposal, vaporization or
6 otherwise." That's 43.

7 Q. Now, 44 has some language that's similar, and
8 then it has some additional information about waste
9 disposal. Could you read that?

10 A. Yes. It's a little more specific. It says
11 on Inerteen 100 42, again the Westinghouse product, "This
12 product contains PCBs, which some studies have shown may
13 be persistent, an environmental contaminant and, possibly
14 injurious, to certain forms of bird, aquatic," that means
15 fish, "and animal life." Then they go through "extreme
16 care," et cetera. Then they add on it, "Waste disposal.
17 Used PCB fluids may be returned freight prepaid for proper
18 incineration at three cents a pound." We had an
19 incinerator in our East St. Louis plant where we burned
20 this stuff when it came back.

21 Q. Now, if you'd look at Exhibit 50, please.

22 A. Am I through with 47?

23 Q. Yes.

24 A. Okay. Yes, sir.

25 Q. Can you identify Exhibit 50?

1 A. Yes. That's a Monsanto label for Capacitor
2 Fluid 21, which is a fluid obviously for capacitors made
3 by Monsanto containing PCBs.

4 Q. And are there safe handling instructions on
5 this exhibit, on this label?

6 A. Well, it's referred to another label, another
7 label I presume it is, which is shown on the container.
8 In other words, this must be two of these This is an
9 addendum to a label, because it says They said what's
10 in it, and they talk about waste disposal, but they say
11 "Read and follow all important safeguard instructions
12 shown on this container." So this must go along with
13 another label.

14 Q. Take a look at Exhibit 64. Keep those all on
15 your lap, but if you could find Exhibit 64, which is the
16 last group No, it's not there. It's the last exhibit
17 in this group.

18 A. Oh, yes. I've got it.

19 Q. Okay. Are you able to identify Exhibit 64 as
20 the safe handling information that goes with Exhibit 50?

21 A. Yes. This is safe handling information in
22 seven different languages. It says what's in it, says
23 it's got PCBs. They say to keep it out of the
24 environment. They say it's a harmful product if taken
25 internally or prolonged contact with the skin, avoid

1 spills, avoid breathing vapors, mists or fumes. Wash
2 product from skin. Yes. It's got a full battery of
3 precautions.

4 MR. CARNEY: I guess, Mr. Murray, for your
5 information, what we have is virtually illegible. In
6 fact, I think it's safe to say it is illegible. We did
7 get a legible copy that we've marked Exhibit 64 since you
8 didn't have that yesterday.

9 MR. MURRAY: Are these going to be the
10 originals or these I can keep?

11 MR. CARNEY: No. That's the only one we
12 have. We can get you We'll make you a better copy or
13 get you another one.

14 MR. MURRAY: Did we get a date on when this
15 was?

16 MR. CARNEY: Yeah.

17 Q. Take a look, first of all, at Exhibit 50.
18 Can you date that document?

19 A. Well, except that it's written on it by
20 somebody, "Printed 1/4/73," and then they talk about
21 ordering 2,000 of them in November of '73, and then it's
22 got a notation that they changed the tare, that's the
23 weight of the empty barrel, from 68 pounds to 65 pounds.
24 So presumably it was originally dated 1973. Printed,
25 rather, in '73.

1 Q. And I believe the safe handling information
2 on Exhibit 64 is in English and six other languages. Is
3 that correct?

4 A. Four other languages.

5 Q. No. I'm talking about 64.

6 A. Oh, yes. Seven languages altogether.

7 Q. Including English?

8 A. Yes.

9 Q. Take a look at Exhibits 51, 52 and 53.

10 A. Yes, sir.

11 Q. Can you identify those three exhibits?

12 A. These are exhibits These exhibits are
13 labels for Monsanto Therminol, a PCB heat transfer medium,
14 of three different types, FR 1, 2 and 3. And, as I said
15 earlier, those are either various concentrations of PCBs
16 or various PCBs chlorinated to different levels or
17 mixtures, but they are all PCBs.

18 Q. And are there safe handling instructions on
19 each of these exhibits?

20 A. Yes, there are.

21 Q. And are these safe Rather than have you
22 read it, are these safe handling instructions similar to
23 the ones you've already read?

24 A. Yes. They were the same as before.

25 Q. Okay. Take a look at Exhibits 54, 55 and

1 55A.

2 A. Yes, sir.

3 Q. Can you identify those exhibits?

4 A. Those are Monsanto labels, all for the same
5 Aroclor 1016, which was a PCB, a dielectric fluid that was
6 manufactured by Monsanto in the mid '70's.

7 Q. And does Exhibit 54 contain the safe handling
8 instructions for handling PCBs?

9 A. Yes, it does. The same as In general, the
10 same as before.

11 Q. Okay. And Exhibits 55 and 56 I'm sorry
12 55 and 55A, do they refer to the safe handling information
13 that's in seven languages that's Exhibit 64?

14 A. Yes. It's the same color as that also.

15 Q. Okay. Take a look at Exhibit Exhibits 56
16 through 62. I'm not sure if I misspoke. I meant to say
17 56, if I said 66. But 56 through 62.

18 A. These are labels of Monsanto PCBs. They're
19 labeled Aroclor, although they have the subtitle of
20 chlorinated polyphenyls. It's a different phraseology but
21 it's still our same old PCBs. They're Aroclors 1232, 42,
22 54 and 68, all of which are PCBs that have different
23 chlorine contents.

24 Q. Dr. Kelly, I'd like you to And these all
25 basically have the same kind of cautionary language that

1 we've read before?

2 A. Yes. Basically. Some have an extra
3 stick on, some don't.

4 Q. About the environmental problem?

5 A. Yes.

6 Q. Take a look at Exhibit 57.

7 A. Yes, sir.

8 Q. And I've got a blow up of 57. Is this
9 blow up the same as Exhibit 57 that you're looking at?

10 A. Yes, it is.

11 Q. Okay. And could you just read the safe
12 handling instructions?

13 A. Yes. It's the same pretty much on all of
14 them. Avoid prolonged breathing of vapors or mists.
15 Avoid contact with eyes or prolonged contact with skin.
16 If skin contact occurs, remove by washing with soap and
17 water. Following eye contact, flush with water. If
18 clothing becomes soaked with fluid, launder before wearing
19 again.

20 Q. Okay. Let's go now to Exhibit 63.

21 A. Yes, sir.

22 Q. Can you identify that exhibit?

23 A. Yes. This is a Monsanto label for PCBs.

24 Q. And do you know what this label was put on,
25 what type of container?

1 A. Drums I'm sure, because they talked someplace
2 about the waste disposal and they say you could return the
3 material. So I think it's drums. Conceivably it might be
4 tank cars, but I think it's drums.

5 Q. But it could be tank cars as well?

6 A. Could be tank cars, yes, sir.

7 Q. And this also has the environmental warning
8 as well?

9 A. Yes, it does.

10 Q. So would that place this label sometime after
11 what date?

12 A. '73.

13 Q. Okay.

14 A. Because the environmental warnings were
15 somewhat before '73, but shipping the material back to
16 Monsanto for incineration occurred I believe around '73.

17 Q. Dr. Kelly, during the time that you were
18 Monsanto's Medical Director, did you have a philosophy or
19 a goal that you followed in writing safe handling
20 instructions?

21 A. Yes, I did.

22 Q. What was that?

23 A. Well, there were two main thrusts. One, tell
24 them what they need to protect themselves. Two, be
25 precise in it and short in it. In other words, don't use

1 a page if you can use a paragraph or a paragraph if you
2 can use a couple of sentences.

3 Q. Why? Why did you believe that?

4 A. Well, it's been my experience, my own as well
5 as talking to workers, that they don't read voluminous
6 warning things.

7 Q. Voluminous They don't read what?

8 A. Warnings that are very big, a large volume,
9 extensive warnings. They don't read it. If it's a
10 booklet, they aren't going to go through the booklet. If
11 it's four pages, they aren't going to sit down and thumb
12 through four pages while they're getting the material out
13 of a drum. But if it says on the drum, "This is what you
14 do. Don't get it on your skin, don't breathe it," they
15 are going to listen to it. They are going to read that
16 and pay attention to it. So I think if you put all the
17 information to protect an individual on a label and make
18 the label make this instruction as short as you can,
19 that's the best protective label.

20 Q. Okay. Dr. Kelly, at the time you retired
21 from Monsanto in December of 1974, did you have an opinion
22 to a reasonable degree of medical certainty whether if the
23 safe handling instructions that you drafted were followed
24 in relation to PCBs, as we've discussed in these Exhibits
25 34 through 64, the products, the PCB products, could be

1 used without ill effects?

2 A. Yes, I did.

3 Q. What was that opinion?

4 A. That they could be used without ill effects.

5 Q. And what is the basis for that opinion?

6 A. Well, the basis is the absence of any illness
7 reported, any case reports in the medical literature about
8 illnesses resulting from contact with PCB in the
9 industrial setting. Number two, the absence of any
10 reports from the government about such occurrences.
11 Number three, the information I received talking to my
12 fellow medical directors in the various companies that
13 used PCBs. And, of course, number four was our own
14 experience. But the labels didn't influence that very
15 much. We didn't label them until they had left the
16 warehouse, the shipping room of the plant. But the other
17 three reasons were The other three statements were the
18 reasons that I was sure that it was working, because we
19 didn't have any trouble in our customers.

20 Q. And did that opinion of yours ever change
21 during the entire time you were employed by Monsanto?

22 A. No. It didn't change. I think it was
23 strengthened after I retired when I read articles like
24 Kimbrough saying there've been no ill effects in any of
25 the industrial workers.

1 Q. Let's take a look now at Exhibit 65.

2 A. Yes, sir.

3 Q. Can you identify Exhibit 65, K 65?

4 A. Well, this is a series of typewritten pages
5 signed by nobody. There's no author on it. It's dated
6 10/1/44. It's labeled "Monsanto Chemical Company Salesman
7 Manual Salesmen's Manual, Aroclor, Description and
8 Properties."

9 Q. Dr. Kelly, did you ever see this document
10 while you were employed by Monsanto?

11 A. I did not.

12 Q. Was this document ever utilized by Monsanto?

13 MR. MURRAY: I object to the form of the
14 question. How could he possibly know if it was utilized
15 if he's never seen it?

16 Q. Let me ask you this. To your knowledge was
17 this document ever utilized by Monsanto?

18 A. While I was with Monsanto I never heard
19 anybody even mention this document, much less use it. I
20 never talked to anybody who used it.

21 Q. Was this document ever reviewed by you to
22 approve the health information in it?

23 A. No, it was not.

24 Q. And are you certain of that?

25 A. Huh?

1 Q. Are you certain of that?

2 A. Positive. Absolutely. A hundred percent.

3 Q. What makes you certain that you never
4 reviewed this document while at Monsanto?

5 A. Well, because I would remember it. This is a
6 manual that I would have thrown away had I seen it. I
7 think it's full of half truths. It's full of garbled
8 information. And I know it. I know I never saw it.

9 Q. Was this document ever officially published
10 by Monsanto?

11 A. It never was. It bears no

12 MR. MURRAY: I object to the question.
13 There's no foundation laid that he would know whether or
14 not this stuff was published by Monsanto. It was
15 apparently published by somebody, and he's said he's never
16 seen it, so he couldn't possibly know who published it.

17 Q. You can answer the question. Was this
18 document ever published by Monsanto?

19 A. You'll have to define what you mean by
20 "publish". It was typewritten by somebody obviously, but
21 it was not published for dissemination to Monsanto
22 employees or to Monsanto customers. If it went outside of
23 Monsanto, there would be on the back of it there would
24 be a bunch of coding like we've seen on our technical
25 bulletins, on our application bulletins. This does not

1 bear any of those things. Somebody at Monsanto during the
2 war sat down when he wasn't doing anything and typing it
3 because we didn't have salesmen's manuals. We didn't need
4 them during the war because Aroclors, PCBs, were on
5 allocation. All you needed to have was someone at a
6 telephone that would call up and say, "I've got a
7 government allocation here for 40,000 pounds of 1242," and
8 they'd say, "Okay. We'll ship it to you." So this was
9 never used by Monsanto.

10 Q. Dr. Kelly, if this document, Exhibit K 65,
11 had been presented to you for your approval back in the
12 '40's, would you have approved it for use by salesmen at
13 Monsanto?

14 A. I would have pitched it in the wastebasket.

15 Q. And why is that?

16 A. Because, as I said, it is a garbled group
17 of garbled group of facts that do not relate to PCBs by
18 themselves. It does not relate to the actual use of PCBs
19 in the industry.

20 Q. Dr. Kelly, during the time you were employed
21 by Monsanto, did Monsanto ever perform tests in relation
22 to the toxicity of PCBs?

23 A. Oh, lots of them over a large number of
24 years.

25 Q. Did Monsanto perform these tests in house?

1 A. No, they did not. We did not have a
2 laboratory of our own. As I said earlier, we started
3 plans for a laboratory a couple of years before I left,
4 and they do now have their in house laboratory. But until
5 1974 when I left they did not.

6 Q. Who performed these tests?

7 A. It varied. It depends on the type of test.
8 If it were a short term test, just acute testing, we would
9 have it performed at two small laboratories in St. Louis.

10 Q. Were they all independent laboratories?

11 A. Oh, they were all independent. Some were
12 university laboratories, but still independent. Some were
13 commercial laboratories that were independent.

14 Q. Dr. Kelly, why And these were all animal
15 tests?

16 A. Yes. With the one exception. We did some
17 patch tests on humans.

18 Q. Dr. Kelly, why are these tests performed on
19 animals?

20 A. Well, one reason is that you do not like to
21 perform tests that may be possibly harmful on people. I
22 mean, that's the only reason.

23 Q. Are the results of animal tests easily usable
24 to predict the potential effects of a particular substance
25 in humans?

1 A. Well, not easily, but, as I said, they are
2 the only thing we have. They're the best thing we have,
3 and in some sense it might show the target organ. In
4 other words, if you've got a product that when you give it
5 to an animal it hurts his kidneys, you would then if a
6 man were exposed to that product, you would say, "Well,
7 I'll look pretty close at the kidneys." But it might very
8 well be that a product that hurts animals' kidneys doesn't
9 hurt human kidneys and doesn't hurt human at all. But, as
10 I say, that's the only thing we've got. But if a product
11 is If Product X is twice as toxic to an animal as
12 Product Y, well, you'd probably figure that Product X
13 would be twice as toxic to a human as Product Y. It may
14 not, but that's the only thing you have to go by.

15 Q. Take a look at Exhibit 66. Can you identify
16 K 66?

17 A. Yes. This is an article by at any rate, a
18 memorandum by Dr. Frederick Flinn, F l i n n, in May of
19 1954. These were patch tests, p a t c h.

20 Q. You said '54.

21 A. 34.

22 Q. Mine says '34.

23 A. Sorry. '34.

24 Q. Okay.

25 A. These copies aren't the best in the world. I

1 think I better explain to the jury what a patch test is.

2 Q. Okay. Why don't you do that now?

3 A. A patch test is not a test for toxicity.

4 It's a test to see whether a particular product can cause
5 irritation or skin sensitivity. Irritation of skin is
6 like what happens when you put turpentine on.

7 Sensitization is something like when you put poison ivy
8 on. Two different skin reactions. Patch tests are used
9 greatly in the cosmetic industry. If you're going to put
10 a face powder on or a lipstick, you want to test it by
11 patch test to see if it's going to cause a breaking out.
12 Well, Dr. Flinn in those early days had these cases of
13 had heard about these cases of chloracne at our Anniston
14 plant.

15 Q. This was the Swann plant before it became a
16 Monsanto plant?

17 A. Yes, the Swann plant. So presumably the
18 Swann people This was not done for Monsanto; it was
19 done for Swann sent it up there, and he did patch tests
20 with various PCBs and with some of the ingredients some
21 of the halowaxes and some of the ingredients that he
22 thought were contaminants of the bad PCBs that had given
23 Halowax given Swann their problem.

24 Q. And what did he conclude?

25 A. Well, he concluded in paragraph two on page

1 four, "One cannot but feel that any styrene,"
2 s t y r e n e, "compound which may be found to be present
3 as an impurity is the cause of your trouble."

4 Q. So did he agree with you then that it was the
5 bad benzene that caused the chloracne outbreak?

6 A. Well, he didn't know me then. I mean, he
7 agreed with

8 Q. I mean, did he Did his opinion that is set
9 forth in this article agree with your opinion?

10 A. Yes. And Jones' opinion, the man who wrote
11 the article.

12 Q. Okay. You saw Was this Exhibit 66, this
13 1934 article by Dr. Flinn, in the Monsanto files when you
14 came to work for Monsanto?

15 A. Yes, it was.

16 Q. And you saw the document at the time when you
17 started work for Monsanto?

18 A. Not when I started work. Sometime in the
19 next 12 months.

20 Q. Okay. Did Dr. Flinn suggest any safe
21 handling precautions for PCBs back in 1934?

22 A. Well, he suggested Yes, he did. He
23 suggested you study the ventilation system where there
24 were fumes and have people able to take a bath with soap
25 and water if they came in contact with the material, and

1 he stated, "I found where I had gotten the material on my
2 hands if I washed them thoroughly no trouble occurred."

3 Q. By "material," what do you mean?

4 A. Well, some of these PCBs. He did a bunch of
5 PCBs

6 Q. When you mention "material"

7 A. Well, the ones he tested.

8 Q. And that included PCBs?

9 A. Well, he tested about ten different Aroclors
10 and four halowaxes, and a few of the ones that he thought
11 were contaminants.

12 Q. So he said if you got the PCBs on your hands,
13 no trouble arose if you washed them off?

14 A. He didn't just mention PCBs. He mentioned
15 all of them. I mean he was talking

16 Q. I know.

17 A. about halowaxes, which is chlorinated
18 diphenyl. Any of these things that he was testing, he
19 said if you got them on, even though they were positive on
20 a patch test, if you washed them off you had no trouble.
21 Remember, a patch test you leave on. You put it on your
22 skin. I forgot to mention that. You put it on the skin
23 undiluted. You put it on neat, put a gauze over it so
24 it's soaked, put a piece of cellophane or pliofilm or
25 something like that over it, leave it on for 24 hours,

1 take it off. Two days later, put it on again for 24
2 hours.

3 Q. What was used in these tests? Were there
4 human beings used in Flinn's

5 A. Yes. Animal skin does not react like humans.

6 Q. I thought I read where it's large rabbits.

7 A. Well, he used rabbits. I'm sorry. This
8 fellow used rabbits.

9 Q. Okay. That's what I

10 A. I mean, that even makes it Because
11 rabbits' skin is different than humans'.

12 Q. But Dr. Flinn in Exhibit K 66 used rabbits
13 for his patch test?

14 A. He used rabbits. I was mistaken there.
15 Because certainly anytime I've done a patch test, I've
16 done humans. We don't do skin patch tests. . .

17 Q. And I believe you misspoke. You talked about
18 halowax being a chlorinated diphenyl.

19 A. No, I didn't. Did I say that? I shouldn't
20 have because halowax is not. It's a chlorinated
21 naphthalene.

22 Q. Okay.

23 A. If I said that here, I'm certainly wrong.

24 Q. Okay. I may have been mistaken myself.

25 A. Well, I want to be sure on that because it

1 certainly is not chlorinated diphenyl.

2 Q. Let's go on. Let's go on to Exhibit 67. Can
3 you identify Exhibit 67?

4 A. Yes. This is a report from Drinker to Dr.
5 Drinker to Monsanto. I don't see the date, but I think
6 this is

7 Q. It's on the first page right in the middle.

8 A. Oh, September '38, I'm sorry.

9 Q. September 15, 1938?

10 A. '38. September 15th. This is the basis for
11 that article by Brinker that he had published that I
12 talked about earlier this morning. He tested four
13 compounds we sent up there. Two of them where he could
14 disregard because they had nothing at all to do with PCBs.
15 That's number one and two, chlorcosane,
16 c h l o r c o s a n e, and diphenyl phthalate, d i

17 Q. We don't need to cover the non PCB.

18 A. Well, I want it just for her. Two of them
19 were not.

20 Q. Okay. Again, we're trying to focus on PCBs,
21 Doctor.

22 A. Okay. Well, two were not. Two were not.
23 The two PCBs were chlorinated diphenyl 1268 and a mixture
24 of chlorinated diphenyl and chlorinated diphenylbenzene
25 5460.

1 Q. Okay. And is Exhibit 67 a report of Dr.
2 Drinker's to Monsanto?

3 A. Yes, it is.

4 Q. Okay.

5 A. And, as I said, this report on the last two
6 compounds, the PCBs, were published by Drinker.

7 Q. Okay. And we've already identified that
8 article?

9 A. Yes, we have. We've gone over that I think
10 at length.

11 Q. Okay. And this report then would include Dr.
12 Drinker's study of the honest to goodness PCBs as you
13 said?

14 A. Yes.

15 Q. And that's the PCBs that you sent to Dr.
16 Drinker?

17 A. That's correct.

18 Q. And did you review this report sometime on or
19 about 1938?

20 A. As soon as I got it.

21 Q. And what did Dr. Drinker in this report to
22 Monsanto conclude in relation to these rat tests that he
23 did on honest to goodness PCBs?

24 A. He said on page seven, "In conclusion"

25 Q. I think Let me just see here. Okay. I've

1 got it now.

2 A. What? Is that the page?

3 Q. Yes.

4 A. "In conclusion, 1268," which is a PCB, the
5 honest to goodness PCB, "if handled with ordinary
6 precautions as to ventilation should be entirely harmless
7 to workmen. While it cannot be given an absolutely clean
8 bill of health" Obviously if you get too much of
9 anything, it will be bad, but he didn't say that. But
10 it's preferable to 4465 and 5460, two compounds which are
11 not PCBs. They were chlorinated bi terphenyls or
12 chlorinated diphenylbenzene. Entirely different
13 compounds.

14 Q. Okay. But his first sentence in the
15 conclusion is that the PCBs, and I'll quote, "if handled
16 with ordinary precautions as to ventilation should be
17 entirely harmless to workmen"?

18 A. That's what he said.

19 Q. Okay. Let's go on to Exhibit 68, 69 and 70.
20 Why don't we The tape is about to run out, so when we
21 come back we'll talk about Exhibit 68, 69 and 70.

22 (Brief recess.)

23 Q. Dr. Kelly, could you look at Exhibits K 68,
24 69 and 70, and, excuse me, identify those for the record?

25 A. Yes. These are reports from the Kettering

1 Laboratory, the University of Cincinnati. The principal
2 investigator is Dr. Treon. It deals with the toxicity of
3 the vapors of Aroclor 1242 and 1254, which are PCBs, an
4 ingredient of various Pydrauls, Pyranol, Inerteen, and the
5 last one is a mist generated by the aspiration of Pyranol.
6 The mist The difference between a mist and a vapor is
7 vapor is something that comes off. Mist is something like
8 when you spray paint, that fluid comes out as a mist.

9 Q. And these are all reports dated in the summer
10 of 1955?

11 A. Yes, sir. June of '55. June and July of
12 '55.

13 Q. Okay. And I believe you had mentioned
14 earlier in your testimony Dr. Treon's testing at the
15 Kettering Laboratory at the University of Cincinnati;
16 hadn't you?

17 A. Yes. He was the principal investigator of
18 this group. He had a group doing it, but he was the man
19 in charge.

20 Q. And who at Monsanto requested that this
21 testing be performed by Mr. Treon at the Kettering
22 Laboratory?

23 A. I did.

24 Q. And was the Kettering Laboratory at the
25 University of Cincinnati Medical School a large

1 toxicological laboratory?

2 A. It was a big one. It was a four story
3 building with about 20 Ph.D.'s in it.

4 Q. What type of testing did Mr. Treon at the
5 Kettering Lab perform that is recounted in Exhibits 68, 69
6 and 70?

7 A. They were all vapor inhalations or mist
8 inhalations. They were His earliest one, he started
9 out with one level and he increased the level and then he
10 increased the time of duration of the experiment from

11 Q. Just generally. I'll get into the details.
12 The animals were breathing PCBs?

13 A. They were in a confined box, and they had a
14 mixed bag of animals. I mean, mixed bag, he had Guinea
15 pigs, rabbits, rats, mice, maybe cats. I don't know if
16 they had any dogs in this.

17 Q. Okay. And they were all subject to a
18 confined space where they would breathe PCBs for a period
19 of time?

20 A. That's right. Eight hours or 16 hours a day
21 for a prolonged period of time.

22 Q. And by prolonged period of time, what do you
23 mean?

24 A. Up to seven months.

25 Q. What were the As a result of these tests

1 that Dr. Treon performed on these various animals, was
2 there an estimate made of the safe human exposure levels
3 to vapors of PCBs?

4 A. Well, he came out with Yes, there was. He
5 came out with two levels. He found the 1254, the PCBs
6 with more chlorine in, was somewhat the more toxic, so he
7 gave that a level At one time he gave it a level of two
8 milligrams per cubic meter of air. A cubic meter is
9 roughly a yard by a yard by a yard. Milligram, there's 60
10 milligrams An aspirin tablet is about 60 milligrams of
11 aspirin. Might be some starch in there. But that's to
12 give you a reference point between milligrams and cubic
13 meters. He came out first with one milligram for 1254 and
14 two milligrams for 1242, but I think eventually he either
15 changed it or he changed it after talking to the American
16 Governmental Society of Governmental Industrial
17 Hygienists, to the standard accepted by OSHA of .5
18 milligrams per cubic meter for 1254 and one milligram per
19 cubic meter for 1242.

20 Q. I don't know if I understood all of the
21 milligrams and meters because I can't fathom that, but did
22 he come up with

23 A. He said those were safe. These levels, which
24 are well known to industrial hygienists, industrial
25 physicians and manufacturing people, were safe for a

1 fellow to work in there eight hours a day the rest of his
2 life.

3 Q. How did he heat the PCBs to get the vapors?
4 Or not how. Did he heat them or

5 A. Oh, yes. He had to heat them because, as I
6 said, you put 1242 and 1254 on the floor here

7 Q. Again, you're talking about

8 A. The PCBs.

9 Q. You're naming numbers.

10 A. I'm sorry.

11 Q. And that's not going to

12 A. If you put If one puts these two PCBs that
13 he tested in an open container at room temperature, you
14 will get a negligible amount of material coming off.

15 Q. Vapor?

16 A. Vapor coming off. Negligible. Small. Very
17 small.

18 Q. How high did he heat these PCBs? Do you have
19 an estimate?

20 A. I'll have to look.

21 Q. Did he do it past the boiling point? If you
22 know, if you remember.

23 A. Let me look, and I can be sure.

24 Q. Okay.

25 A. Yes, he had to use He had to get up with

1 one of them to between 115 degrees and 125 degrees
2 centigrade. That's Boiling point centigrade is

3 Q. Do that I don't know what centigrade is.
4 Can you do it Fahrenheit or give me an estimate of how
5 high the temperature was Fahrenheit?

6 A. You don't look at the evening news then.

7 Q. I never have

8 A. They call it Celsius now.

9 Q. I've never been able to adapt to centigrade.

10 A. Well, water boils at 180 degrees Fahrenheit.
11 Water boils at 100 degrees centigrade. So roughly

12 Q. Just use Fahrenheit, please, because I
13 won't I can't understand it if you use centigrade.

14 A. He went up to about 200 to 250 degrees
15 Fahrenheit.

16 Q. Okay. I think Americans are still I think
17 having trouble getting what centigrade means. Maybe in
18 the next century.

19 A. Well, so do I. That's why I have to look
20 this over.

21 Q. Were your conclusions about the toxicity and
22 safe handling of PCBs changed by the results of the
23 Kettering tests that are Exhibits 68, 69 and 70?

24 A. No, they weren't. We accepted the fact that
25 this material had a certain degree of toxicity. We knew

1 that if you got it up to an elevated temperature you could
2 get problems. But we knew that there were safe levels
3 that people could work with. So that's No, it didn't
4 change my point of view at all.

5 Q. Okay. And if Monsanto's safe handling
6 procedures were followed, would there be any problems
7 based on the Kettering results?

8 A. No, there would not. There hasn't been.

9 Q. Did Dr. Treon of the Kettering Lab that
10 prepared these lengthy reports that are Exhibits 68
11 through 70 publish any of its findings?

12 A. Yes. He published K 69 and K 68. I'm not so
13 sure whether he published K 70 or not. That was the mist.

14 Q. Take a look at K 71. Is that the publication
15 of Dr. Treon's findings that were in K 68 and K 69?

16 A. Yes, it was. He didn't do the mist. He
17 didn't publish the mist.

18 Q. Okay. And that would have been K 70?

19 A. That was K 70. Doing the mist was a rather
20 specialized type of experiment. We were

21 Q. I don't know that we need to go into those
22 details.

23 A. All right. He didn't publish that because it
24 wasn't as important.

25 Q. Okay.

1 A. But there was nothing unusual in the results
2 I mean.

3 Q. Okay. But Exhibit K 71 is the publicized
4 version of Exhibits results
2 I mean.

3 Q. Okay. But Exhibit K 71 is the publicized
4 version of Exhibits K 68 and K 69?

5 A. That's correct.

6 Q. Did you read the Article K 71 at the time it
7 was published?

8 A. Oh, yes.

9 Q. And what publication was this K 71 in?

10 A. The "Industrial Hygiene Quarterly".

11 Q. I'm sorry?

12 A. Which is a reputable peer reviewed article
13 publication. Peer review means they send out the articles
14 to the acknowledged scientists in the same field the man
15 is working with, and they look it over to see if it's an
16 adequately scientifically prepared and presented paper,
17 and it's available to all industrial physicians, such as
18 Westinghouse or General Electric, which have very
19 sophisticated medical and industrial hygiene groups. It's
20 available to medical schools. It's available all over.
21 Government people read it all the time.

22 Q. Did the published article of Dr. Treon
23 contain the same recommendations concerning the
24 permissible exposure levels of PCBs that the two reports
25 to Monsanto contained?

1 A. I don't think he picked that. Yes. He
2 suggested that Yes, he did. He suggested that Aroclor
3 1242 they should have the same level, and I think 54 he
4 cut it down. He said a safe level is one tenth what he
5 found to be safe for animals. So it was the same level.
6 This is a publication that the government scientists use,
7 the American Conference of Government Industrial
8 Hygienists, that I picked. And I might as well tell you
9 what they are.

10 Q. Well, let me ask you I'll get to that.

11 A. Fine. All right.

12 Q. But So, again, but the publication of K 71
13 published safe levels for the use of PCBs in the
14 workplace?

15 A. Published recommended safe levels.

16 Q. Okay. And how long Let's take the PCB
17 that's 1242. How many days were some of the animals
18 exposed to the PCB vapors in that test?

19 A. Well, he said seven hours a day, five days a
20 week for several weeks. That's what he reports in here.
21 But in our report, the report the larger report, he
22 said some of them got up to 83 days, and then I believe he
23 increased the dose in the next report. Let's see what
24 they've got on this one. He went up to 214 days.

25 Q. So what would that mean?

1 A. Seven months, a little over seven months,
2 five days a week. That would be 40 weeks, five days a
3 week, 40 weeks, and seven days Seven hours a day, five
4 days a week for eight months.

5 Q. So some of the animals were exposed to PCB
6 fumes for how many hours a day?

7 A. Seven hours a day, five days a week, for
8 eight months.

9 Q. Okay.

10 A. And the other one, the 1254, he went for a
11 period of seven months, 150 days during that seven months.
12 That's not He kept them all for seven months with 1254,
13 but he only did it five days a week, so it was 153 days,
14 150 days. So back in those days, in '55, that was a quite
15 long experiment.

16 Q. Did Dr. Treon send or submit these safe
17 levels for PCB exposure to any group?

18 A. I don't know if he did, but I know they used
19 it. I mean, when I say "they," there is a group that
20 adopts safe levels for use in industry.

21 Q. Who is that group?

22 A. That group is called the American Conference
23 of Government Industrial Hygienists.

24 Q. And are these a group of industrial
25 hygienists?

1 A. They are, who are employed solely by
2 government.

3 Q. Okay. These are not

4 A. They are federal government, state government
5 or city government. They do not allow academicians in it.
6 Treon is not in it. They do not allow industrial people
7 in it. Elmer Wheeler couldn't get in it because it's
8 strictly government. They want to be unbiased.

9 Q. Okay. And this group of government
10 industrial hygienists, what did they do with these Treon
11 levels that were recommended by Dr. Treon for

12 A. They took them and used them as a basis for
13 coming out with a standard for safe level for Aroclor, for
14 these two PCBs, one with 42 percent chlorine, one with 54
15 percent chlorine, and OSHA has adopted many of the
16 government industrial hygienists' recommendations, and

17 Q. You better explain what OSHA is.

18 A. Occupational Safety and Health Association I
19 think.

20 MR. MURRAY: Administration.

21 A. Administration.

22 Q. Okay. Is that a U.S. government group?

23 A. That's a U.S. government report. Previously,
24 one of these other depositions, I said that OSHA had not
25 accepted this, but I received I saw in one of the

1 papers referring to Bloomington that they had accepted the
2 government hygienists' report for PCBs of five tenths for
3 PCBs chlorinated to 54 percent and one milligram per cubic
4 meter for PCBs chlorinated to 42 percent.

5 Q. Is there any significance to you that this
6 government group of industrial hygienists approved these
7 safe levels for PCBs?

8 A. Sure. They didn't have any axe to grind. I
9 mean, they were not influenced by any possible motive,
10 profit motive or anything else that an industry might be
11 alleged to have. They were involved primarily in
12 protection of the workers, not to

13 Q. In production of the workers?

14 A. Protection of the workers. Not to say that
15 the industrial physicians aren't, but there's always a
16 possibility that somebody would say, "Well, you people
17 want to get this get levels pretty high because you
18 don't have to use all this ventilation." Well, these
19 people said this is safe.

20 Q. Okay. Let's take a look now at Exhibits 72
21 through 82.

22 A. Yes, sir. I have them here.

23 Q. Can you identify Exhibits K 72 through K 82?
24 Just in a general way without

25 A. Yes. These are acute testing of various

1 PCBs. They were carried out from 1957 roughly to 1963 by
2 a laboratory in St. Louis, an independent laboratory, the
3 Younger Laboratories, which is primarily It's a smaller
4 laboratory. And they did acute testing. In other words,
5 we would do would test by a battery of acute tests.
6 We'd feed it to rats to see if we could determine the
7 toxicity. We would put the skin irritants We would
8 deposit the material on

9 Q. These are all PCB tests?

10 A. All PCB tests. There were four prongs to
11 this examination. Drop it in their eyes to see what
12 effect it would have on their eyes, the undiluted stuff.
13 Feed it to rats to see what it would take to harm them.
14 Three, put it on the skin and cover it up and leave it for
15 24 hours and see if it was irritating. And, four,
16 sometimes we would do an inhalation of a saturated
17 atmosphere. We may not do all four of them on all, but
18 that So it was an acute test really to see what would
19 happen if you got a good size dose of it at one time.

20 Q. Who requested that these tests be performed?

21 A. The Medical Department, either I or our
22 toxicologist.

23 Q. At Monsanto?

24 A. At Monsanto.

25 Q. Could you tell us what particular PCB

1 Aroclors were involved in these Younger Laboratory tests
2 that are Exhibits K 72 through 82? Or I don't know if I
3 need to I think these speak for themselves. Rather
4 than go through and list them, they were various PCB
5 Aroclors. Is that

6 A. They were various PCB Aroclors which were
7 chlorinated. Whenever you chlorinate a PCB, when you
8 chlorinate the diphenyl, that's the biphenyl, that's the
9 PC part I mean that's the PB part.

10 Q. I don't know if we need to get into that.

11 A. Anyway, there's a mixed bag of about ten
12 different ones chlorinated to various degrees of
13 chlorination.

14 Q. Okay. And you've used the word "acute," and
15 I'm not sure I've asked you to define what "acute" means.

16 A. Well, acute is something that happens all of
17 a sudden.

18 Q. Short term?

19 A. Short term, and it doesn't linger. You get
20 an acute sore throat. It hurts, comes on relatively
21 suddenly, and lasts for four or five days. That's acute.

22 Q. And just for an example, take a look at
23 What was the dose? What was the amount of PCBs in the
24 1254 PCB that was used in these tests?

25 A. A hundred percent.

1 Q. And how many grams or

2 A. I mean, how many grams were given?

3 Q. Yes. In the 1254, for example.

4 A. I've got to find 1254 here. I've got 42.

5 Q. K 78, would you look at Exhibit 78?

6 A. I found it. Here we are.

7 Q. Is that 78, or is that something

8 A. K 78.

9 Q. Okay.

10 A. What we did on this, we fed from eight grams,
11 that's two teaspoonfuls roughly, of liquid material to a
12 rat. Two grams I mean, two teaspoonfuls. It all
13 depends how big the rat is. A kilogram

14 Q. Let me ask you this.

15 A. Two and a half kilograms to the pound.

16 Q. Would eight grams

17 A. It's a big dose.

18 Q. Is that the most you gave, or did

19 A. No. We gave up to almost 16 grams, twice as
20 much.

21 Q. To a rat?

22 A. To a rat.

23 Q. Okay. Now, how many teaspoonsful, for
24 example, because I can understand teaspoons, I don't
25 understand grams would that be to a if you gave the

1 same amount to a 150 pound human? How would that
2 translate?

3 A. That would be about You're giving two
4 teaspoonfuls per kilogram to the rat. A person 150 pounds
5 is roughly 70 kilograms, a little more, a little less.

6 Q. 70?

7 A. So giving him 140 teaspoonfuls of material at
8 one dose.

9 Q. 70 kilograms is about 150 pounds?

10 A. Yes. Roughly. 154 pounds.

11 Q. I don't know kilograms. I know pounds.

12 A. Okay.

13 Q. So can you tell me how much of this PCB
14 material would have to be fed to a 150 pound human? How
15 many teaspoonfuls to equal about the same amount to these
16 rats?

17 A. Well, the smallest dose they gave would be 70
18 times two, 140 teaspoonfuls. The dose they came out with
19 the figure was roughly Three times 70 would be 210,
20 divided by It would be about Wait a minute while
21 I You have three teaspoonfuls per kilogram at what they
22 call the dose that killed half the rats. That would be
23 210 teaspoonfuls in a person.

24 Q. So, in effect, what they were doing was
25 feeding Over 200 teaspoons of PCBs to a human would be

1 the equivalent of what they fed these rats?

2 A. Yes. If the human reacted the same way as a
3 rat.

4 Q. Okay. Let's What is acute toxicity
5 testing? That's what this was; wasn't it?

6 A. Yes.

7 Q. Okay. Describe that in layman's language.

8 A. Well, acute toxicity testing is how much of
9 a how much does it take to hurt you if you take it all
10 at once over one day or one dose.

11 Q. Do you come up then with what's called a
12 LD 50 factor?

13 A. Well, the LD means lethal dose for half the
14 animals. In other words, you start off with a particular
15 amount. Then you keep on increasing it until you get a
16 dose that kills half the animals because some of the
17 animals may survive one ten grams, others may survive 20
18 grams. So you come up with a standard test that gives you
19 a figure for killing half the animals.

20 Q. Is this a standard test that's just used for
21 PCBs?

22 A. Oh, no. It's used all through toxicology
23 because it compares. You can use it for comparing the
24 toxicity of one compound against the other in animals. In
25 other words, if you've got an LD 50 for ten in a rat and
160

1 an LD 50 for two in a rat, you know that in a rat this one
2 with ten it takes five times as much to kill him. So it's
3 one fifth as toxic.

4 Q. Okay. Is the LD 50 factor, is that something
5 that's calculated for lots of different compounds?

6 A. Oh, sure. Whenever anybody does an LD 50 or
7 a toxicity, acute toxicity test, on a new compound or an
8 old compound, he runs the standard LD 50 test.

9 Q. Okay. Does the fact that a chemical or a
10 compound has an LD number mean that it's harmful to
11 humans?

12 A. Well, again, it depends Sure. If it's got
13 an LD number for humans I mean, for animals, it may or
14 may not. You take salt. Salt's probably got an LD 50 of
15 five. So if you take a If you take a great deal of
16 salt at the same time, you may get serious problems, but
17 if you

18 Q. So if you gave enough quantities of something
19 like everyday salt to an animal, you're going to kill half
20 of them with certain levels?

21 A. That's correct. But that doesn't mean that
22 you put a teaspoonful of salt on your food during a day
23 it's going to be harmful to you unless you've got high
24 blood pressure.

25 Q. Why did the Medical Department at Monsanto

1 want to know what the LD 50 number was for the various
2 PCBs?

3 A. Well, we were always checking our products
4 along the way. In other words, here we have an old
5 product that we've been working on. We had a lot of
6 information on it from 1937 from Drinker, '55 from Treon,
7 and we checked it off and on to see how it was going. In
8 other words, so we wouldn't get booby trapped and find out
9 that, whoops, all of a sudden we've got something that's
10 more toxic than we think.

11 Q. And did these tests that these toxicity
12 tests where you got LD numbers for PCBs that are contained
13 in Exhibits K 72 through K 82 change your view as to the
14 harmfulness of PCBs?

15 A. No. They were all in the same ballpark as a
16 relatively an industrial chemical of relatively modest
17 toxicity.

18 Q. And by "modest toxicity"

19 A. Moderate toxicity, not very toxic.

20 Q. Toxicity means?

21 A. Harmful.

22 Q. So they were modestly harmful?

23 A. Yes. I mean, all industrial chemicals
24 Motor oil is certainly toxic also, but you don't consider
25 that a poison.

1 Q. Okay. Did the Medical Department review
2 Exhibits K 72 through K 82?

3 A. Oh, sure.

4 Q. And did you yourself review them at the time
5 they came in?

6 A. I may or may not. I mean, it all depends.
7 In '57 I'm sure I did. In '62 when we had a toxicologist,
8 he might have reviewed it, but I'm pretty sure it passed
9 my desk.

10 Q. Okay. Let's go to Exhibits 84 through 91.
11 Can you identify those

12 A. Yes. These are

13 Q. exhibits?

14 A. Beg your pardon?

15 Q. Let's go all the way. Why don't you go all
16 the way up to 116. Maybe we can combine this.

17 A. I'll be happy to.

18 Q. And go through it a little faster.

19 A. To 116?

20 Q. Yes.

21 A. Okay.

22 Q. Are these I think there are 31 reports
23 here. Are these 31 reports to Monsanto by two different
24 laboratories, Scientific Associates and Younger
25 Laboratories, dated between February 1951 through October

1 1967 relating to PCB testing?

2 A. Yes, they are. There were two There's one
3 laboratory in St. Louis called Scientific Associates.
4 Younger worked for them. Younger broke up and started his
5 own laboratory. So some of these tests were done by
6 Scientific Associates and some by Younger Laboratories.
7 They are the same type of laboratory. They were good just
8 for They were used just for acute testing. They didn't
9 have the facilities for sophisticated inhalation studies
10 or two year long term testing.

11 Q. And did these tests include Pydraul and
12 Therminol, two PCB containing products?

13 A. Yes. By various different names. There were
14 some called Pydrauls, some called Therminol, some called
15 MCS for Monsanto Chemical. Some was OS.

16 Q. Okay.

17 A. So they are all the same. They are all acute
18 testing of PCBs used for heat transfer agents and
19 hydraulic fluids.

20 Q. Did you request that these tests be
21 performed?

22 A. Yes, I did.

23 Q. Why?

24 A. Well, some of them were either new compounds
25 or new mixtures of compounds, and some were old that we

1 just retested as a routine business.

2 Q. Why did you do that?

3 A. To see if they had changed any, particularly
4 in the toxicity. You mean in the latter

5 Q. Why did you continue What I'm curious
6 about is why you continued to do all this testing.

7 A. Well, we wanted to be sure that we still were
8 dealing a product that had the same toxicity. In other
9 words, we tested it in 1950. We wanted to be sure that in
10 1965 maybe it's time to test it again to see if there's
11 been any change for the better or the worse in it. So
12 that's what we did. But a number of these were new
13 formulations or new mixtures.

14 Q. Did you review Did you or the Medical
15 Department review the tests that are Exhibits K 84 through
16 K 116?

17 A. Yes, we did. They were reviewed by the
18 Medical Department.

19 Q. And were they received by Monsanto on or
20 about the date they bear?

21 A. Oh, yes. We sent them to Younger. We
22 received them. Scientific Associates. We received them.
23 We paid for them.

24 Q. Was there anything contained in these 31
25 reports that caused you to change your opinion that

1 PCB containing products could be used safely in industry
2 if basic safe handling precautions were followed?

3 A. No, there was not.

4 Q. Now, let's go on and look at Exhibits K 117,
5 118, 120 and 121. Can you identify

6 A. Yes.

7 Q. Or just quickly maybe I can Are these all
8 reports from Industrial Bio Test Laboratories relating to
9 testing of various Aroclor PCBs?

10 A. Yes. There were

11 Q. And

12 A. These are tests to Monsanto Chemical Company
13 by Industrial Bio Test Laboratory.

14 Q. And are they all dated 19 in 1963?

15 A. Yes, they're dated 1963. On the subacute
16 skin dermal toxicity, which means skin, subacute means
17 a little longer than acute. These were 20 days, so they
18 didn't call them acute. They weren't 100 days so you'd
19 call them chronic. So they called them subacute.

20 Q. Did you review

21 A. I'm sorry.

22 Q. Did you review these tests?

23 A. Yes, I did.

24 Q. At the time they were received by Monsanto?

25 A. Yes.

1 Q. And did you request that these tests be
2 performed?

3 A. Yes, sir.

4 Q. Why did you choose Industrial Bio Test to
5 perform these tests?

6 A. Well, they at that time We had used them
7 before on other products, and at that time were the
8 pre eminent industrial toxicological laboratory. They're
9 run by a Dr. Calandra, who is a professor at Northwestern
10 University Medical School.

11 Q. Is that a good medical school?

12 A. Oh, it's a top ranked. It's in Chicago. An
13 excellent medical school.

14 Q. Okay.

15 A. Their clients include the government,
16 U.S.D.A., the Department of Agriculture. They included
17 companies that had their own laboratory. Like DuPont had
18 their own laboratory, but they still used Industrial
19 Bio Test. Dow had their own laboratory, but they still
20 used Industrial Bio Test. And we used them.

21 Q. What was their reputation as a laboratory?

22 A. Excellent.

23 Q. Maybe I'm getting confused as to what
24 questions I've asked, but did you review these reports
25 when they came in?

1 A. Yes, I did.

2 Q. Was there any information contained in these
3 reports, K 117, 118, 120, 121, that caused you to doubt
4 whether PCBs could be safely used in industry if the safe
5 handling precautions were followed?

6 A. No. There were no surprises in there to me.
7 There was no reason for me to doubt my previous to
8 change my previous opinion.

9 Q. Let's go to Exhibits 122 through 127.

10 A. Yes, sir.

11 Q. Okay. These are two year tests

12 A. Yes.

13 Q. that were performed by Industrial
14 Bio Test?

15 A. They are two year feeding tests performed by
16 Industrial Bio Test. Their report is dated 19 November
17 1971. That means the preliminary work was probably
18 started sometime in 1968 because

19 Q. All these reports, Exhibits 122 through 127,
20 are Industrial Bio Test reports?

21 A. Yes. And they deal

22 Q. They are all dated November of 1971?

23 A. Yes. That's when the report was done. They
24 deal with the chronic feeding of level of various
25 levels of three different PCBs to rats for two years and

1 to dogs for two years.

2 Q. Okay. Did you request that these studies be
3 performed?

4 A. Yes, I did.

5 Q. Why did you request that I.B.T. perform these
6 two years tests on rats and dogs, PCB tests on rats and
7 dogs?

8 A. Well, because at that time there was
9 information that the PCBs were getting into the food of
10 the American public from environmental contamination.
11 There was information that it was showing up in shrimp or
12 fish or wild ducks, game fish. So the question came up is
13 there any long term toxicity work on these small low
14 levels in animals, and there wasn't any. So we went ahead
15 and did the same sort of testing that the government We
16 talked to the government before we did it. I went up to
17 the Food and Drug Administration along with Calandra and
18 we talked to them and said, "Look, here's what we're going
19 to do. We're never going to think of this as a food
20 additive, intentional food additive, but it may be an
21 unintentional food additive. So we're going to test it
22 just as though we were planning to put an intentional food
23 additive in, like baking powder into bread or something
24 like that." So we tested it in that manner. When we
25 finished up with what looked like a pretty clean bill of

1 health, we sent I think we sent all these reports to
2 the Food and Drug Administration, EPA, if they were
3 several government organizations, United States Government
4 organizations.

5 Q. What did you conclude from these long term
6 two year feeding tests of PCBs to rats and dogs?

7 A. That there was a safe level of PCBs that
8 could be taken in the food for a period of almost a
9 lifetime of a rat.

10 Q. Let me switch to an incident in Japan
11 involving PCBs. It was called I don't think it's come
12 up yet, but the Yusho incident. Are you familiar with
13 that?

14 A. Yes, I am.

15 Q. Could you describe to the jury in a little
16 more detail what this Yusho incident in Japan was?

17 A. Yes. Yes. People in Japan were using a
18 Japan PCB as a heat transfer agent. The Japanese PCB was
19 manufactured by a somewhat different process than a
20 Monsanto PCB was. It contained some contaminants in a
21 different level than might have been present in the
22 Monsanto PCB. It was heated. They were making They
23 were heating up or making rice oil and so were heating
24 this material. So the stuff inside the pipes that were
25 heating the rice oil was hot, quite hot, 800 degrees

1 Fahrenheit or something like that. So it leaked, got into
2 the rice oil at various amounts. They sold the rice oil,
3 not knowing that there had been leaks in it. It was then
4 shipped to the Japanese consumers, who used this rice oil
5 to heat their to fry soybean cakes or soybean pancakes
6 or whatever they were doing with soybeans. So they put
7 this stuff in their pan and put this rice oil contaminated
8 with Japanese PCB, and whatever else was in there, and
9 cooked it.

10 Q. So Japanese ate PCBs?

11 A. They ate it along with the Yes. They
12 thought it was rice oil, and there was PCBs in the rice
13 oil. Not all PCBs obviously, but there was quite a bit of
14 PCBs and other contaminants. Dibenzofurans,
15 quaterphenyls, other things that occurred during either
16 the cooking or the heat exchange business. So they got
17 sick, a lot of them. About 1,000 of them got quite ill.
18 And it was quite a ruckus over in Japan because you get
19 1,000 people sick. And they had chloracne, they had other
20 problems. They had pigmentation. They had poor teeth in
21 children. And they finally checked it out and they
22 found First they thought it was due to PCBs, and then
23 they found out afterwards that it was not. It was due to
24 contaminations in the PCBs that occurred either in the
25 processing of the rice oil at the factory or that occurred

1 in the cooking of the soybean pancakes in the Japanese
2 homes.

3 Q. Okay. Let me stop you there because you
4 covered quite a bit of territory.

5 A. That's as brief as I can make it.

6 Q. Yeah. Well, I know it's not an incident that
7 you can describe in ten words. You mentioned that this
8 Japanese Yusho incident involved Japanese PCBs?

9 A. That's correct.

10 Q. Did it involve any Monsanto or United States
11 PCBs?

12 A. No, it did not.

13 Q. And was there any difference between the
14 Japanese PCBs involved in the Yusho incident and Monsanto
15 PCBs?

16 A. To the best of my knowledge, Japanese PCB is
17 manufactured somewhat differently than the United States.
18 It uses a sodium hydroxide step in the manufacture. I'm
19 not a chemist, so I can't say exactly what happened. But
20 it is There were more The presence of dibenzofurans
21 in the Japanese occurred in the Japanese PCBs to a
22 greater extent I don't know how much greater than it
23 might have occurred if it occurred at that time in the
24 Monsanto PCBs. There also were quaterphenyls, which were
25 not present in the Monsanto PCBs. So we had a different

1 ball of wax than the Monsanto run of the mill PCBs.

2 Q. Okay. And are you aware of any other
3 incident or any incident in the United States where people
4 ate PCBs like they did in Japan?

5 A. No, I am not. I have not.

6 Q. And was there another incident outside of the
7 United States where people accidentally ate Japanese PCBs?

8 A. Ten years later the same thing in Taiwan.

9 Q. Okay.

10 A. The same business, the same rice oil, which
11 was called Yucheng, something like Y a dash c h e n g.

12 Q. Okay. Is there anything published in the
13 medical literature about the Yusho incident?

14 A. Oh, lots. I mean, first of all, the first
15 year or so it came out in the Japanese literature. Then
16 sometime in the early '70's there was quite a bit in the
17 United States literature. I think they are still
18 publishing it.

19 Q. Did the literature about this Yusho incident
20 where the Japanese ate accidentally Japanese PCBs, was
21 there anything in that literature about the cause of the
22 illnesses?

23 A. Well, yes. They said it was the added
24 compounds that occurred in the dibenzofurans and the
25 quaterphenyls that were present in the Japanese PCBs

1 either as a result of the Japanese manufacture or what's
2 happening during the heat transfer process or what's
3 happened in the cooking of the rice pancakes.

4 Q. Are there any quaterphenyls that were in the
5 Japanese PCBs, are they in the Monsanto PCBs?

6 A. To the best of my knowledge, no.

7 Q. Did the National Cancer Institute do any
8 studies on PCBs?

9 A. They did on one, 12 PCB 1254. They did a
10 two year testing on rats.

11 Q. What were the results of that study?

12 A. It was primarily looking for cancers in order
13 to Kimbrough did hers on 1260, so the cancer did theirs
14 on 1254. They didn't come up with any cancer.

15 Q. Dr. Kimbrough did some two year feeding
16 studies, I think you mentioned, where she fed

17 A. 1260.

18 Q. PCBs called 1260 to rats for a long term?

19 A. Two years. The cancer people fed rats for
20 two years also with 1254.

21 Q. What were the results of Dr. Kimbrough's
22 long term studies where she fed rats PCBs for two years?

23 A. Depends who you talk to. I mean, Dr.
24 Kimbrough came up and stated under oath that she found
25 liver cancers in a pretty high percentage of her animals.

1 We had a meeting with Kimbrough, I was at the meeting, and
2 she said, "This is what I found." And I said, "Well,
3 look. We used the same stuff. I believe it's almost the
4 same lot numbers. We used a different strain of rats than
5 you did. Why don't you send us your slides, and we'll
6 give you our slides? " So she let us look at her slides,
7 Monsanto when I say "we". This is just about the time
8 a month before I left. After I left, they sent it up
9 they her slides up to the Eppley Institute of Cancer at
10 the University of Nebraska Medical School as well as
11 Northwestern University Department of Pathology, and those
12 people said, "Well, we don't agree with what Dr.
13 Kimbrough's calling cancers. We don't think they are.
14 There may be one or two, but there aren't a bunch that
15 she's talking about." I never did see any paper on what
16 Kimbrough thought of our slides, so I can't say what she
17 said.

18 Q. But at any rate, your tests on rats didn't
19 show any cancer in the rats?

20 A. No, but No, they did not. But I think to
21 be completely honest, there have been studies that show
22 that probably 1260 in rats causes cancer of the liver, but
23 it's a different a funny kind of a cancer. It doesn't
24 metastasize. It doesn't keep on growing. And the
25 mortality of the rats Doesn't kill the rats I mean.

1 It's there, but they live just as long as the control
2 rats.

3 Q. Okay. Did Dr. Kimbrough use you said a
4 different type of rat than Monsanto?

5 A. A different A different species. I mean,
6 just like if somebody used beagles and somebody used
7 German shepherds or cocker spaniels. I mean, she had a
8 different strain of rats. Laboratories use half a dozen
9 different strains of rats. They are all white rats. They
10 are all about the same size. But she used just female
11 rats. So we used a different strain. We used male and
12 female together.

13 Q. Is this the same Dr. Kimbrough that later
14 determined that there was no evidence that PCBs cause any
15 human long term disease?

16 A. That's what she stated, the same person.

17 Q. Dr. Kelly, have you ever known a Dr. von
18 Oettingen? I think his name came up earlier.

19 A. Oh, yes. A long time ago, when I started in
20 the business.

21 Q. Okay. And who was he?

22 A. He was I believe he was with the
23 government for awhile. He was a well known German
24 toxicologist. He was a Ph.D. and an M.D. Then came to
25 the left the government and went to the first

1 toxicological laboratory outside of a medical school, a
2 Haskell Institute at Wilmington, Delaware. He was used as
3 a consultant by good size companies. He was used by
4 Westinghouse at a consultant.

5 Q. Okay. Would you take a look at Exhibit
6 K 128, and I'll ask you if you can identify that, Doctor?

7 A. Yes. This is a document dated March the
8 28th, 1938, entitled "The Toxicity and Potential Dangers
9 of Inerteen," submitted by Dr. von Oettingen, Director of
10 the Haskell Laboratories, to the Westinghouse Electric
11 Manufacturing Company, East Pittsburgh.

12 Q. Okay. And Inerteen, again, is what?

13 A. Inerteen is the trademark of a PCB electric
14 transformer fluid made specifically according to
15 Westinghouse's direction, made by Monsanto. I don't
16 believe by anybody else unless they use foreign PCBs.

17 Q. What type of testing did Dr. von Oettingen
18 perform with Inerteen back in 1938?

19 A. Remember, back in 1938, that was sort of the
20 beginning of toxicology. They weren't doing This was
21 as sophisticated as anybody was doing there. So he did
22 oral administration, took a hundred rats and put the stuff
23 into them in varying doses. Then he examined them
24 pathologically. Then he had repeated doses. He took 33
25 groups of rats, gave it for five days, and he did

1 Q. The testing he did on rats, did he have them
2 inhale PCBs?

3 A. I'm getting to that.

4 Q. Did he have to feed

5 A. He applied it to the skin of rabbits. Yes,
6 he had them inhale the material.

7 Q. So he had them eat the PCBs, inhale PCBs, and
8 then did skin tests?

9 A. That's correct.

10 Q. What

11 A. He gave them quite a few exposures. He gave
12 some rats 41 different exposures.

13 Q. What do you mean by "exposure"?

14 A. Well, he had them inhale the material 41
15 different times, different days.

16 Q. What potential harmful problems did Dr. von
17 Oettingen report in 1938 in relation to the PCB called
18 Inerteen?

19 A. I'll go right to his conclusions. Well, as
20 far as inhalation is concerned, he came out with pretty
21 much the same as Treon did 20 years later, 18 years later.
22 '38 to '55. He said from animal experiments reported it
23 appears that concentrations below .05 milligram per liter
24 of air he even got higher than Treon would cause no
25 toxic symptoms.

1 Q. So he recommended safe levels of air
2 concentration

3 A. He came out with a safe level, yes.

4 Q. Let me Try to wait until I finish.

5 A. I'm sorry.

6 Q. Because the jury won't understand if we're
7 both talking, and the court reporter has a terrible time.
8 So Dr. von Oettingen recommended safe levels of air
9 concentrations of Inerteen in the workplace

10 A. That is correct.

11 Q. in his report? Did he outline a procedure
12 whereby Westinghouse could test the air to learn whether
13 there are unsafe concentration of vapors?

14 A. Yes. He gave a simple method for the
15 determination of Inerteen, and, you know, at Westinghouse,
16 when I came with the company, they were pretty much in the
17 forefront of industrial medicine. They had a fellow who
18 was their medical director, T. Lyle, L y l e, Hazlett,
19 H a z l e t t. This fellow was one of the fathers of
20 industrial medicine. And they had a pretty sophisticated
21 medical department when I came there.

22 Q. When you came to Monsanto?

23 A. When I came to Monsanto.

24 Q. So that would be in the 1930's?

25 A. Late '30's, yes. And they had it all the way

1 down to the time I left. They had a good size industrial
2 hygiene department also. So they knew how to do
3 industrial hygiene, and he gave them the method he used to
4 find out how much was in the air.

5 Q. Did Dr. von Oettingen in his 1938 report,
6 which is Exhibit 128, recommend safe handling precautions
7 for PCBs?

8 A. Oh, yes. He said personal hygiene is quite
9 important. First he said you ought to use ventilation if
10 you've got concentration to get concentrations down to a
11 safe level. Then he said contamination of skin should be
12 avoided by wearing proper protective garments, such as
13 gloves, caps, coveralls. Then he said if you're going to
14 get accidental or higher exposure, use respirators, and he
15 also said you should have periodic examinations. So he
16 gave quite a bunch of safe handling procedures, which were
17 pretty much as we gave.

18 Q. And by "we," you mean Monsanto?

19 A. Monsanto. I'm sorry. Monsanto.

20 Q. And you mentioned Westinghouse had a medical
21 director while you were at Monsanto?

22 A. They had a full fledged medical organization
23 while I was starting one.

24 Q. To your knowledge, did Westinghouse have
25 knowledge on the subject of toxicity and safe handling

1 precautions for Inerteen?

2 A. If they read the article they paid for, yes.
3 This was done for Westinghouse.

4 Q. Did Westinghouse employ industrial
5 hygienists?

6 A. Yes, they did.

7 Q. Do you know any of the industrial hygienists
8 employed by Westinghouse?

9 A. Well, not in the early days. The later days,
10 after we got an industrial hygienist, I made the
11 acquaintance of a person who was an administrator. I
12 don't know how many people he had under him, but a Dr.
13 Speicher, S p e i c h e r.

14 Q. He was employed by Westinghouse as an
15 industrial hygienist?

16 A. At the headquarters in Pittsburgh, East
17 Pittsburgh.

18 Q. Was Dr. Speicher a competent industrial
19 hygienist to your knowledge?

20 A. Oh, yes. He was head of the industrial
21 hygiene for some state. I don't know whether the state
22 was Pennsylvania. I don't know which one.

23 Q. Okay. I think we're about to run out of
24 tape, so we'll break for a minute.

25 (Brief recess.)

1 Q. Dr. Kelly, if you would take a look at
2 Exhibit K 129. Can you identify that exhibit?

3 A. Yes. This is a letter from Mr. Elmer P.
4 Wheeler of the Medical Department of Monsanto dated July
5 25th, 1956, to a Mr. Speicher, S p e i c h e r, the
6 Administrator of Industrial Hygiene at Westinghouse
7 Electric Company.

8 Q. And did you give the date?

9 A. Yes. July 25th, 1956

10 Q. It's getting late in the day, and I'm
11 starting to forget what was said ten seconds ago. And was
12 this letter sent to Westinghouse by Monsanto on or about
13 July 25, 1956?

14 A. Yes, it was.

15 Q. Take a look at this letter, if you would, and
16 I don't want you to read it into the record, but if you
17 could just go through it and summarize it.

18 A. Well, yes. He asks for toxicity information
19 on several of the Aroclors, the PCBs, and he asks how do
20 you sample for it, how do we sample for it, I suppose, in
21 the air. So Wheeler sent him the reports from the
22 Kettering Laboratory that we discussed here, the Treon
23 reports, and told him where it was published, and he said,
24 "I'm sure you've got it," because he knew that they had as
25 big a library as we did, and then he talked about

1 Treon's

2 Q. So when you say "send reports," it was Mr.
3 Wheeler at Monsanto was sending the reports to
4 Westinghouse?

5 A. Send the reports, but he also told them where
6 it was published.

7 Q. He's sending these reports to Mr. Speicher at
8 Westinghouse?

9 A. Yes, he was.

10 Q. Go on.

11 A. Then he said that Treon gave levels for the
12 safe levels of air, and he said Treon told how to sample
13 at its plant, and Wheeler said, "We did a little sampling
14 of our own, and here's what we used." Then Wheeler said,
15 "You've previously seen our complete report on what
16 happens if you drop Pydraul," which is a PCB containing
17 hydraulic fluid, "onto hot metals," and it appears that
18 Speicher was interested in making magnesium die castings,
19 which is something we didn't know about, so he also
20 Wheeler also the second page said what we recommend as far
21 as the skin is concerned.

22 Q. If PCBs come in contact with skin?

23 A. The PCBs, yes. He recommended repeated or
24 prolonged skin contact be avoided, and he also stated what
25 I have said earlier, that reported cases of skin

1 irritation have been surprisingly few in view of the
2 tonnage quantities that we've manufactured and handled.
3 So that's about the gist of that letter.

4 Q. Okay. Let's go on to Exhibit K 130. Can you
5 identify that?

6 A. Another letter to Mr. Speicher from Wheeler.

7 Q. Okay. And, again, where is Mr. Speicher?

8 A. At the headquarters of Westinghouse in East
9 Pittsburgh.

10 Q. Okay.

11 A. This is three years later, October 23. He is
12 interested at that time in a particular mixture of PCBs.
13 We called it We had 1260 in this one, and I believe
14 here he was concerned about 1254, 1242 and 54. And we
15 advised, again, that the chronic toxicity with PCBs
16 That was the inhalation, because that's the only
17 inhalation we had. We didn't say, "We sent this to you
18 three years ago." But he then stated that they should
19 avoid skin contact and

20 Q. With what?

21 A. With PCBs.

22 Q. Okay.

23 A. And we stated that there was an article in
24 the literature that some people had three people had
25 developed minor chloracne from a heat transfer agent.

1 That was the Meigs article. That was in the literature.
2 That was a leaking heat transfer agency. I think I
3 mentioned that. And he talked about the case where we
4 a mild case of chloracne with workmen dipping their hands
5 in liquid Aroclor. That was really workpersons. That was
6 females that did it. That's the case I referred to at the
7 thermometer company. Then he asked about exhaust
8 ventilation, and we said what we should do. Anytime you
9 heat it over 150 degrees F in open tanks, you ought to
10 be you've got to have exhaust or ventilation. So we
11 went through a long list of talked a great deal about
12 this, and he said he's been in one plant where they were
13 used for transformers and capacitors, where Monsanto PCBs
14 were.

15 Q. Who I'm not understanding.

16 A. Wheeler also went on this third page talking
17 about his experience in going to a capacitor and
18 transformer plant, and he said

19 Q. Whose plant?

20 A. Who? Somebody's plant. He didn't say. One
21 plant. Not Monsanto's obviously, because we don't make
22 capacitors or transformers. But he said, "I've been in
23 one plant where the materials were used for capacitors and
24 transformers." And he said he didn't think that the
25 ventilation was good enough there, and the only problem

1 they had was eye irritation when they got the material up
2 to 120 degrees C, which is roughly 200 degrees Fahrenheit.
3 He said they should ventilate the vapors, and he also
4 suggested to Mr. Speicher he ought to talk to some of his
5 people, the manager of the transformer manufacturer for
6 Westinghouse.

7 Q. By "his people," who do you mean?

8 A. The Westinghouse people, I'm sorry. Wheeler
9 told Speicher, "Why don't you talk to some of your
10 Westinghouse manufacturing people who have been used using
11 this material for 25 years?" He gave him the name of the
12 head of Sharon. And then he said, "You've got a man at
13 Bloomington who's been used been associated"

14 Q. Why don't you read that sentence where Mr.
15 Wheeler in your department is telling Westinghouse to
16 contact a Westinghouse person in Bloomington?

17 A. "Similarly, Mr. R. E. Marbury,"
18 M a r b u r y, "of your Bloomington Indiana plant has been
19 associated with the use of Aroclor 1242. Presumably you
20 have already discussed potential exposures with these
21 gentlemen. If so, I would be interested in learning of
22 their practical experience with these products."

23 MR. MURRAY: You need to correct that word.

24 Q. Yes. You said "presumably," and I think it's
25 "perhaps". Why don't you read those sentences again

1 because I think you said "presumably" instead of
2 "perhaps". You misread one word.

3 A. Wait a minute.

4 Q. Just read it out loud again so we make sure
5 we have it correct. Read starting with

6 A. I'll start the whole paragraph.

7 Q. No. Just start with "similarly".

8 A. "Mr. Marbury, R. E. Marbury, of your
9 Bloomington, Indiana plant" "Similarly, Mr. Marbury of
10 your Bloomington, Indiana plant has been associated with
11 use of Aroclor 1242. Perhaps you have already discussed
12 potential exposures with these gentlemen. If so, I would
13 be interested in learning of their practical experience
14 with these products."

15 Q. And, again, this is Was this letter from
16 Monsanto to Westinghouse sent to your knowledge to
17 Westinghouse?

18 A. Oh, yes. It was sent from the Medical
19 Department to Mr. Speicher at the headquarters of
20 Westinghouse.

21 Q. Okay. Let's take a look at Exhibit 131.

22 A. This is a letter also from Monsanto from
23 Wheeler of the Medical Department to Mr. Speicher at
24 Westinghouse, June of '69, which is three months before
25 the previous letter. It looks like he must have been

1 asking for

2 Q. Let me go back. There was one other question
3 I wanted to ask you on Exhibit 130. Do you have that
4 still?

5 A. Yeah. Uh huh.

6 Q. Okay. In that letter, did Wheeler give Mr.
7 Speicher at Westinghouse any material other than referring
8 him to Westinghouse's own internal own plant people at
9 Bloomington?

10 A. Well, he referred to work by von Oettingen in
11 1955, if that's what you mean.

12 Q. No. I'm talking about the bottom of page
13 two, the last paragraph, that first sentence in the last
14 paragraph.

15 A. Page two in

16 Q. In the

17 A. K 130?

18 Q. Yes.

19 A. Well, I'll read it and we'll see. "The
20 enclosed publication on the toxicity of Aroclor 1242 and
21 1254 suggests an MAC"

22 Q. Okay. That's I just wanted to get So
23 Wheeler enclosed a publication on the toxicity of Aroclor
24 1242 and 1254 in this Exhibit 130, the letter to
25 Westinghouse?

1 A. Yes. Yeah, that's

2 Q. I forgot to bring that out, and now we can go
3 to 131.

4 A. Yes. I thought someplace said it enclosed
5 Aroclor bulletin. That is another publication on
6 toxicity. That was Treon's publication that he sent him.

7 Q. Okay. Let's go on to 131. Can you
8 identify Is that a letter from Wheeler in your
9 department in Monsanto to Mr. Speicher, Westinghouse,
10 dated June 5, 1969?

11 A. Yes, it is.

12 Q. And is that Was that letter sent by
13 Monsanto to Westinghouse?

14 A. Yes, it was.

15 Q. Okay.

16 A. It seemed that he wanted Speicher wanted
17 some Underwriter Laboratory studies on Westinghouse
18 products. I don't know who did that. I don't know if
19 Westinghouse did it, made the studies, or if Monsanto did
20 it. I don't know. But, at any rate, Underwriter
21 Laboratories are usually fire and explosions. They really
22 are not toxicity testing. So I do not believe that was
23 done by the Medical Department.

24 Q. Did Mr. Wheeler forward to Mr. Speicher at
25 Westinghouse toxicity information relating to Monsanto's

1 Therminol heat transfer fluid?

2 A. Well, again, he sent, yes, a reprint of
3 Treon's publication. This appears that it's the third
4 time he sent it to him. In the third paragraph it says,
5 "I enclose also a reprint of Joe Treon's publication on
6 the toxicity of Aroclor 1242 and 54." And he said we
7 don't have enough similar data on 48, but we believe it's
8 someplace between 42 and 54.

9 Q. Take a look at the second I know in the
10 third paragraph he encloses the Treon publications;
11 correct?

12 A. Correct.

13 Q. In the second paragraph, what does he enclose
14 there?

15 A. He encloses one of our product bulletins, our
16 technical bulletins, our application bulletins, whatever
17 they called it, relating to the fluid heat systems.
18 That's for Therminol.

19 Q. Okay. That's a PCB?

20 A. That's PCBs.

21 Q. Okay.

22 A. Then he also said he was forwarding it
23 without a letter from me referring to our favorable
24 manufacturing experience for a period of more than 30
25 years. So presumably I sent him one later, but I don't

1 know.

2 Q. Okay. Let's take a look at Exhibit 132. Can
3 you identify that document?

4 A. This is a letter from Mr. Wheeler again to a
5 Mr. Bindschauler, B i n d s c h a u l e r, safety
6 administrator of Westinghouse Electric.

7 Q. So is this a letter from Monsanto then to
8 Westinghouse dated February 12th, 1969?

9 A. That is correct. He's asking He inquired
10 about the properties of Therminol. I don't know the name,
11 but it was a heat transfer Therminol that contained a PCB
12 1254.

13 Q. Okay.

14 A. He enclosed a Hygienic Guide from the
15 American Industrial Hygiene Association which discussed
16 the toxicity.

17 Q. Of what?

18 A. Therminol. The Therminol compounds.

19 Q. The PCB compounds?

20 A. The PCBs. Then a statement by a medical
21 by me summarizing the toxicity and safe handling data of
22 Monsanto Therminols, and a Monsanto publication discussing
23 the proper engineering for Therminols. And he gave the
24 threshold limit, gave our experience.

25 Q. Okay. Would you read the

1 A. And then he ended up by saying, "Look"
2 I'll quote this. I won't paraphrase it. "I'm sure you
3 know that your company has had many years of experience in
4 handling and using the chlorinated biphenyls as electric
5 transformer fluids. It is possible that your experience
6 is wider than ours in terms of exposure levels in a user's
7 plant as compared to our manufacturing facilities." Well,
8 obviously, it certainly was.

9 Q. And he mentions chlorinated biphenyls?

10 A. That's PCBs.

11 Q. Okay.

12 A. That's Inerteen, whatever else you want to
13 call it.

14 Q. So Wheeler is saying that Westinghouse may
15 have more experience with PCBs than Monsanto with regard
16 to exposure?

17 MR. MURRAY: Object to the form of the
18 question.

19 A. Yes. That's what he's saying, yes, because
20 he said exposure levels at a user's plant. We've got
21 exposure levels in our plant, but we're not a user, so
22 you've got a lot more experience in a user's plant.

23 Q. And was this letter that's K 132, the letter
24 from Monsanto to Westinghouse, sent to Westinghouse on or
25 about February 1969?

1 A. Yes, it was. To the safety administrator.

2 Q. Let's go to 130 Exhibit 133. Can you
3 identify that document?

4 A. This is another letter to Dr. Speicher from
5 Mr. Wheeler of Monsanto. Mr. Speicher is still in the
6 headquarters of the Industrial Hygiene Department of
7 Westinghouse Electric. Dated March the 5th, 1969.

8 Q. Okay. And what's this letter do?

9 A. He wanted two more copies of Treon's
10 publication on the toxicity of the vapors of the two PCBs,
11 Aroclor 1242 and 1254.

12 Q. Okay.

13 A. I think that's the fourth one that we sent
14 him.

15 Q. And was that letter, Exhibit 133, sent by
16 Monsanto to Westinghouse?

17 A. Yes, it was.

18 Q. And, finally, or I won't say finally, but
19 Exhibit 134, can you identify that document?

20 A. This is a letter from Mr. Wheeler, again
21 dated April 28th, 1970, to a Dr. Sloat, S l o a t, who is
22 in the Transformer Division of Westinghouse Electric.

23 Q. Okay. And this is a letter then from
24 Monsanto to Westinghouse, the Transformer Division, dated
25 April 28, 1970?

1 A. Yes. He's not in the headquarters. He's at
2 Sharon, Pennsylvania.

3 Q. And what does this Does this letter send
4 any information to Westinghouse?

5 A. Well, he's giving them a status of the animal
6 toxicity studies. It looks like Sloat and two other
7 people from two other people from Westinghouse met with
8 Wheeler someplace, and Wheeler gave them two copies of the
9 ongoing study. Remember, these are the studies that we
10 were running at Calandra that we started in

11 Q. The Industrial Bio Test studies?

12 A. The Industrial Bio Test. We started on
13 Aroclor PCBs in '68, '69. We got the final reports in
14 '71. This was the beginning. The tests had been going
15 probably a year. So we had interim reports, and they gave
16 them to the associates, and Sloat wanted one for himself,
17 so Wheeler sent him one.

18 Q. So Wheeler was sending Westinghouse the
19 interim I.B.T. or Industrial Bio Test studies on the
20 status of animal toxicity studies of PCBs?

21 A. Yes. Presumably that's what it is because
22 that's the only ongoing studies we had at that time.

23 Q. Did Monsanto respond to Westinghouse when it
24 asked for studies or materials about PCBs?

25 A. Oh, certainly. Whenever they asked, we sent

1 it to them. And they asked quite a few times. I mean, I
2 don't know if this is all the letters, but Wheeler and
3 Speicher had quite a busy correspondence.

4 Q. Dr. Kelly, if Westinghouse and Westinghouse
5 workers followed the safe handling instructions provided
6 by Monsanto in the bulletins and labels and the
7 correspondence that we've just gone over together with the
8 safe handling precautions of Dr. von Oettingen, the
9 Westinghouse consultant, in your opinion to a reasonable
10 degree of medical certainty could the various PCB products
11 utilized by Westinghouse at its plants be used without ill
12 effects?

13 A. No question about it.

14 Q. And what's the basis for that opinion?

15 A. Well, my experience with our own workers, my
16 experience with the information I obtained from other
17 people who used our products, the absence of problems with
18 the case reports, the absence of case reports in the
19 medical literature. There are absence of any government
20 reports.

21 Q. Were the various articles that we've gone
22 over, Dr. Smith and Dr. Drinker's article and Dr. Treon's
23 article, readily available to a company like Westinghouse
24 or anyone else who cared to research the subject?

25 A. Oh, certainly. Westinghouse was not a mom

1 and pop operation, you know. This was a pretty big
2 organization, bigger in the electrical field than we were,
3 and they had a very sophisticated medical department and a
4 good size industrial hygiene group. Certainly it was
5 available to them.

6 Q. Dr. Kelly, did Monsanto send Westinghouse
7 information on the subject of avoiding environmental
8 contamination by PCBs?

9 A. We sent it to all our customers, and I'm sure
10 we sent it to Westinghouse.

11 Q. And who at Monsanto was in charge of sending
12 out the environmental communications to PCB customers?

13 A. William Papageorge.

14 Q. So he would be the best person to ask about
15 that information?

16 A. Yes, he would.

17 Q. During the time that you were Medical
18 Director at Monsanto, I think you've indicated that
19 General Electric had a medical director or medical
20 department?

21 A. Yes. They had one when I came with them, a
22 Dr. Vosburgh. They had one when I left, a Dr. Casey.
23 They had somebody in between, but I don't remember the
24 name or names.

25 Q. And I believe you've indicated Pyranol was

1 General Electric's trademark for PCB containing dielectric
2 fluid for transformers?

3 A. Yes. Remember, General Electric invented the
4 dielectric PCBs. They invented PCBs.

5 Q. Was General Electric

6 A. It was their patent. They have a patent on
7 the product.

8 Q. Okay. Was General Electric knowledgeable on
9 the subject of toxicity and safe handling of PCBs?

10 A. Oh, yes.

11 Q. Was

12 A. They were probably even a bigger outfit than
13 Westinghouse.

14 Q. Was General Electric provided with the
15 various product bulletins containing safe handling and
16 toxicity information relating to Pyranol and other
17 PCB containing fluids which we've previously discussed?

18 A. Yes, and they also contributed to some of the
19 bulletins as we've seen earlier.

20 Q. Did Monsanto attempt to send PCB safe
21 handling information to General Electric transformer
22 customers?

23 A. No, we did not.

24 Q. Why was that?

25 A. Well, we gave the information to General

1 Electric. They built the transformers. They were General
2 Electric's transformers. They knew how to They were
3 told how to prevent injury to their own workers and to
4 anybody that came in contact with the material.

5 Q. Did you know who General Electric's customers
6 were?

7 A. I haven't the slightest idea.

8 Q. Let me show you Exhibit 136. Can you
9 identify that exhibit?

10 A. Yes, I can.

11 Q. Would you, please?

12 A. It is a file copy from Dr. Hunt of the
13 Medical Department, our toxicologist.

14 Q. Monsanto Medical Department?

15 A. Monsanto Medical Department. Dated October
16 the 30th, 1962, concerning a telephone call that was
17 referred to him from a Mr. Kozoriz, K o z o r i z, of the
18 General Electric Company of Hudson Falls. He got a A
19 man by the name of Benignus received a wire from this
20 gentleman at General Electric. He wanted immediate
21 information on some toxicity data on exposures, so Hunt
22 talked to this G.E. employee and told him what acute
23 toxicity data we had for these two compounds. It appeared
24 he was interested in They must have had an acute
25 exposure someplace. So we sent Monsanto sent them that

1 information, three publications.

2 Q. What were the three publications?

3 A. I don't know.

4 Q. But there were three publications on PCBs?

5 A. Yes.

6 Q. Let's take a look at Exhibit 138. Can you
7 identify that document?

8 A. This is a letter from me to

9 Q. Are you on 138?

10 A. 37.

11 Q. Oh, I'm on 138.

12 A. What do I do with 37?

13 Q. Well, put it aside.

14 A. Okay. This is a letter to a General Electric
15 employee, Mr. well, a General Electric employee, from
16 Elmer Wheeler of our department, Monsanto's Department
17 of Medical Department, to this man at Selkirk, New York
18 in their polymer products. That's their plastics
19 department.

20 Q. So this is a letter from Monsanto then to
21 General Electric dated October 10, 1969?

22 A. That's correct.

23 Q. Was this letter sent to General Electric by
24 Monsanto on that date?

25 A. Yes, it was.

1 Q. And did What was this letter concerning?

2 A. Well, this concerned Aroclor 1268, and
3 that's

4 Q. That's a PCB?

5 A. A PCB, but it's a solid.

6 Q. Okay.

7 A. It's a white off colored solid. So Wheeler
8 said, "Look, you're going to have to get it real hot to
9 get any vapor exposure from this stuff." He said we
10 didn't have chronic testing on it, but the acute testing
11 shows that it was quite innocuous, and the rabbit the
12 skin rabbit testing showed it was also innocuous.

13 Q. What do you mean by innocuous?

14 A. Not harmful. I'm sorry. Not harmful. As I
15 said, we didn't have vapor inhalation because it was
16 almost impossible to get the stuff to melt it and boil
17 off the vapors. But then he said

18 Q. Does this letter contain any safe handling
19 information that Monsanto gave to General Electric?

20 A. Well, yes. He said because of the physical
21 characteristics of the stuff, of the PCB, it would be
22 extreme have extreme handling or usage conditions to
23 reach this concentration in the atmosphere. He did say,
24 however, if the stuff is going to be heated you ought to
25 have mechanical exhaust ventilation around there. He also

1 said he was going to send a copy of this letter to his
2 friend, Jack Ferry, who was the counterpart of Wheeler at
3 that time in Medical Department in Industrial Hygiene
4 Department at General Electric. He was He must have
5 been at the headquarters.

6 Q. Okay. Why don't we go on to 141? This is a
7 December 17 letter from you I'm sorry. Exhibit 141A.
8 Do you have Exhibit 141A?

9 A. Yes, I do.

10 Q. Why don't you identify that for the record?

11 A. That's a letter from me to a gentleman at
12 American Mutual Liability Insurance Company, December
13 17th, 1952, who asked a few questions about Aroclors. He
14 was particularly interested in gloves. I sent him the
15 information about the physical properties of Aroclor
16 together with information concerning packing materials and
17 told him about the gloves. I said rubber gloves what
18 gloves could be used, and I said I was concerned about a
19 statement of nausea and headaches that the workers had,
20 and I

21 Q. Why don't you read then the last sentence in
22 the second to last paragraph?

23 A. Well, shall I read the whole paragraph?

24 Q. I'd

25 A. Whatever you say.

1 Q. I think that's a long paragraph.

2 A. Okay. Well, I said, "Certainly I do not
3 believe the fumes evolved at 180 degrees should be
4 breathed. This, of course, will depend upon what Aroclor
5 is used. The larger capacitor manufacturers, such as G.E.
6 and Westinghouse, have not experienced any of these
7 circumstances."

8 Q. And, again, G.E. is General Electric?

9 A. General Electric. I'm sorry.

10 Q. Okay. Why don't we go to 142?

11 A. This is a letter of Jack Garrett, who is a
12 manager of our Industrial Hygiene Section in the Medical
13 Department of Monsanto, dated November 14th, 1963.

14 Q. And what company is that letter directed to?

15 A. To Fleming of the Occupational Health Branch
16 of the Tennessee Valley Authority.

17 Q. So that letter is directed to the Tennessee
18 Valley Authority?

19 A. That's correct.

20 Q. Was that letter sent out on or about November
21 14, 1963?

22 A. Yes, it was.

23 Q. And

24 A. He asked for animal toxicity from us on the
25 possible hazards of the use of Pydraul 625, which is a PCB

1 compound, a PCB of Monsanto mixed with something else.

2 Q. Okay. And did Monsanto send T.V.A. the
3 animal toxicity information requested on this PCB?

4 A. Yes, we did. He wanted to know what was in
5 it. We said we just can't tell you because it's not our
6 compound. I mean, it's developed jointly by somebody
7 else, and we can't let it out. But here's the data on it
8 that ought to allow you to have safe handling procedures
9 carried out.

10 Q. Let's go on to Exhibit 143. Can you identify
11 that document?

12 A. That's a letter from Elmer Wheeler of
13 Monsanto's Medical Department.

14 Q. And which company is that referring to?

15 A. This goes to a Smith, industrial hygienist of
16 the Tennessee Valley Authority, the T.V.A.

17 Q. That's a letter dated September 1, 1970 from
18 Monsanto to the Tennessee Valley Authority?

19 A. That's correct.

20 Q. Okay.

21 A. And he's giving You want me to give the
22 gist of it?

23 Q. Yes. That might be the best way to do it.

24 A. He states, "here's a list of literature
25 references dealing with the environmental aspect of PCBs

1 and two summaries indicating the status of the chronic
2 toxicity and biodegradation studies." Biodegradation
3 means it breaks down or doesn't break down.

4 Q. So this was a letter sent to T.V.A.
5 containing information about PCBs and its toxicity?

6 A. That's correct.

7 Q. Okay. Let's go on to Exhibit Well, just
8 to make sure, I don't know if I asked this question. With
9 regard to Exhibits 142 and 143, were they sent by Monsanto
10 to T.V.A.?

11 A. Yes, they were.

12 Q. Do you know whether T.V.A. had a medical
13 department?

14 A. Yes, they did, because I had quite a bit of
15 contact with the T.W. T.V.A. because they made
16 phosphorous. They used phosphorous. We made phosphorous.
17 And they were pretty sophisticated. They were doing
18 laboratory research on phosphorous with rats when we
19 weren't. So they were quite knowledgeable about They
20 had a good medical department and a good industrial
21 hygiene group and a good toxicological group.

22 Q. And I used the initials T.V.A., but, again

23 A. Tennessee Valley Authority.

24 Q. that stands

25 A. Yes. They were right up there.

1 Q. Okay. Do you know whether the Ford Motor
2 Company had a medical department?

3 A. They had a big one.

4 Q. Okay. Did they also have industrial
5 hygienists?

6 A. Oh, yes. They had lots, because they had
7 problems with their soldering, they had problems with
8 their paint. They had a big industrial hygiene and a big
9 medical group. I knew them quite well.

10 Q. Did you know the Did they have a medical
11 director as well?

12 A. Oh, sure. Bud Irwin was the first one that I
13 knew, and Dwayne Block was one. So they had it all the
14 time I was with Monsanto.

15 Q. Let's take a look at Exhibit 145. Can you
16 identify that exhibit?

17 A. That's a letter from me to the Ford Motor
18 Company at Dearborn that's their headquarters dated
19 April 16th, 1978.

20 Q. Read that date again. I think you misspoke.

21 A. April 16th, 1968. I'm sorry. It is getting
22 late. In which he asks for information on Pydraul 312,
23 which is a PCB hydraulic fluid.

24 Q. And what toxicity information did you provide
25 Ford Motor Company in 1968?

1 A. Well, all we had on that was the acute
2 testing, and I gave them the testing and I told them about
3 the fact that we didn't have any illnesses in our
4 employees or did we have any reports of injuries from the
5 field, but I said there's always a possibility if you
6 breathe the stuff at elevated temperatures and if you

7 Q. Why don't you read that paragraph?

8 A. "However, there is no clinically"

9 Q. Again, hold on a minute. Let me identify the
10 paragraph. Read the second to last paragraph in Exhibit
11 141, which is the letter from Monsanto for

12 A. Second to last page.

13 Q. The letter

14 A. Clinically

15 Q. Just a minute. Let me finish my question.
16 If you would read the second to last paragraph of Exhibit
17 141, which

18 MR. MURRAY: 145.

19 Q. I'm sorry. It is getting late in the day.
20 145. And that's the letter from Monsanto to Ford Motor
21 Company dated April 16, 1968.

22 A. "However, there is no question but that a
23 potential of injury could occur should the fumes evolved
24 at elevated temperatures be breathed for long periods of
25 time or repeatedly. Likewise, the action of the material

1 on the skin causes defatting but, even more so, repeated
2 or continuous skin contact must be avoided to prevent
3 absorption of the material with systemic effects. I
4 repeat, however, these conditions have not come to my
5 attention."

6 Q. Let's go next to Exhibit 146. Can you
7 identify that exhibit?

8 A. Yes. This is a letter from Jack Garrett to
9 an industrial hygienist at Ford Motor Company, same
10 office, in Dearborn, Michigan, dated February 14, 1969,
11 Jack Garrett being the manager of industrial hygiene at
12 Monsanto's Medical Department.

13 Q. And did

14 A. He asks for the same

15 Q. Let me just Let me just identify. Did
16 this letter Was this letter actually sent to Ford Motor
17 Company on or about February 14, 1969?

18 A. Yes, it was.

19 Q. And the prior exhibit, was that letter sent
20 to Ford Motor, Exhibit 141?

21 A. Yes, sir.

22 Q. I'm sorry. 145. Was that sent by Monsanto
23 to Ford Motor Company?

24 A. Yes, it was. This man was asking for
25 information on the same Pydraul.

1 Q. What information did Monsanto send to Ford
2 Motor Company in the February 14, 1969 letter?

3 A. Well, we sent them two things. We sent them
4 a copy of our resume of the toxicity of Pydraul 312.

5 Q. Is that a PCB?

6 A. That's a PCB used as an hydraulic fluid.
7 Plus we also sent them a safety data questionnaire put out
8 by the Ford Motor Company, and which is sort of similar to
9 the ones put out by the government. But after the
10 government started putting their own safety data sheets
11 out, most of the companies started their own, so they sent
12 these questionnaires of theirs to all their suppliers. So
13 we got hundreds of these from various companies. So this
14 one came from Ford on Pydraul 312, and they asked all
15 these questions about precautions for normal uses, warning
16 properties, and That's about it.

17 Q. Finally, in the last sentence, Monsanto says
18 in its letter to Ford?

19 A. "If you are interested in any specific
20 Pydrauls, please inform us."

21 Q. Okay. Did Monsanto respond to any requests
22 that Ford made about information about PCBs?

23 A. Oh, yes. Anyone We responded to any
24 company that made any request about any of our products
25 from the medical point of view. Certainly Ford To

1 answer your question specifically, if Ford sent us a
2 request or called us, we told them everything we knew
3 about it.

4 Q. Would the same be true of Tennessee Valley
5 Authority?

6 A. Oh, yes. Yes, sir.

7 Q. Would the same be true of General Electric?

8 A. Yes. I mean, a lot of times we were telling
9 them information that they knew more about it than we did,
10 but we told them. I mean, maybe everybody in the
11 organization didn't know it, but some of the people in our
12 customers knew. But we certainly told them.

13 Q. Okay. I've covered one. Let me ask you
14 this, Dr. Kelly. If Ford Motor Company or the Tennessee
15 Valley Authority or General Electric or their employees
16 and customers followed the safe handling instructions
17 provided by Monsanto in the bulletins and labels and
18 correspondence which we've discussed today, could the
19 various PCB products utilized by Ford Motor Company,
20 Tennessee Valley Authority or General Electric customers
21 be used without ill effect?

22 A. Yes, they could.

23 Q. And that's based on the same information?

24 A. Based on the same reasons that I gave before.

25 Q. And the various articles that we've discussed

209

1 about PCBs, were they as available to the Tennessee Valley
2 Authority and General Electric and Ford Motor Company as
3 they were to Westinghouse?

4 A. Yes. As they were to us, too.

5 MR. CARNEY: I'm going to another subject
6 area. Does anybody want to quit? How much do we have on
7 the tape?

8 MS. SCHNEIDER: 20 minutes.

9 MR. CARNEY: Okay. Why don't I get a little
10 start on that? I'm not going to quite finish.

11 Q. When did Monsanto first learn that there was
12 a problem with PCBs persisting in the environment?

13 A. Sometime in the late '60's.

14 Q. And how was this environmental problem
15 discovered?

16 A. It was discovered by one of our European
17 offices. I do not know whether it was the Brussels office
18 or the London office.

19 Q. Did Monsanto make the discovery?

20 A. No, they did not. They read it in the
21 newspaper.

22 Q. Okay.

23 A. It was discovered by a Swedish group of
24 scientists, a Dr. Widmark, W i d m a r k, and a Dr.
25 Jensen, J e n s e n, I believe. I don't know. That's

1 close enough.

2 Q. It looks like Jensen, but it's pronounced
3 "Yensen" in Swedish?

4 A. My Swedish isn't the best.

5 Q. Okay.

6 A. They were examining for various compounds,
7 and they came up with this one particular compound that
8 they couldn't identify. And they had a very new
9 sophisticated analytical tool. I don't really know. It
10 was sort of like a chromatograph, c h r o m o g r a p h
11 (sic.), but with some additions. I'm not an analytical
12 chemist, so I can't tell you. But it was really a tool
13 that we didn't even have. So he found this stuff, and
14 using this

15 Q. By "he found," these Swedish chemists?

16 A. The Swedish chemists found this material and
17 was able to identify it as a PCB. So it hit the Swedish
18 newspapers and eventually that was picked up by the
19 Belgian newspapers and by the London newspapers. And so
20 someone either in our Belgian our Brussels office in
21 Belgian or our London office found out about it and went
22 over got in contact with Widmark and Jensen and then
23 reported it to the headquarters in St. Louis.

24 Q. And what was the report to I take it when
25 they reported to the headquarters you found out as well?

1 A. Yes. They bumped it down to Medical
2 Department because in those early days Papageorge had not
3 been appointed and we were the environmental coordinators
4 as it were.

5 Q. By "we," the Medical Department?

6 A. The Medical Department. I'm sorry. The
7 Medical Department.

8 Q. What was this discovery that the Swedish
9 chemists found in the late '60's about PCBs in the
10 environment?

11 A. There are small levels of PCBs present in the
12 bottom of some waters, some coastal waters. There are
13 PCBs found in the feathers of some fish eating birds, and
14 there are PCBs found in some fish. Now, I'm not sure if
15 all of this happened at the same time, but that's a
16 general overview of it. So when they came to me with
17 this, I said, "Well, we ought to find out more about it.
18 Let's get a group over."

19 Q. What was your reaction when you first heard
20 about this?

21 A. Well, I don't know about it. I thought you
22 people had no idea this stuff hung around. I thought you
23 people believed it was just degraded, it was
24 biodegradable. It was broken down.

25 Q. So were you surprised by this discovery by

1 these Swedish chemists?

2 A. Quite surprised. So I said, "Let's be sure
3 it's really PCBs." I'm not an analytical chemist. I
4 don't know if he's right or not. So let's get somebody
5 over there to talk to him. So we They arranged

6 Q. Was there some confusion early on as to
7 whether this discovery by the Swedish chemists was really
8 PCBs?

9 A. Yes. They thought it might be DDT. In fact,
10 I think he was looking for DDT.

11 Q. Okay.

12 A. Which is, of course, an insecticide that was
13 used during the war for oh, millions of pounds. They
14 dusted everybody.

15 Q. Was there some period of time where there was
16 a confusion as to whether this Swedish finding was PCBs or
17 something else then?

18 A. There was quite a Well, I think there was
19 a confusion as to whether or not it was DDT or not, or
20 something

21 Q. Ultimately was that confusion straightened
22 out?

23 A. Well, nobody came out with the idea it was
24 not DDT. People believed it's DDT or something else.
25 Nobody knew what the "something else" was until Widmark

1 and Jensen came out and said this something else is PCB
2 and we're pretty sure it's PCB, not DDT or what else. So
3 we sent over Wheeler and a Dr. Keller, K e l l e r, who
4 was the chief of our analytical group.

5 Q. By "we"?

6 A. Monsanto. Monsanto. I'm sorry.

7 Q. Okay. So Monsanto sent over And I guess
8 you were the one who actually sent them?

9 A. Well, I brought it up to the head of the
10 Organic Division that was manufacturing PCBs. I couldn't
11 send over an analytical chemist who didn't belong to me,
12 who wasn't in the Medical Department. So they sent their
13 top scientist, their research man, "they" meaning the
14 Organic Division sent over their top research man in PCB
15 manufacturing. They sent over their top analytical
16 chemist.

17 Q. Okay. And "they" now is Monsanto?

18 A. The Organic Division of Monsanto Company.
19 And the Organic Division of Monsanto Company sent over
20 research, manufacturing, and an analytical chemist. The
21 Medical Department of Monsanto sent over Wheeler, who was
22 our industrial hygienist, who had quite a lot of
23 background in toxicology and industrial hygiene, and he
24 was a member of the Medical Department. So they went
25 over. They talked to they, this group, went over and

1 talked to Widmark and Jensen, and they came back, and this
2 group came back and said, "I think he's right. This man
3 certainly seems to know what he's doing."

4 Q. When they said, "I think he's right," who are
5 "they" referring to?

6 A. Widmark and Jensen.

7 Q. This story is getting confusing to me and the
8 jury I think. Okay.

9 A. Why don't I simplify it and say Monsanto sent
10 over this group of people with individual specialties over
11 to Sweden to talk to this man, and presumably I believe
12 they talked to some government officials. This group from
13 St. Louis went over there and talked to these people,
14 Widmark and his group and the Swedish government, and the
15 Monsanto group came back and said, "We believe the Swedish
16 group is right. This is PCB. We, Monsanto, better get
17 one of these instruments right away and start looking
18 around to double check it." And that's what Monsanto did.

19 Q. And did Monsanto eventually get one of these
20 new tools that the Swedes had to detect these minute
21 particles in the environment?

22 A. Yes, they did.

23 Q. Did the Swedish chemists, Dr. Jensen and his
24 other chemist, did they ask for anything from Monsanto?

25 A. I can't be sure. I think they may have asked

1 for as purified samples of various PCBs as we had. They
2 may have done that. I'm not sure. Some people did later
3 on and some didn't. I don't know if the Swedes did. If
4 they did, we sent it to them.

5 Q. Okay. What do you mean You've mentioned
6 that the PC it was learned by these Swedish chemists
7 that PCBs were persisting in the environment, were
8 non biodegradable. What does that mean in lay language?

9 A. Well, non Biodegradable means that if you
10 put something into the soil or drop it in the bottom of a
11 lake, after a while the bacteria in the soil, the fungi in
12 the soil or the bacteria or whatever it is down in the
13 bottom of the lake, in the goop at the bottom of the
14 lake That's spelled g o o p.

15 Q. Goop is not a scientific word; is it?

16 A. No, sir.

17 MR. MURRAY: As scientific as I ever get.

18 Q. But I understand what goop is.

19 A. At the bottom of the lake will break this
20 molecule down into its parts. I mean, into water,
21 chlorine, et cetera. And then you don't have that
22 material existing anymore as it was when it was dropped in
23 there. If it is non biodegradable, it stays there.

24 Q. And doesn't disappear?

25 A. Doesn't disappear.

1 Q. And that's what was happening to PCBs?
2 Instead of biodegrading and disappearing over the years,
3 it was just staying there?

4 A. That's correct.

5 Q. And that's what the Swedish scientists or
6 chemists found?

7 A. Well, they found even a little more than
8 that, because they found it was picked up by the animal
9 organisms who lived in the very minute plankton, which is
10 like p l a n k t o n, which is a very minute let's say
11 like algae scum on top of a lake. And shrimp would eat
12 these plankton, fish would eat these shrimp, eagles would
13 eat the fish, and it showed up in the eagles' feathers.

14 Q. Eagles and other birds that eat fish?

15 A. Peregrine falcons and other fish eating
16 birds.

17 Q. Were these reports from these Swedish
18 chemists, were they in English at first, or were they in
19 another language?

20 A. Swedish.

21 Q. And did it take some time to get or did you
22 try to get the nod or get the translations of these
23 reports? Could you describe that?

24 A. Well, we Yes. We wanted We got the
25 Swedish reports. Of course, I gave it to a Swedish. We

1 had the newspapers reports in Sweden, and we gave them all
2 to either our Brussels office or London office and said,
3 "Here, translate these into something we can read, and
4 translate them into English, and get it over to us."

5 Q. You eventually got those articles translated?

6 A. Yes. It took a little time.

7 Q. Okay. I've just got a few more minutes on
8 this tape. Let me just ask a couple more questions and
9 then we'll adjourn for the day. Was Monsanto able to
10 obtain the original paper that had been written by Dr.
11 Jensen, the Swedish chemist?

12 A. Yes, they were.

13 Q. And eventually, after sending this team of
14 people from Monsanto, was Monsanto able to confirm that
15 PCBs, in fact, were persisting in the environment as the
16 Swedish chemists said they were?

17 A. Yes, we were.

18 Q. Did you After this time, did you get some
19 reports that PCBs were persisting in the environment in
20 the United States as well?

21 A. Yes. There's another man, a Dr. Riseborough,
22 I'm not exactly sure, R i s e b o r o u g h, out at one of
23 the California universities. I don't know if it was
24 Berkeley, UCLA or USC. But I thought it was a California
25 state university. Found Corroborated the work of the

1 Swedes. I think he did it before we did. And he found it
2 in some birds out there on the coast of California.

3 Q. By "he found it," he found some PCB?

4 A. He found PCB in the tissue

5 Q. Feathers?

6 A. Feathers and tissues, I believe, of birds of
7 prey out in California.

8 Q. These are fish eating birds?

9 A. That's correct.

10 Q. Did PCBs after this period of time also show
11 up in minute quantities in the food chain, such as fish
12 and later in milk?

13 A. Yes, it did.

14 MR. CARNEY: I think we're running out of
15 tape, so I think we'll break for the day and start in
16 again tomorrow morning.

17 THE WITNESS: No argument with me about it.

18 MR. CARNEY: Okay.

19 (Deposition was recessed until 9:30 a.m. on October
20 25, 1990.

21 Q. Dr. Kelly, earlier we put aside Exhibit 137,
22 and if you could just take a look at that quickly and
23 identify it for me.

24 A. This is a letter from me to a Mr. Murray,
25 Robert Murray, of General Electric Corporation, dated

1 August 26th, 1964. He asked for information on
2 Therminols, and I sent it to him.

3 Q. Okay. Take a look at Exhibits 150, 151 and
4 152. Can you identify those three exhibits?

5 A. Yes. These three letters are from people at
6 Monsanto, two of them are from two are from Mr. Richard
7 of Monsanto, and the other is a letter back to Dr. Richard
8 from somebody in the government in the pesticide
9 department. The letters go to various agencies of the
10 government, one Department of Agriculture, the other the
11 Fish and Wildlife Service of the government, which
12 presumably they asked for samples of our various PCBs that
13 we sent up to them.

14 Q. Was this during the time that the government
15 and Monsanto were interested in the environmental problem
16 with PCBs?

17 A. Yes, it was.

18 Q. And Exhibits 150 or Exhibit 150 dated
19 February 15, 1968 and Exhibit 152, dated June 18, 1968,
20 were sent by Monsanto to the government?

21 A. That's correct.

22 Q. And Exhibit 151 was received by Monsanto from
23 the government?

24 A. Yes, it was.

25 Q. Shouldn't Monsanto have discovered this

1 environmental problem before with PCBs earlier than it
2 did?

3 A. Well, no. It's almost like saying If
4 somebody discovered a cure for cancer at Sloan Koettering
5 should you say somebody else should have discovered it? I
6 mean, first, there were two reasons. One, we didn't have
7 the equipment that would go down that low. And, secondly,
8 we didn't Well, we had Like for the environment,
9 we've looked for agricultural chemicals, we've looked for
10 fluorides around our plants. We've carried out work on
11 environmental work, on environmental contamination, but
12 this is one we didn't suspect to be there. And if we had
13 suspected, we were not in the position at that time to
14 have the equipment to get such low levels.

15 Q. What steps did Monsanto take to control the
16 environmental problem of PCBs not biodegrading or
17 disappearing in the environment?

18 A. Well, we couldn't do much about the
19 biodegradability or nonbiodegradability. That's an
20 inherent factor of the chemical itself. Our steps were to
21 prevent any more from going in the environment. We looked
22 at our own plant obviously and our own outflow from the
23 plants. We told all our customers about it. We
24 cooperated with all the government scientists that were
25 trying to help the problem. We arranged for the material

1 to be sent back to Monsanto, any used material or surplus
2 material or drums sent back to us, and we burned the
3 material so that they wouldn't have to put it in landfills
4 or throw it in the streams as they were doing before.

5 Q. Doctor, can you identify Exhibit 153 for me?

6 A. Yes. This is minutes of a meeting of the
7 Corporate Development Committee. That's one of the top
8 two committees of the company.

9 Q. Of Monsanto?

10 A. Of Monsanto. Sorry. It's made up of the top
11 brass in the company. It was dated November 17th, 1969.
12 They had the people interested in the PCB problem, the
13 environment. We briefed them on the problem, "we" being
14 the Medical Department, as well as the Marketing
15 Department and Research Department, and we gave them our
16 plan of action. We, this group, gave the top brass our
17 plan of action.

18 Q. Okay. And is that plan of action set out in
19 this exhibit?

20 A. Yes, it is.

21 Q. Okay. Did the Monsanto management approve of
22 the plan of action recommended by the research and medical
23 people at Monsanto?

24 A. Yes. They went along with everything we
25 said. They even went along further. I remember Ed Bock,

1 who was the chairman, the number one person at the
2 company, said, "If we can't lick this problem, we're going
3 to stop manufacturing this. We'll get out of it."

4 Q. What was Could you just briefly
5 summarize Feel free to refresh your recollection with
6 Exhibit 153, but if you would briefly summarize Monsanto's
7 plan of action at this time in November 1969.

8 A. Yes. They said we'll take this group by
9 group, we'll go into a program of every use of the
10 material, and, we'll First of all, we'll put a project
11 manager on. The Medical Department was loaning Mr.
12 Wheeler to this project up to then, but we knew it was
13 just more than a part time person could do. So they
14 picked Bill Papageorge, who had been the manufacturing
15 the plant manager of the plant where they manufactured
16 PCBs at Anniston. So, first of all, they said we'll pick
17 a person, then we'll tell all the customers about the
18 problem, then we'll cut down our own effluence, the stuff
19 that comes out of our plants. Then they'd say we'll
20 educate the customers, we'll introduce the market
21 replacement products, if there are any, continue testing
22 various Aroclors to see if we could come up with a PCB
23 that would biodegrade, continue the toxicological testing.
24 Well, that's about it. Developing a plan to reclaim the
25 fluid and recover, keep it out of the environment.

1 Q. Okay. Did Monsanto eventually stop
2 manufacturing PCBs altogether?

3 A. Well, that was the last stop. First of all,
4 they stopped using it in open operations such as
5 stopped selling it for use in carbonless carbon paper,
6 paints, lubricants, waxes, plasticizers. Then they
7 eventually That was the first step. And they stopped
8 using it in places where there were substitutes. We
9 stopped using it where it wasn't so critical that you had
10 to have a PCB. We stopped using it in hydraulic fluids
11 where there could easily be escape to the outside. We
12 stopped using it in heat transfer units where it could
13 leak and give you problems.

14 Q. At that time did you stop using it in
15 capacitors and transformers?

16 A. Haven't got up to that yet. No.

17 Q. Why not?

18 A. There was no substitute, and the use of it
19 was critical to the electrical industry. We'd have shut
20 down the country. They had to use this in the subways, as
21 I said. They used it in hospitals, schools. And there
22 just was no substitute for the material. Once a
23 substitute was found, we stopped it. We stopped
24 manufacturing even for electrical uses. In fact, the
25 government told us before we stopped in the early '70's,

1 "You've got to keep on manufacturing this stuff." So

2 Q. Why?

3 A. Because it was critical. There was no
4 substitute. It was critical because it was used in
5 trains, subways, hospitals, schools, where a fire would be
6 a catastrophe. So what they did, when someone came out
7 with a substitute, that was not Monsanto. Everybody was
8 working on it, of course. We were working on it, all our
9 competitors were working on it, on a substitute for PCBs
10 in this critical area. And when they came out, when a
11 substitute was found, we stopped. We stopped, oh, 1977, I
12 think, or middle '70's, '75, '77. It was two years before
13 the government stopped it. We had to voluntarily cease
14 manufacturing.

15 Q. So Monsanto in 1977 voluntarily ceased
16 manufacturing PCBs altogether?

17 A. Yes, we did.

18 Q. Dr. Kelly, are you familiar with an
19 organization called the Environmental Defense Fund?

20 A. Yes, I am.

21 Q. Can you tell me what that is?

22 A. Well, that's an activist group that's sort of
23 similar to a Nader group. It's a self appointed group
24 whose purpose is to keep the environment clean. I would
25 say it's a group that's pretty critical of industry. They

1 certainly are not on industry's side.

2 Q. Are they in the practice of complimenting
3 industry or a chemical company like Monsanto?

4 MR. MURRAY: Object to the form of the
5 question. No foundation's been laid.

6 A. Not as a rule. I've never I've never
7 thought that about them.

8 Q. Okay. Can you identify for me Exhibit 154?

9 A. Yes. That's a letter from the Environmental
10 Defense Fund, the group we've been talking about, August
11 24, 1970, sent by their executive director to our New York
12 office.

13 Q. To Monsanto?

14 A. To Monsanto's New York office.

15 Q. Okay. Let me I've got a blow up of that
16 particular document, and, if you would, read the second
17 paragraph of that letter.

18 A. Yes. It says, "At EDF" that's the
19 Environmental Defense Fund "we have been most impressed
20 by Monsanto's willingness to be responsible where the
21 environment is concerned. We very closely watched the
22 development of information concerning the environmental
23 aspect (sic.) of Monsanto's

24 Q. Impact, I think.

25 A. Impact. ". . .impact of Monsanto's product,

1 PCB. What impressed us most was Monsanto's attitude and
2 finally its action to lessen the environmental degradation
3 caused by its product. We continue to watch your PCB
4 cleanup program to be sure that your action is as good as
5 your word, but, in the meantime, we are impressed by your
6 sensitivity and responsibility. Indeed, in many informal
7 conversations, we have signalled out your company as being
8 one capable of acting in its own long term interest and
9 that of society rather than its short term economic
10 interest. We have great respect for you. Roderick
11 Cameron, Executive Director."

12 MR. CARNEY: Thank you, Dr. Kelly. I have no
13 further questions.

14 CROSS EXAMINATION

15 QUESTIONS BY MR. MURRAY:

16 Q. Good morning, Dr. Kelly.

17 A. Yes, sir, Mr. Murray.

18 Q. Again, for the record, my name is Joe Murray,
19 and I represent the plaintiffs in this case. Dr. Kelly,
20 when Monsanto took over the manufacture of PCBs, did they
21 obtain from Swann Chemical Company any tests that were run
22 by Swann on these chemicals concerning the toxicity of the
23 chemicals?

24 A. I was not there when Monsanto took over
25 Swann. I do know that when I came with Monsanto in 1936

1 shortly afterwards I saw the Flinn report in the files of
2 Monsanto. I don't know when they obtained them. I don't
3 know whether there was other material that Flinn might
4 have given them. I saw the Jones article, which was the
5 article that was published by Dr. Jones of Atlanta who
6 took care of the Swann employees with their chloracne.

7 Q. Presumably, Dr. Kelly, if Swann had done
8 further testing other than the Flinn tests on these
9 chemicals, they would have provided that information to
10 Monsanto; is that correct?

11 A. Well, I can't say.

12 Q. Well, isn't that the normal course of things
13 when someone takes over the manufacture of a chemical, to
14 obtain all of the information that they can possibly get
15 on that chemical from whoever has that information?

16 A. Yes.

17 Q. Okay. When Monsanto took over the
18 manufacture of these chemicals, what tests, if any, were
19 run on the chemicals to determine the toxicity of them at
20 the time that or prior to Monsanto beginning the
21 manufacture of it?

22 A. I know of no tests that Monsanto ran from the
23 toxicological point of view from the time they took over
24 Swann until I came with the company, and I do not know the
25 first time we ran some tests. After all, you must

1 remember, Mr. Murray, that Swann had a two year period of
2 no problems at all. They had the one episode that was
3 proven to be due to contaminated benzene, and then they
4 had two years of freedom from any problem when Monsanto
5 bought the company.

6 Q. The first tests that were run by Monsanto
7 would have been roughly in the 1950's; correct, sir?

8 A. Oh, no. Because we had tests We
9 contributed to Drinker's tests in 1937 and '38.

10 Q. What do you mean you contributed to it? What
11 do you mean?

12 A. Beg your pardon?

13 Q. What do you mean you contributed to it?

14 A. We paid part of the bill.

15 Q. So the Drinker test was run in '37 and '38?

16 A. Yes, sir.

17 Q. And then the next test was in the '50's?

18 A. We may have had short term testing in the
19 '40's at Younger's. I'm not sure.

20 Q. Whatever was done, though, we have here with
21 us today; correct?

22 A. I suppose so, yes, sir.

23 Q. Now, the Drinker study was an acute toxicity
24 study; correct?

25 A. Oh, no. He ran In those days, he ran this

1 for weeks. It wasn't acute. He had inhalation for quite
2 a bit a period of time. It wasn't

3 Q. Periods of weeks, though, as opposed to
4 years?

5 A. Well, yes. But in those days, in the '30's,
6 that was considered sort of long term testing.

7 Q. Well, let me ask you a couple of preliminary
8 questions then, Doctor. What you're telling us and the
9 jury today is that there were no long term chronic
10 toxicity studies in the early '30's and '40's?

11 A. If by long term you mean two years, that's
12 correct.

13 Q. So the best chronic studies that could be
14 done during that period of time would then be periods of
15 weeks?

16 A. Oh, no. They could have done it if that
17 would have been the usual thing, but they were not doing
18 chronic studies at that time on industrial chemicals.

19 Q. That's what I'm trying to understand. There
20 were chronic studies out there that could have been done?

21 A. Oh, yes, you can always

22 Q. But that was not the usual?

23 A. If you're feeding an animal for two weeks,
24 you can feed him for two years.

25 Q. Now, let's talk a little bit about the

1 difference between acute and chronic. I know you gave a
2 definition in your direct examination about what acute
3 effects or acute toxicity is. Chronic as opposed to acute
4 is simply a longer term?

5 A. Longer term at a smaller dose.

6 Q. And a low level chronic effect of a chemical
7 could very well be different than a high level acute
8 effect; correct?

9 A. Oh, yes.

10 Q. And, in fact, that's normally the case;
11 correct?

12 A. Yes. I would think so.

13 Q. So basically a chemical when it's exposed to
14 a human being or when a human being is exposed to a
15 chemical can get several different effects from that
16 chemical depending upon his exposure and the length of
17 time that he's exposed?

18 A. Yes, sir.

19 Q. Would it be fair to say, Doctor, that the
20 first low level long term chronic toxicity tests run on
21 PCBs were in the late '60's and early '70's when I.B.T.
22 did their two year studies?

23 A. Well, yes and no. It would be fair to say
24 that in 1954 when Treon did repeated inhalation studies he
25 went 127 days or something like that. That was a pretty

1 long term testing by inhalation. And I don't believe that
2 even today they are doing any longer inhalation tests than
3 a period of four months. They don't do two year testing
4 on inhalation. The standard test for a food additive,
5 that's something you add intentionally to food, in the
6 '70's was and '60's, late '60's, was two year feeding
7 in rats, two year feeding in dogs. But prior to that,
8 there are extremely few two year testing of any products.

9 Q. What was Dr. Treon trying to find out when he
10 did his studies?

11 A. What would happen to you if you breathed a
12 small amount of this material for a prolonged period of
13 time.

14 Q. Wasn't part of his Part of the reason for
15 his study was to determine the toxicity of acute
16 toxicity of this chemical when it's breathed in?

17 A. Well, first of all, whenever you do a
18 prolonged study, you have to find out what the acute dose
19 is, because then you've got to cut that dose down so that
20 you can give it repeatedly, or you won't have the animals
21 living at the end of halfway through the experiment.
22 So he does the acute test first, and then he cuts gives
23 a fraction of that every day to the dogs, to the animals,
24 and sees what happens.

25 Q. Essentially he was trying to determine what's

1 a safe level in the air?

2 A. Yes.

3 Q. What epidemiological studies were undertaken
4 by Monsanto in connection with PCBs?

5 A. None while I was with Monsanto.

6 Q. And that was from 1936 until 1974; correct?

7 A. That's correct.

8 Q. The various skin tests that were done by I
9 believe you said Dr. Flinn for Swann?

10 A. Yes, sir.

11 Q. Those were simply to detect the skin reaction
12 to the chemical. It was not designed to detect systemic
13 reaction; is that right?

14 A. That's correct. In those Back then people
15 did not know how chloracne occurred. In the '30's they
16 thought this is due to the action of a chemical on the
17 skin. Later, of course, people found out or people came
18 to realize that chloracne is a manifestation of absorption
19 of the chemical rather than it just getting on the skin
20 itself and clogging up the sweat glands or whatever they
21 thought back in the '30's.

22 Q. When was it determined that Or, I guess,
23 when was it established that chloracne was the result of a
24 systemic reaction as opposed to a local reaction?

25 A. Well, when you say it was established, when

1 most of the people started believing it?

2 Q. Yes.

3 A. I would say in the '50's.

4 Q. The tests that were run by Monsanto in the
5 '50's by the Younger Laboratories, those were designed, am
6 I not correct, to determine the LD 50 of the chemical?

7 A. That's right. The LD 50, which is the gross
8 toxicity by mouth. Was also to determine whether what
9 the potential for eye injury was, what the potential for
10 skin injury was, whether the material could be absorbed
11 through the skin.

12 Q. All of that is acute toxicity; correct?

13 A. That's correct, yes, sir.

14 Q. And testing for acute toxicity, what can you
15 determine about the chronic effect of the chemical, if
16 anything?

17 A. You can't.

18 Q. The tests that were run, these acute toxicity
19 tests on these chemicals, showed effects on various types
20 of organs; did they not, Doctor?

21 A. No, they don't. In an acute toxicity test,
22 the animal usually dies before a great number of organs
23 are affected. I mean, there are some symptoms you get.
24 Of course, if you give a large dose of an industrial
25 chemical by mouth, you will get obviously vomiting,

1 diarrhea. It will have effects on the intestines because
2 of the volume of stuff and the local irritation. You may
3 get liver failure. So that's usually what occurs in acute
4 poisoning, unless it has a specific action like cyanide,
5 which acts on the oxidation products processes of a
6 body.

7 Q. All of these tests that were run by Monsanto
8 in the '50's and '60's did not show any effects on any
9 other organs other than the liver and the skin?

10 A. They didn't show on the skin. Liver and the
11 intestinal tract. Did you say skin?

12 Q. Yes, skin.

13 A. No. Well, they showed Obviously the
14 animal died, so you had pulmonary edema when an animal
15 dies. His heart eventually stops. Before it stops, the
16 lungs clog up with fluids. So those are the terminal
17 things when you die from anything outside of an accident.

18 Q. Well, the point is, though, is that other
19 effects on other systems in the body other than the liver
20 were shown?

21 A. There were some effects shown. The liver was
22 enlarged. Whether that We did that through microscopic
23 testing on the acute studies at Younger. We really
24 weren't looking for effects, where the effects were. We
25 were looking to see what was the relationship of the acute

1 toxicity of this particular product versus other
2 industrial chemicals.

3 Q. All right. The I.B.T. studies that were
4 done, they were designed to show what would happen if
5 someone was exposed to this chemical in low levels for a
6 long period of time; correct?

7 A. That's correct.

8 Q. All right. Now, would I be correct in
9 saying, Doctor, that when dealing with animals, as these
10 studies were doing, you're not able to determine the
11 symptoms that one might be suffering while taking this
12 chemical over a long period of time? And by symptoms, I'm
13 talking about pain

14 A. Pain, no.

15 Q. Things like that.

16 A. Well, you could have signs in animals. I
17 mean, the animals If it were bothering their joints,
18 you couldn't say whether the joints hurt or not, but you'd
19 be able to tell if the animals were limping that it would
20 be bothering their joints. The animal couldn't tell you
21 that they are sick to their stomach, but if they didn't
22 eat and didn't gain weight, you would be pretty sure that
23 they probably had some intestinal problems.

24 Q. So you could tell sometimes indirectly what
25 the animal might be suffering from during the course of

1 the study by watching the animal and observing it?

2 A. Yes. There are two things that happen. One
3 is symptoms, which are If you have a headache, that's a
4 symptom. If you say your skin itches, that's a symptom.
5 If you say, "My shoulder hurts," that's a symptom. A sign
6 is something that is objective that you can look at and
7 see. You've got a swollen joint, that's a sign. The pain
8 in that joint is a symptom. Animals, obviously the only
9 way you can tell they are in pain is if you move the joint
10 and the animal would start making a fuss. You would be
11 pretty sure he had pain. But he can't tell you this
12 hurts.

13 Q. So in order to determine the effects that
14 this chemical might be having on the animal during the
15 course of the study, one needs to observe the animals
16 closely?

17 A. Oh, yes. Yes. That's done. I mean, you
18 look at the animals every day.

19 Q. Now, during the time that I.B.T. was running
20 its chronicity tests Is that a correct word?

21 A. Chronic tests.

22 Q. Chronic toxicity tests. You mentioned I
23 think Dr. Kimbrough was also undertaking a two year study
24 on rats.

25 A. Yes, she was.

1 Q. And there were two different conclusions
2 reached on these tests; correct?

3 A. That's correct.

4 Q. Dr. Kimbrough found that PCBs actually caused
5 tumors in rats and the I.B.T. study did not?

6 A. Well, not exactly. Remember, we ran three
7 different PCBs; she ran one. We ran two sexes; she ran
8 one sex.

9 Q. Did any of the I.B.T. studies show that PCBs
10 could cause cancer in rats?

11 A. In 1060, there might have been one or two,
12 but there was not the predominance of cancers that she
13 found in her 1260.

14 Q. And you mentioned, Doctor, did you not, in
15 your direct examination that Monsanto took Dr. Kimbrough's
16 slides and showed them to another doctor to get his
17 opinion on whether or not this was actually cancer they
18 were looking at.

19 A. Two others, two groups. Eppley Institute, a
20 cancer institute of the University of Nebraska Medical
21 School, and the Pathology Department of Northwestern
22 University Medical School.

23 Q. Was there not, Doctor, another group that
24 looked at those slides?

25 A. Beg your pardon?

1 Q. Was there not another group that also looked
2 at those slides?

3 A. Well, we gave the slides Well, her
4 pathologist looked at them, but we had two We had two
5 groups that we sent her slides to, "her" being
6 Kimbrough's.

7 Q. Was there also not, Doctor, a group composed
8 of people from Monsanto and people from I.B.T. who
9 traveled to Dr. Kimbrough's laboratory and looked at those
10 slides?

11 A. I don't know. Not while I was there they
12 didn't.

13 Q. You're not aware of a Dr. Richter and Dr.
14 Calandra

15 A. Well, they were I.B.T.

16 Q. going with Dr. some people from
17 Monsanto and looking at those slides and determining that
18 Dr. Kimbrough's results were correct?

19 A. No, I am not aware of that.

20 Q. Okay.

21 A. We did not have any pathologists, who are the
22 people who look at slides.

23 Q. Doctor, you mentioned, I believe, on direct
24 examination that part of your job duties at Monsanto was
25 to obtain toxicological data on various chemicals that

1 Monsanto was using and producing.

2 A. Yes, sir.

3 Q. In order to attempt to prevent injuries
4 resulting from those products?

5 A. Well, to prevent injuries to our workers, to
6 our customers and the ultimate user.

7 Q. Right. Part of the way you do that, Doctor,
8 is to review literature in the scientific community about
9 the product?

10 A. Yes, sir.

11 Q. When you review literature, part of what
12 you're looking for is that the literature is coming from a
13 well established journal that has, I think you mentioned,
14 peer review status?

15 A. Yes, sir.

16 Q. What does that mean? And please tell the
17 jury what it is.

18 A. What peer review is?

19 Q. Yes, sir.

20 A. It means that a scientific article that is
21 proposed to be published in that article in that
22 journal is sent out by the editor of this journal to
23 several people, who are presumably expert in that field.
24 If they are dealing with brain tumors, they send out the
25 article to people who are knowledgeable about brain

1 tumors. And they come back to the editor and give their
2 points of view as whether this article has scientific
3 basis or not.

4 Q. And if it does, if it meets with peer
5 approval, then it will be published in the journal?

6 A. That's correct. If there's space for it. I
7 mean, there's a lot more.

8 Q. I understand that. And if it does not, if it
9 comes back and the peers say, "No, this is just a piece of
10 junk," then the journal will not publish it?

11 A. That's correct.

12 Q. So it has to be a fairly a scientifically
13 designed study that is done by somebody with a good
14 reputation and comes up with scientifically established
15 results before it will be published in one of these types
16 of journals?

17 A. Yes. The people may not agree with the
18 results.

19 Q. Right.

20 A. I mean, but they say this study is
21 scientifically designed. But just because they say, "We
22 don't believe these results are correct" doesn't mean it
23 wouldn't be published.

24 Q. And it happens, does it not, Doctor, in a lot
25 of situations where these well established peer review

1 articles reach different conclusions based upon based
2 upon the data that was obtained in the study?

3 A. And the interpretation of the data, yes, sir.

4 Q. And the interpretation of the data.

5 Depending upon how you interpret it, depending upon
6 various factors, one person looking at the same article
7 may reach different conclusions about it than another
8 person?

9 A. Yes.

10 Q. Now, would it not be fair to say, Doctor,
11 that with regard to PCBs there have been articles
12 published in the scientific literature, in peer review
13 journals, that reach different conclusions than what you
14 have talked about today and yesterday?

15 A. Yes. But I believe I stated that in 1260 I
16 have accepted the fact that PCB 1260 is acknowledged by me
17 to cause to be an animal carcinogen. Yes, it is. The
18 others have not been shown 1254 was not shown by the
19 National Cancer Institute, and there's been no information
20 on any of the lower chlorinated compounds as far as
21 causing tumors are concerned.

22 Q. Well, I mean, just I'm talking in general
23 terms as opposed to one specific result.

24 A. Yes, but I want to be sure you didn't
25 misinterpret my direct testimony.

1 Q. I understand. I understand. That's not
2 unusual, is it, Doctor, in the scientific community to
3 have different people reach different conclusions with
4 regards to the same issue?

5 A. Not at all. Just like the earthquake scare
6 today.

7 Q. I'm sure.

8 A. Some people say it's going to occur December
9 3rd. An awful lot of people say this is nonsense.

10 Q. The PCBs that are manufactured by Monsanto,
11 they are manufactured in a closed system; correct, Doctor?

12 A. Yes, sir.

13 Q. Meaning that all the material is enclosed in
14 pipes or vats or something to where the workers don't come
15 in direct contact with it.

16 A. Well, in a perfect world, in a perfect
17 chemical plant, that would occur, but there are always
18 leaks, there are always spills, there are always pumps
19 that we have to replace the packing. So ideally that's
20 what we strive for. You strive to minimize exposure. But
21 in a chemical plant there are exposures.

22 Q. I understand that. And the only point I'm
23 making is that someone who is working with a closed system
24 would be expected to have less exposure to a chemical than
25 someone working in an open system?

1 A. Yes. That's correct.

2 Q. The more direct contact you have with the
3 chemical, the more exposure you're going to have?

4 A. Well, yes, but it all

5 MR. CARNEY: Let me object to the question.
6 I think it contains some undefined terms as to what you
7 mean by "direct". Do you mean PCBs in the room, at room
8 temperature, or do you mean actually having skin contact
9 or

10 Q. Well, Doctor, in whatever way that a chemical
11 can be gotten into the system. If you have that kind of
12 exposure, the more of that kind of exposure you have
13 Now I've lost my train of thought.

14 A. The more exposure you have, the more there is
15 a possibility of you having an effect from this chemical.

16 Q. Correct.

17 A. Yes. But that's what I have said, I believe,
18 pretty much all the way through, that if you don't get the
19 material on your skin, you aren't going to get an
20 exposure, whether it's an open system or a closed system.
21 So we say, "Don't get it on your skin." If you don't
22 breathe the material at elevated temperatures and the
23 material has a negligible vapor pressure, in other words,
24 fumes don't come off, but it's sitting in a pan on the
25 floor, you may have exposure, but that exposure is

1 negligible. If you heat it, you've got exposure.

2 Q. I understand that. And that's the point I'm
3 making. Let's talk about that for just a second, Doctor.
4 Let's talk about the three ways that PCBs can get into the
5 human body, one of which is ingestion. That is eating it;
6 correct?

7 A. Yes, sir.

8 Q. The other is by skin absorption. If you get
9 it on your skin and it stays on there, then it can be
10 absorbed into the body?

11 A. Yes, if it stays on long enough and isn't
12 washed off.

13 Q. And the third way is through inhalation,
14 breathing it in?

15 A. That's correct.

16 Q. And you have testified several times, I
17 think, during the course of your testimony that the PCBs
18 at room temperature don't give off as much vapor as those
19 that are heated; correct?

20 A. That's correct.

21 Q. They do give off some, though; don't they
22 Doctor?

23 A. Some negligible. It's insignificant.

24 Q. And, again, if you're there for you know,
25 smelling that kind of thing for over an eight hour day,

1 then that's not going to be harmful to you?

2 A. That's correct. It's not going to be
3 harmful.

4 Q. If you are there breathing that stuff for an
5 eight hour day at room temperature for the course of 20 or
6 30 years, though, there aren't any tests that show what
7 the effects of that might be; are there?

8 A. Well, there are no tests, but there is the
9 historical evidence that people who have been working with
10 the PCBs for 20 or 30 years have not shown problems.

11 Q. At least as far as the studies that you've
12 seen are concerned?

13 A. Yes, sir.

14 Q. And Monsanto didn't run any epidemiological
15 studies themselves to determine what that long term effect
16 might be?

17 A. No, sir, but the people who did run them have
18 stated there hasn't been any ill effect.

19 Q. Do we have any epidemiological studies in the
20 materials that you've talked about?

21 A. You mean yesterday and today?

22 Q. Yes, sir.

23 A. No, sir.

24 Q. Let me just make sure, Doctor. It would have
25 been possible for Monsanto to run epidemiological studies

1 over the course of the 40 years that they were
2 manufacturing this chemical; wouldn't it?

3 A. Oh, sure. It could have been possible, but
4 it wasn't warranted. There were no problems.

5 Q. You indicated that you monitored the Monsanto
6 workers and what effects they might have from their
7 exposure to this through reviewing compensation cases,
8 your cancer index, and I believe you said just by looking
9 at the examinations when they were done.

10 MR. CARNEY: I'm going to object to that. I
11 think it mischaracterizes his testimony.

12 MR. MURRAY: I'm sure if it does the doctor
13 can correct me.

14 MR. CARNEY: Talking with plant physicians
15 and other areas, but you can answer.

16 A. Well, I monitored the health of the
17 employees, all the employees, but not especially PCB
18 workers. I mean, whether they were working in chlorine,
19 phenol, insecticides. We monitored all the workers.

20 Q. That's one of the things I want to talk
21 about, Doctor. For instance, the cancer index that you
22 had, that was for every worker in Monsanto; correct?

23 A. Salaried and hourly, yes, sir.

24 Q. And how would you be able to determine
25 groupings or anything else by looking at the cancer rate

1 for everybody who worked for Monsanto?

2 A. Because it would say Department A 9, Joe
3 Blow, Department A 9, Queeny plant in St. Louis. A 9 I
4 know is the phthalic anhydride department,
5 p h t h a l i c, a n h y d r i d e. We'd know it. If I
6 look at the You know, there weren't thousands of these
7 people. If I look at this every three months and see six
8 people in Department A 9, that rings a bell. I don't need
9 to be an epidemiologist to think that's pretty many. But
10 there weren't any clustering or grouping of cancers like
11 that.

12 Q. None of those obvious things that you could
13 see with a naked eye reviewing these things every three
14 months?

15 A. That's right.

16 Q. Was that cancer index ever given to an
17 epidemiologist to look at and determine what conclusions
18 he would reach, if any?

19 A. No, it wasn't. But it wasn't necessary. You
20 don't need to be an epidemiologist to know that nothing
21 has occurred.

22 Q. Were any Would Monsanto follow up with
23 employees who used to work with them to look at what
24 happened to them after they left?

25 A. If they retired, they still had insurance.

1 If they quit after two years, no, they did not.

2 Q. What kind of turnover rate would Monsanto
3 have Are you familiar with what turnover rate they
4 would have in their plant level employees?

5 A. No. But there were an awful lot of
6 25 year old 25 year watches given out to them. No, it
7 was

8 Q. I'm sure there were. There were probably
9 also an awful lot of people who come and work for a year
10 or two years and leave.

11 A. That's correct.

12 Q. You mentioned various uses that PCBs were put
13 to over the years.

14 A. Uses?

15 Q. Uses.

16 A. Yes, sir.

17 Q. Were you ever aware of PCBs being used as a
18 mold release agent?

19 A. A which?

20 Q. A mold release agent.

21 A. I may have heard something about that.

22 Q. Could you tell the jury what a mold release
23 agent is?

24 A. Well, I presume it's in a casting where you
25 have a sand or a plastic type of casting in which you pour

1 metal to form individual objects, whether it's a wheel or
2 an axle or something like that, whether or not PCBs were
3 incorporated in the mold in the release agent. You
4 generally spray a release agent onto the sand so it comes
5 out easier.

6 Q. What kind of temperatures would molten metal
7 be, or would that depend upon the metal?

8 A. Yes. But it's hot. If it's metal that's
9 molten, it's hot.

10 Q. It's going to be well above 700 degrees?

11 A. Fahrenheit?

12 Q. Yes.

13 A. It's going to be hot. I cannot tell you. I
14 would have to speculate on how hot it is.

15 Q. Let's talk a little bit about chloracne,
16 Doctor. You discussed that a lot on your direct
17 examination, and I just want to make sure I've got some
18 points clear. Chloracne, first of all, is an acute
19 reaction; correct?

20 A. Well, no, it isn't. I don't know what you
21 mean by an acute reaction. Does it occur just because of
22 one acute dose? It isn't acute from the sense that it
23 occurs you get an exposure to anything to a compound
24 that will cause chloracne, if you would get that exposure
25 today, you don't get the chloracne tomorrow.

1 Q. Okay.

2 A. So it isn't acute from that standpoint. I
3 wouldn't call it acute.

4 Q. All right. Would it be the type of thing
5 that you would get from high level exposures over a
6 relatively short period of time as opposed to low levels
7 over the life of a worker?

8 A. It depends on the compound. There have been
9 compounds, not PCBs, that a two week exposure will give
10 chloracne.

11 Q. Usually after the exposure is over, the
12 chloracne goes away?

13 A. Yes. It may end up with scarring. It may
14 end up with cysts. But no new acne occurs.

15 Q. It may also end up with nothing?

16 A. If you had a mild case.

17 Q. Chloracne is usually on what areas of the
18 body?

19 A. Well, again, it depends on how severe it is.
20 It usually starts on the cheekbones. Then it can spread
21 to the face. It can occur on the back of the neck. It
22 can occur a good part of the body. The face is usually
23 the predominant part of the body that's affected.

24 Q. In a word, Doctor, it's blackheads and
25 pimples and whiteheads?

1 A. That's correct.

2 Q. Some obviously can become worse and look like
3 boils, and others might not?

4 A. Yes. If they get infected like boils. And
5 there are usually black pigmentation. Whether that
6 pigmentation is due to blackheads or changes in skin, it's
7 hard to say.

8 Q. Now, you mentioned that you did not feel that
9 PCB could cause any problems in a human being unless there
10 was chloracne present?

11 A. I didn't say that in this deposition.

12 Q. You may not have.

13 A. Beg your pardon?

14 Q. You may not have, and I might be getting it
15 confused. But is that true?

16 A. I would say that chloracne is accepted as the
17 hallmark of PCB harmful effect. I think that's accepted.
18 With the exception of acute episodes. If you get an acute
19 episode of like the people that I mentioned in the heat
20 exchange operations where they developed jaundice, that
21 jaundice occurred without chloracne.

22 Q. Would it be fair to say, Doctor, that the
23 only rule you can follow in toxicology is that there are
24 no definite rules? There are only trends?

25 A. Would you repeat that question? I didn't

1 hear all of it. Sometimes you may have to speak a little
2 louder.

3 (Reporter read back as follows: Would it be
4 fair to say, Doctor, that the only rule you can follow in
5 toxicology is that there are no definite rules? There are
6 only trends?)

7 A. Oh, no, I don't think so at all. No, that's
8 not true. I mean, what I have said talking about
9 chloracne And this refers an awful lot to toxicology.
10 If you get an acute episode, you may get problems before
11 chloracne has time to develop. If you inhale PCBs at
12 elevated temperatures for a period of one, two, three
13 days, you get enough of a dose of this, you will get
14 swelling of the liver and jaundice. You'll get problems
15 from it. You will not get chloracne because chloracne
16 takes longer to develop. So that's very definitely
17 established. Also then, if you get chloracne due to an
18 exposure over a prolonged I can't tell you how long
19 prolonged is but over an extended period of time, that
20 chloracne response is due to absorption of PCBs. You may
21 get no other problems at all from it at all. But I think
22 the rule in toxicology related to PCBs is no chloracne, no
23 PCB poisoning, with the exception of acute problems.

24 Q. Do you have any scientific article that you
25 can cite me to that comes up with that rule?

1 A. Yes, I can get them for you. Yes, I can get
2 them.

3 Q. You can't tell me what they are now, but you
4 will get them for me and provide them to Mr. Carney?

5 A. Uh huh. Yes. I mean, they will be people's
6 opinions, just like my opinions. I mean, I don't believe
7 there's any series of articles that say these people had
8 problems and didn't have chloracne. I mean, there may be.
9 But I can give you the opinions of experts in the field
10 who are not connected with Monsanto or industries.

11 Q. That say if you don't have chloracne you're
12 not exposed to PCBs?

13 MR. CARNEY: That's not quite what

14 A. I didn't say that. I said you do not have
15 problems resulting from PCB exposure.

16 Q. If you don't have chloracne, you do not have
17 problems resulting from PCBs?

18 A. That's correct. With the exception of acute
19 problems like

20 Q. I'm sorry.

21 A. With the exception of acute problems like the
22 liver jaundice, like the jaundice from liver.

23 Q. In order to have any long term problems with
24 PCBs, you have to have chloracne?

25 A. That's correct.

1 Q. You mentioned, Doctor, that I believe you
2 did mention this in your direct examination that people
3 react differently when they have the same exposure to
4 various chemicals or they could react differently?

5 A. Yes, sir.

6 Q. I and Mr. Carney could be sitting together
7 doing the same work with the same chemical. I could come
8 down with a symptom from that exposure and Mr. Carney
9 might not; correct?

10 A. That's conceivable.

11 Q. And, in fact, even in that first instance of
12 chloracne at the Swann Chemical Company, everybody working
13 there did not come down with chloracne; correct?

14 A. That's correct. Of course, they may have
15 different exposures, too.

16 Q. That's the next point. They Those who do
17 come down with a symptom might have different levels or
18 different degrees of that symptom?

19 A. That's correct. Different degrees of
20 exposure. You said different degrees of that symptom?

21 Q. Well, what I'm talking about right now,
22 though, is same exposure.

23 A. Oh, same exposure.

24 Q. Same exposure. We both come down with the
25 same symptom, but mine is severe and his is not.

1 A. It's possible.

2 Q. I have to ask you this, Doctor. It's not
3 only possible, it's probable; isn't it? Human beings just
4 don't react the same to the same thing?

5 A. Well, yes, that's correct. But, I mean, it
6 doesn't mean that this happens invariably. I mean,
7 obviously, if people are exposed to any illness, somebody
8 eats a contaminated shellfish, some people may get sick
9 and some may not. There is a difference obviously in
10 susceptibility.

11 Q. And there's also a difference even though in
12 the ones that do get sick, some get very sick and some
13 don't?

14 A. Yes. That could occur.

15 Q. So in general terms, generally speaking,
16 people don't react the same to the same to the same
17 exposure?

18 A. I don't think I can be as broad as that.
19 People in Generally, people can have varying degrees of
20 response to the same exposure, yes, sir. If that's what
21 you're saying, I'll agree with that.

22 Q. Yes. There are situations, aren't there,
23 Doctor, when even when you try and follow all of the safe
24 handling instructions on a chemical that some people are
25 just so sensitive to it that they are going to get a

1 symptom from it anyway?

2 A. Would you repeat that? I lost you a little
3 in the middle of it.

4 Q. There are occasions, Doctor, and obviously
5 I'm talking that this is an exception to the general rule,
6 but there are occasions when people are just so sensitive
7 to a chemical, to a product, that they might get a symptom
8 from it even when they follow all of the safe handling
9 instructions, the normal safe handling instructions.

10 A. You're talking

11 MR. CARNEY: I'm going to object. I think
12 the question is overbroad.

13 MR. MURRAY: It's designed to be a broad
14 question.

15 MR. CARNEY: Well, my objection is that it's
16 a little too broad.

17 Q. Can you answer it, Doctor?

18 A. You're talking about a symptom now.

19 Q. Yes, sir.

20 A. A symptom doesn't mean you've got any harm.

21 In other words, if you sneeze, that's a symptom. That
22 doesn't mean you've got trouble with your nose. If
23 somebody is smoking in a room, somebody is going to cough.
24 That doesn't mean he's harmed. So there's a difference.
25 You may cough; nobody else coughs. So you may get a

1 symptom from the same amount of secondary tobacco smoke
2 that Mr. Carney does not get.

3 Q. Exactly. I'm more sensitive to it than he
4 is?

5 A. That's correct. But you were talking about
6 symptoms. That doesn't mean there's anything wrong with
7 you

8 Q. I understand.

9 A. just because you cough when somebody is
10 smoking.

11 Q. I understand that. Some people can get
12 symptoms easier than others?

13 A. That's right. A symptom doesn't hurt you.

14 Q. Except when it happens to you.

15 A. Well, if you sneeze, when the sneeze is gone,
16 you're all right.

17 Q. I understand that. But while I'm sneezing, I
18 might be uncomfortable.

19 A. Yes. That's correct.

20 MR. MURRAY: We've got three minutes left.
21 You want to take a break right now so we can change the
22 tape?

23 (Brief recess.)

24 Q. Doctor, I asked you earlier to pull out
25 certain exhibits that you have now in front of you;

1 correct?

2 A. I'm sorry. I couldn't hear you.

3 Q. I asked you earlier to pull out certain
4 exhibits which you now have in front of you?

5 A. Yes, I have four of them.

6 Q. All right. First look at Exhibit K 146, if
7 you would, Doctor. That is a letter from Monsanto to a
8 Mr. Greschaw, an industrial hygienist at Ford Motor
9 Company; is that correct?

10 A. Yes, sir. I have it.

11 Q. And with that letter he attaches a
12 questionnaire which Mr. Greschaw had sent to him regarding
13 PCBs; correct?

14 A. Yes, sir.

15 Q. And he attempted to answer the questions
16 posed on that questionnaire?

17 A. Yes, sir.

18 Q. Who would have filled that out? Would that
19 have been Mr. Garrett?

20 A. Somebody in the Medical Department. I mean,
21 it might very well have been Mr. Garrett. But it might
22 have been Dr. Johnson, who was my associate. Might have
23 been Elmer Wheeler. But probably was Garrett.

24 Q. Would you normally have reviewed things like
25 that that go out to other companies?

1 A. Beg your pardon?

2 Q. Would you normally have reviewed things like
3 that that the Medical Department fills out and sends to
4 other companies?

5 A. The first time I probably would have.

6 Q. All right.

7 A. I mean, these This is just one
8 questionnaire. We probably got this questionnaire from a
9 half a dozen companies similar to this, even on the same
10 product.

11 Q. So the first time somebody would have sent
12 you a similar questionnaire you would have looked at it to
13 make sure it's filled out correctly?

14 A. That's correct.

15 Q. And then from then on it would have been
16 filled out similarly no matter what?

17 A. Yes, sir.

18 Q. If you would look on the first page of that
19 questionnaire, Doctor.

20 A. Yes, sir.

21 Q. Number one asks for the toxicity of the
22 chemical through ingestion, through inhalation and through
23 absorption; correct?

24 A. Yes, sir.

25 Q. Now, under absorption it says "None"?

1 A. Yes, sir.

2 Q. Do you consider that to be an error?

3 A. If Pydraul is a PCB, that is a mistake, yes,
4 sir.

5 Q. There is, in fact, a toxicity associated with
6 that chemical through skin absorption?

7 A. Yes, sir.

8 Q. Look at Exhibit 142, again from Mr. Garrett
9 to a Mr. Fleming, who was with the T.V.A.; correct?

10 A. Yes, sir.

11 Q. Apparently Mr. Fleming had asked for a
12 breakdown of the composition of PCBs or at least of
13 Pydraul 625?

14 A. Yes, sir.

15 Q. And Mr. Garrett told him he couldn't because
16 it was developed jointly with a second company.

17 A. Yes, sir.

18 Q. What company was that?

19 A. I think it was an airline airplane company
20 like Douglas or something like that.

21 Q. Was there a

22 A. I think there was a patent situation there.

23 Q. A patent or trademark?

24 A. Yes, sir. I mean, I don't know about the
25 trademark, but the patent was there. So I don't believe

1 Monsanto had sole control of the patent.

2 Q. Pydraul was a combination of PCBs along with
3 something else?

4 A. That's correct.

5 Q. Okay. If you look at Exhibit K 141A, that
6 was from a Mr. Palmer at American Mutual Liability
7 Insurance Company; correct?

8 A. Yes, sir.

9 Q. Do you know what company he was talking about
10 where the workers were having nausea and headaches?

11 A. No, sir, I do not. I do not remember. I
12 don't even know if he told me the company.

13 Q. When you get a letter from a company like
14 that and then answer it like this one, would you normally
15 keep the letter that was sent to you originally?

16 A. Yes, I would, unless I sent it back to
17 maintenance, but it certainly should have been kept, yes.

18 Q. Somebody should have it at Monsanto?

19 A. Yes, sir.

20 Q. You don't have any recollection, do you,
21 Doctor, with regard to any specifics that may have been
22 talked about by Mr. Palmer when he was talking about the
23 workers having nausea and headaches?

24 A. No, sir, I do not remember. That was 38
25 years ago.

1 Q. Apparently they were working with this stuff
2 at temperatures of approximately 180 degrees Fahrenheit?

3 A. Yes, sir.

4 Q. Which would have been the heated type
5 situation which you had referred to at various times in
6 your testimony?

7 A. Yes, sir.

8 Q. Why would heating this chemical cause it to
9 have any more toxicity than if it's at room temperature?

10 A. It doesn't have any more toxicity. You get
11 more exposure.

12 Q. I see. So, again, you were talking about if
13 you breathe it at elevated temperatures, then there are
14 more fumes in the air, and you get more exposure that way,
15 so you're more likely to have a symptom resulting from it?

16 A. You're more likely Yes, if you exceed the
17 concentration. All depends how much gets out in the air,
18 how hot you heat it and whether you protect yourself
19 against it.

20 Q. You talked several times in your direct
21 examination about Dr. Kimbrough and her conclusions
22 regarding PCBs; correct?

23 A. Yes, sir.

24 Q. You stated that she was of the opinion that
25 PCBs don't cause any chronic health effects; is that

1 correct?

2 A. No, she didn't say that. She was of the
3 opinion that there have been no reported cases of adverse
4 health effects in workers using PCB.

5 Q. That's what I wanted.

6 A. She didn't say it was impossible to occur.

7 Q. That's what I wanted to clarify. She's not
8 saying that PCBs can't cause any problems. They are
9 saying that there have been no studies showing that
10 workers exposed to this stuff have come down with any
11 chronic health effects?

12 A. No, she didn't No, that's wrong, too. She
13 said that there have been no cases of industrial injury
14 from workers using PCBs with the exception of chloracne,
15 an occasional acute effect in the last 38 years or 40
16 years that it's been used. She didn't say there were
17 studies. I don't know how she phrased it, but that was
18 the thrust of it.

19 Q. That's what I'm having a hard time
20 understanding. Let's go to Exhibit K 8, which is her
21 article in the "Health & Environment Digest". I believe
22 you may have even quoted from this last paragraph in her
23 article.

24 MR. CARNEY: What number?

25 MR. MURRAY: K 8.

1 MR. CARNEY: Eight, okay.

2 A. Yes, sir.

3 Q. She says, "Thus, despite positive laboratory
4 animal data and except for chloracne, exposure to PCBs has
5 led to know convincing, clinically demonstrable, chronic
6 health effects in humans."

7 A. That's correct.

8 Q. All right. Now, there are two words in there
9 I'd like to talk to you about first. She said, first of
10 all, "convincing".

11 A. Yes, sir.

12 Q. Now, I would assume by that word being in
13 there that there are some articles out there which, in
14 fact, have talked about some chronic health effects in
15 humans, although in her mind it's not convincing evidence?

16 A. I don't know what she what her
17 interpretation of that word is, but to me it means that
18 she says that "No matter what has been said, I am
19 convinced that there has been no demonstrable chronic
20 health effects in workers with working with PCBs." I
21 don't know. I cannot interpret her wording, whether
22 But here is a person who has worked with PCBs for the past
23 50 20 years and has been certainly studying the problem
24 with PCBs, comes out with a statement. I think you'd have
25 to ask her exactly what she means by it. But the English

1 to me means except for chloracne there have been no
2 convincing, clinically demonstrable, chronic health
3 effects. I take the English for what it says.

4 Q. I just want to make sure we're understanding
5 it in the same vein, and

6 A. Well, that's what I believe.

7 Q. When she says convincing and clinically
8 demonstrable, she has, in effect, said, "There are things
9 out there, but to me they are not convincing"?

10 A. Yes. But she says I don't know what she
11 is saying. There may be suppositions out there. There
12 may be people saying, "Well, maybe this could occur." But
13 she says pretty positively it's led to no convincing,
14 clinically demonstrable, chronic health effects in humans.
15 And other people have said the same thing.

16 Q. There are articles, there are published
17 literature, regarding PCBs which associate it with certain
18 symptoms. Is that not a fair statement?

19 MR. CARNEY: Are you talking about humans?

20 Q. In humans, yes, sir.

21 A. In humans? There are articles, but one has
22 to analyze each article directly, and if you show me the
23 article, I'll be happy to give you my interpretation of
24 it.

25 Q. I understand, Doctor, and all I'm saying

1 all I'm trying to get from this and from you is that to
2 her those articles aren't convincing, the same way they
3 are not convincing to you?

4 A. That's right.

5 Q. Someone else in the medical community might
6 find them convincing?

7 MR. CARNEY: I'm going to object to that.

8 A. They might or might not.

9 MR. CARNEY: It might call for him to
10 speculate as to some unnamed medical person.

11 MR. MURRAY: I understand.

12 Q. Let's look at the N.I.O.S.H. study, which you
13 produced earlier, Exhibit No. K 8A.

14 A. Yes, sir.

15 Q. This was an epidemiological study; correct?

16 A. Beg your pardon?

17 Q. This was a epidemiological study; is that
18 correct?

19 A. Well, I suppose it could be termed that, yes,
20 sir, although there were no controls on it.

21 Q. Well, there, in fact, were; were there not?

22 A. What?

23 Q. They used controls They used two groups of
24 people. One was exposed at levels One had levels of
25 PCB in their blood of over 200 parts per billion?

1 A. Yes.

2 Q. And the other group had levels of under 200
3 parts per billion?

4 A. Yes. But

5 Q. So what you are comparing in this study was
6 highly exposed people to a relatively lower exposed group
7 of people?

8 A. No, not exactly, because the presence of PCBs
9 in the blood can also be due to other reasons. It's
10 accepted now that the elevation of PCBs in the blood is
11 relative to the presence of triglycerides. In other
12 words, if an individual has fats in his blood, higher
13 levels of fats in his blood, triglyceride is one of them,
14 PCB is fat soluble. So you can have higher levels of PCB
15 in your blood that is not caused by higher exposure. Do I
16 make myself clear to you, Mr. Murray?

17 Q. I understand what you're saying, Doctor. I'm
18 not familiar with any of the articles that say that. Can
19 you cite me anything?

20 A. Oh, I think that's pretty well established.

21 Q. I know that there is an association between
22 PCB levels and triglycerides.

23 A. Yes. But the reason that has been shown that
24 it's due to the solubility of PCBs in the triglycerides
25 in the blood, that's why it's higher. That's why the

1 level is higher.

2 Q. Can you get me that article also, Doctor?

3 A. Sure.

4 Q. In any event, what this study was doing was
5 comparing people who had levels of over 200 parts per
6 million in their blood with people who had levels of under
7 200 parts per million?

8 A. That's correct.

9 Q. Now, what is the average background level of
10 PCB in the average person's blood in the United States?

11 A. 20 parts per billion give or take a few
12 points.

13 Q. So if in this group of people that they were
14 comparing you had someone who had 195 parts per billion in
15 their blood, they would be in the lower group, but they
16 would still be way over normal with regard to the levels
17 of PCB in their blood; correct?

18 A. That's correct.

19 Q. What is an odds ratio, Doctor?

20 A. Pardon?

21 Q. What is an odds ratio?

22 A. Odds ratio?

23 Q. Yes, sir.

24 A. I'm not familiar with the term.

25 Q. Look at table two in that study.

1 A. What page is that on?

2 Q. 1546.

3 A. Yes, sir.

4 Q. All right. This table talks about odds
5 ratios and 95 percent confidence intervals for signs and
6 symptoms of disease by exposure group and study year;
7 correct?

8 A. Yes, sir.

9 Q. They actually looked at these people at two
10 different times. They looked at them in 1977 and again in
11 1985; correct?

12 A. Yes, sir.

13 Q. 1977 was the date that Monsanto stopped
14 manufacturing PCBs; correct?

15 A. Yes, sir.

16 Q. The same group of people, two different
17 times?

18 A. Well, I'm not sure they had I mean, the
19 same group, but there were difference in numbers.

20 Q. Same group. They might have not been able to
21 find some of the ones in 1985 that they had in 1977?

22 A. They may not have examined all the people in
23 '85 that they examined in '77.

24 Q. But whoever was part of this study in '85 was
25 also a part in '77?

1 A. Yes. Yes.

2 Q. Now, it talks about odds ratios and 95
3 percent confidence intervals; does it not?

4 A. Yes.

5 Q. Do you know what those terms mean?

6 A. I don't know what the odds ratio means.
7 Confidence levels means that this does not occur by chance
8 in 95 percent of the people.

9 Q. And 95 percent confident in talking about
10 these odds ratios?

11 A. That's correct. Well, I don't know what odds
12 ratio is.

13 Q. If I told that you that odds ratio meant that
14 it was talking about the percentage of likelihood of these
15 symptoms appearing in this group of people at these levels
16 as opposed to the normal population. Or in this case
17 opposed to the lower

18 A. I think you'd have to ask an epidemiologist
19 about that.

20 Q. All right. They actually asked each
21 individual in this study whether or not they had these
22 symptoms both in 1977 and in 1985; correct?

23 A. Yes, sir.

24 Q. And this exhibit even has a questionnaire
25 that was used?

1 A. Yes, sir.

2 Q. One of the conclusions of this study, was it
3 not, Doctor, was that PCB levels in blood actually
4 decreased after the exposure has been removed or after the
5 people have been removed from exposure to the chemical?

6 A. Well, I'll have to go through it. Yes. They
7 had decreased, yes, sir.

8 Q. Between 1985 when they looked at the blood
9 levels again and 1977 when they first looked at the blood
10 levels, the blood levels had decreased?

11 A. Yes, sir.

12 Q. And would that be something you'd expect,
13 that after you're removed from the exposure that the blood
14 levels would decrease over the years?

15 A. Well, they ought to start decreasing as soon
16 as you were removed.

17 Q. Do you know what percentage the blood levels
18 decreased by over the eight years between the two times
19 when the levels were taken?

20 A. Well, yes. They say on page 21 that it went
21 down 90 percent in the high exposure group and 85 percent
22 in the low group.

23 Q. I'm sorry. On what page?

24 A. Beg your pardon?

25 Q. On what page was that?

1 A. 1521. That's about the third page.

2 Q. So over that eight years

3 A. It's right there, right before.

4 Q. I see it.

5 A. It says

6 Q. After those eight years, the blood levels had
7 gone down tremendously?

8 A. Yes.

9 Q. But they were still there. I mean, you could
10 still see blood levels in these people?

11 A. Yes. But I'm not sure what their absolute
12 value was, whether they were down to what would be called
13 a background level. But, you know, you're picking pieces
14 out of this, because right after we're talking about blood
15 levels there's that statement, "No clinical abnormalities
16 attributable to exposure to PCBs were observed." I mean,
17 it's really unfair to me for you to pick out little items
18 of this unless we look at it in the entirety.

19 Q. Well, obviously this is an exhibit, so the
20 jury will be able to look at it entirely, but I'm asking
21 you certain questions about it the same way Mr. Carney
22 asked you certain questions about it.

23 A. Okay.

24 Q. Now, let's talk about that. It says, "No
25 clinical abnormalities were observed." What does that

1 mean?

2 A. That means they couldn't find anything wrong
3 with them from the clinical point of view.

4 Q. Even though the people might have been
5 saying they had certain symptoms. For instance, I come in
6 and say, "I have headaches." There is no clinical
7 abnormality that can be observed when I say I have
8 headaches; is there?

9 A. That's right. But, again, when I stated
10 right out in the beginning this did not have any control
11 group. They are talking Say, pick poor appetite. The
12 low group, or in '77, they had .3, whatever they mean by
13 the odds ratio, and .3 in '85. I don't know if they
14 examined 200 office workers, a good control group, what
15 their symptoms of poor appetite would be. So certainly
16 these people responded to that questionnaire, but the
17 people if they gave that same questionnaire to people
18 who had never even heard of PCB or been exposed to PCB,
19 what they would say I don't know.

20 Q. Exactly. That's part of the problem with
21 this is because actually what you're looking at is big
22 apples and little apples; huh? You know, you're comparing
23 people who are highly who have very high levels of PCBs
24 in their blood with people who might have moderately high
25 levels of PCB in their blood?

1 A. And you are not comparing the symptoms of
2 these people with individuals who have what would be

3 Q. Normal?

4 A. normal levels.

5 Q. Exactly.

6 A. There is no true control group in this.

7 Q. Okay. In the laboratory tests that were run,
8 they did find that certain liver tests and certain kidney
9 tests were abnormal in the highly exposed or the high
10 level group; correct?

11 A. No. They found a There was no
12 difference

13 MR. CARNEY: Let me object. Are you talking
14 about the N.I.O.S.H.?

15 THE WITNESS: We're back on this.

16 MR. CARNEY: Okay.

17 A. The last sentence it said, "When the
18 prevalence of symptoms and overt clinical disease," overt
19 meaning it's something you can find, "were investigated by
20 exposure group, no difference between the groups could be
21 ascertained except for a positive association with GGTP."
22 That is a very sensitive liver enzyme. There has been no
23 evidence in here to show whether these people had had two
24 beers the night before, which would change GGTP. And a
25 negative association with urinary creatinine means

1 nothing. Creatinine is a negative. If it were a high
2 creatinine, you'd worry. But low doesn't bother you.
3 That has no clinical significance. So I would say that
4 the laboratory work in this looks pretty clean. So
5 there's a little high GGTP. But that's an extremely
6 sensitive liver function test. They did a half a dozen
7 liver function tests, and the others were all negative.

8 Q. Well, you talk about

9 A. So I would discount the GGTP.

10 Q. You talked about, Doctor And let's be fair
11 about this. You talked about maybe the guy might have had
12 two beers the night before.

13 A. I can't hear you, sir.

14 Q. Let's be fair about this. You talked about
15 the guy might have had two beers the night before.
16 Obviously in this kind of a study they control for that
17 kind of thing; don't they?

18 A. Oh, no, they don't. No, they don't. They
19 haven't said anything about it.

20 Q. I understand that. But over the size of the
21 study and the number of people that are studied, that is
22 built into the system; is it not?

23 A. Not necessarily. I don't think so. That's
24 why I'm saying that we didn't have an adequate control
25 group in this. And I'm also saying that this is one of

1 the five liver tests they ran. And the others were all
2 normal. So I don't believe that you pay I don't give a
3 great deal of credence to this GGTP elevation.

4 Q. What you're doing, Doctor, is to accept the
5 study for the negative results but not accept it for the
6 abnormal results?

7 A. No, I'm not.

8 Q. Is that not Wait! Is that not a fair
9 statement?

10 A. No, it is not a fair statement.

11 Q. All right. We'll let the jury decide that.
12 I'd like to talk to you about, if we could, Doctor, the
13 Yusho and Yucheng incidents.

14 A. Yes, sir.

15 Q. You talked about those on direct examination,
16 and you talked about the contaminated rice oil; correct?

17 A. Yes, sir.

18 Q. In the course of your reviewing the
19 literature on those two incidents, were you able to
20 determine the total amount of PCBs or the average total
21 amount of PCBs in the contaminated rice oil?

22 A. Probably was. I don't remember it offhand
23 now. I think it was written up someplace in there. I
24 haven't reviewed it lately. But I think the important
25 amount the important point is the amount of

1 quaterphenyls and the

2 Q. Do you remember

3 A. and the furans.

4 Q. I'm sorry. Do you remember giving the
5 deposition in the case of Brown versus Monsanto where Mr.
6 McCrea and Mr. Carney were here?

7 A. Yes, I did.

8 Q. Let me refer you to page 28 of volume two of
9 that deposition if I could. The question was asked The
10 question was with regard to the levels of PCB in the rice
11 oil. You answered at that time, "To the best of my
12 knowledge, persons consumed 195 to 3,375 milliliters of
13 rice oil, which contained 920 parts per million of PCB."
14 Does that Does that refresh your recollection?

15 A. May I see what I

16 Q. Sure.

17 A. I can't get over there. Yes, sir. I'd
18 really have to look up the articles first. I mean, this
19 transcription is a little confusing. It says, "To the
20 best of my knowledge, persons consumed 95 to 300 comma,"
21 then "3375 milliliters of rice oil, which contained 920
22 parts per million of PCB." I don't know what "95 to 300
23 comma 3300 milliliters of rice oil" Those figures are
24 confusing. I mean, I did some corrections on some of
25 these on this. We had troubles with the video. We had

1 troubles with the stenographer. We had troubles with Mr.
2 McCrea, too. But I'm not sure whether I whether these
3 were corrected by me afterwards or not.

4 Q. I understand. I understand. And all I'm
5 asking is if that refreshes your recollection with the
6 amount of PCBs in the rice oil. If it doesn't, say that.

7 A. Well, I don't know because it's confusing to
8 me, Mr. Murray.

9 Q. Does 920 parts per million of PCBs contained
10 in that rice oil sound about right to you? If it doesn't,
11 it doesn't.

12 A. It sounds about right. I'm not positive. I
13 would have to double check it. But I do not know what the
14 sentence before It doesn't make sense to me, the
15 sentence before, "195 to 300 comma," then coming a bunch
16 of numbers on milliliters.

17 Q. I understand, Doctor, and I'm not trying to
18 trick you with this.

19 A. Okay.

20 Q. I'm just asking you if that sounds about
21 right. If it doesn't, that's fine. If it does, then
22 we'll go from there.

23 A. It could very well be true.

24 Q. You testified on direct examination in your
25 opinion the problem with that rice oil was not the PCBs

1 but the furans and quaterphenyls that were contained in
2 the PCBs.

3 A. It was not only my opinion; it was also the
4 Japanese scientists' opinion. That was written up.

5 Q. I understand. I understand. How much Do
6 you remember what the percentage of furans and the
7 quaterphenyls were in the rice oil?

8 A. I don't remember offhand.

9 Q. If I tell you that in your deposition with
10 Mr. McCrea you said that it was between five and 18 parts
11 per million of furans, does that sound about right?

12 A. In the rice oil?

13 Q. Yes, sir.

14 A. It could be, yes, sir.

15 Q. So these people over the course of How
16 long was this, was this incident? Do you remember?

17 A. Months. Some months.

18 Q. Over the course of a few months, these people
19 consumed rice oil which contained between five and 18
20 parts per million of these furans?

21 A. Plus some quaterphenyls, which I don't
22 believe were quantified.

23 Q. Okay. What are quaterphenyls?

24 A. Beg your pardon?

25 Q. What are quaterphenyls?

1 A. It's got four benzene rings on it rather than
2 two in PCBs.

3 Q. That doesn't tell me anything.

4 A. Well, it's a contaminant of PCBs if they are
5 heated in a certain way.

6 Q. And you mentioned that in the normal
7 manufacture of Monsanto's PCBs that they were not
8 contaminated with quaterphenyls; is that right?

9 A. I don't believe I phrased it that way. I
10 think I said I saw no analyses showing whether there was
11 quaterphenyls or not.

12 Q. Okay. That's what I wanted to clarify.
13 There actually was never They were never tested for
14 quaterphenyls to your knowledge?

15 A. To my knowledge, but they might very well
16 have been, because I wouldn't have been privy to all of
17 the analytical tests they did. I do not know I do not
18 remember seeing it. It could very well have been, but I
19 don't remember seeing such analyses.

20 Q. What about furans?

21 A. Yes. There were several analyses of furans.
22 Earlier some Swedish workers examined German French and
23 Italian PCBs and found furans. They did not find any in
24 the Monsanto PCBs. This was a man by the name of Voss,
25 and it was probably the early '70's. Later on, either

1 right before I retired or right afterwards, Monsanto did
2 find some PCBs in their I mean, did find some
3 benzofurans in their PCBs. It was to the best of my
4 knowledge less than that was present in the Kanechlor, the
5 Japanese PCB.

6 Q. So although they were there in lower levels,
7 there were some in the Monsanto PCBs when they were tested
8 by Monsanto?

9 A. That's correct.

10 Q. In your opinion, Doctor, would those levels
11 that were found when they were tested by Monsanto be
12 representative levels of any one particular batch of
13 Monsanto PCBs?

14 A. Well, it was manufactured the same way, and
15 presumably I'd have to speculate. If I were to
16 speculate, I'd probably say, yes, it was representative.

17 Q. So in your opinion, on any

18 MR. CARNEY: Let me just record an objection.
19 I didn't know he was going to speculate. Object to the
20 speculation.

21 Q. In your opinion, Doctor, on any one
22 particular batch of PCBs over the course of the years that
23 they were manufactured, we could expect to find roughly
24 the same levels of furans in Monsanto PCBs?

25 MR. CARNEY: Objection to the form. I think

1 it would call for speculation.

2 A. I don't think I can answer that. I mean, I
3 don't I believe you'd have to ask a manufacturing
4 individual.

5 Q. Do you have any reason to believe that they
6 would not be there?

7 A. I'll have to answer it the same way. I'm
8 not I'm not I have no evidence to show it one way or
9 the other. In other words, I believe you'll have to ask
10 either a research chemist or a manufacturing individual at
11 Monsanto as to what their thoughts were as far as the
12 changing levels of furans in their product was concerned.

13 Q. Okay. Furans are polychlorinated
14 dibenzofurans?

15 A. By that I mean chlorinated dibenzofurans.

16 Q. They are extremely toxic; are they not?

17 A. They are quite toxic, yes.

18 Q. Can you estimate for me in teaspoons or pints
19 or quarts or any measurement you want to give me how much
20 furans were contained in that rice oil, that batch of rice
21 oil that was that these people in Yusho were consuming?

22 A. No, sir, I couldn't.

23 Q. It would be an awful small amount; would it
24 not?

25 A. It would be small.

1 Q. Less than a teaspoon?

2 A. Less than a teaspoon.

3 Q. That amount of furans caused problems for
4 roughly 1,000 people; correct?

5 A. Beg your pardon?

6 Q. That amount of furans caused health problems
7 for roughly 1,000 people; correct?

8 MR. CARNEY: Again, we're talking about the
9 Japanese

10 MR. MURRAY: The Yusho incident.

11 MR. CARNEY: PCB.

12 A. The Yusho incident. That along in
13 conjunction with the quaterphenyls, yes, sir.

14 Q. What were some of the problems found in those
15 people?

16 A. There were problems with pigmentation, skin
17 troubles, chloracne. They had I'm trying to think.
18 There were some digestive disturbances. I'm not There
19 were quite a varied amount of symptoms.

20 Q. Can you tell us any more than that?

21 A. I'm sorry. I didn't hear you.

22 Q. Can you tell us any more than that?

23 A. There was some reproductive problems in the
24 sense that some of the children had the children, the
25 babies that were born, had problems with the eruption of

1 their teeth.

2 Q. There were, in fact, birth defects associated
3 with this incident? There were deformed

4 A. It all depends. Birth defects means a lot.
5 It's different to every to other people. There were
6 not birth defects in the sense There were birth defects
7 in pigmentation of the babies and, as I said, poor
8 dentition, poor eruption of the teeth. Those were the
9 birth defects that were present.

10 Q. There were, in fact, babies born with teeth
11 already in their mouth; correct?

12 A. I believe so.

13 Q. And they were Some of these babies had
14 blackened teeth, they had blackened fingernails, blackened
15 pigmentation on their skin?

16 A. Yes. They had pigmentation, yes, sir.

17 Q. The adults had problems with nausea and had
18 problems with lethargy, they had problems with skin
19 eruption, blackened pigmentation, fingernails, teeth?

20 A. I don't know about the teeth in adults. I
21 know that they had problems with their fingernails, and I
22 do know that they had chloracne.

23 Q. And nausea?

24 A. They could very well have complained of
25 nausea.

1 Q. Headaches?

2 A. There were a variety of symptoms. I

3 Q. Joint pain? I mean, do you remember in these
4 articles those symptoms being talked about?

5 A. Yes. But I don't know how prominent the
6 symptoms were. Here we're talking 1,000 people. I don't
7 know exactly how many what percentage of people
8 complained of these various things.

9 Q. And, again, go back to the point we're making
10 before. Some of these people had these symptoms; some of
11 them didn't?

12 A. That's correct.

13 Q. Even though they all might have consumed this
14 rice oil?

15 A. Yes, that's correct.

16 Q. When PCBs are heated to certain levels,
17 chlorinated benzofurans could be created; could they not,
18 Doctor?

19 A. It all depends how they are heated. If they
20 are heated in a closed system, there may not, where
21 there's an absence of oxygen. You may not get
22 benzofurans, chlorinated benzofurans.

23 Q. If they are heated in an open system, you
24 can?

25 A. I did not hear you.

1 Q. If they are heated in an open system, you
2 can?

3 A. You can, yes.

4 Q. If a fire happens, you can get dibenzofurans?

5 A. Yes, sir.

6 Q. If the PCBs are poured onto molten metal, you
7 might get dibenzofurans?

8 A. You might or might not because there's a
9 certain window at which the dibenzofurans are formed, and
10 when you exceed that temperature they are broken down
11 completely.

12 Q. And we ought to, just to be fair to the jury,
13 make that clear. At one level temperature, these PCBs
14 might start creating dibenzofurans, and at a higher level
15 then the dibenzofurans are destroyed; correct?

16 A. That's correct. And at a lower level they
17 are formed.

18 Q. Roughly that window is what? Between 200,
19 300 degrees? And I'm not talking about I'm talking
20 about the window of opportunity, so to speak.

21 A. Yes, sir.

22 Q. It's about a 200 to 300 degree window there;
23 correct?

24 A. That's correct.

25 MR. CARNEY: We're talking Fahrenheit so I

1 understand?

2 A. Well

3 Q. You tell me. I thought it was centigrade.

4 MR. CARNEY: Well, I just want

5 A. That's not the absolute level, but there is a
6 window of about 200 degrees that dibenzofurans can be
7 formed, and if you exceed this upper limit they are
8 destroyed.

9 Q. Is it fair to say, Doctor, that when you have
10 a batch of stuff that is set on fire or that is exposed to
11 heat, part of that batch is going to be exposed to one
12 temperature and part of it is going to be exposed to
13 another?

14 MR. CARNEY: Is the batch PCBs?

15 MR. MURRAY: Yes.

16 A. Well, you've got two situations there. One,
17 you have the PCBs ignited, caught on fire. Are we talking
18 about that? Are we talking you have a flame under this
19 pot of PCBs and it's heated that way? I mean, there's a
20 difference between burning the PCBs and heating the PCBs.
21 What are we talking about?

22 Q. Well, I don't know, Doctor. And I guess what
23 I'm saying is almost in any situation where something is
24 exposed to heat, whether by fire or whether by hot or
25 whether by just sunlight, part of that material is going

1 to get hotter than other parts?

2 A. Yes. But still you've got two situations.
3 If you're boiling water, a pot full of water, obviously
4 there's going to be The water away from the flame is
5 going to be a little hotter, but then it circulates. When
6 it starts boiling, it all hits the same temperature.

7 Q. Eventually, yes, sir.

8 A. But then if you've got a pile of kindling and
9 it's ignited, there are going to be different temperatures
10 at some time in different parts of that flame. When it
11 gets quite a roaring flame, it all hits pretty much the
12 same temperature.

13 Q. Are you familiar, Doctor, with an incident
14 where a PCB transformer exploded and the residue of that
15 fire was analyzed? Do you know what I'm talking about?

16 A. You want to give me the city? I mean, when
17 you say "exploded"

18 Q. I think it was in New York. I'm not sure.

19 A. Well, there have been fires where the
20 transformer fire started outside the transformer and
21 during the course of this fire the fluid in the
22 transformer came out, leaked and burned, yes.

23 Q. And actually it was the soot on the walls
24 that was analyzed; correct?

25 A. Yes, that's correct.

1 Q. And both dibenzofurans and dioxin were found
2 in that residue; is that correct?

3 A. That's correct. But remember that this
4 particular transformer, dioxins do not come from PCBs.
5 Dioxins came from the trichlorobenzene in the transformer.

6 Q. Trichlorobenzene was one of the ingredients
7 of that transformer fluid that was manufactured by
8 Monsanto?

9 A. Yes. In transformers, but not capacitors.

10 Q. Dioxins are also a very toxic material; are
11 they not, Doctor?

12 A. Yes, they are.

13 Q. In fact, they are one of the most toxic
14 Including furans, they are some of the most toxic
15 materials in the world; are they not?

16 A. Well, they are certainly extremely toxic. I
17 won't be able to say they are among the most toxic in the
18 world, but they are extremely toxic.

19 Q. Are you aware of any chronic toxicity studies
20 that have been performed on chlorinated benzofurans?

21 A. No, sir, I'm not.

22 Q. What about on dioxins?

23 A. No, sir.

24 Q. So if somebody is exposed to those materials
25 at low levels over 20 years, so to speak, or even ten

1 years, we're not sure what that might do to them; are we?

2 A. No, we are not.

3 MR. MURRAY: We can just go off the record
4 for a minute.

5 (An off the record discussion was had.)

6 MR. MURRAY: Dr. Kelly, I appreciate your
7 time this morning, sir. That's all the questions I have.

8 THE WITNESS: Thank you, sir.

9 MR. CARNEY: Dr. Kelly, thank you for coming
10 in. I have no further questions either.

11 THE WITNESS: Thank you.

12 MR. MURRAY: That's it.

13 _____
14 R. Emmet Kelly, M.D.

15 Subscribed and sworn to before me this _____ day
16 of _____, 1990.

17 My commission expires _____.

18 _____
19 _____
20 Notary Public
21
22
23
24
25

NOTARIAL CERTIFICATE

STATE OF MISSOURI)

)

CITY OF ST. LOUIS)

I, FAITH A. OLLIGES, a Registered Professional Reporter and a duly commissioned Notary Public within and for the State of Missouri, do hereby certify that there came before me at the offices of Communitronics Corporation, 1907 South Kingshighway, St. Louis, Missouri,

R. EMMET KELLY, M.D.,

who was by me first duly sworn to testify to the truth and nothing but the truth of all knowledge touching and concerning the matters in controversy in this cause; that the witness was thereupon examined under oath and said examination was reduced to writing by me; and that this deposition is a true and correct record of the testimony given by the witness.

I further certify that I am neither attorney nor counsel for nor related nor employed by any of the parties to the action in which this deposition is taken; further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto or financially interested in this action.

IN WITNESS WHEREOF, I have hereunto set my hand and seal November 8, 1990.

My commission expires March 21, 1993.

commission expires March 21, 1993.

commission expires March 21, 1993.

commission expires March 21, 1993.

NOTARY PUBLIC

I CERTIFY THE FOLLOWING TAXATION TO BE TRUE AND CORRECT:

Tax for Husch, Eppenberger, Donohue, Cornfeld & Jenkins

100 North Broadway

St. Louis, Missouri 63102

Org & 1 cc	\$902.10
Attendance	100.00
Jurat	___E1.00R
TOTAL	\$1003.10

Murray Law Firm

650 Poydras Street, Suite 1450

New Orleans, Louisiana 70130

Carbon copy	\$320.10
Delivery	___E2.00R

Transcript Word Index

[& - 1942]

&	12 (cont.)	138	160
& 2:11 261:21 290:8,12	96:16 104:10,16 138:19 172:9	197:6,9,11	159:25
0	120 164:5 166:3 184:2	14 21:20 96:8 100:4,4,7 101:3 101:9,11,13,21 200:21 205:10,17 206:2	16th 203:19,21
02008 1:10	121 164:5 166:3	140 158:7,18	17 95:19 103:21,25 104:11,12 104:21,25 199:7
05 176:23	122 166:9,19	1400 26:24	17th 199:13 219:11
1	1232 127:21	141 199:6 204:11,17 205:20	18 16:7 34:17 79:17 104:14,15 104:15,15 176:21 217:19 277:10,19
1 1:1 56:15 57:3,8 58:20 59:2 59:10 107:21 126:14 159:25 201:17 207:25 290:12	1242 134:7 144:3 146:14,19 147:6 151:3,17 182:14 184:19 185:11 186:20,24 188:6 191:11	141a 199:7,8 259:5	180 148:10 200:3 260:2
1,000 169:17,19 281:4,7 283:6	125 148:1	142 200:10 202:9 258:8	1890's 46:13
1/4/73 125:20	1254 144:3 146:5,13,18 147:6 152:10,12 156:24 157:3,4 172:9,14,20 182:14 186:21 186:24 189:12 191:11 239:18	143 201:10 202:9	19 104:14,16 114:18 164:14 166:16
10 30:21 79:3 91:9 94:1,14,18 108:11 197:21	1260 172:13,17,18 173:22 182:13 235:13 239:15,16	145 203:15 204:18,20 205:22	1907 1:21 289:9
10/1/44 132:6	1268 141:23 143:4 198:2	1450 2:7 290:18	1930 57:10
100 2:11 35:17 119:15 122:24 123:11 148:11 164:18 290:9	127 166:9,19 228:25	146 205:6 256:6	1930's 42:9 46:15 47:11 177:24
100.00 290:13	128 175:6 178:6	14th 200:13	1931 59:12
1003.10 290:15	129 180:2	15 11:13 76:17 95:5,11,16 96:8,17 100:4,25 101:3,7,9 101:11,22,24 102:13 108:11 141:9 217:19	1932 4:21
1016 127:5	12th 189:8	150 60:7 152:11,14 158:1,4,9 158:14 183:9 217:3,18,18	1933 5:9 27:17 47:16
1029 63:24	13 70:21 71:2 95:22 98:1,2,3,6 98:9,12 104:18	151 150:25 217:3,22	1934 138:13,21
1030 65:15,16	130 182:4 186:3,17,24 191:2	152 217:4,19	1935 47:15 57:19
106 85:17,19 86:1	131 185:21 187:3,7	1521 270:1	1936 4:4 9:12,22 12:13 21:24 27:15 28:1 58:21 62:11 112:24 113:12 224:25 230:6
1060 235:11	132 189:2 190:23	153 70:6,11,12 152:13 219:5 220:6	1937 30:11 58:3 63:1 66:6 72:16 72:25 92:8,15 93:2,6 160:6 226:9
11 91:24 93:1 94:15 104:10	133 191:2,15	154 158:10 223:8	1938 13:21 47:8 58:10 141:9 142:19 175:8,18,19 176:17 178:5
115 91:14 148:1	134 191:19	1546 267:2	1939 58:18
116 161:16,19 163:16	135 118:21	158 70:13,15	1941 98:4
117 164:4 166:3	136 196:8	15th 27:15 141:10	1942 4:6 58:22 59:4
118 164:5 166:3	137 216:21	16 63:6,7 98:7 102:7,18 103:19 106:11 145:20 157:19 204:21	
11th 92:8			
12 76:17 77:5,5 95:4,11,16,18			

1945 13:21	1975 101:8	23rd 107:16	3300 275:23
1946 4:7 10:12 11:6 27:6 91:16 91:17	1977 27:18 222:11,15 267:10,13 267:21 268:22 269:9	24 1:18 107:13 108:2,12 139:25 140:1 155:15 223:11	3375 275:21
1947 17:15	1978 203:19	245 47:24 55:11	33a 108:21,24 109:11
195 266:14 275:12 276:15	1985 267:11,21 268:22 269:8	25 1:19 76:22 78:8 108:24 109:11,15 180:13 184:11 216:20 246:6,6	34 111:1,4,14,15,18,19,22 113:11 130:25 136:21,22 136:23
1950 163:9	1987 84:13	250 148:14	35 111:1,6 113:2,11
1950's 226:7	1988 87:23	25th 180:5,9	36 63:1,12 111:2,7,14 112:4,4 112:13 113:11
1951 161:25	1990 1:19 89:13 90:2 216:20 288:16 289:25	26th 217:1	36a 114:8,12
1952 199:13	1993 290:1,3,3,3	27 79:16,16,17	36b 114:9 115:12
1954 136:19 228:24	1st 98:20	28 191:25 275:8	37 27:3 49:1 58:2 63:1,9,13 92:20,23 116:13,16 117:9 117:19,19 118:5 197:10,12 226:15
1955 6:3,6 99:11 144:10 186:11	2 57:13 60:23 62:24 65:10,10 107:21 126:14	280 60:11	38 10:13 32:23 47:9 118:16 141:8,10 176:22 226:9,15 259:24 261:15
1956 6:6 98:20 180:5,9,13	2,000 125:21	288 69:4	39 47:9 118:16
1957 155:1	20 11:13 47:17 63:5 76:21,22 84:24 88:20 89:21 103:25 104:14,16,21,25 105:8 108:22 145:3 159:17 164:17 176:21 207:8 243:5 243:10 262:23 266:11 287:25	28th 175:8 191:21	3rd 240:9
1962 196:16	200 26:23 148:14 158:25 184:2 264:25 265:2 266:5,7 271:14 284:18,22 285:6	297 69:7	4 58:5,6 66:11,23
1963 114:18 155:1 164:14,15 200:13,21	200,000 41:25 42:2	3 7:1 57:24 66:11 67:7,9,17 68:17 69:1,2,8,11 72:8 73:4 107:21 126:14 271:12,13	40 4:12 12:4 15:9 16:6 32:24 82:25 118:16 152:2,3 244:1 261:15
1964 6:4 115:14,18 217:1	209 207:25	3,375 275:12	40,000 134:7
1965 163:10	21 105:6,9,11,18,19 106:4,11 107:5,11 124:2 269:20 290:1,3,3,3	30 60:4 188:24 243:6,10	40's 15:18 39:8 52:22 55:16 134:12 226:19 227:10
1967 107:16 162:1	210 158:19,23	300 73:1,3 275:20,22 276:15 284:19,22	41 118:16 176:12,14
1968 166:18 203:21,25 204:21 217:19,19	214 151:24	30's 47:7 63:4 65:6 177:25 227:5,10 230:15,21	42 10:13 118:17 119:15 122:24 123:11 127:21 153:14 154:4 157:4 188:8
1969 187:10 189:8 190:25 191:7 197:21 205:10,17 206:2 219:11 220:7	22 105:6,8,9,22 106:4,13 107:5,11	30th 196:16	43 119:5,19 121:25 122:3,5,13 122:21,23 123:6
1970 191:21,25 201:17 223:11	23 62:13 63:5 77:6 78:1 79:15 107:4 108:21 182:11	31 161:22,23 163:24	44 119:5,22 121:25 122:14,21 122:21 123:7
1971 102:24 166:17,22		312 118:21 203:22 206:4,14	
1972 29:20 30:22 75:22 77:24 79:3		320.10 290:21	
1973 125:24		33 109:15 175:24	
1974 15:19 22:5 27:9,22 82:10 113:12 130:21 135:5 230:6			

4465 143:10	6	700 247:10	9:30 216:19
45 119:5,25 120:6	6 70:24 78:17	70130 2:7 290:19	90 269:21
46 27:3 106:14 119:6,19	6,000 12:14	70's 127:6 171:16 221:25 222:12 228:21 229:6 278:25	902 1:10
47 123:22	60 146:9,10	71 149:14 150:3,3,6,9 151:12 192:14	902.10 290:12
47a 120:19,20 121:9,13	600 26:24	72 30:16 77:21 154:20,23 156:2 160:13 161:2	90's 77:13
48 188:7	60's 120:20 207:13 209:9 228:21 229:6,6 232:8	73 29:20 30:16 75:22 125:21 125:25 129:12,15,16	91 161:10
4th 98:4 102:24	62 127:16,17 161:7	74 17:20 18:15 27:3	920 275:13,21 276:9
5	625 200:25 258:13	75 18:16 26:22,23 95:22 98:21 222:12	95 39:1 267:5 268:2,8,9 275:20,22
5 56:16 57:3 58:10,20 59:2 66:11 67:10 68:21,25 70:3 70:4,9,10 72:2,3,12 146:17 187:10	63 121:3 122:1 128:20	76 18:16 95:22	a
50 12:4 16:7,8 123:21,25 124:20 125:17 159:12,25 159:25,4,6,8,14 160:1 231:6,7 262:23	63102 2:12 290:10	77 222:12 267:23,25 271:12	a.m. 216:19
500 35:18	63105 3:20	78 157:5,5,7,8	a.m.a. 8:5
50's 18:12 39:8 52:21 226:17 231:3,5 232:8	64 116:16 117:9 121:3 124:14 124:15,19 125:7 126:2,5 127:13 130:25	8	able 5:20 17:6 41:13 53:20 124:19 138:24 148:9 208:17 215:9,14 233:10,19 244:24 267:20 270:20 274:19 287:17
51 126:9	65 68:24 69:24 70:19 125:23 132:1,3,3 134:10	8 23:23 87:16,17 261:20,25 289:25	abnormal 77:22 90:9 272:9 274:6
52 126:9	65.0 69:6	80 8:15 12:15	abnormalities 90:5,6 270:15,25
53 126:9	650 2:6 290:18	800 168:25	abnormality 77:25 90:8,9 271:7
54 126:25 127:7,22 136:20 151:3 153:14 154:3 182:14 188:6,8	66 127:17 136:15,16 138:12 140:12	80's 77:12,13	abrasives 26:14
5460 141:25 143:10	665 3:19	82 154:21,23 156:2 160:13 161:2	absence 83:7 131:6,9 193:17,18,19 283:21
55 114:3 126:25 127:11,12 144:11,12 152:14 160:6 176:22	67 107:17 141:2,3 142:1	83 151:22	absolute 270:11 285:5
55a 127:1,12	68 69:24 70:21 125:23 127:22 143:19,21,23 145:5 148:23 149:10,12,15 150:4 192:13	84 161:10 163:15	absolutely 56:24 133:2 143:7
56 127:11,15,17,17	69 107:18 143:19,21,24 145:5 148:23 149:12,15 150:4 185:24 192:13	85 267:23,24 269:21 271:13	absorbed 103:11 231:10 242:10
57 128:6,8,9 161:7	7	88 88:16	absorption 205:3 230:18 242:8 250:20 257:23,25 258:6
5th 191:7	70 60:7,11,12,14 143:19,21,24 145:6 148:23 149:11,13,18 149:19 158:5,6,9,17,19	8a 89:4 264:13	academicians 153:5
	9	9	academy 8:4
		9 91:8,9 94:1,14,18 102:13 108:11 245:2,3,3,8	accept 274:4,5
			accepted 5:23 109:5 146:17 148:24

[accepted - analyzed]

accepted (cont.) 153:25 154:1 239:16 249:16,17 265:10	adapt 148:9	advise 23:11	alabama (cont.) 74:22
access 41:11	adapted 109:5	advised 182:15	alcohol 21:10,10
accident 232:17	add 17:25 70:18,19 123:16 229:5	advisory 9:15	alcoholic 79:13
accidental 103:5,6 178:14	added 4:5 97:8 106:18 171:23	affiliation 88:23 89:1	algae 214:11
accidentally 171:7,20	addendum 121:14 124:9	afternoon 1:20	allay 76:5
accompanied 47:21 110:20	adding 40:10,13	age 3:11 6:11,11 16:10 79:24	alleged 22:25 154:11
accounts 45:17	addition 35:13 38:16 75:4 97:1 122:16	aged 78:1,1	allis 42:19 101:21
acid 26:21 78:3	additional 121:15 123:8	agencies 217:9	allocation 134:5,7
acknowledge 101:10 102:2	additions 96:19 208:11	agency 88:3 183:2	allow 153:5,6 201:8
acknowledged 150:14 239:16	additive 167:20,20,21,23 229:4	agent 54:21 168:18 182:25 246:18,20,23 247:3,4	allowed 103:12,16
acknowledges 101:13	adequate 273:24	agents 10:25 43:17 44:13 162:18	al amalgamation 16:1
acne 47:18,22 51:14,17 57:24 93:11 248:14	adequately 150:16	ages 16:5	altogether 126:6 221:2 222:16
acneform 57:20	adhesive 94:22	ago 52:22 62:15 79:17 174:19 180:11 182:18 259:25	aluminum 9:6
acquaintance 179:11	adjourn 215:9	agree 33:12 56:18 85:12 138:4,9 173:12 238:17 253:21	american 5:18 7:19,25 8:1,3,4,5,11 8:12 23:6 146:15 151:7 152:22 167:10 189:15 199:12 259:6
acting 224:8	administration 153:20,21 167:17 168:2 175:22	agreed 3:1 138:7	americans 148:16
action 204:25 219:16,17,18,22 220:7 224:2,4 230:16 232:4 289:20,23	administrative 115:2	agricultural 9:18 41:24 84:20 218:9	amount 5:21 12:1 20:23,24 21:8 25:6 68:7 82:15 83:8 103:18 147:14 156:23 158:1,15 159:15 229:12 255:1 274:20,21,25,25 276:6 280:23 281:3,6,19
active 8:16 63:9	administratively 40:25	agriculture 165:16 217:10	amounts 169:2
activist 222:22	administrator 114:14 179:11 180:6 189:6 191:1	ahead 86:18,19 167:14	analogy 71:18
acts 232:5	adolescents 6:14	air 11:22 58:15,16,16 98:24 99:3,16 146:8 176:24 177:1 177:8,12 178:4 180:21 181:12 230:1 260:14,17	analyses 77:20,20 278:10,19,21
actual 134:18	adopted 153:15	airline 258:19	analysis 77:8 89:13,19
acute 46:20 49:22 59:15 86:3 87:4,6,8,10 135:8 154:25 155:4,5,18 156:14,15,16,20 156:21 159:4,8,7 162:8,17 164:17,18 196:22,24 198:10 204:1 226:23 227:1 228:1,2,3,3,7 229:15,18,22 231:12,14,18,21 232:3,23 232:25 247:18,21,22,22 248:2,3 249:18,18 250:10 250:23 251:18,21 261:15	adopts 152:20	airplane 43:14 258:19	analytical 11:21 17:10 208:9,11 210:3 211:4,11,15,20 278:17
	adult 6:12	airplanes 43:15	analyze 263:22
	adults 6:14 282:17,20	al 1:6	analyzed 286:15,24
	adverse 33:5 261:3	alabama 25:18 26:3,11 27:1 28:11 28:22 31:23 32:25 62:7,8 62:21 63:4 64:25 65:5 74:4	
	advertising 115:6		
	advice 37:8		

anhydride 245:4	apparatus 65:25 66:2	arizona 5:13	askarel 98:5 100:10,12,13,17,21,21 100:23 101:1 102:22
animal 14:1 22:20 60:6,9,10 88:7 88:11 123:15 135:14,23 136:5,11 140:5 159:19 176:22 192:5,20 200:24 201:3 214:8 227:23 231:22 232:14,14 233:20,25 234:1 234:10,14 239:17 262:4	apparently 133:15 258:11 260:1	arkansas 10:21	asked 36:9 73:20 109:6 156:15 165:24 183:7 192:24,25 193:1 199:13 200:24 202:8 206:14 212:25 217:1,12 255:24 256:3 258:11 268:20 270:22 275:9
animals 20:20 60:14 66:14,15,16,25 85:10,11 93:7 135:19 136:8 145:12,14 146:1 151:5,17 152:5 159:14,16,17,19,24 159:13 167:14 172:25 229:20,23 233:9,16,17,19 234:8,15,18	appearance 63:20 64:1	arm 89:8	asking 35:16 49:10 54:3 67:8 186:1 189:9 205:24 270:20 276:5,20
anniston 25:18 26:3,11,15,22 27:1,1 27:13 28:11,14,22 29:22 30:5 31:22 32:25 62:6,8,20 63:3,12,13 64:25 65:5 70:6 74:3,12,14,21 115:16 137:13 220:16	appeared 55:14 196:23	army 11:1 58:22	asks 180:18,19 203:22 205:14 257:21
annual 16:3 84:13	appearing 268:15	aroclor 43:25 44:6 92:13,24 93:8 93:18,20 95:2 96:2 99:10 111:4,8,23 114:16,22 127:5 127:19 132:7 144:3 151:2 153:13 164:9 183:5 184:19 185:11 186:20,23 187:5 188:6 191:11 192:13 198:2 199:15 200:4	aspect 17:9,19 20:10 24:5 31:1 97:9 201:25 223:23
annually 16:8 23:15	appears 92:10 93:1 94:7 110:10 176:23 181:17 188:3	aroclors 44:5,5 91:13,20 92:5,12 93:11,15,17,17 96:16 98:15 98:16,18 114:17 115:21 117:6 127:21 134:4 139:9 156:1,5,6 180:19 199:13 220:22	aspects 19:5 20:5 30:17 33:9
answer 30:9,20 36:16 37:14 39:20 39:25 47:14 56:9 112:22 133:17 207:1 244:15 254:17 256:15 259:14 280:2,7	appetite 271:11,15	arose 139:13	aspiration 144:5
answered 275:11	apples 71:6,7,17 271:22,22	arranged 99:8 210:5 218:25	aspirin 146:10,11
anybody 32:13 33:23 36:4 39:11 73:15 95:1,2 97:24 105:1,1 107:6,8 108:8 132:19,20 159:6 175:16,21 196:4 207:6	application 35:10 133:25 188:16	arsenals 10:20	assessed 89:24
anybody's 21:11 77:20	applications 42:12 91:13 94:21	art 115:7	assistance 101:14 102:3
anymore 52:20 213:22	applied 176:5	article 57:17 58:6 59:11,13,14 60:1,23 62:24 65:9 67:18 71:13,16,23 72:1,2 85:15 85:25 86:12 87:18,22 88:16 136:17 138:9,11,13 141:11 142:8 150:6,12,22 179:2 182:23 183:1 193:22,23 225:4,5 237:20,21,25 238:2 239:6 250:24 261:21,23 263:22,23 266:2	assistant 4:21 6:23,25 7:6 8:10 40:20
anyplace 52:10	appointed 209:3 222:23	articles 7:13,17 14:6 21:22 22:20 23:8 46:20 58:20,25 59:2 61:9 66:10 131:23 150:13 193:21 207:25 215:5 239:1 239:11 251:7 262:13 263:16,21 264:2 265:18 275:18 283:4	associate 8:21 256:22 263:17
anytime 75:7 140:15 183:8	appreciate 56:24 288:6	ascertained 272:21	associated 8:24 19:15 62:15 83:10 85:16 86:5,10 87:14 184:13 184:19 185:10 258:5 282:2
anyway 49:7 55:18 78:24 84:9 156:11 254:1	apprehensions 76:6	aside 197:13 216:21	associates 161:24 162:3,6 163:22 192:16
apa 88:1	approached 107:8		association 5:19 7:20 8:1,3,4,6,7 9:16 9:19 22:23 23:7 90:18,19 153:18 189:15 265:21 272:21,25
	approval 20:3 32:13 134:11 238:5		assume 54:3 262:12
	approve 32:5 92:15,22 96:15 104:19 110:10 117:15 132:22 219:21		assumed 64:6
	approved 5:16,18 20:10 34:13 92:24 93:2,5,6 96:19 97:24 115:7 134:12 154:6		asterisk 117:21
	approximately 63:2 76:19 81:9 260:2		ate 169:10,11 171:4,7,20
	april 115:18 191:21,25 203:19 203:21 204:21		atlanta 85:4 225:5
	aquatic 123:14		
	archives 57:18		
	area 58:14 207:6 222:10		
	areas 47:19 244:15 248:17		
	argument 216:17		

atmosphere 155:17 198:23	awful 13:21 16:21 21:2 38:24 45:8 240:9 246:5,9 250:9 280:23	basically (cont.) 228:13	believing 231:1
atoxic 49:22	awhile 22:17 48:21 174:23	basis 18:23 74:5 91:17 131:5,6 141:10 153:12 193:14 238:3	bell 245:8
attaches 256:11	axe 154:8	batch 279:12,22 280:20 285:10 285:11,14	bellows 55:21
attempt 195:20 237:3	axle 247:2	bath 65:20 138:24	belong 7:23 211:11
attempted 256:15	b	battery 77:1,4 125:2 155:5	belonged 7:24 39:2
attend 66:6	babies 281:25 282:7,10,13	baylor 7:11	bench 14:17,17
attendance 290:13	baby 21:19	beagles 174:6	benefit 44:17
attended 72:24	bachelor 4:19	bear 134:1 163:20	benefits 44:15
attending 72:15	back 9:10,22 19:7 41:25 62:11 63:4 68:21 72:25 93:6 94:3 109:8 122:1 123:20 129:15 133:23 134:11 138:21 143:21 152:14 175:18,19 186:2 212:1,2,15 217:7 219:1,2 230:14,21 238:1,9 248:21 250:3 259:16 272:15 283:9	bearing 8:21	benignus 196:19
attention 130:16 205:5	background 4:16 211:23 266:9 270:13	bears 133:11	benzene 46:25 48:6,6,7,8,9 57:9 64:9,11,14 65:1 68:3 138:5 226:3 278:1
attitude 224:1	bacteria 213:11,12	beers 21:12 272:24 273:12,15	benzofurans 279:3 283:17,22,22 287:20
attorney 289:18,21	bad 45:14 64:18,19 65:1 79:18 103:8 137:22 138:5 143:9	beg 63:22 161:14 226:12 235:25 249:13 257:1 264:16 269:24 277:24 281:5	berkeley 215:24
attributable 29:10 90:5 91:4 270:16	bag 59:14,15 145:14,14 156:11	beginning 29:7,8 175:20 192:14 225:20 271:10	best 53:11 54:22 105:5 130:19 136:2,25 170:16 172:6 194:14 201:23 208:4 227:13 275:11,20 279:3
august 87:23 88:16 217:1 223:10	bake 96:4	behalf 1:18 36:11	better 122:22 125:12 137:1 153:17 163:11 212:16
author 57:7 132:5	baking 167:23	beings 140:4 253:3	beyond 45:25
authority 33:9 200:16,18 201:16,18 202:23 207:5,15,20,2	ball 171:1	belgian 208:19,20,21	bi 143:11
authorized 5:8	ballpark 160:15	believe 6:3 9:11 18:12 23:14 30:22 36:13 40:9 42:2 55:18 56:17 63:8,14 69:15 81:24 82:4 84:20 110:15 126:1 129:16 130:3 140:17 144:13 151:22 173:3 174:22 175:16 182:13 187:22 188:7 194:25 200:3 207:25 212:11,15 216:6 229:1 230:9 236:23 238:22 239:15 241:17 244:8 251:6 252:1 258:25 261:21 263:6 274:2 277:22 278:9 280:3,5 280:9 282:12	big 36:5 42:18 45:6,6,8,9 47:2 47:12 71:5 103:24 113:9 116:15 130:8 145:2 157:13 157:17 180:25 194:1 203:3 203:8,8 271:21
automobile 97:2	barnes 8:22,24	believed 76:7 209:23 210:24	bigger 194:2 195:12
available 14:6,9 46:15 59:3 83:15 150:17,20,20 193:23 194:5 207:25	barrel 125:23		bill 38:19,20 143:8 167:25 220:14 226:14
average 266:9,10 274:20	based 54:7 83:1,2 149:7 207:23 207:24 239:1,1		billion 77:19 264:25 265:3 266:11 266:14
avoid 53:14,16 106:25 107:1 112:2,15,15 113:5,6 116:8 118:10,11 119:15 124:25 125:1 128:14,15 182:19	basic 59:16,16 97:22 106:19,21 106:23,24 164:2		bindschauler 189:5
avoided 103:11 121:16 178:12 181:24 205:2	basically 18:6 22:18 127:25 128:2		bio 164:8,13 165:4,19,20
avoiding 122:17 194:7			
aware 80:12,15 171:2 236:13,19 246:17 287:19			

[bio - calculated]

bio (cont.) 166:14,16,20 192:11,12,19	blown 80:5	break (cont.) 202:3 213:19 216:15	bud 203:12
biodegradability 218:19	blowup 111:13,21 112:5,7,11	255:21	build 18:14
biodegradable 209:24 213:8,9,23	blue 120:16	breakdown 258:12	building 18:15,25 43:20 59:17 145:3
biodegradation 202:2,2	blues 120:17	breaking 137:11	built 196:1 273:22
biodegrade 220:23	bluff 10:21	breaks 202:3	bulletin 35:2,5,23 92:24 94:25
biodegrading 214:2 218:16	board 5:15,16,25 6:2 8:11	breathe 72:22 130:14 145:18 204:6	102:21 103:2 105:23
biphenyl 111:25 156:8	bock 219:25	241:22 260:13	107:15 108:6 187:5
biphenyls 84:16,17 123:2 190:4,9	bodily 93:10,14	breathed 54:15 200:4 204:24 229:11	bulletins 23:4 35:1,10,11,14 91:19
bird 123:14	body 18:8 232:6,19 242:5,10	229:16	91:21 92:16 93:20 94:17
birds 76:3 97:12 209:13 214:14	248:18,22,23	breathing 21:20 53:17 107:1 112:15	95:7,15 96:21 97:10,19
214:16 216:2,6,8	boil 198:16	113:6 118:10 122:17 125:1	102:14,15 104:2,8,21,23
birth 282:2,4,6,6,9	boiling 147:21 148:2 286:3,6	128:14 145:12 242:14	105:4,12 106:4,15 107:3
bit 25:4 28:15 30:16,21 47:8	boils 148:10,11 249:3,4	243:4	108:10,12 133:25,25
74:25 84:3 122:20 169:13	booby 160:8	brief 40:8 75:3 143:22 170:5	188:15,16,16 193:6 195:15
170:4 171:16 202:14 227:2	booklet 130:10,10	179:25 255:23	195:19 207:17
227:25 247:15	booklets 92:13,24	briefed 219:13	bum 48:9 64:9,10,11,14,18 65:1
black 120:15 249:5	born 281:25 282:10	briefly 6:20 57:4,15 63:16 89:16	bumped 48:25 209:1
blackened 282:14,14,14,19	bother 273:2	102:25 220:4,6	bunch 35:3,5 45:12 133:24 139:4
blackheads 51:1 248:24 249:6	bothering 233:17,20	bring 187:2	173:14 178:16 276:15
bladder 38:12	bottom 70:7 186:12 209:12 213:10	brinker 141:11	burn 31:9
blew 15:5	213:13,13,19	broad 253:18 254:13,16	burned 31:10 123:19 219:2 286:22
blind 51:1	bought 27:15 28:7 47:15 48:13,15	broadway 2:12 290:9	burning 285:20
block 59:17 203:13	49:13 55:5 61:4,22 105:1	broke 162:4	busch 45:9
blocked 51:19	226:5	broken 209:24 284:10	business 73:9 100:2 163:1 169:16
blood 21:5 29:9 77:3,8,10,19,21	box 145:13	bromine 84:19	171:10 174:20
78:5 79:12 89:21 159:24	brain 237:24,25	brother 73:8	busy 193:3
264:25 265:9,10,12,13,15	branch 6:8,16 10:15,22 200:15	brought 24:13 211:9	butter 15:8 21:1,2
265:25 266:6,10,15,17	brass 219:11,16	brown 275:5	buy 16:1
269:3,8,9,10,13,17 270:6	bread 167:23	brownish 49:5	buying 61:19
270:10,14 271:24,25	break 40:6 75:2 108:17 179:24	brussels 207:17 208:20 215:2	c
bloomington 89:15,17 90:3 154:1 184:13		buck 19:5	cakes 169:5
184:16,18 185:9,10 186:9		bucked 19:16	calandra 165:9 167:17 192:10
blow 85:19 128:8,9 223:15 245:3			236:14
			calculated 159:5

[california - charge]

california 215:23,24 216:2,7	carbonless 43:11 221:5	catches 44:24	certain (cont.) 123:14 132:24 133:1,3
call 13:10 19:6,13 25:19,25 31:10 34:5,7 52:23 77:5 134:6 148:8 158:22 164:18 164:19 190:13 196:16 248:3 264:9 280:1	carbons 41:5,6	cats 145:15	148:25 159:20 255:25 256:3 263:17 270:21,22 271:5 272:8,8 278:5 283:16 284:9
called 8:12 10:7,18 18:3 22:15,22 27:16 28:18 44:11,12 46:8 53:3 57:20 58:7 60:18 67:25 68:1,9,18 71:23 72:7 89:8 91:12,20 104:25 152:22 159:11 162:3,14,14 162:14 164:19 168:11 171:11 172:18 176:17 182:13 188:17 207:2 222:19 270:12	carcinogen 239:17	caught 285:17	certainly 21:1 27:5,21,24 34:3 42:15 61:8,25 62:11 80:3 85:10 92:23 102:17 107:7 108:7 108:15 113:8 140:15,23 141:1 160:24 190:8 192:25 193:25 194:4 200:2 206:25 207:12 212:3 223:1 259:17 262:23 271:15 287:16
calling 41:14 72:5 173:13	care 28:18 30:6 93:16 123:3,16 225:6	causally 86:5	certainty 54:8 82:11 130:22 193:10
calls 19:16,24	cared 193:24	cause 1:10 21:9 50:16 63:15 97:2 97:3 137:4,11 138:3 171:21 174:14 176:24 235:10 239:17 247:24 249:9 260:8 260:25 261:8 289:13	certificate 289:1
camera 85:23	careful 65:19	caused 38:23 47:22 49:18,20 50:21 55:1 63:17 64:16 138:5 163:25 166:3 224:3 235:4 265:15 281:3,6	certified 5:15,16,25 6:2,4
cameron 224:11	carney 2:10 3:14 40:6 56:25 70:10 86:25 93:16 125:4,11,16 207:5,9 216:14,18 224:12 241:5 244:10,14 251:4,13 252:6,8 254:11,15 255:2 261:24 262:1 263:19 264:7 264:9 270:21 272:13,16 275:6 279:18,25 281:8,11 284:25 285:4,14 288:9	causes 173:22 205:1	certify 289:7,18 290:6
cancer 7:19 38:23 39:9,14 40:3 172:7,13,14,19 173:9,19,22 173:23 218:4 235:10,17,20 239:19 244:8,21,25 245:16	carol 2:10	causing 64:6 97:7 239:21	cetera 94:24 122:18 123:16 213:21
cancers 172:12,25 173:13 235:12 245:10	carolina 89:9	caution 111:7,7 112:14 113:5 117:11	chain 216:11
capabilities 87:21	carried 10:1 20:8 24:17,18 41:8 42:7 83:9 118:4 155:1 201:9 218:10	cautionary 117:15 118:17 119:8 127:25	chairman 8:10 9:14,17 220:1
capable 224:8	carry 42:6 43:12 91:14	cautions 118:3	chalmers 42:19 101:21
capacitor 81:21 96:3 117:4 124:1 183:17 200:5	cars 96:1 129:4,5,6	cc 290:12	chamber 96:4
capacitors 42:13,14,17 44:16 124:2 183:13,22,23 221:15 287:9	case 22:24 23:4 49:25 55:15 60:19 68:13 71:7,8,11 83:7 131:7 183:3,4,6 193:18,18 224:19 228:10 248:16 268:16 275:5	cease 222:13	chance 56:21 268:7
capacity 4:5 11:5 59:11	cases 22:21 38:17 51:22 52:10 53:8 54:13,16 65:8 67:24 137:12,13 181:25 244:7 261:3,13	ceased 222:15	change 20:14 53:16 97:9 131:20,22 149:4 160:13 163:11,25 166:8 255:21 272:24
caps 178:13	casey 194:22	cecil 1:6 57:25	changed 10:9 20:13 48:5,8 97:15 125:22 146:15,15 148:22 163:3
car 113:22,23	casting 43:14 246:24,25	cellophane 139:24	changes 23:23 58:7 90:24 97:16,17 249:6
carbolic 26:21	castings 181:18	celsius 148:8	changing 280:12
carbon 43:11 47:1,2 66:17 221:5 290:21	catastrophe 222:6	center 7:2,3 9:17 10:22 84:25	channel 71:14
	catch 45:3	centigrade 148:2,2,3,9,11,13,17 285:3	characteristics 198:21
		central 4:8 11:8 40:17	charge 40:24,25 144:19 194:11
		cents 123:18	
		century 46:12 148:18	
		certain 5:19,21 20:23 52:9 57:9,25 58:8,12 82:15 101:14	

[check - comma]

check 11:21 14:8 24:2 25:5 29:12 41:23 76:24 79:13 212:18 276:13	chloracne (cont.) 63:3,10,15,17 64:2,12,24 65:2,4 74:5,10,13,17 77:1 80:20 88:8,12 137:13 138:5 169:19 182:25 183:4 225:6 230:15,18,23 247:15,18,24 247:25 248:10,12,17 249:10,16,21 250:9,11,15 250:15,17,20,22 251:8,11 251:16,24 252:12,13 261:14 262:4 263:1 281:17 282:22	cinnamati 7:12 99:11,23 144:1,15,25	closely 223:21 234:16
checked 41:6 53:6 160:7 169:21	chlorcosane 141:15	circuit 1:1 117:10	closest 69:25
checking 160:3	chlorinate 156:7,8	circulates 286:5	clothes 53:16
cheekbones 248:20	chlorinated 46:8,10,23,25 47:5,23,24 48:10 49:7 50:13 57:25 58:8,12 59:17 62:18 64:3 67:19,20,23 68:2,6,9 69:5 69:12,21,24 70:18,22 71:1 71:1,3,9,10,14,15,24 72:17 93:17,21 111:5,9,24 112:14 113:4,8,10 114:20,23 126:16 127:20 139:17 140:18,20 141:1,23,24,24 143:11,12 154:3,4 156:7,12 190:4,9 239:20 280:15 283:17,22 287:20	circumstances 55:9 200:7	clothing 65:22 112:18 118:14 128:18
chemical 9:15,18 10:20,21,22,24 17:7 27:16 30:6 31:11 38:15 39:15,17 41:24 47:13 47:14,16 49:12 50:5,12,12 52:23 60:22 61:3 64:5 81:6 81:13 82:16 109:16 132:6 159:9 160:16 162:15 164:12 218:20 223:3 224:21 225:13,15 228:6,13 228:15,16 229:16 230:12 230:16,19 231:6,15,25 233:5,12 234:14 240:17,21 240:24 241:3,10,15 244:2 252:7,12 253:24 254:7 257:22 258:6 260:8 269:5	chlorinating 48:7	cite 250:25 265:19	clustering 245:10
chemicals 18:7 22:22 29:11 38:24 50:6 59:15 62:17 89:10 160:23 218:9 224:22,23 225:9,18,19 227:18 231:19 233:2 236:25 252:4	chlorination 68:7 156:13	city 1:1 4:22 5:3 15:5,6 153:5 286:16 289:4	coal 47:2,3
chemist 92:4 170:19 208:12 210:3 211:11,16,20 212:24 215:11 280:10	chlorine 26:21 29:7 31:16,17,17,19 68:24 69:5,6,23,24 70:1,19 70:22 84:18 127:23 146:6 153:14,15 213:21 244:18	claim 80:13,14	coast 216:2
chemists 208:15,16 209:9 210:1,7 212:23 213:6 214:6,18 215:16	cholesterol 78:2,4 79:9	claimed 80:21	coastal 209:12
chest 77:2	choose 165:4	clarify 261:7 278:12	coating 49:7
chicago 165:12	chromatograph 208:10	clark 101:15	coatings 49:3 94:24
chief 52:8 211:4	chronic 86:4,7 87:13,13 88:13 164:19 166:24 182:15 198:10 202:1 227:9,13,18 227:20 228:1,3,6,20 231:15 234:21,22 260:25 261:11 262:5,14,19 263:2,14 287:19	classification 44:6	cocker 174:7
child 6:11	chronicity 234:20	clean 49:5 143:7 167:25 222:24 273:4	cocoa 15:8
children 169:21 281:24,24		cleanup 224:4	coding 133:24
chloracne 47:17,18 48:20 49:13,18,19 50:21 51:6,11,13 53:25 54:9,19,20,23 55:1,4,7,13 55:16 56:1,2,7,8 60:24 61:3 61:18 62:10,13,16,16,22		clear 110:5,19 247:18 265:16 284:13	coincidentally 64:2
		cleared 50:20	cold 87:10
		clears 114:19	collect 81:3
		clients 165:15	college 4:18
		clinic 8:23	color 48:16 64:16,23 68:4 120:2 120:6 127:14
		clinical 8:2 77:4,7 83:7,10 90:5,6,7 90:9,10,13 270:15,25 271:3 271:6 272:18 273:3	colored 198:7
		clinically 88:13 204:8,14 262:5 263:2 263:7,14	colors 120:14,18
		clog 232:16	column 70:8
		clogging 230:20	combination 259:2
		close 38:16 40:19 53:21 69:23 92:25 136:7 208:1	combine 161:16
		closed 105:14 240:11,23 241:20 283:20	combined 44:18
			coming 52:1 79:17 147:14,16 153:13 237:12 276:15 288:9
			comma 275:20,23 276:15

[commence - contamination]

commence 39:14	complained 282:24 283:8	concerning (cont.) 224:22 289:13	consistent 33:16
commercial 135:13	complaint 54:17 81:20,25 82:5	conclude 63:18 90:2 137:24 142:22 168:5	consolidated 9:5
commission 288:17 290:1,3,3,3	complaints 25:6 33:20,21,25 34:1,3 80:18,20 81:10,11	concluded 63:16 64:9 137:25	consult 8:20
commissioned 289:6	complete 181:15	conclusion 84:2 88:16 142:24 143:4,15	consultant 9:3,5,8,16 25:2 73:14 175:3 175:4 193:9
committee 9:15,18 19:9 33:7 219:7	completely 41:18 84:18 100:2 173:21 284:11	conclusions 148:21 176:19 235:1 239:1 239:7,13 240:3 245:17 260:21 269:2	consumed 275:12,20 277:19 283:13
committees 219:8	complex 40:16,17	condition 8:21 29:10 31:8 38:11,13 42:5 47:18 50:9,14,23 53:22 65:19	consumers 169:4
communication 37:17	complimenting 223:2	conditions 10:1 22:25 28:17,19,20 41:20 198:22 205:4	consuming 280:21
communications 194:12	composed 236:7	conduct 42:11	contact 12:23 19:1 53:15 93:10,14 103:13 107:1 112:2,16,16 112:17,18 113:6 118:11,11 118:12,13 124:25 128:15 128:15,16,17 131:8 138:25 181:22,24 182:19 184:16 196:4 202:15 205:2 208:22 240:15 241:2,8
communitronics 1:21 289:8	composition 258:12	conducted 59:3	contain 106:5 116:19 118:24 127:7 150:23 198:18
community 6:18,25 237:8 240:2 264:5	compound 20:19,23 21:6,11 35:3 42:11 60:21 67:24 70:17,21 70:23 71:2,10 84:18 117:22 138:2 159:24,7,8,10 201:1 201:6 208:7 247:23 248:8	conference 151:7 152:22	contained 104:24 150:25 160:12 163:24 166:2 168:20 189:11 275:13,21 276:9 277:1,19 280:20
companies 13:7,10 131:12 165:17 175:3 206:11,13 256:25 257:4,9	compounds 21:6,16 26:15 44:4 47:23 49:19 57:10 62:18 68:8 117:5 141:13 142:6 143:10 143:13 159:5 162:24,25 171:24 189:18,19 196:23 208:6 239:20 248:9	confidence 267:5 268:3,7	container 114:1,4 124:7,12 128:25 147:13
company 1:12 9:4,6,23 12:12 13:8 19:9 27:14,14,15,16 34:12 35:7 36:5,5 37:2,16 41:13 47:13,15,16 48:12,23 52:23 55:5,18 89:14 92:9 101:16 101:19,24 109:9 132:6 164:12 175:11 177:16 180:7 183:7 190:3 193:23 196:18 199:12 200:14 201:14 203:2,18,25 204:21 205:9,17,23 206:2,8,24 207:14,19,2 211:18,19 219:8,11 220:2 223:3 224:7 224:21 225:24 226:5 252:12 256:9 258:16,18,19 259:7,9,12,13	conceivable 252:10	confident 268:9	containers 116:3
compared 190:7	conceivably 129:3	confined 53:17 107:2 145:13,18	containing 100:14,16 104:4 105:14 107:3 115:21 117:12 124:3 162:12 164:1 181:16 195:1 195:15,17 202:5
compares 159:23	concentration 98:24 99:7,12 177:2,13 178:10 198:23 260:17	confirm 215:14	contains 70:19,21 106:3 111:23 112:14 114:3 118:2 122:25 123:1,12 241:6
comparing 159:23 265:5 266:5,14 271:22 272:1	concentrations 58:14 126:15 176:23 177:9 178:10	conflagration 45:4	contaminant 64:11 123:3,13 278:4
compensation 38:17 80:11,12 244:7	concern 115:19	confused 71:17,22 165:23 249:15	contaminants 11:22 47:25 137:22 139:11 168:20 169:14
competent 88:21 179:18	concerned 13:15 23:13 39:15 41:9 75:16 85:11 106:20,25 176:20 181:21 182:14 198:2 199:18 223:21 239:21 243:12 280:12	confusion 210:6,16,19,21	contaminated 53:16 169:7 226:3 253:8 274:16,21 278:8
competition 46:6	concerning 31:7 33:5 35:24 37:17 61:9 80:19 82:1,11 92:11 97:19 98:23 99:6 150:23 196:16 198:1 199:16 223:22	conjunction 281:13	contamination 121:16,18 167:10 178:11
competitors 222:9		connected 82:18 251:10	
		connecticut 74:1	
		connection 39:17 91:1 230:4	
		consider 36:25 51:2 160:24 258:2	
		considered 21:1,4 227:6	
		consisted 10:2	

[contamination - data]

contamination (cont.) 194:8 218:11	copies 136:25 191:9 192:8	correspondence 41:8 92:14 193:3,7 207:18	crept 44:11
contaminations 169:24	copy 78:25 100:8 125:7,12 196:12 199:1 206:4 290:21	corroborated 215:25	critical 79:14 221:9,19 222:3,4,10 222:25
content 69:6,23	copyright 116:22,23 120:11	cosmetic 137:9	cross 78:7 79:23 224:14
contents 127:23	cords 49:6	cost 41:25 42:1	crown 52:23 81:6,13
continue 22:1 163:5 220:21,23 224:3	corner 111:15	cough 254:23,25 255:9	cubic 146:8,8,12,18,19 154:3
continued 15:24 22:7 27:17,21 83:15 163:6	cornfeld 2:11 290:8	coughs 254:25	cure 218:4
continuous 205:2	corporate 219:7	council 78:20	curious 163:5
contribute 101:23	corporation 1:21 216:25 289:9	counsel 3:2,2 289:19,22	currently 75:18
contributed 195:18 226:9,10,13	corps 10:18,19 11:3	count 81:12	customer 33:25 37:9 54:18 80:18,20 80:24 81:10 107:6,6 110:17
contributions 101:14 102:3	correct 15:12 22:9 26:5 28:9 30:13 43:4 49:15,17 51:15 56:22 56:24 63:11,11 72:14 79:4 79:8 80:22 88:17 91:5 94:16 101:5,7 112:12 114:7 115:23 118:7 126:3 142:17 150:5 159:21 170:9 176:9 177:10 184:23 185:5 188:11,12 189:9 197:22 200:19 201:19 202:6 214:4 216:9 217:21 225:10 226:7 226:21,24 227:12 228:8,11 230:6,7,14 231:6,12,13 233:6,7,8 234:20 235:2,3 236:18 238:6,11,22 240:11 241:1,16 242:6,15,19,20 243:2 244:13,22 246:11 247:19 249:1 251:18,25 252:9,13,14,19 253:5 255:5 255:19 256:1,9,13 257:14 257:23 258:9 259:4,7 260:22 261:1 262:7 264:15 264:18 266:8,17,18 267:7 267:11,14 268:11,22 272:10 274:16 279:9 281:4 281:7 282:11 283:12,15 284:15,16,23,24 286:24,25 287:2,3 289:16 290:6	counters 199:2	customers 11:18 19:22 23:12 34:3,10 34:16 35:6,24 36:2,7,23 42:16 49:2 82:17,20 91:23 105:3 107:7,10 108:7 109:6 110:15,16 116:4 131:19 133:22 194:9,12 195:22 196:5 207:12,16,20 218:23 220:17,20 237:6
contributory 39:3		country 73:23 221:20	customer's 37:5 110:21 116:11
control 9:16 85:1 93:12 97:11 174:1 218:15 259:1 271:10 271:14 272:6 273:16,24		counts 77:3	cut 44:22 99:14 151:4 220:18 229:19
controlled 24:5		couple 22:13 99:9 117:18 120:17 130:2 135:3 215:8 227:7	cuts 229:22
controls 264:20,23		course 11:15 27:3 35:19 48:18 131:13 200:4 210:12 214:25 222:8 225:12 230:17 231:24 233:25 234:15 242:17 243:5 244:1 252:14 274:18 277:15,18 279:22 286:21	cyanide 232:4
controversy 289:13		course 11:15 27:3 35:19 48:18 131:13 200:4 210:12 214:25 222:8 225:12 230:17 231:24 233:25 234:15 242:17 243:5 244:1 252:14 274:18 277:15,18 279:22 286:21	cyst 51:18
convenient 104:16		courses 4:23	cysts 51:8 248:14
conversation 92:10		court 1:1 86:24 177:7	
conversations 224:7		cover 30:21 141:17 155:14	d
convinced 262:19		coveralls 178:13	damage 88:18
convincing 88:13 262:5,10,15 263:2,7 263:9,13 264:2,3,6		covered 81:16 170:4 207:13	dangers 175:8
cooked 169:9		created 283:17	dash 171:11
cooking 169:16 170:1 172:3		creating 284:14	data 37:22 88:7,7,12 101:15 109:2,10,13,20,22,23,24 110:7,8,17,25 121:1 122:7 188:7 189:21 196:21,23 201:7 206:7,10 236:25 239:2,3,4 262:4
cooperate 79:25	corrected 276:3	creatinine 90:20 272:25 273:1,2	
cooperated 218:24	corrections 275:24	credence 274:3	
coordinators 209:3	correctly 257:13	credentials 32:19	
	correlate 79:12		

[date - diabetes]

date 57:7 87:22 89:12 115:17 125:14,18 129:11 141:5 163:20 180:8 197:24 203:20 267:13	decrease 269:14 decreased 269:4,7,10,18 decreasing 269:15 defatting 205:1 defects 282:2,4,6,6,9 defendant 1:14,18 2:9 3:3,12 defense 222:19 223:10,19 define 12:8 20:18 133:19 156:15 definite 249:24 250:5 definitely 250:16 definition 21:11 68:1 228:2 definitions 60:19 deformed 282:3 defunct 22:17 degradation 224:2 degraded 209:23 degree 4:19,20 54:7 82:11 130:22 148:25 193:10 284:22 degrees 35:17,18 148:1,1,10,11,14 156:12 168:25 183:9 184:2 184:2 200:3 247:10 252:18 252:19,20 253:19 260:2 284:19 285:6	department (cont.) 33:22 34:14,17 35:15 37:13 39:13 40:10,12,15,23,25 41:3 48:24 75:18 76:18 78:8,15 85:3 96:15 99:4 104:19 108:4 109:3,3 110:2 110:3,4,6 117:14 155:21 159:25 161:1 163:15,18 165:16 173:11 177:21 178:2 180:4 184:15 185:19 185:23 187:9,23 191:6 194:3,20 196:13,14,15 197:16,16,17,19 199:3,4 200:13 201:13 202:13,20 203:2 205:12 209:2,5,6,7 211:12,21,24 217:9,10 219:14,15,15 220:11 235:21 245:2,3,4,8 256:20 257:3 departments 12:7 16:9 24:12 38:2 85:5 depend 200:4 247:7 depending 20:21 68:7 228:16 239:5,5 depends 13:5 16:5 21:16 34:25 47:6 50:24 113:18,19 135:7 157:13 159:12 161:6 172:23 248:8,19 260:17 282:4 283:19 deposes 3:12 deposit 155:8 deposition 1:17 3:3 21:11 56:18 216:19 249:11 275:5,9 277:9 289:16,20 depositions 153:24 derivatives 57:10 dermal 164:16 dermatergosis 57:22 dermatology 57:18 describe 60:24 72:23 76:12 89:16 122:19 159:7 168:15 170:7 214:23 describes 95:19,19,23,23	description 132:7 designation 117:7 118:2 designed 230:12 231:5 233:4 238:13 238:21 254:13 desk 161:9 despite 88:7,11 262:3 destroyed 284:15 285:8 destructive 70:20 detail 57:16 67:3 96:10 168:16 detailed 35:16 details 52:14 61:18,22 145:11 149:22 detect 29:7 212:20 230:11,12 determination 177:15 determine 155:6 225:19 229:15,25 231:6,8,15 233:10 234:13 243:15 244:24 245:17 274:20 determined 174:14 230:22 determines 12:10 determining 236:17 detroit 19:12 develop 250:11,16 developed 31:16 43:6 48:19,20 50:1 85:9 94:23 182:25 201:6 249:20 258:16 developing 220:24 development 219:7 223:22 devoted 22:19 di 64:3 diabetes 29:9
--	--	--	--

[diagnose - dozen]

diagnose 6:12	diphenyl 59:16,17 68:2 69:5 70:18	discussed 47:5 130:24 180:22 184:20	doctor (cont.) 243:24 244:12,21 247:16
diagnosis 6:10 9:24,25	70:22 71:1,3,10,14,15	185:11 189:15 195:17	248:24 249:22 250:4 252:1
diamonds 47:1,3	111:24,24 113:5,7,10	207:18,25 247:16	253:2,23 254:4,17 255:24
diarrhea 232:1	114:20,23 139:18 140:18	discusses 66:24	256:7 257:19 259:21
dibenzofurans 169:14 170:20 171:24	diphenylbenzene 69:21 71:2,9,25 93:18,21	discussing 66:20 189:22	263:25 265:17 266:2,19
280:14,15 284:4,7,9,14,15	141:24 143:12	discussion 288:5	269:3 273:10 274:4,12
285:6 287:1	dipped 55:22	disease 6:5,17 21:3 50:4,5 83:10	276:17 279:10,21 283:18
die 43:14 181:18 232:17	dipping 183:4	90:13 174:15 267:6 272:18	285:9,22 286:13 287:11
died 232:14	direct 3:13 228:2 235:15 236:23	diseases 6:10 38:6	doctors 11:24,25 12:3 19:23,23
dielectric 42:10 44:18,23 48:17 64:23	239:25 240:15 241:2,7	dispensary 25:4 29:25 31:18 38:1	29:21 32:20 40:13 62:14
127:5 195:1,4	247:16 252:2 260:20	disposal 123:5,9,16 124:10 129:2	73:22,23,24
dielectrics 45:17 64:16	274:15 276:24	disregard 141:14	doctor's 38:19
dies 231:22 232:15	directed 24:7 33:6 41:19 94:18 95:1	dissatisfied 100:2	document 57:10 78:18 102:9 103:19
difference 47:2 86:21 90:14,15 122:20	95:12 200:14,17	disseminated 91:22	107:14 108:2 125:18 132:9
144:6 170:13 228:1 253:9	direction 24:9 31:5 175:15	disseminating 12:25	132:12,17,19,21 133:4,9,18
253:11 254:24 267:19	directive 33:14	dissemination 133:21	134:10 138:16 175:7 189:3
272:12,20 285:20	directives 19:8	distilling 65:24 66:2,3	191:3,19 197:7 201:11
different 26:22 37:2 38:14 47:1,19	directly 36:7,23 37:1 263:22	distributed 95:8 104:3 105:13 108:13	223:16
48:16,17 64:16 68:4,5,6,8	director 4:8 9:7 10:11,14 11:7,7,10	distributors 121:22	documents 12:7 56:14,15,19,21 109:1
71:10,19 74:25 84:17 85:5	14:23 15:18 18:19 23:17	disturbances 281:18	114:9 116:16,18,20
90:17 107:23,25 111:6	28:13 32:7 37:16 38:1,4	divided 158:20	dogs 145:16 167:1,6,7 168:6
118:20 119:10 120:17	40:19,20 41:10 45:22 59:12	division 92:4 191:22,24 211:10,14	229:7,23
122:23 124:22 126:14,16	73:13,21 80:17 87:20 92:21	211:18,19	doing 8:19 13:4 21:14 22:4 23:21
127:20,22 137:8 139:9	129:18 175:9 177:18	doctor 3:24 5:7,14 6:20 9:20 12:4	25:9 134:2 144:18 149:19
140:11 143:12 156:12	178:21 194:18,19 203:11	19:3 23:21 25:9 28:14 30:5	158:24 169:6 175:20,21
159:5 161:23 162:13	223:11 224:11	31:22 32:21,21,22 34:5,6,7	202:17 212:3 219:4 227:17
166:25 168:19,21 170:25	directors 13:10 73:24,25 131:12	34:8 38:5 40:9 46:1,2 52:24	229:2 233:10 252:7 266:4
173:4,23 174:4,5,5,8,9,11	disappear 51:20 213:24,25	54:5 56:13 58:19 59:2	274:4
176:12,15,15 228:7,15	disappearing 214:2 218:17	63:21 74:3 76:15 78:15,20	donohue 2:11 290:8
235:1,7 239:1,7,13 240:3,3	discipline 18:6	79:3,15,20 86:15,18,19	dose 151:23 155:19 156:23
252:15,17,18,19,20 267:10	discount 273:9	91:7 95:4 119:5 121:7	157:17 158:8,17,18,22
267:16 282:5 286:9,10	discovered 207:15,16,23 217:25 218:4	141:21 175:6 219:5 227:8	159:10,13,16 228:5 229:18
differently 29:5 170:17 252:3,4	218:5	228:19 231:20 233:9	229:19 231:24 247:22
digest 261:21	discovery 207:19 209:8,25 210:7	235:14,16,23 236:7,23	250:13
digestive 281:18	discuss 67:3	237:7 238:24 239:10 240:2	doses 60:3 175:23,24
dioxin 287:1		240:11 241:10 242:3,22	double 212:18 276:13
dioxins 287:4,5,10,22			doubt 166:3,7
dip 55:23			douglas 258:20
			dow 165:19
			dozen 15:7 174:8 257:9 273:6

[dr - emphasize]

dr 4:15 8:14 17:22 30:4 31:24 32:4,8 40:20,23 41:8 42:8 43:5 47:9 52:7 57:9,17,24 61:15 62:25 65:9 66:6,7,10 66:13 72:15,24 73:10 75:4 78:25,25 79:19 82:9 84:11 84:22 86:15,17 87:2,18,19 88:15,23 99:13,16,20 108:20 114:16 127:24 129:17 130:20 132:9 134:10,20 135:14,18 136:18 137:12 138:13,20 140:12 141:4 142:1,11,15 142:21 143:23 144:2,14 146:1 149:9,15 150:22 152:16 153:11 165:9 172:15,21,23 173:12 174:3 174:13,17,17 175:9,17 176:16 177:8 178:5 179:12 179:18 180:1 191:4,21 193:4,8,22,22,22 194:6,22 194:22 196:12 207:14,24 207:24 211:3 212:23 215:10,21 216:21 217:7 222:18 224:12,16,19 225:5 225:7 229:9 230:9 234:23 235:4,15 236:9,13,13,16,18 256:22 260:21 288:6,9	drum (cont.) 130:13,13 drums 113:24 114:6 115:20,25 121:20 129:1,3,4 219:2 ducks 167:12 due 22:25 34:16 50:6 54:24 64:4 169:22,23 226:3 230:16 249:6 250:17,20 265:9,24 duly 289:6,11 dupont 165:17 duration 145:10 dust 17:11,11 dusted 210:14 dusts 112:3 duties 4:5 9:21,21 11:9,11,23 236:24 dwayne 203:13	easier 106:13 247:5 255:12 easily 135:23 136:1 221:11 east 25:19,25 26:3,6,18,23 27:4 27:5,20 28:12,23 29:24 32:25 55:19 62:13,18,21 74:4,14,22 75:17 79:1,7 80:1 115:15 123:19 175:11 179:16 182:8 easy 13:16 eat 176:7 214:11,12,13,14 233:22 eating 50:7 209:13 214:15 216:8 242:5 eats 253:8 economic 224:9 ed 219:25 edema 232:14 edf 223:18 edgar 41:14 edgewood 10:21 edited 97:24 editor 237:22 238:1 educate 220:20 educational 4:16 effect 74:6,23 80:21 93:15 155:12 158:24 207:21 228:6,8 231:15 241:15 243:15,18 249:17 261:15 263:8 effects 12:11,23 14:15,16 33:5 37:8 84:16 86:3,5,10 87:5,6 87:14 88:14 89:10 93:10 131:1,4,24 135:24 193:12 205:3 228:3,15 231:19 232:1,8,19,21,24,24 234:13 243:7 244:6 260:25 261:4 261:11 262:6,14,20 263:3 263:14	effluence 220:18 eight 1:19 145:20 147:1 152:4,8 157:10,16 242:25 243:5 262:1 269:18 270:2,6 either 4:23 6:6 12:24 15:2 16:24 19:5 20:11 22:24 29:16 30:16 37:14 38:3 54:18 57:22 73:7 77:6 126:15 146:14 155:21 162:24 169:15,24 172:1 208:20 215:2 278:25 280:10 288:10 ekg's 77:2 electric 42:18,20,23,25 43:3 73:14 73:15,21 82:1 89:14 96:7 101:17,20 102:6,16 103:23 116:25 117:2,21,23,25 150:18 175:10,13 180:7 189:6 190:4 191:7,22 194:19 195:3,5,8,14,21 196:1,18,20 197:14,15,21 197:23 198:19 199:4 200:8 200:9 207:7,15,20,2 216:25 electrical 42:12 44:19 54:23 94:22 95:13,25 98:15 100:14 103:20,22,24 194:2 221:19 221:24 electricity 42:11 electric's 195:1 196:2,5 elevated 49:23 50:9 53:17 54:15 72:22 79:11 93:13 107:2 149:1 204:6,24 241:22 250:12 260:13 elevation 265:10 274:3 elmer 17:15 153:7 180:3 197:16 201:12 256:23 emeritus 6:23 eminent 165:8 emmet 1:17 3:10,17 288:14 289:10 emphasize 88:17
draft 93:12 drafted 130:23 draw 78:5 115:6 drinker 47:9 57:25 58:11 66:7,10 66:13 67:5,15,18,25 68:23 72:15 73:2,6,6,8 93:19 141:4,5 142:6,16,21 160:6 226:15,23 drinker's 58:6 72:24 142:2,12 193:22 226:9 drinks 90:23 drop 155:11 181:16 213:10 dropped 5:13 213:22 dropping 45:13 drug 167:17 168:2 drum 113:20,21 114:3 116:6,11	e e1.00r 290:14 e2.00r 290:22 eagles 214:12,13,14 earlier 80:10 87:13 126:15 135:2 141:12 144:14 174:18 181:25 195:19 216:21 218:1 255:24 256:3 264:13 278:22 earliest 145:8 early 13:20 15:14,18 18:2 29:8,9 47:4,6 52:21 63:4 65:5 92:15 111:10 137:12 171:16 179:9 209:2 210:6 221:25 227:10 228:21 278:25 earner 39:7 earthquake 240:5		

[employ - exhibit]

employ 179:4	entirety 270:18	escape 221:11	examinations (cont.) 75:6 78:11 79:6 89:23
employed 4:2,3,11 74:15 75:18 131:21 132:10 134:20 153:1 179:8,14 289:19,22	entitled 57:20,25 105:24 175:8	especially 15:25 65:19 76:25 244:17	178:15 244:9
employee 9:12 25:1,2,8 33:25 37:2,4 37:7 39:6 92:6,7 196:22 197:15,15 289:21	entry 123:4	essence 72:5 90:25	examine 29:15,18 30:14 75:15 90:7
employees 24:8,9 28:11 29:13 30:6 31:3 32:14 36:7,23 37:18 38:4,7,20 39:2,4 61:7 63:20 67:16 74:8 77:9 78:7 133:22 204:4 207:15 225:6 244:17,17 245:23 246:4	environment 6:19,19 10:3 76:2 97:11 119:20,23 123:4 124:24 207:12 209:10 212:21 213:7 215:15,19 218:8,17 218:21 219:13 220:25 222:24 223:21 261:21	essentially 229:25	examined 1:18 3:11 29:20,21 41:22 74:4,7 75:9,11,16,18 76:20 91:1 175:23 267:22,23 271:14 278:22 289:14
employment 4:9 9:10 65:24 89:1	environmental 30:17 78:20 85:1 88:2,3 97:9 106:17 121:16,18 122:18 123:3,13 128:4 129:7,14 167:10 194:7,12 201:25 207:14 209:3 217:15 218:1,11,11,16 222:19 223:9,19,22 224:2	established 230:23,25 237:13 238:14 238:25 250:17 265:20	examining 10:2 15:23 74:10,18 208:6
empty 125:23	enzyme 90:19,22,23 272:22	estimate 146:2 147:19 148:4 280:18	example 16:19 21:1,10 31:16 41:21 43:16 119:25 156:22 157:3 157:24
enclose 188:5,13	enzymes 79:10	et 1:6 94:24 122:18 123:16 213:21	examples 22:10
enclosed 65:24 186:20,23 187:4 189:14 240:13	epa 78:22,22 87:20 88:1,2 168:2	european 207:16	exams 16:3 28:22 29:2,17 75:20 77:23
encloses 188:10,15	epidemic 48:1	evaluation 89:6	exceed 260:16 284:10 285:7
ended 190:1	epidemiological 230:3 243:14,19,25 264:15 264:17	event 266:4	excellent 165:13,22
engaged 17:13 18:10 37:18 65:19	epidemiologist 245:9,17,20 268:18	eventually 122:13 146:14 208:18 212:19 215:5,13 221:1,7 232:15 286:7	exception 3:22 8:20 15:14 20:7 31:9 54:13,15 81:6 96:23 97:17 135:16 249:18 250:23 251:18,21 254:5 261:14
engineer 17:8	epidemiologists 83:9	everybody 35:25 39:4 103:20 110:16 115:7 207:10 210:14 222:7 245:1 252:12	exceptions 96:23
engineering 17:8 96:19 189:23	episode 226:2 249:19 250:10	everyday 159:19	exchange 56:19 169:16 249:20
england 7:18 15:15 17:14 23:6 27:23 54:21 74:1	episodes 249:18	everytime 25:3	excuse 143:24
english 83:18 126:2,7 214:18 215:4 262:25 263:3	eppenberger 2:11 290:8	evidence 91:3 174:14 243:9 262:15 272:23 280:8	executive 19:9 33:7 223:11 224:11
enlarged 232:22	eppley 173:9 235:19	evolved 93:8,12 200:3 204:23	exhaust 183:7,10 198:25
enlargement 76:25	equal 158:15	exam 76:13,14	exhibit 62:24 65:10 69:8,11 70:3 70:14 72:12 78:17 84:7,8 87:16,17 89:4,5 91:24 92:1 98:1,22 102:7 103:25 107:13,22 111:22 112:4 113:2 115:12 116:13 118:5 119:19,19 120:6,19 121:13 123:21,25 124:5,14,15,16 124:19,20 125:7,17 126:2 127:7,13,15 128:6,9,20,22 132:1,3 134:10 136:15 138:12 140:12 141:2,3 142:1 143:19,21 150:3,3 157:5 175:5 178:6 180:2,2 182:4 185:21 186:3,24
ensure 36:1	equipment 94:22 218:7,14	examination 3:13 5:20,22 6:17 10:4 25:8 25:9 28:11 74:7,9 76:11,15 89:20,25 155:11 224:14 228:2 235:15 236:24 247:17 252:2 260:21 274:15 276:24 289:15	
entail 14:5	equivalent 111:19 159:1	examinations 5:22 12:5 15:19 28:25 75:5	
entire 131:21	error 258:2		
entirely 38:14 68:3,3 71:9 143:6,12 143:17 270:20	eruption 64:1,2 66:1 93:11 281:25 282:8,19		

[exhibit - female]

exhibit (cont.) 189:2 191:2,15,19 196:8,9 197:6 199:7,8 201:10 202:7 203:15,16 204:10,16 205:6 205:7,19,20 216:21 217:18 217:19,22 219:5,19 220:6 223:8 256:6 258:8 259:5 261:20 264:13 268:24 270:19	expert 85:6 237:23 expertise 45:25 experts 251:9 expire 40:7 expires 288:17 290:1,3,3,3	extent 50:24 170:22 extra 128:2 extreme 123:3,15 198:22,22 extremely 21:7,19 229:8 273:5 280:16 287:16,18	familiar 41:7 66:9,11 168:12 222:18 246:3 265:18 266:24 286:13 familiarize 17:3 23:21 61:18,20,22 62:4
exhibits 56:15 57:1,3,4 58:20 66:11 66:18,20 91:7,11,12 94:1,8 94:14 95:4,11 96:8,16 102:13 103:21 105:7,12 107:4,10 108:21 109:11 111:1,3 113:11 114:8 117:9 118:16 119:5,17 121:25 122:19 126:9,11,12,12,19 126:25 127:3,11,15 130:24 143:23 145:5 148:23 149:10 150:4,4 154:20,23 156:2 160:13 161:2,10,13 163:15 164:4 166:9,19 202:9 217:3,4,18 255:25 256:4	explain 5:14 68:20 71:4 137:1 153:17 explained 71:16 exploded 286:14,17 explosion 15:5 20:8 34:21 109:23 explosions 187:21 exposed 14:20 16:22 17:12 37:7 49:23 50:9 52:25 55:10,11 86:2 87:4 96:2 136:6 151:18 152:5 228:13,14,17 233:5 251:12 253:7 261:10 264:24 265:6,6 271:18 272:9 285:10,11,12,24 287:24	eye 112:18 118:13 128:17 184:1 231:9 245:13 eyes 76:24 112:16 118:11 128:15 155:11,12	fans 65:25 far 13:15 20:9 23:12 24:5 31:2 41:9 71:14 75:16 82:18 85:11 86:4 87:13 94:24 106:19,24 119:14 120:23 176:20 181:20 239:20 243:11 280:11
exist 16:10 existed 13:20 38:11 existing 13:9 213:22 exists 20:21 expanded 40:10,13 expect 269:12 279:23 expected 240:24 experience 83:4,5 130:4 131:14 183:17 184:22 185:13 188:24 189:24 190:3,5,15,22 193:15,16 experienced 200:6 experiment 145:10 149:20 152:15 229:21 experimental 93:7 experimentation 14:1 experiments 70:21 176:22	exposure 16:18,21 20:24 37:4 39:15 39:17 49:21 50:15,19 51:22 58:8 86:5 88:12 90:5,14,21 91:4 93:8 103:6,10 146:2 150:24 152:17 176:13 178:14 190:6,16,20,21 196:25 198:9 228:16 240:20,24 241:3,12,12,14 241:20,25,25 242:1 244:7 247:23,24 248:9,11 250:18 251:15 252:3,8,20,22,23,24 253:17,20 260:11,14 262:4 265:15 267:6 269:4,5,13,21 270:16 272:20 exposures 90:15,16,17 103:8 176:11 176:12 184:20 185:12 196:21 240:21 248:5 252:15 extended 250:19 extension 49:6 extensive 93:14 130:9	face 137:10 248:21,22 facilities 162:9 190:7 fact 17:7 36:13 45:17 46:10 56:2 62:14 69:20 72:9 78:3 80:3 83:8 85:8 125:6 148:24 159:9 204:3 210:9 215:15 221:24 228:10 239:16 252:11 258:5 262:14 264:21 282:2,10 287:13 factor 159:12,4 218:20 factors 239:6 factory 169:25 facts 134:17 fahrenheit 148:4,5,10,12,15 169:1 184:2 247:11 260:2 284:25 failure 232:3 fair 119:1 228:19,23 239:10 249:22 250:4 263:18 273:10,14 274:8,10 284:12 285:9 fairly 72:8 238:12 faith 1:22 3:4 289:5 falcons 214:15 falls 196:18	faster 161:18 fat 265:14 fatality 82:6 fathers 73:12 177:19 fathom 146:21 fats 265:12,13 favorable 188:23 feathers 209:13 214:13 216:5,6 february 4:7 58:10 161:25 189:8 190:25 205:10,17 206:2 217:19 fed 60:14 66:14,15,16 157:10 158:14 159:1 172:16,19,22 federal 153:4 feed 155:6,13 176:4 227:24 feeding 158:25 166:15,24 168:6 172:15 227:23 229:6,7 feel 104:9 138:1 220:5 249:8 fell 44:6 fellow 7:25 31:9 73:7 74:18 78:2 115:3 131:12 140:8 147:1 177:17,19 female 174:10,12

[females - four]

females 183:6	finished 18:16 34:9 64:7 120:23 121:2 122:10 167:25	flinn (cont.) 140:12 225:1,3,8 230:9	foreign 175:16
ferry 199:2	fire 20:7 34:21 44:17,19,24 45:3,3,6,8,9,11,12,21 100:19 109:23 187:21 222:5 284:4 285:10,17,24 286:15,20,21	flinn's 140:4	foreman 24:11 38:3
fiber 113:24	fires 286:19	floor 147:6 241:25	forenoon 1:20
field 6:9 8:18 150:14 194:2 204:5 237:23 251:9	firm 2:6 290:17	fluid 43:12,16 105:14,24 112:19 117:4 118:14 119:9 120:12 124:2,2 127:5 128:18 144:8 175:14 181:17 188:1,17 195:2 203:23 206:6 220:25 286:21 287:7	forget 180:11
fifth 159:3	first 9:21 10:20 12:12 14:19 16:15 17:22 18:22 19:1 21:21 25:22 27:2,4 34:4 35:1 37:1 39:2 40:24 41:13 57:2 66:1 71:8,13,23 73:2,6 90:4 109:4 112:20 125:17 141:7 143:14 146:13 169:22 171:14,14 174:25 178:9 186:13 203:12 207:11 209:19 214:18 218:6 220:10,16 221:3,7 225:25 226:6 228:20 229:17,22 247:18 252:11 256:6 257:5,11,18 262:9,9 269:9 275:18 289:11	fluids 43:11,14,24 44:1,14,20 94:22 100:14,15,16,21 104:4 117:3 123:17 162:19 190:5 195:17 221:10 232:16	forgot 56:11 102:12 139:22 187:2
fifties 78:2	fish 50:7 97:12 123:15 167:12 167:12 209:13,14 214:12 214:13,14,15 216:8,11 217:11	fluorides 218:10	fork 56:5
figure 136:12 158:19 159:19	fitted 95:2	flush 112:18 118:13 128:17	form 36:8 54:2 93:11 102:19,20 132:13 190:17 223:4 247:1 279:25
figures 275:23	five 9:1 12:14 26:16 76:17 77:16 81:19 98:23 110:8 151:19 152:2,2,3,7,13 154:2 156:21 159:2,15 175:25 274:1 277:10,19	focus 141:20	formalized 92:18
file 92:3 196:12	flagrant 24:19	focused 67:18,20 85:24	format 115:6
filed 80:13	flame 285:18 286:4,10,11	follow 56:7 124:11 245:22 249:23 250:4 253:23 254:8	formed 4:8 284:9,17 285:7
files 48:23 138:13 225:1	flaming 45:12	followed 24:3 53:25 54:6,14 82:23 83:22 115:24 129:19 130:23 149:6 164:2 166:5 193:5 207:16	forms 37:21 123:14
fill 109:7,9 110:6	flammable 45:2	following 67:25 101:15 102:4 112:18 118:13 128:17 290:6	formulations 163:13
filled 43:20 55:23 109:16,24,24 256:18 257:13,16	fledged 178:22	food 159:22 167:9,17,19,20,21 167:22 168:2,8 216:11 229:4,5	fort 19:13
fills 257:3	fleming 200:15 258:9,11	forceps 56:5	forth 138:9
final 32:12 97:25 192:13	flinn 136:18 137:12 138:13,20	ford 203:1,17,25 204:20 205:9 205:16,20,23 206:1,8,14,18 206:22,25 207:1,14,19,2 256:8	forties 78:1
finally 72:11 116:10 169:21 191:18,18 206:17 224:2		forearm 31:10	forward 59:4 187:24
financially 289:22		forefront 177:17	forwarding 188:22
find 13:19 17:11 23:10 40:3 52:10 91:1 95:18 99:17 124:15 157:4 160:8 178:4 209:17 229:9,18 264:6 267:21 271:2 272:8,19 278:23 279:2,2,23			found 35:3 48:8 69:12 70:24 71:25 72:12 76:2 77:23 85:8 88:18 91:3 138:2 139:1 146:5 151:5 157:6 169:22,23 172:24 173:2 208:13,15,16,21,25 209:9 209:13,14 214:6,7,8 215:25 216:1,3,3,4 221:23 222:11 230:17 235:4,13 272:11 278:23 279:11 281:14 287:1
finding 77:18 210:16			foundation 133:13
findings 77:22 90:22 149:11,15			foundation's 223:5
fine 26:9 151:11 276:21			fountain 34:17
fingernails 282:14,19,21			four 7:15 17:19,20 18:12,13
fingers 81:12			
finish 177:4 204:15 207:10			

[four - goodness]

four (cont.) 26:13,16 40:1 48:5 55:12 60:2,4,8,10,11,11 75:11 76:21 79:18 83:7,8 104:8 126:4 130:11,12 131:13 138:1 139:10 141:12 145:2 155:10,15,17 156:21 229:3 256:5 278:1	functions 89:24,25 fund 222:19 223:10,19 fungi 213:11 funny 173:23 furans 275:3 277:1,6,11,20 278:20 278:21,23 279:24 280:12 280:13,20 281:3,6 287:14 furnace 43:19 further 58:11 219:25 224:13 225:8 288:10 289:18,20 fuss 234:10	general (cont.) 195:14,21,25 196:1,5,18,20 197:14,15,21,23 198:19 199:4 200:8,9 207:7,15,20 207:2 209:16 216:25 239:22 253:15 254:5 generally 86:4 145:11 247:4 253:15 253:19 generated 144:5 generic 44:4 100:19 gentleman 196:20 199:11 gentlemen 184:21 185:12 georgia 85:4 german 174:7,23 278:22 getting 21:15 31:18 52:16 53:25 66:3,4,5 69:16 73:17 130:12 148:17 165:23 167:9 176:3 180:10 203:21 204:19 212:7 230:19 249:14 ggtp 90:18,20,25 272:21,24 273:5,9 274:3 gimic 56:4 gist 182:3 201:22 give 13:14 22:10 31:6 36:6,22 37:5 49:4 57:11 64:23 76:21 84:4,5 96:6 98:11,23 118:1 122:1 136:4 146:12 148:4 173:6 180:8 186:6 201:21 221:13 229:20 231:24 238:1 242:18,21 248:9 251:9 263:23 266:11 274:2 280:19 286:16 given 7:8,10 107:9 137:22,23 143:7 157:2 225:4 245:16 246:6 289:17 gives 159:18 229:22 giving 88:19 108:6 158:3,7 192:5 201:21 275:4 gland 51:19	glands 230:20 gloves 178:13 199:14,17,17,18 go 13:4 15:15,16 16:24 32:17 34:4,6 37:1,12 41:23,24,25 47:14 57:13 68:21 73:18 74:25 76:15 77:7 80:8 85:17 86:18,19 87:24 93:20 94:3,22 95:17,21 96:9 102:7,18 103:21,25 106:13 113:15 122:11 123:15 124:12 128:20 130:10 136:14 141:2,2 143:19 149:21 156:4 161:10,15,15 161:18 164:4 166:9 176:19 180:17 181:10 182:4 186:2 187:2,7 191:2 199:6 200:10 201:10 202:7 205:6 217:9 218:7 220:9 256:25 261:20 269:6 276:22 283:9 288:3 goal 129:19 god 18:16 45:12 goes 51:7 124:20 201:15 248:12 going 13:11 21:3 30:18 31:21 41:25 42:1 45:24 49:10 51:12,13,20 56:19 76:8 80:4 84:8 85:18 103:9 106:8 116:15 125:9 130:10 130:11,15,15 137:9,11 147:11 159:19,23 160:7 167:18,19,21 178:13 183:17 192:14 198:8,24 199:1 207:5,10 218:21 220:2 236:16 240:8 241:3 241:19 243:1,2 244:10 247:10,13 253:25 254:11 254:23 264:7 279:19 285:11,12,25 286:4,5,9 good 23:21 32:21 35:7 39:25 41:1 44:18,19,23 45:16,23 64:22,22 77:17,20,21 85:14 97:9 100:8 114:4 116:7 155:19 162:7 165:11 175:3 178:1 183:25 194:4 202:20 202:20,21 224:4,16 238:13 248:22 271:14 goodness 70:4 72:3,12 142:12,23 143:5
fourth 14:11 191:13 fr 107:21,21,21 126:14 fraction 229:23 frame 113:22 frank 101:15 frederick 136:18 free 13:14 220:5 freedom 226:4 freely 57:23 freight 123:17 french 278:22 frequent 17:17 41:15 frequently 41:12 freshly 65:21 friend 199:2 front 57:3 67:10 122:14 255:25 256:4 fry 169:5 full 4:14 12:3 25:1 28:14 60:15 80:5 125:2 133:7,7 178:22 286:3 fully 79:25 fumes 49:23 52:1 53:19 66:4,5 107:1 112:3 113:7 125:1 138:24 152:6 200:3 204:23 241:24 260:14 function 24:14 34:21 77:3 273:6,7	g g.e. 102:4,5 116:22,24 196:22 200:5,8 gain 233:22 gallons 114:4 game 167:12 gamut 94:25 96:6 garbled 133:7 134:16,17 garments 93:14 178:12 garrett 200:11 205:8,11 256:19,21 256:23 258:8,15 gases 10:24 gasoline 44:22,23 gather 82:19 gathered 60:20 gauze 139:23 general 6:9 8:19 18:25 19:2 39:4 42:18,23,25 43:3 73:15,21 82:1 100:13 101:17,20 102:6,15,20 103:4,23 105:21 116:25 117:2,21,23 117:25 127:9 150:18 154:24 194:19 195:1,3,5,8		

[goop - heat]

goop 213:13,15,18	group (cont.) 202:21,21 203:9 207:23 209:18 211:4,25 212:2,10 212:12,14,15,16 219:16 220:8,9 222:22,23,23,25 223:10 235:23 236:1,7 265:2,6 266:13,15 267:6,16 267:19,20 268:15 269:21 269:22 271:11,12,14 272:6 272:10,20 273:25	handled (cont.) 143:15 182:2	harmless 143:6,17
gotten 78:9 139:1 241:11	grouping 25:5 245:10	handling 20:1,6,7,9 23:12 24:2,6,17 34:13,20,24 35:8,12,20,22 36:2,6,22 37:11,17,24 53:12,24 54:6 65:10 82:22 83:22 92:12,16 93:2 94:7 94:13,15 95:14,20 96:9,15 96:20 97:18 98:5,14 99:2 102:21 103:1 104:6,13,20 104:24 106:5,10,16,25 107:4,20 108:3,9 116:9 117:11,15 118:2,5,9,25 119:1,11 122:16 124:4,20 124:21 126:1,18,22 127:7,8 127:12 128:12 129:19 130:23 138:21 148:22 149:5 164:2 166:5 178:6,16 178:25 189:21 190:4 193:5 193:8 195:9,15,21 198:18 198:22 201:8 207:16 253:24 254:8,9	harvard 7:11 47:9 72:16,25
gout 78:3	groupings 40:3 244:25		haskell 73:13 175:2,10
government 13:23 23:1 78:13,24,25 79:3,20 80:1,4,7 83:8 85:2 85:6,13 88:4,21 89:9 131:10 134:7 150:21 151:6 151:7 152:23 153:2,4,4,5,8 153:9,16,22,23 154:2,6 165:15 167:15,16 168:3,3 174:23,25 193:19 206:9,10 212:12,14 217:8,10,11,14 217:20,23 218:24 221:25 222:13	groups 90:15 150:19 175:25 235:19 236:5 264:23 272:20		hazard 16:9 89:6 109:23,23,24 110:8
governmental 146:16,16	growing 173:24		hazards 23:23 200:25
grab 59:14,15	guess 18:11 24:1 29:19 39:7 48:4 60:20 89:11 100:9 125:4 211:7 230:22 285:22		hazlett 177:18
grade 64:3,7	guidance 101:14 102:3	hands 49:5 56:5 139:2,12 183:4	head 34:17 115:2 179:20 184:12 211:9
gradual 65:25	guide 100:11 101:2 189:14	happen 18:19 37:12 155:19 229:11 233:4 234:2	headache 234:3
grams 60:4,4,6,8,10,11,11 157:1,2 157:10,12,16,19,25 159:17 159:18	guides 101:4	happened 61:5 66:24 170:19 172:3 209:15 245:24	headaches 199:19 259:10,23 271:6,8 283:1
grandstands 45:13	guinea 145:14	happening 172:2 214:1	headquarters 40:17 179:16 182:8 185:19 191:6 192:1 199:5 203:18 208:23,25
gratefully 101:13 102:2	guy 273:11,15	happens 51:6 67:5 87:9 137:6 156:16 181:16 229:24 238:24 253:6 255:14 284:4	health 7:3,19 8:22 18:20 19:5,11 23:3 24:22 29:12 30:3,12 33:1,5,21 39:1 49:20 52:8 73:25 74:6,23 79:20 80:14 80:19,21 81:11,22 82:2,6 82:12 84:15 85:1,3,16 86:5 86:10 87:13,20,24 88:13 89:6,7,10 90:3 109:23,24 110:8 132:22 143:8 153:18 168:1 200:15 244:16 260:25 261:4,11,21 262:6 262:14,20 263:2,14 281:6
great 11:25 159:15 183:11 224:10 231:22 274:3	half 3:23 15:7 21:9 25:12 77:13 92:8 99:14 133:7 157:15 158:22 159:13,16,19,19 174:8 257:9 273:6	happy 19:5 48:23 67:2 161:17 263:23	healthy 78:6 79:23
greater 170:22,22	halfway 229:21	hard 249:7 261:19	hear 86:20,22 250:1 256:2 273:13 281:21 283:25
greatly 96:22 137:9	hallmark 249:17	harm 20:20 21:14 22:21 97:12 155:13 254:20	heard 21:25 30:11 132:18 137:13 209:19 246:21 271:18
greschaw 256:8,12	halowax 49:2,7 67:24,25 68:10 69:18,20 137:23 140:18,20	harmful 12:11,22 14:16 23:11 37:8 53:22 124:24 135:21 159:10,23 160:21,22 176:16 198:14,14 243:1,3 249:17	heart 8:3 21:3 232:15
grew 17:19	halowaxes 67:22,23 137:21 139:10,17	harmfulness 160:14	heat 35:17,18 43:17,18,18,21,22 44:9,13 52:11,13,25 54:21 99:18 105:14,15,20,21,24 106:2 107:7 117:5 126:13 147:3,4,5,18 162:18 168:18 169:5,16 172:2 182:25 183:2,9 188:1,17 189:11
grind 154:8	hand 56:13 81:12 91:7,8 112:9 120:4,24 122:8 289:24		
gross 231:7	handle 35:9		
group 5:17 19:9 31:18 58:6 90:14 90:21 109:15 115:3 116:15 116:18,20 120:22 124:16 124:17 134:16,17 144:18 144:18 152:17,19,21,22,24 153:9,22 154:6 194:4	handled 19:11,24 40:21 41:1 143:5		

[heat - incident]

heat (cont.) 221:12 242:1 249:19 260:18 285:11,24	honest 32:22 70:4 72:3,12 88:21 142:12,23 143:5 173:21	hurt 36:4 136:9,9 159:9 233:18 255:13	identify (cont.) 121:13 123:25 124:19 126:11 127:3 128:22 132:3 136:15 141:3 143:24 154:23 161:11 164:5 175:6 180:2 182:5 187:8 189:3 191:3,19 196:9 197:7 199:10 201:10 203:16 204:9 205:7,15 208:8,17 216:23 217:4 219:5 223:8
heated 43:21 96:3 103:16 168:22 198:24 242:19 260:4 278:5 283:16,19,20,23 284:1 285:19	horse 68:3	hurts 13:16,16 136:5,8 156:20 234:5,12	ignited 285:17 286:9
heating 168:23,23,25 260:8 285:20	hospital 4:22 5:3 7:2 8:24,25 38:20 45:1 77:8	husch 2:10 290:8	ii 10:16 22:12 27:24 46:7
held 6:22 8:8	hospitality 56:24	hydraulic 19:14 43:11,14,16,24 44:1 44:14 94:22 104:4 117:3 162:19 181:17 203:23 206:6 221:10	illegible 125:5,6
help 12:17 218:25	hospitalized 52:19	hydrocarbon 111:9	illinois 5:12 25:20,24
henry 57:9	hospitals 6:21 9:1 221:21 222:5	hydrocarbons 44:21 58:1,9,13 72:18 112:14	illness 22:21 38:10,15,18 82:6 87:10 91:2 131:6 253:7
hepatitis 49:22 50:2,5,6,8,12,13,16 51:22 53:9 54:1,9,18 87:12	hot 31:10 52:12 66:4 103:14 168:25,25 181:17 198:8 247:8,9,13,14 260:18 285:24	hydroxide 170:18	illnesses 6:12 22:24 25:6 29:8 82:18 131:8 171:22 204:3
herbicides 47:24	hotter 286:1,5	hygiene 11:20,21 16:13 17:19 22:16 22:19 24:5 40:22 57:11 58:10,17 150:10,19 178:2,3 178:8 179:21 180:6 189:15 191:6 194:4 199:3 200:12 202:21 203:8 205:11 211:23	immediate 196:20
hereto 289:22	hour 242:25 243:5	hygienic 189:14	impact 223:24,25,25
hereunto 289:24	hourly 244:23	hygienist 17:14,16 31:20 179:10,15 179:19 201:15 205:9 211:22 256:8	imped 14:18
high 21:5 29:9 51:23 78:2,3,4 79:9 85:13 93:8 96:2 100:3 147:18 148:5 154:17 159:23 172:25 228:7 248:5 269:21 271:23,24 272:9 273:1,5	hours 1:19 65:21 139:25 140:2 145:20,20 147:1 151:19 152:3,6,7 155:15	hygienists 17:21 40:11,22 146:17,24 151:8 152:23,25 153:10,16 154:2,6 179:5,7 203:5	implement 12:17
higher 70:1 90:16,21 176:24 178:14 265:12,14,15,25 266:1 284:14	house 45:2 134:25 135:4	i	implied 22:19
highly 265:6 271:23 272:9	hudson 196:18	i.b.t. 167:5 192:19 228:21 233:3 234:19 235:5,9 236:8,15	importance 31:12,14
hire 32:5,13	huh 69:9 132:25 186:5 251:5 271:22	idea 196:7 209:22 210:23	important 14:12,18 15:2 16:16 20:25 37:3 44:25 45:14 46:21 124:11 149:24 178:9 274:24,25
hiring 32:6	human 22:20 60:7 82:12 84:15 85:4,16 89:11 136:9,9,13 140:4 146:2 158:1,14,25 159:2 174:15 228:14,14 242:5 249:9 253:3	ideally 240:19	impossible 198:16 261:6
historical 243:9	humans 86:2,2 88:14 135:17,25 140:5,11,16 159:11,13 262:6,15 263:14,19,20,21	identical 94:14	impregnating 96:4
history 63:19 76:16,22 79:13	hundred 45:18 46:4 133:2 156:25 175:22	identified 142:7	impressed 223:19 224:1,5
hit 208:17	hundreds 206:13	identify 57:4,6,14,15 78:17 84:9 87:17 89:5 91:11 92:1 102:9,18 105:7 107:14 109:1 111:2 114:9 115:12 116:18 117:19 120:19	impression 103:3
hits 286:6,11	hung 209:22		improvement 66:1
hmo 28:18	hunt 196:12,21		impurity 138:3
hold 6:22 85:23 204:9			incident 47:17 168:10,12,16 170:6,8 170:14 171:3,3,6,13,19
homes 170:2			

[incident - intentionally]

incident (cont.) 277:16 281:10,12 282:3 286:13	individually 29:24 57:5	information 11:16 12:22 13:1,3,13,20 13:22,24 14:4,13 20:1,2,3 34:13,24 35:19,22 36:2,7 36:23 37:5,17,20 38:3 78:16 82:19 92:11 94:7,13 94:15 95:15,23 96:9,15,21 97:10,23 98:23 99:3,6 101:10,23 104:7,14,20,24 106:5,16,17,19,22,23,24 107:4 109:10,19,22,22 110:6 112:10 115:4 119:1,2 119:22 123:8 124:20,21 125:5 126:1 127:12 130:17 131:11 132:22 133:8 160:6 166:2 167:9,11 180:18 187:25 192:4 193:16 194:7 194:15 195:16,21,25 196:21 197:1 198:19 199:15,16 201:3 202:5 203:22,24 205:25 206:1,22 207:9,23 217:1 223:22 225:9,14,15 239:19	innocuous 198:12,13
incidents 274:13,19	individuals 5:17 13:1 14:13 272:2		inquire 24:22
incineration 123:18 129:16	industrial 8:3 11:20,21 13:14 16:12 17:14,16,18,20 21:6,6 22:15,19,21,23 24:5 31:20 40:10,21,22 49:20 50:19 55:15 57:11 58:2,10,17 60:21,22 82:16 83:3 131:9 131:25 146:16,24,24 150:10,17,19 151:7 152:23 152:24 153:6,10,16 154:6 154:15 160:16,23 164:8,13 165:4,8,18,20 166:13,16,20 177:17,20 178:1,3 179:4,7 179:10,15,18,20 180:6 189:15 191:6 192:11,12,19 194:4 199:3 200:12 201:15 202:20 203:4,8 205:9,11 211:22,23 227:18 231:24 233:2 256:8 261:13		inquired 18:20 108:8 189:9
incinerator 123:19			inquiries 33:5 80:1 110:15
include 35:11 38:18 93:20,22,23,24 96:9,12 103:22 142:11 162:11 165:15			inquiry 70:24
included 11:12 38:25 67:6 139:8 165:16			insecticide 26:14 84:19 210:12
includes 100:15			insecticides 62:16 244:19
including 29:2 49:19 50:22 126:7 287:14			inside 16:20 43:19 116:7 168:24
inclusions 50:25			insignificant 242:23
incorporated 247:3	industries 251:10	ingestion 93:9 103:5 242:5 257:22	inspection 24:4 100:10 101:1,4
increased 145:9,10 151:23	industry 81:21 89:2 94:19 95:12,13 95:25 96:7 98:15 100:14 103:20,22,24 134:19 137:9 152:20 154:10 164:1 166:4 221:19 222:25 223:3	ingredient 144:4	inspections 17:9,18,18 23:15
increasing 159:15		ingredients 137:20,21 287:6	instance 54:20 244:21 252:11 271:5
independent 85:10,12 99:25 100:3 135:10,11,12,13 155:2	industry's 223:1	inhalation 49:23 99:10 103:15 112:3 155:16 162:9 176:20 182:16,17 198:15 227:1 228:24 229:1,2,4 242:13 257:22	instances 50:19 52:4
index 14:8 38:9 39:9,14 59:6 106:9,14 244:8,21 245:16	inerteen 42:24 119:9,16 120:8 122:24 123:11 144:4 175:9 175:12,13,18 176:18 177:9 177:15 179:1 190:12	inhalations 145:7,8	institute 7:20 89:7 172:7 173:9 175:2 235:19,20 239:19
indexed 14:7 59:5	inerteens 115:22 119:10	inhale 66:15 176:2,6,7,14 250:11	instituted 15:24
indiana 89:15,18 184:18 185:9,10	infected 50:7 249:4	inhaling 52:2	instructed 34:8
indicate 64:4 86:15	inflammability 45:14	inherent 21:13 97:6 218:20	instruction 130:18
indicated 9:11 23:14 40:9 194:18,25 244:5	inflammable 45:16	initials 202:22	instructions 31:7 82:23 117:11 119:12 124:4,11 126:18,22 127:8 128:12 129:20 130:23 193:5 207:16 253:24 254:9 254:9
indicating 202:1	inflammatory 50:4,5	injuries 9:25 204:4 237:3,5	instruments 212:17
indication 52:12	influence 131:14	injurious 103:17 123:14	insulation 100:20
indirectly 233:24	influenced 154:9	injury 11:17 34:15 50:18 119:15 196:3 204:23 231:9,10 261:13	insurance 39:1 199:12 245:25 259:7
individual 12:5,25 22:24 24:12 38:4 41:7 85:7 92:4 108:6 130:17 212:10 247:1 265:12 268:21 280:4,10	inform 206:20	innocuous 198:11	intelligent 32:21
	informal 18:23 224:6		intended 97:6
			intentional 167:20,22
			intentionally 229:5

[interest - knew]

interest 18:10 30:17 49:14 76:1 224:8,10	iron 73:9	john's 7:1	kelly (cont.) 43:5 57:2 66:6 75:4 82:9
interested 39:16 48:22,25 62:1,3,4 68:13 74:11,19 78:14 105:2 107:7 181:18 182:12 184:21 185:13 196:24 199:14 206:19 217:15 219:12 289:23	irregular 23:3	johnson 40:20 256:22	94:9 108:20 127:24 129:17 130:20 132:9 134:10,20 135:14,18 143:23 174:17 180:1 193:4 194:6 207:14 216:21 222:18 224:12,16 224:19 225:7 288:6,9,14 289:10
interesting 38:24	irritants 155:7	joined 61:24,25	kept 38:15 39:7 152:12 259:17
interim 192:15,19	irritating 52:1 103:9 155:15	joining 48:6	kettering 99:22 143:25 144:15,21,24 145:5 148:23 149:7,9 180:22
intermediary 34:11	irritation 97:4,8 137:5,5 182:1 184:1 232:2	joint 234:7,8,9 283:3	kidney 89:24 272:8
intern 4:21	irwin 203:12	jointly 201:6 258:16	kidneys 136:5,7,8,9
internal 4:24 6:2,7,8 8:19 186:8	isolated 23:4 46:19	joints 233:17,18,20	kill 159:2,19 173:25
internally 124:25	issue 240:4	jones 57:17 61:7 62:25 63:6,7,19 65:9,9 138:10 225:4,5	killed 158:22
internship 5:1	italian 278:23	joseph 2:5	killing 159:19
interpret 239:5 262:21	itches 234:4	journal 7:18,19,20,21 14:5 22:15 22:22,22 23:6,6 52:5,5,7 57:11 58:1,9,17 237:13,22 237:22 238:5,10	kills 159:16
interpretation 239:3,4 262:17 263:23	items 270:17	journals 23:5 59:6 83:19 238:16 239:13	kilogram 60:4,6,7,8,10 157:13 158:4 158:21
intervals 96:5 267:5 268:3	ivy 137:7	july 144:11 180:4,9,13	kilograms 157:15 158:5,9,11
interviewed 32:11	jack 57:17 199:2 200:11 205:8 205:11	june 66:6 72:16 89:13 90:2 114:18 144:11,11 185:24 187:10 217:19	kimbrough 84:12,23 86:16,18 87:2,18 87:19 88:23 131:24 172:13 172:15,24 173:1,16 174:3 174:13 234:23 235:4 260:21
intestinal 232:11 233:23	january 4:4,4 9:8 27:15 58:21 107:16	junk 238:10	kimbrough's 88:15 172:21 173:13 235:15 236:6,9,18
intestines 232:1	japan 168:10,16,17,18 169:18 171:4	jurat 290:14	kind 16:13 17:11 35:23 38:9 53:9 64:22 76:12 127:25 173:23 241:11,12 242:25 246:2 247:6 273:16,17
introduce 220:20	japanese 168:18 169:4,8,10 170:1,8 170:8,14,16,21,21 171:7,15 171:20,20,25 172:1,5 277:4 279:5 281:9	jury 4:1,15 12:8 52:11 59:23 71:4 85:20 94:6 110:5 114:3 137:1 168:15 177:6 212:8 227:9 237:17 246:22 270:20 274:11 284:12	kindling 286:8
invariably 253:6	jaundice 50:1 52:15 53:2,5,9 249:20 249:21 250:14 251:22,22	k	kingshighway 1:22 289:9
invented 73:8 195:3,4	jaundiced 52:16	kanechlor 279:4	knew 33:10,23 62:11 100:2 148:25 149:2 178:2 180:24 196:2 203:9,13 207:2,9,12 210:25 220:12
investigated 90:14 272:19	jenkins 2:11 290:8	kc 69:11	
investigation 64:5 80:6	jensen 207:25 208:2,22 211:1 212:1,6,23 215:11	keep 26:7 38:5 122:12 124:14,23 125:10 159:15 173:24 220:25 222:1,24 259:15	
investigator 144:2,17	job 9:21 23:21 45:21 61:17 115:1 236:24	keller 211:3	
involve 170:10	joe 188:5 224:18 245:2	kelly 1:17 3:10,17 4:15 8:14 42:8	
involved 28:2 29:13 30:15 35:13 154:11 156:1 170:8,14			
involving 168:11			

[know - levels]

know	I	lap	leave
13:12 16:16 17:6 19:3	lab	121:5,7 124:15	139:21,25 155:14 246:10
27:19 31:19 36:24 37:3,4,6	78:11 145:5 149:9	large	lectures
37:6,7,7 39:19 42:13 46:2,3	label	25:13 43:10 89:11 97:8	7:8,10
46:3,16 48:18 50:20 52:3	20:14 35:23 111:4,7,7,15	130:8 134:23 140:6 144:25	led
52:18 55:16 57:22 59:22	111:22 112:8,13 113:3,4	231:24	88:12 262:5 263:13
64:22 67:9 73:18 74:17	115:2,7,10 116:10 118:9	larger	left
78:15,23 81:4 89:3,12	120:8 121:14,15,15 124:1,5	12:2 59:8 151:21 200:5	17:19,20 18:12,14 27:19
91:15,17 96:10 99:1 100:16	124:6,7,9,13 128:23,24	largest	58:21 70:7 131:15 135:3,5
108:14,15 113:2,24 114:16	129:10 130:17,18,19	8:23	173:8,8 174:25 178:1
115:17 117:23 128:24	131:15	lasts	194:22 245:24 255:20
132:14 133:8,8,13,16 138:6	labeled	51:4 156:21	legal
139:16 145:15 146:20	70:22 127:19 132:6	late	115:5
147:22 148:3 149:21	labeling	39:8 46:15 47:11 52:22	legible
152:18,18 156:2,10 158:11	114:14,17	77:13 177:25 180:10	125:7
158:11 159:25 160:1 170:6	labels	203:22 204:19 207:13	length
170:22 177:15 179:7,12,21	35:19,21 111:10,14 112:20	209:9 228:21 229:6	106:20 142:10 228:16
179:22 181:19 187:18,18	113:11,16 114:5 115:20,25	lately	lengthy
187:20 188:9 189:1,10	116:2,21 117:11,16 118:17	274:24	149:10
190:3 193:2 194:1 196:5	118:23 119:8,12 120:13	launder	lessen
197:3 201:4 202:8,12 203:1	121:19,20,22 122:9 126:13	112:19 118:14 128:18	224:2
203:10 207:11,17,25 208:9	127:4,18 131:14 193:6	laundered	lethal
209:21 210:4 212:3 213:3	207:17	65:21	159:13
215:23 224:25 225:2,3,22	labor	law	lethargy
225:24 228:1 230:15	73:24 109:4	2:6,10 290:17	282:18
236:11 242:24 245:4,5,6,20	laboratories	lawful	letter
247:20 258:24 259:9,12	14:2,14 135:9,10,12,13	3:11	19:6 37:10,12,14 54:17
261:17 262:5,16,21 263:10	155:3 161:24,25 162:6	lay	57:1 78:19 79:2,6,15
265:21 268:5,6,11 269:17	164:8 174:8 175:10 187:21	20:13 86:15 87:1 213:8	102:10,20 114:12 115:13
270:13 271:13,19,22	231:5	layman's	180:3,12,15 182:3,6 185:15
275:22 276:7,13 278:17	laboratory	50:3 159:7	185:22,25 186:6,24 187:8
279:19 282:20,21,22 283:5	14:17,17,20 18:14,15 73:13	ld	187:12 188:23 189:4,7
283:7 285:22 286:15	77:23 79:7 88:7,11,18	159:12,13,25,25,4,6,8,10	190:23,23 191:4,8,15,20,23
knowing	99:21,22,24 100:1 135:2,3	159:13,14 160:1,12 231:6,7	192:3 197:8,14,20,23 198:1
169:3	135:4 144:1,15,22,24 145:1	lead	198:18 199:1,7,11 200:11
knowledge	155:2,2,4 156:1 162:3,5,7	93:9,11	200:14,17,20 201:12,17
34:17,17 53:11 54:23 61:2	164:13 165:8,17,18,19,21	leading	202:4 203:17 204:11,13,20
61:9 105:5 114:20 132:16	175:1 180:22 187:17	86:12	205:8,16,16,19 206:2,18
170:16 172:6 178:24,25	202:18 236:9 262:3 272:7	leak	216:24 217:7 223:9,17
179:19 185:16 275:12,20	273:4	221:13	256:7,11 259:13,15
278:14,15 279:4 289:12	lack	leakage	letterhead
knowledgeable	97:6 114:19	123:5	98:4
62:10,19 88:20,20 195:8	laid	leaked	letters
202:19 237:25	133:13 223:5	52:11,12 169:1 286:22	19:22 35:13 41:6 80:24,25
known	lake	leaking	193:2 217:5,9
14:1 49:20 66:16 73:7	213:11,13,14,19 214:11	183:2	level
146:24 174:17,23	landfills	leaks	77:9 99:14 145:9,9 146:7,7
knows	219:3	52:17 53:1 169:3 240:18	151:3,4,5 153:13 166:24
14:19 18:16 45:12	language	learn	168:7,21 177:3 178:11
koettering	50:3 83:18 86:15 87:1	59:12 177:12 207:11	228:6,7,20 230:1 246:4
218:4	92:22 93:1,1,5 97:18,21	learned	248:5 266:1,9 270:13
kozoriz	106:15 110:10 117:15	213:6	272:10 284:13,14,16 285:5
196:17	123:7 127:25 159:7 213:8	learning	levels
krummrch	214:19	184:21 185:13	99:3,7,15,18 103:17 126:16
25:18,23	languages	leather	146:2,5,23 149:2 150:24
	124:22 126:2,4,6 127:13	55:22	151:13,15 152:17,20

[levels - magnesium]

levels (cont.)	list	long (cont.)	lot (cont.)
153:11 154:7,17 159:20	35:6,7,8 39:5,7 156:4	82:6 86:8,10 99:8,9 103:10	240:9 246:5,9 247:16 250:9
166:25 167:14 177:1,8	183:11 201:24	151:16 152:15 162:10	282:4
181:11,12 190:6,20,21	listed	167:13 168:5 172:18,22	lots
209:11 218:14 233:5 248:6	9:7 37:22 39:13 70:18	174:1,15,19 183:11 200:1	55:8 134:23 159:5 171:14
252:17 264:24,24 265:2,13	116:10,21	204:24 224:8 227:6,9,11	203:6
265:14,22 266:5,6,16 268:7	listen	228:20 229:1 233:6,12	loud
268:15 269:3,9,10,10,14,17	130:15	242:11 243:15 250:18	185:4
269:19 270:6,10,15 271:23	liter	251:23 277:16	louder
271:25 272:4 275:10 279:6	176:23	longer	250:2
279:10,12,24 280:12	literature	164:17 228:4,5 229:2	louis
283:16 287:25	13:19,25 22:7 46:8,14,18	250:16	1:1,22 2:12 3:19,21 4:20,22
levinskas	46:21 47:4,9,11 49:16 52:5	look	5:3,3 6:24,25 7:2,3,6 8:6,23
40:23 41:8	54:19 82:20 83:16 84:2	32:20 42:1 56:17 59:10	8:24 10:6 15:22 19:16,18
liability	131:7 171:13,15,17,19,21	60:23 66:18 67:9 69:15	19:19 25:19,21,25 26:4,7
199:12 259:6	182:24 183:1 193:19	73:1 74:17,18 78:17 80:25	26:18,24 27:4,5,20 28:12
liable	201:24 237:8,11,12 239:12	81:4 87:16 89:4,22 91:9,24	28:23 29:24 33:1 59:8
17:5 76:4	263:17 274:19	95:4 98:1,9,21 100:4 104:9	62:13,18,21 74:4,14,22
libraries	little	105:6 106:7 107:13 108:20	75:17 79:1,7 80:2 114:14
46:22	28:15 30:21 36:5 46:17	111:1 114:8 116:13 117:18	115:15 123:19 135:9 155:2
library	55:21,24 57:16 60:5 71:22	118:16 119:5,25 121:24	162:3 208:23 212:13 245:3
180:25	74:25 91:18 97:14 106:8	122:6 123:21 124:14	289:4,9 290:10
licensed	107:25 111:5 122:23	125:17 126:9,25 127:15	louisiana
5:7,10,12,12	123:10 152:1 158:5,5	128:6 132:1 136:7,15	2:7 290:19
lick	161:18 164:17 168:15	143:23 147:20,23 148:6,19	low
220:2	181:13 207:9 214:7 215:6	149:14 150:15 154:20	53:18 64:6 167:13 218:7,14
life	227:25 247:15 250:1 254:2	156:22 157:5 164:4 167:18	228:6,20 233:5 248:6
3:22 123:15 147:2 248:7	254:16 270:17 271:22	173:3,6 175:5 180:1,15	269:22 271:12 273:2
lifetime	273:5 275:19 286:5	185:21 188:9 189:2 190:1	287:25
168:9	live	197:6 198:8 203:15 216:22	lower
lightning	3:18 174:1	217:3 234:6,18 236:22	90:17 111:15 239:20 265:6
45:11	lived	245:6,7,17,23 249:2 256:6	266:15 268:17 279:6
lights	3:21 214:9	257:18 258:8 259:5 264:12	284:16
45:11	liver	266:25 270:18,20 275:18	lubricants
likelihood	50:4,6,14,16 55:1 66:16	looked	43:8 221:6
268:14	70:20 76:25 77:2 79:10	74:10,16 76:25 77:1 78:6	lubrication
likewise	85:9 89:24 90:19,22,23	81:5 167:25 218:9,9,21	94:23
204:25	172:25 173:22 232:3,9,10	235:24 236:1,4,9 257:12	lunch
limit	232:19,21 250:14 251:22	267:9,10 269:8,9	40:18
77:4 189:24 285:7	251:22 272:8,22 273:6,7	looking	luncheon
limited	274:1	14:5 65:14 94:2 98:6	108:19
39:9	livers	104:11 121:6,8,9 128:9	lung
limping	58:7	172:12 210:10 212:17	73:9
233:19	living	232:24,25 235:18 236:17	lungs
line	52:20 229:21	237:12 239:6 244:8,25	232:16
24:9	loaning	271:21	lyle
linger	220:11	looks	177:18
156:19	local	92:2 185:25 192:6 208:2	m
linn	230:24 232:2	273:4	m.d.
92:3	located	lost	1:17 3:10 4:20 73:11
lipstick	25:19 114:13	38:20 241:13 254:2	174:24 288:14 289:10
137:10	london	lot	mac
liquid	207:18 208:19,21 215:2	13:21 16:21 21:2 38:24	186:21
55:24 93:11,14 100:20	long	46:14 47:1 68:5,6 71:5 76:1	magnesium
113:20 157:11 183:5	3:21 5:4 22:1 25:10 51:4	160:5 169:17 173:4 190:22	181:18
	52:22 56:11 62:14 73:9	207:8 211:22 238:7,24	

[mailed - medicine]

mailed 78:15	manufactured (cont.) 168:19 170:17 182:2 220:15 240:10,11 279:14 279:23 287:7	material (cont.) 219:1,2,3 220:10 221:22 225:3 229:12 231:10 240:13 241:19,22,23 285:25 287:10	means (cont.) 53:18 57:23 71:5,6 87:23 90:6,13 100:19,20 109:22 123:14 148:17 150:13 156:15 159:13 160:20 164:16,16 166:17 202:3 213:9 237:20 262:17,25 263:1 268:6,7 271:2 272:25 282:4
main 12:21 42:10 44:13 129:23	manufacturer 42:20 184:5	materials 11:17 17:1 23:4 34:9 35:24 92:17 183:23 192:24 199:16 243:20 287:15,24	meant 90:21 113:8 127:16 268:13
maintenance 100:11 101:2,4 259:17	manufacturers 200:5	matter 15:2 16:21 75:1 257:16 262:18	measurement 280:19
majority 67:21	manufacturing 9:15 16:25 23:22 24:11 27:18,19,20,21,22 28:8 29:6,6 37:25 62:15 64:13 146:25 175:11 184:10 188:24 190:7 211:10,15,20 220:3,14 221:2,24 222:1,14 222:16 244:2 267:14 280:3 280:10	matters 19:11 22:15 289:13	mechanical 198:25
makeup 90:10	marbury 184:17 185:8,8,9	maximum 99:12	medical 3:24 4:7,8 5:7,18,25 7:1,13 7:20,25 8:3,5,6,7 9:7,15,18 10:2,11,14,18,18,19 11:3,7 11:8,10,12,14 12:7 13:10 13:19,25 14:5,10,23 15:18 15:23 18:1,19 19:8,11,20 19:24 20:10,11,12 21:22 22:23 23:5,7,17,20 28:12 31:1 32:6 33:6,8,9,21 34:14 34:17 35:15 37:13,15 39:12 40:12,19,20 41:10,18,19 42:5,5,5,6 45:22 46:11,14 48:24 52:4,7 54:7,19 59:7,7 59:8,8,12 73:21 80:17 82:11 83:16 84:1 89:20 92:21 96:14 99:4,11,23 100:1 104:19 108:4 110:2,3 110:4,6 115:5 117:14 129:18 130:22 131:7,12 144:25 150:19,20 155:21 159:25 161:1 163:14,18 165:10,11,13 171:13 173:10 175:1 177:18,21 178:20,22 180:4 185:18,23 187:23 189:20 193:10,19 194:3,17,19,19 196:13,14 196:15 197:17 199:3 200:12 201:13 202:12,20 203:2,9,10 205:12 206:25 209:1,5,6,7 211:12,21,24 219:14,22 220:11 235:20 235:22 256:20 257:3 264:5 264:10
making 13:11 15:8 28:6 48:1,4 49:2 55:19 168:22,23 181:18 234:10 240:23 242:3 283:9	march 4:6,7 10:12 98:4 101:8 102:24 175:7 191:7 290:1,3 290:3,3	mean 13:1 14:11 29:4,15 31:13 37:7,21 38:12 41:5 43:13 44:1 46:24 47:6 50:11 51:3 51:23 52:6 55:17 56:8 59:15 60:9 61:9,24 64:14 64:18,22 67:2 68:4,25 75:14 86:7 87:6,8 90:7,20 94:9 96:18 97:15 99:17 101:18 106:20 108:15 114:17 121:20 133:19 135:22 138:6,8 139:3,15 140:10 145:14,23 150:2,2 151:25 152:19 154:9 156:9 157:2,12 159:10,13,21 160:23 161:6 163:4 171:14 172:23 173:25 174:5,7 176:13 178:18 184:7 186:11 193:1 198:13 201:6 207:8,10 213:5,8,20 218:6 226:10,11,13 227:11 231:23 233:17 234:17 237:16 238:7,20,22 239:22 241:7,7,8 243:21 244:18 247:21 250:8 251:5,6,8 253:5,6,6 254:20,22,24 255:6 256:20 257:7 258:24 267:18 268:5 270:9,16 271:1,12 275:18,24 279:2 280:2,15 283:3 285:19 286:16	medically 31:5
male 174:11	marie 2:14	mccrea 275:6 276:2 277:10	medicine 4:22,24,24 5:8 6:2,5,7,8,9 6:15,16,24,25 7:5,7,10,18 8:5,17,18,19 23:6 177:17 177:20
malignancies 39:5	marked 56:14,15 57:1 58:20 94:17 121:23 125:7	mcs 44:12 162:15	
malignancy 39:18	markedly 62:5		
maloney 42:19	market 35:4 220:20		
man 8:14 16:8,17,22,24 17:12 17:13 21:8 24:15 31:10 32:14 38:1 60:7 100:1 102:4,4 115:10 136:6 138:10 144:18 150:14 184:12 196:19 197:17 205:24 211:13,14 212:2,11 215:21 278:24	marketing 115:4 219:14		
management 13:1 33:12 37:6 41:11,16 41:20 219:21	martin 30:5 31:24 32:4,8 61:15 62:11		
manager 24:20 31:4 32:12,17 37:25 78:13 184:5 200:12 205:11 220:11,15	mary's 7:3		
manifestation 230:18	massachusetts 74:1		
manner 54:4 167:24	massive 103:6		
manual 132:7,7 133:6	master's 17:23		
manuals 134:3	material 20:10,17 45:20 48:2,3 53:17 54:14 66:15 72:21,22 83:6 99:18 105:1 109:2,10 109:13,14,19 115:9 121:1,4 129:3,15 130:12 138:25 139:1,3,6 147:14 148:25 155:8 157:11 158:7,14 168:24 176:6,14 184:1,11 186:7 196:4 204:25 205:3 208:16 213:22 218:25		
manufacture 13:9 27:12 28:1 29:13 37:18 48:19 65:20 170:18 172:1 224:20 225:13,18,21 278:7			
manufactured 10:24 25:15 26:2,10,12,13 26:14,15,16,20,21 27:17 30:10 31:23 49:7 92:5 100:21 115:14 127:6			

[medium - monsanto]

medium 126:13	methods 77:11,17	misinterpret 239:25	monsanto (cont.) 14:22 16:1,15 18:18 19:21
meeting 173:1,1 219:6	mice 145:15	misread 185:2	20:2,6 21:23,25 22:11 23:9
meetings 24:13 38:2 41:3	michigan 205:10	missouri 1:3,22,24 2:12 3:19 5:7,11	23:17 24:9 25:21,23 27:11
meets 238:4	microscopic 66:24 232:22	7:20 8:6 289:2,7,9 290:10	28:1,2,3,7 29:2,13 30:4,10
meigs 183:1	mid 127:6	misspoke 98:8 127:16 140:17 203:20	30:24 32:23,24 33:2,6,9,17
melt 198:16	middle 53:20 78:1,1 141:7 222:12	mist 144:5,6,6,7,8 145:7 149:13	34:16,23 35:23 36:1,6,10
member 8:1,2 9:14 211:24	254:3	149:16,17,19	36:10,11,14,15,15,20,22
memo 115:19	midwestern 52:6,8	mistake 258:3	37:1,9,10,11,16,18,22 38:7
memoranda 61:9	mild 51:7 183:4 248:16	mistaken 140:14,24	39:1,6,10 41:11,16 42:15
memorandum 37:21 92:2,3,9 98:3 102:10	military 10:15,16	mists 112:15 118:10 125:1	42:16,20 43:25 44:4 47:15
136:18	milk 216:12	128:14	48:12,15 49:13 53:12,24
men 16:23 65:19 76:16	mill 171:1	misunderstanding 61:21	54:6,18,25 55:5 58:22
mention 9:14 63:14,16 93:16 132:19	milligram 146:9,13,18 154:3 176:23	mixed 122:9 145:14,14 156:11	59:11 61:4,16,17,19,22,24
139:6,14,22 252:2	milligrams 146:8,10,10,12,14,18,21	201:1	61:25 62:9 63:9,12 74:15
mentioned 30:14 33:20 34:12 39:19	milliliters 275:12,21,23 276:16	mixture 71:1 141:23 182:12	75:5,7 79:25 80:13,18,19
44:9 46:11 49:18 51:21	million 12:15 45:18 46:4 77:14,16	mixtures 98:15 107:25 126:17	82:10,22 83:5,13,21 88:24
55:4 60:25 80:10 81:15	77:19 266:6,7 275:13,22	162:25 163:13	91:19,21,22 92:6,7,17 95:8
139:14 144:13 170:7	276:9 277:11,20	moderate 83:3 160:19	96:14 98:3 99:4,20,24
172:16 178:20 183:3 213:5	millions 210:13	moderately 271:24	100:22 101:4,6,9,13 102:14
234:22 235:14 236:23	mind 84:7 262:15	modest 160:16,18	103:1 104:3,19 105:3,13,23
237:13 246:12 249:8,19	mine 23:2 98:3 102:11,11 105:16	modestly 160:22	108:12 109:9 110:3,4,6
252:1 278:6	107:15 136:22 252:25	mold 246:18,20,22 247:3	111:11 112:20 113:12
mentions 190:9	minimize 240:20	molecule 213:20	114:15 115:1,10 117:22
mercy 7:1	minor 86:4 87:4 182:25	molecules 48:7	118:8,23 119:8 124:1,3
messed 120:25	minute 21:20 30:8,19 49:9 61:20	molten 247:6,9 284:6	126:13 127:4,6,18 128:23
met 41:4 192:7	70:9 120:20 121:3 158:20	mom 193:25	129:16 130:21 131:21
metal 247:1,6,7,8 284:6	179:24 185:3 204:9,15	money 38:19	132:6,10,12,17,18 133:4,10
metals 181:17	212:20 214:9,10 216:11	monitor 29:12,16	133:14,18,21,22,23 134:1,9
metastasize 173:24	288:4	monitored 30:1 244:5,16,19	134:13,21,21,25 137:16,18
meter 146:8,8,18,19 154:4	minutes 108:11 207:8 215:7 219:6	monsanto 1:12 4:2,9,10,11 9:4,11,22	138:13,14,17 141:5 142:2
meters 146:13,21	255:20	11:5,18,24 12:12,16 14:4	142:22 144:20 150:25
method 17:10 177:14 178:3	mischaracterizes 244:11		155:23,24 159:25 161:23

[monsanto - observe]

monsanto (cont.)	n	needles	northwestern
243:14,25 244:5,22 245:1	n.i.o.s.h	50:7	165:9 173:11 235:21
245:22 246:2 251:10 256:7	89:8	needs	nose
259:1,18 267:13 275:5	n.i.o.s.h.	234:15	254:22
278:24 279:1,7,8,11,13,24	89:17 90:2 264:12 272:14	negative	notarial
280:11 287:8	nader	90:19 272:25 273:1,7 274:5	289:1
monsanto's	222:23	negligible	notary
10:10 11:10 28:10 33:4	naked	147:14,16 241:23 242:1,23	1:23 3:5 288:20 289:6
38:11 49:1 116:3 118:17	245:13	neither	290:4
129:18 149:5 183:21	name	289:18	notation
187:25 197:16 201:13	3:15 22:19 41:13 43:25	new	125:22
205:12 220:6 223:14,20,23	44:4,8,8,13 100:13,19,19	2:7 7:18 14:12,18 17:14	notch
223:25 224:1 278:7	116:22,23 118:1 120:11	23:5 32:10,11 52:23 54:21	73:11
month	174:18 184:11 189:10	55:18 56:1 74:1,1 121:19	note
53:7,23 173:8	194:24 196:19 224:18	159:7 162:24,25 163:12,13	79:14
months	278:24	197:17 208:8 212:20	noticed
16:7 99:10 138:19 145:24	names	223:11,14 248:14 286:18	14:16
152:1,1,4,8,11,11,12	26:7 42:22 43:2,23 44:11	290:19	november
185:24 229:3 245:7,14	73:19 101:16,18,19 162:13	newly	125:21 166:16,22 200:13
277:17,17,18	194:24	4:8	200:20 219:11 220:7
morning	naming	news	289:25
141:12 216:16 224:16	147:9	69:15 148:6	number
288:7	naphthalene	newspaper	11:19 12:24 13:18 37:2
morphological	46:9,10 47:25 49:8 50:13	207:21	44:12 57:2,17 66:23 67:6,7
58:7	67:23 140:21	newspapers	71:2 85:6 91:14 108:23
morris	naphthalenes	208:18,19,19 215:1	109:6 121:8 131:9,11,13
40:20	46:23 47:5 67:19,21 68:6	nice	134:23 141:15 159:10,13
mortality	national	49:5	160:1 163:12 220:1 231:22
173:25	7:19 9:18 89:7 172:7	night	257:21 261:24 273:21
motive	239:19	90:24 272:24 273:12,15	numbers
154:9,10	nature	nilly	147:9 160:12 173:4 267:19
motor	29:8 38:18	110:16	276:16
160:24 203:1,17,25 204:20	nausea	nine	nurse
205:9,16,20,23 206:2,8	199:19 259:10,23 282:17	63:6 110:9	24:25,25 25:4
207:14,19,2 256:8	282:23,25	nod	nurses
mouth	nauseated	214:22	24:22
231:8,25 282:11	52:25	non	
move	near	6:9 28:16,19 39:3 141:17	oath
234:9	45:10	213:8,9,23	172:24 289:14
moved	neat	nonbiodegradability	object
85:5	139:23	218:19	36:8 45:24 54:2 86:11,17
murray	nebraska	nonsense	91:6 132:13 133:12 190:17
2:6,6 31:25 36:8 45:24 54:2	173:10 235:20	240:9	223:4 241:5 244:10 254:11
56:16,20,23 63:21,23,25	necessarily	nontoxic	264:7 272:13 279:19
69:4 70:7,9,11 85:17 86:11	273:23	60:3,18,19 70:24 71:12	objection
86:17,23 91:6 125:4,9,14	necessary	72:4,13	86:20,22 254:15 279:18,25
132:13 133:12 153:20	92:14 245:19	normal	objective
184:23 190:17 204:18	neck	90:8 206:15 225:12 254:9	234:6
213:17 216:24,25 223:4	248:21	266:16 268:16 272:3,4	objects
224:15,17,18 226:1 244:12	need	274:2 278:6	247:1
254:13 255:20 261:25	66:23 73:18 86:22 91:15	normally	obscure
264:11 265:16 276:8	96:9 99:1 129:24 134:3	228:10 256:24 257:2	52:5
281:10 285:15 288:3,6,12	141:17 149:21 156:3,10	259:14	observations
290:17	184:23 245:8,20	north	58:11
mutual	needed	2:11 89:9 290:9	observe
199:12 259:6	17:8,9 134:5		234:15

[observed - ordinary]

observed 90:6 270:16,25 271:7	october (cont.) 196:15 197:21 216:19	okay 7:16 9:10,20 17:25 22:1	onboard 41:2
observing 234:1	odds 266:19,21,22 267:4 268:2,6 268:10,11,13 271:13	26:6 30:7,20,21,23 36:19 40:14 45:7 46:2,7 50:2 56:25 59:18,21 60:23 65:17 67:1,4,12,15 68:16,22 69:2 71:20 72:11 73:5,20,22 75:13,23,25 77:9 81:2,20 84:6,8 85:15,18,24 86:9,14 87:11,16 88:5 90:11 91:19 94:13 95:21 96:8,14 97:14 98:19,21 99:15,20 100:25 102:7 103:25 105:10,22 106:12,15 107:19 108:17 108:17,20 109:18 110:18 111:13 112:1,4,10,13 114:2 114:5 117:1 119:11 120:13 120:19 121:12,13 122:6,16 123:24 124:19 126:25 127:11,15 128:11,20 129:13 130:20 134:8 136:24 137:2 138:12,20 140:9,22,24 141:20,22 142:1,4,7,11,25 143:14,19 144:13 145:17 147:24 148:16 149:5,18,25 150:3,3 151:16 152:9 153:3,9,22 154:20 156:14 157:9,23 158:12 159:4,7,4,9 161:1 161:10,21 162:16 165:14 166:11 167:2 170:3 171:2,9 171:12 174:3,21 175:5,12 179:23 182:4,7,10,22 185:21 186:6,22 187:7,15 188:19,21 189:2,13,25 190:11 191:8,12,23 195:8 197:14 198:6 199:6 200:2 200:10 201:2,20 202:7 203:1,4 206:21 207:13,9,22 208:5 210:11 211:7,17 212:8 213:5 215:7 216:18 217:3 219:18,21 221:1 223:8,15 225:17 236:20 248:1 259:5 262:1 270:23 272:7,16 276:19 277:23 278:12 280:13	once 15:1 16:10 35:9,22 159:10 221:22
obtain 11:16 14:3 215:10 224:21 225:14 236:25	oettingen 73:10 174:18 175:9,17 176:17 177:8 178:5 186:10 193:8	ones 12:21 32:10,11 42:18 92:20 94:1 126:23 139:7,10 156:12 206:9 253:12 267:21	ongoing 192:9,22
obtained 12:22 13:3 19:20 193:16 225:2 239:2	offending 64:6	ons 121:19	open 16:20 51:2,20 53:23 66:2,4 147:13 183:9 221:4 240:25 241:20 283:23 284:1
obvious 90:13 245:12	offhand 274:22 277:8	opened 51:1,9,9	opening 96:3
obviously 24:20 32:9 34:4 48:22 50:7 52:15 54:13 62:3 66:3 74:9 74:16 76:14 78:12 81:7 92:19 109:21 124:2 133:20 143:8 169:13 183:21 190:8 218:22 231:25 232:13 234:8 249:2 253:7,9 254:4 270:19 273:16 286:3	office 18:25 19:2,13,19 39:4,11 40:16 205:10 207:17,18 208:20,21 215:2,2 223:12 223:14 271:14	operation 106:10 194:1	operations 95:24 221:4 249:20
occasion 29:19 75:16	offices 1:21 2:10 8:8 33:15 40:17 108:5 207:17 289:8	opinion 54:3,7,11 82:10,14,21 83:1 83:12,22 130:21 131:3,5,20 138:8,9,10 163:25 166:8 193:9,14 235:17 260:24 261:3 276:25 277:3,4 279:10,17,21	opinions 83:20 251:6,6,9
occasional 8:20 75:14 261:15	official 91:21	opportunities 284:20	opportunity 284:20
occasions 254:4,6	officially 10:10,12 133:9	opposed 227:3 228:3 230:24 239:23 248:6 268:16,17	oral 5:22 93:9 175:22
occupational 4:24 6:5,15 7:10 8:4,18,21 8:23 9:25 10:1 22:14,25 28:16,19,19 31:8 38:18 52:6 72:24 89:7 153:18 200:15	officials 212:12	orange 120:14	oranges 71:7,11,17
occupationally 22:14	oftener 15:3,4 16:11	ord 19:13	order 11:17 66:19 99:15,17 172:12 234:13 237:3 251:23
occur 19:22 47:20,22 53:2 54:12 74:13 204:23 240:8,17 247:21 248:21,22 253:14 261:6 263:12 268:7	oh 12:19 14:7 24:4,24 30:20 34:2 39:21,24 43:7 44:17 46:12,24 59:5 61:13 62:11 73:20 78:12 80:3 82:24 84:3 85:3 94:5 97:21 98:10 98:14,18 99:17 102:17 105:10 110:24 116:1 119:24 121:10 122:4 124:18 126:6 134:23 135:11 141:8 147:5 150:8 159:22,6 161:3 163:21 165:12 171:14 174:19 178:8 179:20 185:18 192:25 193:25 195:10 197:11 203:6,12 206:23 207:6 210:13 222:11 226:8 226:25 227:16,21 228:9 234:17 244:3 250:7 252:23 265:20 273:18	ord 19:13	ordinary 143:5,16
occurred 39:5 48:14 61:19 74:11 129:16 139:2 169:15,24,25 170:21,23,23 171:24 230:15 245:21 249:21	oil 16:19 19:14 44:21,22 45:12 160:24 168:23,25 169:2,2,4 169:7,12,13,25 171:10 274:16,21 275:11,13,21,23 276:6,10,25 277:7,12,19 280:20,21 283:14	okay 97:25	
occurrences 131:10		old 8:14 49:3 111:25 127:21 159:8 160:4 162:25 246:6	
occurring 38:6 54:23		oldest 8:23	
occurs 112:17 118:12 128:16 232:3 247:23 248:14		olliges 1:23 3:4 289:5	
o'clock 1:19,20			
october 1:18 92:8 161:25 182:11			

org 290:12	overexposed 51:23,24 52:3	paragraph 63:24 70:7 79:22 86:1 88:8	pathologist 236:4
organ 136:3	overt 90:13,13 272:18,18	98:22 114:21 122:21 130:1	pathologists 85:9 236:21
organic 92:4 211:10,14,18,19	overview 209:16	130:1 137:25 185:6 186:13	pathology 66:24 173:11 235:21
organisms 214:9	oxidation 232:5	186:14 188:4,10,13 199:22	pay 130:16 274:2
organization 11:12,15 16:1 23:20 178:22 194:2 207:11 222:19	oxygen 21:18,18,19 283:21	199:23 200:1 204:7,10,10 204:16 223:17 261:22	payroll 31:3
organizations 7:23 8:9 168:3,4	p	paraphrase 190:2	pb 156:9
organs 231:20,22 232:9	package 111:23 113:19	paraphrasing 86:17	pbb 84:17,20
oriented 22:14	packaged 115:9	parathion 26:13	pbbs 86:3,6
original 215:10	packing 199:16 240:19	pardon 63:22 161:14 226:12	pc 156:9 213:6
originally 4:3 6:3 125:24 259:15	page 63:21,23 65:15,15 69:4,7 70:6,13 73:1,3 85:17,19 86:1 88:6 90:4 95:18,19 98:21,23 100:9 101:13 102:1,2,20 104:10,15,15,16 104:17,18,18 105:16,20 106:9,11,14 130:1 137:25 141:7 142:24 143:2 181:20 183:16 186:12,15 204:12 257:18 267:1 269:20,23,25 270:1 275:8	235:25 249:13 257:1 264:16 266:20 269:24 277:24 281:5	pcb 27:25 29:3,4,20,23 30:12 30:14,17 33:1,2 44:8 48:10 48:11,16,17 49:16 50:15 54:25 55:23 59:20 62:15,22 64:4,11,17 67:25 68:9,10 69:5,12,20,22,22 70:5,18 71:11,12 74:3,11,13 75:16 75:18,21 76:17 77:24 79:7 79:10,12,20 80:2,14 81:22 82:1 85:11 88:19 89:18 90:3 93:19 98:24 100:14,16 100:17,23 101:3 102:23 104:4 105:14 106:1,2,3 107:24,25 109:14 111:5,6,8 111:25 113:8,16,19,20,23 115:21,24,25 116:3 117:4,5 117:6,8,12 118:6,18,24 119:9 120:9,12 123:17 126:13 127:5 130:25 131:8 141:17 143:4,5 151:16,18 152:5,17 155:9,10,25 156:4 156:6,7,24 158:13 162:1,12 164:1 167:6 168:18,18,20 168:22 169:8 170:16 172:9 175:13 176:17 181:16 188:19 189:11,19 193:10 194:12 195:1,17,20 198:4,5 198:21 200:25 201:1,3 203:23 206:5,6 207:19 208:17 211:1,2,14 212:16 216:3,4 219:12 220:22 221:10 224:1,3 239:16 244:17 249:9,17 250:23 251:15 258:3 261:4 264:25 265:14,14,22 266:10,17 269:3 271:18,18,25 275:10 275:13,22 279:5 281:11
originals 125:10	pages 95:18,22,22 130:11,12 132:4	part 3:12 4:13 9:11 18:23 24:2,4 25:2 36:25 41:1 61:17 75:11 77:14,15,16 81:7 156:9,9 220:13 226:14 229:14,14 236:24 237:7,11 248:22,23 267:24,25 271:20 285:11,12,25	
orleans 2:7 290:19	paid 31:3 163:23 179:2 226:14	particles 212:21	
os 44:11 162:15	pain 233:13,14 234:7,9,11 283:3	particular 5:18 11:13 16:18 17:13 19:14 23:25 25:6,7 28:16 30:15 38:6 39:10,15 46:6 56:3 75:15 94:18 95:12 109:15 117:7 135:24 137:4 155:25 159:14 182:12 208:7 223:16 233:1 279:12 279:22 287:4	
osha 146:17 153:15,17,24	paint 144:8 203:8	particularly 74:18 76:8 79:13 163:3 199:14	
osland 78:25,25	paints 43:10 94:24 221:6	parties 289:19,22	
ought 33:8 66:22 70:1 178:9 183:9 184:4 198:24 201:8 209:17 269:15 284:12	palmer 259:6,22	parts 77:18 213:20 264:25 265:3 266:5,7,11,14 275:13,22 276:9 277:10,20 286:1,10	
ounce 60:5	pan 53:19 169:7 241:24	passed 161:8	
ounces 60:12	pancakes 169:5 170:1 172:3	patch 96:25 97:5 135:17 136:19 137:1,3,8,11,19 139:20,21 140:13,15,16	
outbreak 49:12 60:24 61:3,14,19 63:15,17 65:4,7 138:5	papageorge 194:13 209:2 220:14	patent 195:6,6 258:22,23,25 259:1	
outfit 81:14 195:12	paper 43:11 150:16 173:15 215:10 221:5	pathologically 175:24	
outflow 218:22	papers 154:1		
outline 177:11	paracloranaline 17:4		
outside 6:19 14:2 15:6 56:6 113:21 113:25 133:22 171:6 175:1 221:11 232:17 286:20			
oven 55:19,20 96:4			
overbroad 254:12			

pcb (cont.) 286:14	pcbs (cont.) 217:12,16 218:1,16 220:16 221:2 222:9,16 224:20 228:21 230:4 235:4,7,9 239:11 240:10 241:7 242:4 242:17 243:10 246:12,17 247:2 248:9 250:11,20,22 251:12,17,24 256:13 258:12 259:2 260:22,25 261:8,14 262:4,20,22,24 263:17 265:8,10,24 267:14 270:16 271:23 274:20,21 276:6,9,25 277:2 278:2,4,7 278:23,24 279:2,3,7,13,22 279:24 283:16 284:6,13 285:14,17,19,20,20 287:4	people (cont.) 253:16,19,19,24 254:6 255:11 263:12,15 264:24 265:6,7 266:5,6,13 267:9 267:16,22 268:8,15 269:5 270:10 271:4,16,17,17,23 271:24 272:2,23 273:21 277:15,18 280:21 281:4,7 281:15 282:5 283:6,7,10 people's 251:5 percent 39:1 67:24 68:9,24 69:6,24 69:25 70:19,21 133:2 153:14,15 154:3,4 156:25 267:5 268:3,8,9 269:21,21 percentage 172:25 268:14 269:17 277:6 283:7 percentages 107:24 peregrine 214:15 perfect 240:16,16 perform 45:21 66:13 75:6,20 134:21 134:25 135:21 145:5 165:5 167:5 175:18 performed 76:13 89:17 135:6,9,18 144:21 146:1 155:20 162:21 165:2 166:13,15 167:3 287:20 period 5:6 26:25 27:11 40:4 49:24 75:21 99:9 145:18,21,22 152:11 168:8 188:24 210:15 216:10 226:1 227:2 227:14 229:3,12 233:6,12 248:6 250:12,19 periodic 15:19 23:18 28:22 29:2 41:3 74:5 75:5 178:15 periodically 39:20 periods 204:24 227:3,14 permanent 50:8,17,18,22 51:2,3,17 permissible 58:13 150:24 persist 51:8 persistent 123:13	persisting 207:12 213:7 215:15,19 person 16:6 18:7 20:25 34:4 39:12 41:25 51:5 60:8 75:15 76:16 77:15 78:4 79:11 85:13,13 87:24 90:7 158:4 158:23 174:16 179:11 184:16 194:14 220:1,13,17 239:6,8 262:22 264:10 personal 61:2 178:8 personality 32:15 personally 32:5 58:19 75:6,20 personnel 15:2 persons 275:12,20 person's 266:10 pesticide 217:8 ph.d. 73:10 174:24 ph.d.'s 145:3 pharmacologist 18:7 pharmacologists 18:4,6 pharmacology 8:2,11 84:13 phenol 26:20 244:19 phenyl 64:3 philosophy 129:18 phosphorous 26:15 29:6 202:16,16,16,18 phrase 54:4 phrased 261:17 278:9 phraseology 97:22 106:21 127:20 phthalate 141:16 phthalic 245:4 physical 10:3 15:19 16:3 28:11,22 29:2 37:23 54:8 76:23,23 89:23 91:13 198:20 199:15
------------------------------	--	--	--

[physically - precautions]

physically 29:15	plaintiffs 1:8 2:5 3:2 224:19	pliofilm 139:24	positive 88:7,11 90:18,22 133:2
physician 4:4 8:22 9:23 24:24 25:1 30:1 32:18 61:11,12,15 74:10 75:10 79:1	plan 219:16,17,18,22 220:7,24	plugged 52:17	139:19 262:3 272:21 276:12
physicians 13:15 24:21 30:2,24 31:6 32:6,25 62:6,9,20 72:24 146:25 150:17 154:15 244:14	plankton 214:9,12	plus 206:7 277:21	positively 263:13
pick 220:16 270:17 271:11	planning 18:13 167:22	point 83:3 85:10 146:12 147:21 148:2 149:4 206:25 225:23 232:18 240:22 242:2 252:16 271:3 274:25 283:9	possibility 21:14 97:7,12 121:18 154:16 204:5 241:15
picked 151:1,8 208:18 214:8 220:14	plans 135:3	pointing 111:16	possible 12:22 23:10 33:5 39:16 58:11 76:5 94:23 154:9 190:5 200:25 243:25 244:3 253:1,3
picking 270:13	plant 4:3 9:24 10:3,5,6,6,7,23 11:14,24,25 15:6,8,11,19 15:22,23,23 16:18 17:3,11 18:24,25 19:4 23:15,18,22 24:6,8,10,16,18,20,21,24 25:1,1,2,2,10,12,13,18,19 25:22,23,24,24,25 26:11 27:1 28:12,12,15,16 30:1,2 30:5,24 31:2,3,4,6,22,23 32:6,12,17,20,24,25 33:1 34:5,6,6,8 37:5,25 39:6,10 39:11 61:3,4,11,12,15,19 61:23 62:2,6,7,7,8,9,10,20 62:21,21 63:3,4,15,19 64:25 65:5 74:4,4,22,22 75:10,11,17 78:7,13 79:1 79:23 80:9 110:21 115:15 115:15,16 123:19 131:16 137:14,15,16,17 181:13 183:12,18,19,20,21,23 184:18 185:9,10 186:8 190:7,20,21,22 218:22 220:15,15 240:17,21 244:14 245:3 246:4	points 238:2 247:18 266:12	possibly 123:13 132:14 133:16 135:21 225:14
picture 113:22	plants 11:13,14,20,24 12:2,3,15 14:22 15:7,15,21,25,25 16:4,13,16,23 17:17 23:16 25:14,17 26:2 27:8,23 28:23,24 33:15 34:4 38:11 38:22 82:17 115:8,13,14 193:11 218:10,23 220:19	poison 9:16 66:16 137:7 160:25	post 6:10,11
piece 139:24 238:9	plastic 97:1 246:25	poisoning 232:4 250:23	pot 285:19 286:3
pieces 270:13	plasticizer 26:17 43:7 96:25	policies 12:17 15:17	potential 20:19 35:5 42:3 74:5 107:6 135:24 175:8 176:16 184:20 185:12 204:23 231:9,9
pigmentation 47:21 169:20 249:5,6 281:16 282:7,15,16,19	plasticizers 221:6	policy 15:13 18:18 20:3 28:10,21 33:4,16,19,24 34:12,14 35:24 37:16 41:19 42:6 115:24	pound 60:7 123:18 157:15 158:1 158:14
pigs 145:15	plastics 94:24 197:18	political 6:24	pounds 45:18 46:4 60:7 125:23,23 134:7 158:4,9,10,11 210:13
pile 286:8	please 3:15 7:22 12:8 123:21 148:12 196:11 206:20 237:16	polybrominated 84:17 86:3	pour 246:25
pimples 51:14 248:25		polychlorinated 84:16 123:1 280:13	poured 284:6
pine 10:21		polymer 197:18	powder 137:10 167:23
pint 21:10		polyphenyls 127:20	poydras 2:6 290:18
pints 280:18		pool 40:18	practical 184:22 185:13
pipe 16:20 43:20		poor 64:3,16 169:20 271:11,15 282:7,8	practically 71:12 72:4
pipes 168:24 240:14		pop 194:1	practice 5:8 8:16 14:21 22:2 223:2
pitched 134:14		population 89:11 268:16	practices 12:17
pittsburgh 175:11 179:16,17 182:9		portfolio 10:14	pre 46:7 165:8
place 129:10		portion 112:7	preamble 80:23
places 47:20 221:8		posed 256:16	precautionary 115:20
placing 116:2		position 4:7 218:13	precautions 24:16 35:20 65:11 72:17
plain 117:6		positions 6:22	

[precautions - proven]

precautions (cont.) 96:6 109:25 110:9 118:8 125:3 138:21 143:6,16 164:2 166:5 178:6 179:1 193:8 206:15	prevent 11:17 33:10 34:15 37:8 65:18 93:15 123:4 196:3 205:2 218:21 237:3,5	problems (cont.) 54:8,16,25 55:1,2,3 56:8 81:11 85:16 88:22 149:2,6 159:16 169:20 176:16 193:17 203:7,7 221:13 226:2 233:23 243:10 244:4 249:9 250:10,14,21,23 251:8,15,17,19,21,23 261:8 281:3,6,14,16,23,25 282:17 282:18,18,21	products (cont.) 162:12 164:1 165:7 184:22 185:14 187:18 193:10,17 197:18 206:24 207:19 220:21 229:8 232:5 237:4
precise 129:25	prevention 6:17	procedure 17:2 42:5 54:14 106:25 177:11	professional 1:23 3:4 4:16 7:23 289:5
predict 135:24	preventive 6:4 10:2	procedures 20:6,7 23:12 24:2,6,17 34:20 35:8,12 37:24 53:13 53:24 54:6 83:22 92:12 95:20 116:9 118:2,6 122:17 149:6 178:16 201:8	professor 6:23,25 7:4,6 59:13 165:9
predominance 235:12	previous 79:9 166:7,8 185:25	proceeds 50:13	profit 154:10
predominant 248:23	previously 13:7 44:18 56:14 70:17 153:23 181:15 195:17	process 23:22 168:19 172:2	program 10:2,4 15:23 38:25 220:9 224:4
preferable 143:10	prey 216:7	processes 232:5	project 220:10,12
preliminary 166:17 227:7	primarily 6:12 42:12 67:18,20,23 109:4 110:24 154:11 155:3 172:12	processing 169:25	prolonged 49:24 53:14 93:8 103:10 107:1 112:15,16 113:5,6 118:10,11 122:17 124:25 128:14,15 145:21,22 181:24 229:12,18 250:18 250:19
prepaid 123:17	principal 144:1,17	produced 1:17 3:11 264:13	prominent 18:10 48:21 73:23 83:19 97:10 100:1 283:5
prepared 107:22 149:10 150:16	printed 125:20,24	producing 237:1	promote 12:17
presence 11:22 170:20 265:8,11	printer 97:25	product 12:11,18 13:5,6,7,15,16 14:19 16:22 18:20,21 20:6 35:2,6,12 37:10,11 41:22 42:3 64:7 83:3 95:7 102:14 104:2 105:12,22 109:19 115:8 119:21 120:10 122:24,25 123:1,11,12 124:24 125:2 136:4,6,8,10 136:11,12,12,13 137:4 160:5 163:8 188:15 195:7 195:15 223:25 224:3 233:1 237:9 254:7 257:10 280:12	prongs 155:10
present 2:14 83:17 138:2 168:21 170:25 171:25 209:11 249:10 279:4 282:9	prior 22:12 61:19 205:19 225:20 229:7	production 10:23 35:9 64:3 70:5 154:13	pronounced 208:2
presented 66:7 134:11 150:16	private 19:23 29:8 89:2	products 11:17,19 12:23 13:2,4,24 14:4,12,17,17 16:17 21:23 22:11 23:2,9 26:10,19,22 33:9 34:10,16,24 36:3 37:19 44:24 45:15,15 50:22 67:22 71:19 80:19 84:20 95:3 113:17 114:15 115:21 117:12 130:25,25 160:3	proper 98:14 123:17 178:12 189:23
preservatives 47:23	privy 278:16		properties 20:5 21:7 23:11 34:9,19 35:6 37:23,23 44:19,24 91:13 132:8 189:10 199:15 206:16
president 41:14	probable 253:3		property 20:21 21:2
pressure 21:5 29:9 43:12 53:18 159:24 241:23	probably 9:1 10:12 12:14 15:6 18:16 27:2 39:24 57:19 63:1 73:11 75:22 76:22 78:22 93:4 109:16 136:12 159:14 166:17 173:22 192:15 195:12 233:23 246:8 256:23 257:5,8 274:22 278:25 279:16		proposed 237:21
presumably 58:3 125:24 137:17 184:19 184:24 185:1 188:25 192:21 212:11 217:12 225:7 237:23 279:15	problem 16:23 20:5 34:6,7 35:17,18 49:20 50:16,20 53:7,10,23 55:4 65:2 67:16 81:22 82:2 116:9 128:4 137:23 183:25 207:12,14 217:15 218:1,16 218:25 219:12,13 220:2,18 226:4 262:23 271:20 276:25		protect 119:20 129:24 130:17 260:18
presume 124:7 246:24	problems 13:12 15:3 18:20 19:15 21:9 24:23 30:3,11,12 31:16 33:1,11,21 35:16		protection 88:3 93:13 154:12,14
pretty 39:25 48:21 89:25 92:25 94:20 120:25 128:13 136:7 154:17 161:8 167:25 172:25 176:20 177:16,20 178:17 194:1 202:17 211:2 222:25 228:25 233:22 234:11 241:18 245:9 263:13 265:20 273:4 286:11			protective 130:19 178:12
prevalence 90:12 272:18			proved 60:3,18 68:10 70:20,25 71:8
			proven 68:2 93:19 226:3

[provide - read]

provide 78:10 93:15 203:24 251:4	put (cont.) 45:2 50:3 56:5 59:6 97:10 101:4 102:14 109:3,4 113:16,20,22,25 114:5,22 114:22 115:8,9,20 117:12 118:8 120:22 121:1,19,22 128:24 130:16 137:6,7,9 139:21,22,23,23,24 140:1 147:6,12 155:7,14 159:22 167:22 169:6,7 175:22 197:13 206:7,9 213:10 216:21 219:3 220:10 246:12	queeny 10:7 15:22 18:24 19:4 41:13 75:11 245:3	ran 19:9 97:4 225:22,25 226:25 226:25 235:6,7,7,7 274:1
provided 193:5 195:14 207:17 225:9	puts 147:12	question 19:4,10,10 21:10 30:9 36:9 36:17 37:10 38:23 42:4 45:25 54:3 56:9,11 76:3 80:23 81:8 82:24 86:11,25 91:6 132:14 133:12,17 167:12 186:2 190:18 193:13 202:8 204:15,22 207:1 223:5 241:5 249:25 254:12,14 275:9,10	random 25:7
public 1:24 3:5 7:19 10:8 23:3 52:8 73:25 85:1 167:10 288:20 289:6 290:4	putting 115:24 206:10	questionnaire 89:21 206:7 256:12,16 257:8,8,12,19 268:24 271:16,17	ranked 165:12
publication 20:4,14 57:8 84:14,15 149:14 150:9,13 151:6,12 186:20,23 187:5,6 188:3,5 189:22 191:10	pydraul 44:3,14 117:3 118:17,21,21 162:11 181:16 200:25 203:22 205:25 206:4,14 258:3,13 259:2	questionnaires 206:12	rashes 14:15
publications 7:16 13:23 22:11 23:1 188:10 197:1,2,4	pydrauls 104:4,25 105:4 115:21 118:20,22,24 119:2 144:4 162:14 206:20	questions 3:14 36:14 165:24 199:13 206:15 215:8 224:13,15 227:8 256:15 270:21,22 288:7,10	rat 142:22 157:12,13,21,22 158:4 159:3,25,25,25 168:9 174:4
publicized 150:3,3	pydraul's 44:3	quickly 164:7 216:22	rate 136:17 173:18 187:20 244:25 246:2,3
publish 7:16 34:23 133:20 149:11 149:17,23 238:10	pyranol 42:25 43:25 44:3 117:20 118:6 144:4,5 194:25 195:16	quit 64:25 207:6 246:1	rated 9:1
published 7:13,15 22:16 57:19 58:1,3 58:9 82:19 84:12 91:22 92:17 95:7 99:12 104:2 105:13,23 108:13 133:9,14 133:15,16,18,21 141:11 142:6 149:12,13 150:7,22 151:13,15 171:12 180:23 181:6 225:5 237:21 238:5 238:15,23 239:12 263:16	pyranols 115:22	quite 4:23 14:18,18 18:10 21:5 25:4 30:16 47:8,12,20 55:11,14 59:1,1 62:5,17 69:12 71:25 72:10 76:10 84:3 152:14 168:25 169:13 169:17,18 170:4 171:16 176:11 178:8,16 193:1,3 198:11 202:14,19 203:9 207:10 210:2,18 211:22 227:1 251:13 280:17 281:19 286:11	ratio 266:19,21,22 268:6,12,13 271:13
publishing 171:18	q	quote 70:6 143:15 190:2	ratios 267:5 268:2,10
pull 25:8 49:4,4 255:24 256:3	qualifications 5:20 32:19	quoted 92:13 261:22	rats 58:7 88:18 145:15 155:6,13 158:16,22 159:1 166:25 167:6,6 168:6 172:10,18,19 172:22 173:4,18,19,22,25 173:25 174:2,8,9,9,11 175:22,25 176:1,12 202:18 229:7 234:24 235:5,10
pulled 52:16	qualified 36:11	quote's 85:25	raw 11:16 17:1 34:9
pulmonary 31:16 232:14	qualities 44:19	quoting 63:18	rays 77:2
pump 43:13	quality 21:13 78:20	r	reach 198:23 239:1,7,13 240:3 245:18
pumps 240:18	quantified 277:22	rabbit 198:11,12	reached 235:2
purchased 62:9	quantities 48:17 159:18 182:2 216:11	rabbits 140:6,7,8,11,12,14 145:15 176:5	react 140:5 252:3,4 253:4,16
pure 71:12	quarterly 38:17,21,21 39:24,25 150:10	raise 69:13	reacted 159:2
purified 213:1	quarts 280:19		reaction 209:19 230:11,13,24,24 247:19,21
purpose 23:18 29:1 33:19 34:14,15 109:21 116:2 222:24	quaterphenyls 169:15 170:24 171:25 172:4 275:1 277:1,7,21,23 277:25 278:8,11,14 281:13		reactions 137:8
purposes 23:19			read 22:7 76:9 85:18,20 93:5 94:15 98:2 99:2 100:7,25 101:16 107:17 111:21 112:13 113:2 118:25 119:3 119:13,17 122:22 123:9 124:11 126:22,23 128:1,11
put 35:1,20,22 43:20 44:12			

[read - representative]

read (cont.) 130:5,7,9,15 131:23 140:6 150:6,21 179:2 180:16 184:14,25 185:4,5 186:19 189:25 199:21,23 203:20 204:7,10,16 207:20 215:3 223:16 250:3	recognized 17:7 recollection 220:5 259:20 275:14 276:5 recommend 65:10,23 103:12 178:6 181:20 recommendation 33:13 recommendations 41:17 103:1 150:23 153:16 recommended 99:13 151:15 153:11 177:1 177:8 181:23 219:22 record 3:16 56:18,23 79:2 84:10 84:22 143:24 180:16 199:10 224:18 279:18 288:3,5 289:16 records 25:8 29:21,22,23 80:12 89:20 recounted 145:5 recover 220:25 red 120:3,14 reduced 289:15 refer 59:18 119:17 127:12 275:8 reference 146:12 references 201:25 referred 25:25 34:3 62:8 124:6 183:6 186:10 196:17 260:5 referring 114:23 154:1 186:7 188:23 201:14 212:5 refers 100:16 121:15 250:9 refinery 16:19 44:21,22 refresh 79:16 220:5 275:14 refreshes 276:5 regard 14:21 16:12,14 20:3 22:11 28:10 33:25 81:11 83:20 93:2 190:15 202:9 239:11 259:21 266:16 275:10	regarding 23:9 36:14 81:21 82:6 106:16 256:12 260:22 263:17 regardless 16:10 regards 240:4 registered 1:23 3:4 289:5 regular 17:18 28:25 29:1 38:2 64:23 75:4 relate 109:13,14,15 134:17,18 related 19:4 33:1 40:4 48:24 57:10 67:13 68:4 74:6,23 80:14 80:19 81:22 82:2,7 250:22 289:19 relates 6:9 67:16 relating 19:11 21:22 46:8 53:10 80:13 95:8 104:3 105:13 106:5 162:1 164:8 187:25 188:17 195:16 relation 34:24 38:6 78:5 80:1,21 82:12 95:15 104:7 130:24 134:21 142:22 176:17 relations 10:9 relationship 6:18 21:15 64:4 78:6 232:25 relative 265:11 289:21 relatively 43:9 96:2 97:19 156:20 160:16,16 248:6 265:6 release 97:11 246:18,20,22 247:3,4 relevant 41:7 remain 103:12 remarkable 105:17 remember 27:21 36:17 49:3 75:10 81:9,13,23 82:3 133:5 139:21 147:22 175:19 192:9 194:23 195:3 219:25 226:1 235:6 259:11,24 274:22 275:2,4 277:6,8,16	remember (cont.) 278:18,19 283:3 287:3 remove 51:5 112:17 118:12 128:16 removed 269:4,5,13,16 renate 84:11,22 repeat 34:20 36:19 86:23 88:9 205:4 249:25 254:2 repeated 53:14 93:9,10 103:10 106:25 112:2 113:5 175:24 181:23 205:1 228:24 repeatedly 204:25 229:20 rephrase 86:14 rephrasing 86:12 replace 240:19 replacement 220:21 report 30:3,25 31:7,12 33:1 38:21 62:21 79:5,5 81:25 84:11 88:6 89:6 141:4 142:1,5,11 142:18,21 151:21,21,21,23 153:23 154:2 166:16,23 176:17 177:11 178:5 181:15 208:24 225:1 reported 31:1,2,4 51:21 52:4 53:10 59:25 63:7 71:13 78:21 131:7 176:22 181:25 208:23,25 261:3 reporter 1:23 3:4 177:7 250:3 289:6 reports 22:24 23:5 38:17 49:25 50:18 54:22 83:7 131:7,10 143:25 144:9 149:10 150:24 151:20 161:22,23 163:25 164:8 165:24 166:3 166:19,20 168:1 180:21,23 181:2,3,5,7 192:13,15 193:18,18,20 204:4 214:17 214:23,25 215:1,19 represent 224:19 representative 108:16 117:10 118:19,23 279:12,16
--	--	---	---

[represented - safety]

represented 2:5,9	rest 147:1	right 18:25 23:20 25:20 26:1	run 46:20 70:5 75:1 96:25
reprint 52:9 57:8 188:2,5	result 77:23 145:25 172:1 230:23	34:11 37:1 48:14 53:4	108:18 143:20 165:9 171:1
reprinted 58:17	239:23	69:19 70:5 72:9 91:9 92:23	179:23 224:21 225:19
reproductive 281:23	resulting 54:20 58:8 131:8 237:4	98:17 100:5 103:7 112:9	226:6,15 228:20 231:4,18
reputable 59:6 150:12	251:15,17 260:15	115:11 141:7 145:20	232:7 243:14,17,25 272:7
reputation 165:21 238:14	results 78:9,10 79:6 135:23 148:22	149:23 151:11 176:19	running 23:20 192:10 216:14
repute 85:13	149:7 150:1,4 172:11,21	202:25 210:4 212:2,4,16,17	234:19
request 41:18 162:20 165:1 167:2,5	236:18 238:15,18,22 274:5	230:13 231:7 233:3,8 237:7	runs 159:8
206:24 207:2	274:6	238:19 245:15 248:4	rutter 2:10
requested 144:20 155:20 201:3	resume 206:4	252:21 255:13,16,21 256:6	s
requests 41:17 206:21	retardant 45:21	257:6 262:8 264:4 267:4	sack 55:21
research 10:22 14:14 99:25 193:24	retested 163:1	268:20 270:3,3,14 271:9,10	sacks 55:24 113:25
202:18 211:13,14,20	retired 9:8 15:18 39:8 61:16 75:24	274:11 276:10,12,21	safe 20:1,6,7,9 23:12 24:2,6,17
219:15,22 280:10	113:12 130:20 131:23	277:11 278:8 279:1,1	34:13,20,24 35:8,11,20,22
residency 5:2	245:25 279:1	rings 245:8 278:1	36:2,6,22 37:11,17,24
resident 4:21,22	retirement 22:5 27:9 30:11 82:9 83:17	riseborough 215:21	53:12,24 54:6 65:10 82:22
residue 55:14 286:14 287:2	return 4:14 11:5 129:2	risk 53:25 87:20,24,25	83:21 92:11,15 93:2 94:7
resistance 44:20	returned 4:6 123:17	river 25:21	94:13,14 95:14,19 96:9,15
resistant 44:18 100:20	review 23:8 39:20,23 46:7 58:19	roaring 286:11	96:20 97:18 98:4,23 99:2,3
resort 13:25	59:12 62:24 80:24 83:15	robert 114:13 216:25	99:7,12,15 102:21 103:1
respect 224:10	84:13 93:25 142:18 150:13	roderick 224:10	104:6,13,20,24 106:5,16,24
respirator 24:15 73:8 96:5	161:1,4 163:14,15 164:20	role 41:10	107:4,20 108:3,9 109:19
respirators 178:14	164:22 165:24 237:8,11,14	roll 74:8	116:9 117:11,15 118:2,5,9
respond 192:23 206:21	237:18 238:25 239:12	room 53:20 55:24 103:15 131:16	118:25 119:1,11 122:16
responded 206:23 271:16	reviewed 22:11 38:21 39:22 58:24	147:13 241:7,7 242:18	124:4,20,21 125:6 126:1,18
response 110:14 250:20 253:20	80:11,17,23 108:11 132:21	243:5 254:23 260:9	126:21,22 127:7,12 128:11
responsibility 224:6	133:4 150:12 161:8 163:17	rotated 29:24	129:19 130:23 138:20
responsible 12:25 115:4 223:20	256:24 257:2 274:24	roughly 32:24 60:14 63:5 146:9	146:2,23,25 148:22 149:2,5
responsive 41:16	reviewing 244:7 245:13 274:18	148:11 155:1 157:11 158:5	151:4,5,13,15 152:16,20
	rice 168:23,25 169:2,2,4,7,12	158:10,19 184:2 226:7	153:13 154:7,19 164:2
	169:12,25 171:10 172:3	279:23 281:4,7 284:18	166:4 168:7 177:1,3,8
	274:16,21 275:10,13,21,23	routine 163:1	178:6,11,16,25 181:12
	276:6,10,25 277:7,12,19	rubber 49:6 94:25 199:17	189:21 193:5,8 195:9,15,20
	280:20,20 283:14	ruckus 169:18	198:18 201:8 207:16 230:1
	richard 217:6,7	rule 223:6 249:23 250:4,22,25	253:23 254:8,9
	richter 236:13	254:5	safeguard 124:11
	rigged 52:11	rules 249:24 250:5	safely 82:22 103:18 164:1 166:4
			safety 12:18 13:15 16:24 20:8

[salaried - ship]

salaried 39:6,12 244:23	schneider 2:14 207:8	seen 55:7,15 56:2 62:16 101:12 101:25 120:16 132:15 133:6,16,24 181:15 195:19 243:12	sentence (cont.) 186:13 199:21 206:17 272:17 276:14,15
sales 12:15 33:15 35:10 108:5	school 7:4,7 45:1 46:11 59:7 99:11 99:23 100:1 144:25 165:10 165:11,13 173:10 175:1 235:21,22	self 222:23	sentences 130:2 184:25
salesman 19:12 110:20 132:6	science 4:19 12:10	selkirk 197:17	separately 122:22
salesmen 107:8 108:6 134:12	scientific 14:5 21:22 23:8 83:16 84:1 161:24 162:3,6 163:22 213:15,17 237:8,20 238:2 239:12 240:2 250:24	sell 69:20,20	seppala 114:16
salesmen's 132:7 134:3	scientist 100:3 211:13	selling 221:5	september 141:8,9,10 201:17
salt 20:22 21:3 159:14,16,19,22	scientists 150:14 151:6 207:24 214:5 218:24 277:4	send 35:5,14,14 37:20,24 39:5 69:17,21 109:6,7 110:13 115:8 150:13 152:16 173:5 181:2,5 192:3 194:6 195:20 199:1 201:2 206:1 211:11 237:24	sequence 30:22
salt's 159:14	scott 1:6	sending 181:3,7 192:18 194:11 215:13	series 132:4 251:7
sample 180:20,20 181:12	scum 214:11	sends 257:3	serious 17:5 21:9 33:21 50:14 82:6 103:8 159:16
samples 117:10 213:1 217:12	seal 289:25	sense 20:13 31:4 119:14 136:3 247:22 276:14 281:24 282:6	served 10:16
sampling 96:1 181:13	search 59:4	sensitive 90:23 253:25 254:6 255:3 272:22 273:6	service 3:23 4:6,13,14 8:22 10:13 10:23 19:7 23:3 85:1 217:11
sand 246:25 247:4	seatcover 97:2	sensitivity 97:4 137:5 224:6	services 85:4
sat 134:2	second 10:21 63:24 70:13,23 71:11 71:16,25 72:2 85:22 86:1 100:9 101:7 104:17 181:20 188:9,13 199:22 204:10,12 204:16 223:16 242:3 258:16	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	set 5:17 11:11,19 19:8 38:25 53:19 56:16,17 138:8 219:18 285:10 289:24
saturated 155:16	secondary 255:1	sentitization 137:7	setting 11:12 131:9
sauguet 25:20,24	secondly 11:15 23:21 116:8 218:7	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	seven 12:15 124:22 126:6 127:13 142:24 145:24 151:19 152:1,1,3,3,7,11,11,12
saw 24:18 29:22,23 38:21 52:9 55:11,15 61:9 81:1 97:25 133:8 138:12,16 153:25 225:1,4 278:10	seconds 180:11	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	severe 248:19 252:25
saying 69:3 86:9,16 87:2,3 103:4 117:21 131:24 190:1,14,19 218:3 233:9 253:21 261:8,9 263:11,12,25 265:17 271:5 273:24,25 285:23	secretarial 40:18	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	sex 235:8
says 3:12 68:23,24 69:4,6,13 72:4 79:15 85:22 88:1,6,22 111:22,23 113:4 114:21 123:10 124:9,22,22 130:13 136:22 188:4 206:17 223:18 257:25 262:3,18 263:3,7,10,13 270:5,24 275:19	section 35:1,11 40:16 78:7 79:23 94:1,8 109:25 110:8,8 200:12	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	sexes 235:7
scar 51:16	sections 110:11	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	sharon 184:12 192:2
scare 240:5	seeing 8:20 278:18,19	sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	sheet 37:22 109:3 110:25
scarring 50:25 248:13		sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	sheets 109:2,10,13,20 110:7,13,17 110:22 121:1 122:7 206:10
scars 51:9		sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	shellfish 253:8
		sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	shepherds 174:7
		sent 12:5 33:14 41:5,6 63:6 69:19,22,24 78:13,14 80:8 108:4,8 110:14,15,20,22 114:15 116:3 137:19 141:13 142:15 163:21 168:1,1 173:8 180:12,21 182:17 185:16,18 187:6,12 188:2,4,25 190:24 191:13 191:15 192:17,25 194:9,10 196:25,25 197:23 199:14 200:20 202:4,9 205:16,19 205:22 206:3,3,7,11 207:1 211:3,7,8,12,14,15,19,21 212:9 213:4 217:2,13,20 219:1,2 223:11 236:5 237:22 256:12 257:11 259:15,16	ship 15:5 134:8

[shipped - somebody]

shipped 113:20,21,24 115:25 121:21 169:4	signed 132:5	sitting 97:3 241:24 252:6	smaller 15:7 42:19 155:3 228:5
shippers 110:22	significance 154:5 273:3	situated 89:9	smallest 158:17
shipping 129:15 131:16	significant 21:22 83:8 86:4,10 87:13 103:15	situation 19:20 30:7 50:15 52:17 75:8 258:22 260:5 285:23	smell 53:21
short 87:9 96:5 117:10 129:25 130:18 135:8 156:18,19 224:9 226:18 248:6	signs 233:16 267:5	situations 238:25 253:22 285:16 286:2	smelling 242:25
shorthand 3:3	silicates 45:15	six 1:20 63:6 70:8 126:2 245:7	smith 57:9 59:10,13 193:22 201:15
shortly 225:1	similar 16:19 46:23 47:18 119:2,13 123:7 126:22 188:7 206:8 222:23 257:9,12	sixth 70:17	smoke 255:1
shorts 97:3	similarly 184:17 185:7,9 257:16	size 11:15 12:12 28:15 97:9 113:18 155:19 174:10 175:3 178:1 194:4 273:20	smoking 254:23 255:10
shoulder 234:5	simple 177:14	sized 114:4	sneeze 254:21 255:15,15
show 84:9 90:24 136:3 173:19,21 196:8 216:10 232:8,10 233:4 235:9 243:6 263:22 272:23 280:8	simplest 66:21	skin 53:15,15 57:24 93:11 97:4 97:7 103:6,10,12 107:1 112:2,16,16 113:6 118:11 118:12 124:25 125:2 128:15,16 130:14 137:5,5,8 139:22,22 140:5,11,16 155:7,14 164:16,16 176:5,8 178:11 181:21,22,24,25 182:19 198:12 205:1,2 230:8,11,17,19 231:10,11 232:9,10,11,12 234:4 241:8 241:19,21 242:8,9 249:6 258:6 281:16 282:15,18	sneezing 255:17
showed 17:2 120:14 198:12 214:13 231:19 232:13 235:16	simplify 212:9	skinker 3:19	soaked 53:16 112:19 118:14 128:18 139:24
showing 120:6 167:11 261:9 278:10	simply 228:4 230:11	slides 173:5,6,6,9,16 235:16,24 236:2,3,5,10,17,22	soap 103:13 112:17 118:12 128:16 138:24
shown 123:2,12 124:7,12 232:20 232:21 239:18,18 243:10 265:23	single 103:6,7	slight 122:20	societies 59:7,8
shows 93:7 198:11	sir 82:3,8 83:14,18 88:8 91:10 91:25 95:6,10,13 102:8 104:1,12 105:5 106:2 107:12 108:25 112:6 116:14,17 117:13,17 119:7 120:1 123:24 126:10 127:2 128:7,21 129:6 132:2 144:11 154:22 165:3 166:10 205:21 207:6 213:16 224:17 226:7,16,22 228:18 230:10 231:13 237:2,10,15,19 239:3 240:12 242:7 243:13,17,22 243:23 244:23 246:16 252:5 253:20 254:19 256:10,14,17 257:17,20,24 258:1,4,7,10,14,17,24 259:8,11,19,24 260:3,7,23 262:2,11 263:20 264:14,20 266:23 267:3,8,12,15 268:23 269:1,7,11 273:13 274:14,17 275:17 277:13 277:14 280:22 281:13 282:16 284:5,21 286:7 287:21,23 288:7,8	society 8:1,6,11,13 59:9 146:16 224:9	soaked 53:16 112:19 118:14 128:18 139:24
shrump 167:11 214:11,12	sick 87:7,15 90:10 169:17,19 233:21 253:8,12,12	slightly 60:3,20 103:4	soap 103:13 112:17 118:12 128:16 138:24
shut 221:19	sickness 90:7 91:3	sloan 218:4	societies 59:7,8
sic 42:25 58:14 84:12,12 208:11 223:23	side 112:9,11 223:1	sloat 191:21 192:6,16	society 8:1,6,11,13 59:9 146:16 224:9
sick 87:7,15 90:10 169:17,19 233:21 253:8,12,12	sido 114:13,25 115:14	sma 77:5,5,6	sodium 170:18
sickness 90:7 91:3	sign 234:5,7	small 12:3 21:8 25:12 26:22 29:23 40:15 43:9,10 45:3 135:9 147:16,17 167:13 209:11 229:12 280:23,25	soil 213:10,11,12
side 112:9,11 223:1	signalled 224:7		sold 45:18 46:4 48:18 105:3 169:2
sido 114:13,25 115:14			soldering 203:7
sign 234:5,7			sole 259:1
signalled 224:7			solely 54:24 153:1
			solid 113:23 198:5,7
			solidify 76:6
			soluability 265:24
			soluable 265:14
			somebody 17:3 18:19 32:16 41:21 97:3 114:15 125:20 133:15 133:20 134:1 154:16 174:6 174:6 194:23 201:6 210:4

[somebody - story]

somebody (cont.) 217:8 218:4,5 238:13 253:7 254:23,23 255:9 256:20 257:11 259:18 287:24	speak 36:11 156:3 250:1 284:20 287:25	st (cont.) 5:3,3 6:24,25 7:1,2,3,3,6 8:6,22,24 10:6 15:22 19:16 19:18,19 25:19,21,25 26:3 26:6,18,24 27:4,5,20 28:12 28:23 29:24 32:25 59:8 62:13,18,21 74:4,14,22 75:17 79:1,7 80:2 114:13 115:15 123:19 135:9 155:2 162:3 208:23 212:13 245:3 289:4,9 290:10	stated (cont.) 172:24 174:16 181:24 182:18,23 239:15 243:18 260:24 271:9
somebody's 183:20	speaking 253:15	stadium 45:10	statement 42:6 67:15 69:3 79:9 91:16 102:11,19 119:20 123:1 189:20 199:19 262:24 263:18 270:15 274:9,10
someplace 101:12,25 129:1 187:4 188:8 192:8 196:25 274:23	spec 64:15	staff 6:21 7:1 18:1	statements 131:17
somewhat 35:15 47:18 68:4 129:15 146:6 168:19 170:17	special 74:9 75:8 110:9	stain 49:5	states 9:2 17:14 22:17 23:16 25:14 42:21 54:20,24 73:12 73:25 78:24 86:1 88:4 98:25 117:22 168:3 170:10 170:17 171:3,7,17 201:24 215:20 266:10
soon 142:20 269:15	specialist 5:17,23	stand 57:2 103:9	stationed 10:20
soot 286:23	specialized 18:5 149:20	standard 48:17 64:15 146:17 153:13 159:18,20,8 229:4	statistics 38:5
sophisticated 77:12,17 150:19 162:9 175:21 177:20 194:3 202:17 208:9	specialties 212:10	standing 100:3	status 192:5,20 202:1 237:14
sore 156:20	specialty 5:18 6:1,4,13	standpoint 62:1 103:5 248:2	stay 51:25 52:2 97:19
sorry 44:3 58:16 70:9,15 81:2 98:8,10 105:10 108:23 127:11 136:23 140:7 141:8 147:10 150:11 164:21 177:5 178:19 184:8 198:14 199:7 200:9 203:21 204:19 205:22 209:6 211:6 219:10 251:20 256:2 269:23 275:4 281:21	species 174:5	stands 202:24	stayed 4:5
sort 9:6 10:14 14:12 16:2 25:9 28:17 55:20,22 56:4 60:5 87:24 96:4 97:8,13 113:22 114:13 167:15 175:19 206:8 208:10 222:22 227:6	specific 35:16 38:15 123:10 206:19 232:4 239:23	starch 146:11	staying 214:3
sound 276:10 277:11	specifically 175:14 207:1	start 13:11 46:25 67:6 88:10 95:18 112:20 114:12 159:14 185:6,7 207:10 212:17 216:15 234:10 269:15 284:14	stays 213:23 242:9,11
sounds 276:12,20	specifications 117:24	started 9:12,21 10:8 13:8 15:22 18:13 21:24 27:13,20,22 28:1,2,3,5 32:1,2 42:14 52:16 63:14 65:22 96:24,24 110:24 121:10 135:2 138:17,18 145:8 162:4 166:18 174:19 192:10,12 206:10,11 231:1 286:20	stenographer 276:1
source 43:18 94:7,9,11	specifics 259:21	starting 4:4,18 73:1 178:23 180:11 185:5	step 170:18 221:7
south 1:21 3:19 289:9	speculate 247:14 264:10 279:15,16 279:19	starts 67:15 248:20 286:6	steps 17:2 218:15,20
soybean 169:5,5 170:1	speculation 279:20 280:1	state 1:3,24 3:15 5:7,10 52:6,6,8 153:4 179:21,21 215:25 289:2,7	stick 68:12 121:14,19 128:3
soybeans 169:6	speicher 179:13,18 180:5 181:7,18 182:6,7 184:4,9 185:19,23 186:7 187:9,16,24 191:4,5 193:3	stated 60:2 83:9 103:3 139:1	stipulated 3:1
space 145:18 238:6	spell 57:21		stomach 233:21
spaces 53:17 107:2	spelled 213:14		stop 102:12 170:3 220:3 221:1,3 221:14
spaniels 174:7	spent 4:21 12:1 25:4 38:19		stopped 52:17 221:4,5,7,9,10,12,23 221:23,25 222:11,11,13 267:13

[straight - sworn]

straight 26:8	subacute 164:15,16,19	summarize 6:20 7:22 102:25 180:17 220:5,6	surgical 6:9
straightened 210:21	subject 75:1 83:16 115:19 145:17 178:25 193:24 194:7 195:9 207:5	summarized 79:21	surplus 219:1
strain 173:4 174:8,11	subjects 7:14	summarizing 189:21	surprise 70:23
strains 174:9	submit 5:21 152:16	summary 79:22 90:4	surprised 209:25 210:2
strange 28:15	submitted 175:9	summer 144:9	surprises 166:6
streams 219:4	subscribed 288:15	sunlight 285:25	surprisingly 182:1
street 2:6 290:18	subsequently 66:16 68:1,10	superintendent 16:25 24:12 37:25	survey 11:20 12:6 16:13
strengthened 83:24 131:23	subspecialty 6:5	supervise 11:23 12:6,7 40:11	survive 159:17,17
strictly 22:13,14 153:8	substance 45:2 46:8,11 64:6 70:24 135:24	supervised 24:7	survived 22:18
strike 45:11	substitute 45:20 221:18,22,23 222:4,7 222:9,11	supervision 31:5	susceptibility 253:10
strip 76:23	substitutes 94:25 221:8	supplier 48:8 109:7	suspect 218:12
strive 240:20,20	subtitle 127:19	suppliers 206:12	suspected 218:13
studied 65:24 273:21	subway 45:4,8,9	supply 48:5,9	sutter 8:22
studies 83:9 123:2,12 162:9 167:2 172:8,16,22 173:21 187:17 187:19 192:6,9,11,19,20,22 192:24 202:2 227:10,13,18 227:20 228:22,24 229:10 230:3 232:23 233:3,10 235:9 243:11,15,19,25 261:9,17 287:19	subways 221:20 222:5	support 84:2	swallow 103:5
study 89:17 138:23 142:12 172:11 192:9 226:23,24 229:15,18 234:1,15,23 235:5 238:13,20 239:2 264:12,15,17 265:5 266:4 266:25 267:6,24 268:21 269:2 273:16,21 274:5	sudden 156:17 160:9	supports 84:2	swann 27:16 28:5,5,7 30:6 47:13 47:14,16 48:1,10,12,20 49:12,13 55:5,12 60:24 61:3,12,16 62:7,15 63:3,15 74:12 137:15,17,18,19,23 224:21,22,25 225:6,7,24 226:1 230:9 252:12
studying 21:21 47:10 262:23	suddenly 156:21	supposed 11:11 31:9,12,19 87:24	sweat 51:19 230:20
stuff 13:11 46:4,21 47:14 53:23 60:13 66:3 69:19 72:5 96:24 123:20 133:14 155:12 168:24 169:7 173:3 175:22 198:9,16,21,24 204:6 208:13 209:22 220:18 222:1 232:2 243:4 260:1 261:10 285:10	suffering 233:11,25	suppositions 263:11	sweden 212:11 215:1
styrene 64:5 138:1	suggest 72:16 138:20	sure 21:18 27:4,7,23 36:11 39:21 52:14 64:20 69:19,20 71:6 73:1 77:20 81:8 82:24 85:23 87:3 95:17 97:1,21 100:15 104:9 106:7 108:7 113:7 120:16 127:16 129:1 131:18 140:25 147:23 149:13 154:8 156:15 159:6 159:12 161:3,7,8 163:7,9 180:24 185:4 190:2 194:9 202:8 203:12 209:14 210:2 211:2 212:25 213:2 215:22 224:4 226:19 233:22 234:11 239:24 240:7 243:24 244:3,12 246:8 247:17 257:13 263:4 266:3 267:18 270:11 275:16 276:2 286:18 288:1	swedes 212:20 213:3 216:1
	suggested 35:4 91:13 99:7 138:22,23 151:2,2 184:4	supposed 11:11 31:9,12,19 87:24	swedish 207:23 208:3,4,15,16,17 209:8 210:1,7,16 212:14,15 212:23 213:6 214:5,17,20 214:25,25 215:11,16 278:22
	suggestion 9:13	suppositions 263:11	swelling 250:14
	suggestions 58:13	sure 21:18 27:4,7,23 36:11 39:21 52:14 64:20 69:19,20 71:6 73:1 77:20 81:8 82:24 85:23 87:3 95:17 97:1,21 100:15 104:9 106:7 108:7 113:7 120:16 127:16 129:1 131:18 140:25 147:23 149:13 154:8 156:15 159:6 159:12 161:3,7,8 163:7,9 180:24 185:4 190:2 194:9 202:8 203:12 209:14 210:2 211:2 212:25 213:2 215:22 224:4 226:19 233:22 234:11 239:24 240:7 243:24 244:3,12 246:8 247:17 257:13 263:4 266:3 267:18 270:11 275:16 276:2 286:18 288:1	switch 168:10
	suggests 186:21	suppositions 263:11	swollen 234:7
	suitable 93:12,13	sure 21:18 27:4,7,23 36:11 39:21 52:14 64:20 69:19,20 71:6 73:1 77:20 81:8 82:24 85:23 87:3 95:17 97:1,21 100:15 104:9 106:7 108:7 113:7 120:16 127:16 129:1 131:18 140:25 147:23 149:13 154:8 156:15 159:6 159:12 161:3,7,8 163:7,9 180:24 185:4 190:2 194:9 202:8 203:12 209:14 210:2 211:2 212:25 213:2 215:22 224:4 226:19 233:22 234:11 239:24 240:7 243:24 244:3,12 246:8 247:17 257:13 263:4 266:3 267:18 270:11 275:16 276:2 286:18 288:1	sworn 1:18 3:11 288:15 289:11
	suite 2:6 290:18	sure 21:18 27:4,7,23 36:11 39:21 52:14 64:20 69:19,20 71:6 73:1 77:20 81:8 82:24 85:23 87:3 95:17 97:1,21 100:15 104:9 106:7 108:7 113:7 120:16 127:16 129:1 131:18 140:25 147:23 149:13 154:8 156:15 159:6 159:12 161:3,7,8 163:7,9 180:24 185:4 190:2 194:9 202:8 203:12 209:14 210:2 211:2 212:25 213:2 215:22 224:4 226:19 233:22 234:11 239:24 240:7 243:24 244:3,12 246:8 247:17 257:13 263:4 266:3 267:18 270:11 275:16 276:2 286:18 288:1	
	summaries 202:1	sure 21:18 27:4,7,23 36:11 39:21 52:14 64:20 69:19,20 71:6 73:1 77:20 81:8 82:24 85:23 87:3 95:17 97:1,21 100:15 104:9 106:7 108:7 113:7 120:16 127:16 129:1 131:18 140:25 147:23 149:13 154:8 156:15 159:6 159:12 161:3,7,8 163:7,9 180:24 185:4 190:2 194:9 202:8 203:12 209:14 210:2 211:2 212:25 213:2 215:22 224:4 226:19 233:22 234:11 239:24 240:7 243:24 244:3,12 246:8 247:17 257:13 263:4 266:3 267:18 270:11 275:16 276:2 286:18 288:1	

[symposium - tests]

symposium 57:25 58:2 66:7 69:14 72:16,25	talked (cont.) 69:14,23 87:19 129:1 132:20 140:17 141:12 167:16,18 180:25 183:3,11 196:22 211:25 212:1,12,13 239:14 243:20 259:22 260:20 262:14 273:10,11 273:14 274:15,16 283:4	technical 35:2 92:16 94:17 96:21 97:19 108:10 111:6,24 113:5,7,10 114:20,23 133:24 188:16	term (cont.) 251:23 266:24
symptom 234:4,4,5,8 252:8,17,18,20 252:25 254:1,7,18,20,21 255:1,13 260:15	talking 59:19,22 65:22 77:18 83:6 84:21 87:12 114:16 122:24 126:5 130:5 131:11 139:15 146:15 147:7 173:15 177:7 183:16 186:12 223:10 233:13 239:22 244:14 250:8 252:21 254:5,10,18 255:5 259:9,22 260:12 263:19 268:9,14 270:14 271:11 272:13 281:8 283:6 284:19,19,25 285:17,18,21 286:15	teenage 47:18,22 51:16	termed 25:22 264:19
symptoms 14:16,18 56:6 89:24 90:12 176:25 231:23 233:11,12 234:3 255:6,12 263:18 267:6 268:15,22 271:5,15 272:1,18 281:19 283:2,4,6 283:10	talks 67:3,5 267:4 268:2	teeth 169:20 282:1,8,10,14,19,20	terminal 232:16
syphilology 57:18	tank 96:1 113:21,23 129:4,5,6	telephone 19:16,24 37:14 134:6 196:16	terms 71:5 190:6 239:23 241:6 253:15 268:5
system 19:14 41:4 43:20 52:11,13 53:1 138:23 240:11,23,25 241:11,20,20 273:22 283:20,23 284:1	tanks 183:9	tell 4:1,15 17:1 24:16,20 65:13 66:19 72:23 79:19 87:1 94:6 116:6,6 118:9 129:23 151:8 155:25 158:13 201:5 208:12 220:17 222:21 233:19,20,24 234:9,11 237:16 246:22 247:13 250:18 251:3 277:9 278:3 281:20,22 285:3	terphenyls 143:11
systemic 58:12 93:10 205:3 230:12 230:24	tape 40:7 75:1 143:20 179:24 207:7 215:8 216:15 255:22	telling 184:15 207:8 227:8	terrible 177:7
systems 44:9 105:15,25 107:7 188:17 232:19	tape's 108:18	temperature 49:24 50:10 54:15 55:25 93:9 103:16 147:13 148:5 149:1 241:8 242:18 243:5 260:9 284:10,13 285:12 286:6,12	territory 170:4
t	tare 125:22	temperatures 51:23 53:18 72:22 93:13 96:3 107:2 204:6,24 241:22 247:6 250:12 260:2,13 286:9	test 59:25 68:17 69:22 71:15 77:7 97:5 135:7,8 137:1,3,3 137:4,10,11 139:20,21 140:13,15 151:18 155:5,18 159:18,20,7,8 163:10 164:8 164:13 165:4,19,20 166:14 166:16,20 167:21 177:12 192:11,12,19 226:15,17 229:4,22 231:21 273:6
t.v.a. 201:2,16 202:4,10,12,15,22 258:9	target 136:3	ten 9:6 18:17 63:6 67:24 68:8,8 68:11 76:17 139:9 156:11 159:17,25,2 170:7 171:8 180:11 287:25	tested 60:2 67:22,22 68:7,11,18 70:25 71:6,7,11,19,23 72:3 72:11 139:7,9 141:12 147:13 163:9 167:24 278:13 279:7,11
t.w. 202:15	tax 290:8	tendency 21:3	testified 80:16 242:16 276:24
table 94:4 121:25 266:25 267:4	taxation 290:6	tennessee 200:16,17 201:16,18 202:23 207:4,14,20,25	testify 289:11
tablet 146:10	teaching 6:21 8:25	tenth 21:8 77:14 151:4	testifying 86:18
taiwan 171:8	team 215:13	tenths 77:15,16 154:2	testimony 60:25 80:11 144:14 239:25 242:17 244:11 260:6 289:16
taken 3:3 4:23 35:20 78:8 86:24 123:4 124:24 168:8 269:19 289:20	teaspoon 281:1,2	term 12:8 20:18 82:6 86:8,10 87:9 99:8,9 111:6,25 135:8 156:18,19 162:10 167:13 168:5 172:18,22 174:15 224:8,9 226:18 227:6,9,11 228:4,5,20 229:1 243:15	testing 68:23 71:14 99:16 135:8 139:18 144:14,21 145:4 154:25 155:4 159:5,8 162:1 162:8,10,18 163:6 164:9 167:15 172:10 175:17 176:1 187:22 198:10,10,12 204:2,2 220:21,23 225:8 226:18 227:6 229:1,3,8 231:14 232:23
talk 24:21 25:3 26:6 41:13 55:14 61:11 66:23 67:12,13 71:20 94:21 95:25 103:14 105:19,20,21 118:20 124:10 125:20 143:21 172:23 184:4,9 210:5 212:11 227:25 242:3,4 244:20 247:15 262:9 270:24 273:8 274:12	teaspoonful 21:8 60:12 159:22		tests 66:13,14 70:2,4 77:1,3,4 79:7 89:22,22 96:25 97:5 134:21,25 135:6,15,17,18 135:21,23 136:19 137:8,19
talked 24:24 29:21,25,25 52:7,20 56:3 61:6,6,7 62:14 69:13	teaspoonfuls 60:12 157:11,12 158:4,7,15 158:18,21,23		
	teaspoons 60:15 157:24 158:25 280:18		
	teaspoonsful 157:23		

[tests - toxic]

tests (cont.)	think (cont.)	three (cont.)	time (cont.)
140:3,16 142:22 145:25	58:15 59:23 63:18 66:10,22	49:25 52:10,15 55:12,25	288:7
148:23 155:5,9,10,20 156:1	67:6,13 68:13 70:13 76:22	63:6 66:9,14,18,20 67:16	times
156:24 160:11,12 162:5,11	77:4,5 78:8,22 79:8,21 80:3	76:21 80:8 83:5 88:6 104:7	15:7 21:20 36:9 40:1 60:11
162:20 163:15 164:12,22	80:6,10,16 81:15,18 83:24	114:21 119:10 123:18	75:14 158:18,19 159:2
165:1,5 166:11,15 167:6,6	84:25 86:23 89:9 94:20,20	126:11,14 131:11,17,17	176:15 193:1 207:8 242:16
168:6 173:18 176:8 192:14	97:16 98:6 100:4 101:12,18	155:14 158:19,21 166:25	260:5,20 267:10,17 269:18
224:21 225:8,18,22,25	102:1 108:14 110:14 113:9	182:11,18,24 185:24 197:1	tissue
226:6,8,9 228:20 229:2	116:5 119:22 120:16	197:2,4 217:4,5 235:6	216:4
230:8 231:4,18,19 232:7	121:24 122:8,9 125:6 129:3	242:4 245:7,13 250:12	tissues
234:20,21,22 235:2 243:6,8	129:4 130:16 131:22 133:7	255:20	216:6
272:7,8,9 273:7 274:1	137:1 141:5 142:9,25	threshold	title
278:17	146:14 148:16,16 151:1,3	103:17 189:24	57:12 98:2,11 100:7,25
tetrachloride	153:19 156:3 160:10	throat	105:16
66:17	161:22 167:19 168:1,11	156:20	tobacco
texas	171:17 172:16 173:13,20	throw	255:1
15:5,6	174:18 179:23 183:2,24	219:4	today
thank	184:24 185:1 191:13	thrown	22:3 28:18 49:6 56:20
9:20 63:25 224:12 288:8,9	194:18 200:1 203:20	133:6	83:23 207:18 226:21 227:9
288:11	210:10,18 212:2,4,8,25	thrust	229:2 239:14 240:6 243:21
theirs	216:1,14,15 222:12 223:24	261:18	247:25
172:13 206:12	228:12 234:23 237:13	thrusts	toes
therapeutics	241:6 242:17 244:11 245:9	129:23	76:24
8:2,12,12	249:17 250:7,21 253:18	thumb	told
therminol	254:11 258:19,22 262:24	130:11	24:15 33:7 53:1 78:12,12
44:10,13 105:14,23,24	265:20 268:18 273:23	till	180:23 181:5,12 184:9
106:1 107:10,20 126:13	274:23,24 278:10 279:25	10:13 22:3 85:23	196:3,22 199:17 204:2
162:12,14 188:1,18 189:10	280:2 281:17 286:18	time	207:2,10,12 218:23 221:25
189:11,18,18	thinks	4:13,14,25 5:6 8:13 9:11	258:15 259:12 268:13
therminols	35:7	10:17,19,19 11:13 12:1,3	tomorrow
107:4,23 108:3,9 117:6	third	15:5 17:13 18:23 19:21	216:16 247:25
189:22,23 217:2	13:25 14:11 38:22 57:24	20:12 22:4 24:6,19,25 25:1	tonnage
thermometer	70:7 105:19 183:16 188:3,4	25:2,4 26:25 27:3,11 28:14	182:2
55:18,20 81:13 183:7	188:10 242:13 270:1	30:15 31:25 33:17 37:15	tool
thermometers	thomas	38:20 39:8 45:22 47:13	208:9,12
55:20	2:9	49:24 51:4 52:21,22 55:20	tools
thick	thorough	56:3 58:21 61:14 62:14	212:20
98:13,22	65:20 76:10,15 89:25	63:10,20 65:5 66:1 73:9	top
thing	thoroughly	74:12,14 75:11,21 76:2	9:1 41:11 73:11 165:12
14:11,11 20:25 35:9 44:25	139:2	77:4 80:17 82:9 83:13	211:13,14,15 214:11 219:7
59:16 97:25 102:13 111:20	thought	87:19 106:8 129:17 130:20	219:10,16
114:19 136:2,2,10,14 171:8	16:9 19:18 34:2 49:10 63:5	131:21 134:20 138:16	topic
227:17 242:25 248:4 253:4	72:8 73:20 76:6,8 95:1,2	145:10,19,21,22 146:7	108:13
263:15 273:17	137:22 139:10 140:6	150:6,21 155:19 159:16	total
things	169:12,22 173:16 187:4	161:4 163:10 164:24 165:6	274:20,20 290:15
14:7,15 24:14 44:20 55:24	209:21,22 210:9 215:24	165:7 167:8 170:23 173:7	touching
83:2 84:21 93:24 117:10	223:7 230:16,21 241:13	174:19 177:7 178:1 182:12	289:12
118:3 130:6 134:1 139:18	271:4 285:3	188:4 192:22 194:17 199:3	toxic
169:15 206:3 225:12	thoughts	203:14 204:25 209:15	16:21 21:1,4,4,5,6,7,11,12
232:17 233:15 234:2	280:11	210:15 214:21 215:6,18	21:16,19 60:3,20 69:4,12
244:20 245:12,13 256:24	thousands	216:10 217:14 218:13	69:16 70:1,25 71:8,25 72:5
257:2 263:8 283:8	245:6	220:7,13 221:14 225:20,23	72:8,9,10 76:8 93:10,19
think	three	225:25 227:2,14,18 228:17	103:4 136:11,13 146:6
17:15,19 18:15 22:17 23:19	3:22 4:21 5:5 11:19 12:2	229:13 233:6,12 234:19	159:3 160:10,19,24 176:25
27:15 32:14,16 39:25 42:3	15:15 16:6 18:12 25:12	248:6 250:11,19 257:5,11	280:16,17 287:10,13,14,16
50:24 52:19 56:13,14,20	26:13,16 28:8 38:11 48:5	261:19 275:11 286:10	287:17,18

[toxicity - understanding]

toxicity 13:19 20:18,19,23 21:13 22:20,20 34:23 37:11 46:20 57:9 58:12 59:15 60:19,22 82:12,16 83:3 85:11 92:11 93:25 94:8 95:14,19,23 96:20 97:6,7,18 98:4 102:21 103:4 104:6,13,20 106:5 107:20 108:9 134:22 137:3 144:2 148:21,25 155:7 159:4,8,24,7,7 160:11,17,18,19,20 163:4,8 164:16 167:13 175:8 178:25 180:18 182:15 186:20,23 187:6,22,25 188:6 189:16,21 191:10 192:6,20 195:9,16 196:21 196:23 200:24 201:3 202:2 202:5 203:24 206:4 224:22 225:19 226:23 227:10 228:3,20 229:15,16 231:8 231:12,14,18,21 233:1 234:22 257:21 258:5 260:9 260:10 287:19	transcribed 3:5 transcription 275:19 transf 43:17 transfer 44:9,13 52:11,13 53:1 54:21 105:14,15,20,21 106:2 107:7 117:5 126:13 162:18 168:18 172:2 182:25 183:2 188:1 189:11 221:12 transform 45:3 transformer 45:1 46:5 55:17,17 81:21 100:14,15,20,21 101:1 117:20 120:12 175:14 183:18 184:5 190:5 191:22 191:24 195:21 286:14,20 286:20,22 287:4,5,7 transformers 42:12,15,17 44:16 45:10,21 183:13,22,24 195:2 196:1,2 221:15 287:9 translate 158:2 215:3,4 translated 57:23 215:5 translations 214:22 transmits 43:21 transmitted 38:3 transportation 109:5 110:25 transposition 60:6 trapped 160:8 traveled 236:9 treat 103:14 treated 29:5 48:20 treating 52:24 62:17 treatment 6:10,17 9:24,25 65:22 treatments 12:6 tremendous 44:17	tremendously 270:7 trends 249:24 250:6 treon 99:13,16,20 144:2,21 145:4 146:1 149:9 150:22 152:16 153:6,10,11 160:6 176:21 176:24 180:22 181:11,12 188:10 228:24 229:9 treon's 144:14 149:15 181:1 187:6 188:3,5 191:9 193:22 trichlorobenzene 287:5,6 trick 276:18 tried 15:10 65:18 triglyceride 265:13 triglycerides 265:11,22,24 trouble 57:24 62:2 97:2 131:19 138:3 139:2,13,20 148:17 254:22 troubles 275:25 276:1,1 281:17 true 21:5 207:4,7 249:15 250:8 272:6 276:23 289:16 290:6 truth 289:11,12 truths 133:7 try 36:19 177:4 214:22 253:23 trying 14:3 89:22 141:20 218:25 227:19 229:9,25 264:1 276:17 281:17 tumors 85:9 235:5 237:24 238:1 239:21 turn 46:12 69:7 turned 12:1 41:20 42:7 turning 42:4 turnover 246:2,3 turpentine 137:6	twelve 77:5 twice 15:4 136:11,13 157:19 type 32:19 57:24 89:16 97:5 128:25 135:7 145:4 149:20 162:7 174:4 175:17 246:25 248:4 260:4 types 66:13,14 113:16 126:14 231:19 238:15 typewriting 3:6 typewritten 132:4 133:20 typically 34:23,25 typing 134:2
u			
u.s. 79:3,19 85:2,3 89:9 109:3 153:22,23 u.s.d.a. 165:16 ucla 215:24 uh 186:5 251:5 ultimate 237:6 ultimately 210:21 unbiased 153:8 unbroken 103:12 uncomfortable 255:18 uncontrolled 23:23 undefined 241:6 underneath 121:4 understand 50:3 66:21 71:21 72:11 93:25 148:13 157:24,25 177:6 213:18 227:19 238:8 240:1,1,22 242:2 255:8,11 255:17 263:25 264:11 265:17 273:20 276:4,4,17 277:5,5 285:1 understanding 183:15 261:20 263:4			

[understands - war]

understands 18:7	usc 215:24	varies 21:7	visited 27:8
understood 146:20	use 13:17 20:24 32:16 34:16	variety 47:23 283:2	visiting 14:22
undertaken 230:3	35:10,12 42:10,14 43:10,12	various 11:20 14:22 17:2 23:5	visits 23:18 25:10 31:18
undertaking 234:23	54:23 56:19 59:19 71:20,21	37:19,21 49:19 50:22 73:25	voice 69:13
underwriter 187:17,20	82:17 83:10 95:1 99:20,24	89:10 95:7,24 104:2 108:5	volume 130:8 232:2 275:8
undiluted 139:23 155:12	109:4 111:5 114:16,17	108:9 116:21 126:15,16	voluminous 130:5,7
unfair 270:17	123:5 129:25 130:1,2	131:12 137:20 144:4 146:1	voluntarily 222:13,15
unintentional 167:21	132:19 134:12,18 147:25	154:25 156:4,6,12 160:1	vomiting 231:25
united 9:1 22:16 23:16 25:14	148:12,13 151:6,13 152:20	162:13 164:9 166:24 169:2	von 73:10 174:17 175:9,17
27:25 42:21 54:19,24 73:12	154:18 159:23 174:3,8	193:10,21 195:15 206:13	176:16 177:8 178:5 186:10
78:24 88:3 168:3 170:10,17	175:16 178:9,14 184:19	207:19,25 208:6 213:1	193:8
171:3,7,17 215:20 266:10	185:11 200:25 220:9 221:5	217:9,12 220:22 230:8	vosburgh 73:20 194:22
units 221:12	221:18,20	231:19 236:25 239:6	voss 278:24
universities 7:9 215:23	user 37:9 80:18,20 81:10 190:21	246:12 252:4 260:5 283:8	vs 1:10
university 4:20 6:24 7:1,2,2,6,11,11	237:6	varnishes 94:24	w
8:25 72:16,25 99:11,23	user's 190:6,20,22	vary 83:12 96:21 106:16,20	wage 39:7 74:8
135:12 144:1,15,25 165:10	uses 35:4 43:5,9,10 46:6 94:23	varying 107:24 175:23 253:19	wait 61:20 70:9 81:6 120:20
173:10,11 215:25 235:20	170:18 206:15 221:24	vats 240:14	121:3 158:20 177:4 185:3
235:22	246:12,14,15	vein 263:5	274:8
unload 48:23	usual 8:5 100:19 227:17,22	ventilate 184:3	walls 286:23
unnamed 264:10	usually 18:4 25:10 69:25 77:7	ventilation 65:25 93:12 138:23 143:6	want 36:1,4,13 43:18,19,22
unsafe 177:13	110:17 187:21 231:22	143:16 154:18 178:9 183:8	47:13 57:5,14 66:20 67:7
untoward 93:15	232:3 248:11,17,20,22	183:10,25 198:25	79:14 81:8 88:17 96:10
unusual 24:22 33:20 60:22 82:16	249:5	version 150:4,4	99:2 114:22 137:10 140:25
150:1 240:2	utilized 132:12,14,17 193:11	versus 233:1 275:5	141:18 153:8 154:17 160:1
unwanted 12:11	207:19	vessel 43:12	180:16 190:12 201:21
upper 112:7 285:7	v	video 275:25	207:6 239:24 244:20
uric 78:3	valley 200:16,18 201:16,18	videographer 2:15	247:17 255:21 263:4
urinary 90:19 272:25	202:23 207:4,15,20,25	view 83:4 85:11 149:4 160:13	280:19 285:4 286:16
urine 89:22	value 270:12	182:1 206:25 225:23 238:2	wanted 36:12,14 42:6,7 64:20
usable 135:23	vapor 103:15 113:6 144:6,7 145:7	271:3	163:7,9 186:3,22 187:16,16
usage 82:18 113:9 198:22	147:15,16 198:9,15 241:23	vinyl 49:6	191:9 192:16 196:20 201:4
	242:18	violation 24:19	214:24 261:5,7 278:12
	vaporization 123:5	virtually 125:5	wants 86:23
	vapors 93:8,12 96:2 98:24 99:7,10	visit 25:14 26:25	war 10:16,24 11:6 18:22 22:12
	99:16 103:8,16 112:15		22:18 27:2,6,24 38:22 46:7
	118:10 122:17 125:1		134:2,4 210:13
	128:14 144:3 146:3 147:3		
	151:18 177:13 184:3		
	191:10 198:17		
	varied 11:15,25 13:20 26:12,23,24		
	135:7 281:19		

[warehouse - workroom]

warehouse 121:21 131:16	week (cont.) 248:9	wheeler (cont.) 193:2 197:16 198:7 199:2	words (cont.) 87:14 90:16 114:21 115:3
warfare 10:20,23,25	weeks 99:9 151:20 152:2,3 227:1	201:12 211:3,21 220:12	124:8 129:25 136:4 155:4
warned 116:11	227:3,15,23	256:23	159:14,25 160:4,8 163:9
warning 129:7 130:6 206:15	weight 125:23 233:22	whereof 289:24	170:7 241:23 254:21 262:8
warnings 122:18 129:14 130:8,9	went 4:6 10:13 12:13 13:18,22	white 45:1 112:11 120:3,15 174:9	265:12 280:9
warranted 244:4	14:3 15:1 16:15,23 17:17	198:7	wore 24:15
wash 53:15 72:21 103:7 125:1	19:22 20:2 22:17 25:3 27:2	whiteheads 248:25	work 9:21 12:13 16:24 17:17
washed 103:13 139:2,13,20 242:12	27:4,5 40:18 48:20 56:3,8	whoops 94:3 160:9	18:8 38:13 74:6,23 77:23
washing 112:17 118:12 128:16	56:11 63:12 89:19 97:25	wider 190:6	78:11 85:7,8 88:19 91:2
washington 7:11 8:25 9:17	133:22 148:14 151:24	widespread 94:21	93:7 99:13 115:7 138:14,17
waste 123:8,16 124:10 129:2	152:10 167:14,16 174:25	widmark 207:24 208:22 210:25	138:18 147:1 149:3 166:17
wastebasket 134:14	183:11,16 208:21 211:24	212:1,6,14	167:13 186:10 215:25
watch 53:2,5 224:3	211:25 212:13 219:24,25	wild 167:12	218:10,11 245:23 246:9
watched 16:23 52:18 118:3 223:21	228:25 269:20	wildlife 217:11	252:7 273:4
watches 246:6	westinghouse 42:19,23,24 43:3 73:14	william 194:13	worked 12:24 17:6 38:14 39:12
watching 234:1	82:1 89:14,18 101:21 102:4	willingness 223:20	52:13 76:17 162:4 245:1
water 103:13 112:17,18 118:13	102:15 103:22 116:22	willy 110:16	262:22
118:13 128:17,17 138:25	117:2 119:9 120:9,11,11	wilmington 73:13 175:2	worker 39:17,18 80:13 88:21,22
148:10,11 213:20 286:3,3,4	122:24 123:11 150:18	window 284:9,18,20,22 285:6	116:10,11 244:22 248:7
waters 209:12,12	175:4,10 177:12,15 178:20	wire 49:2,3 196:19	workers 10:4 11:18 14:20 15:20
watt 92:3,3,24	178:24 179:3,4,8,14 180:6	witness 45:25 63:22,24 70:12	23:11 29:2,3,4,20,24 30:2
wavelength 64:21	180:12 181:4,8 182:8 184:6	216:17 272:15 288:8,11	30:12,15 33:2 48:19 54:18
wax 171:1	184:8,10,15,16 185:16,17	289:14,17,24	54:25 55:11,12,12 62:22
waxes 43:8 221:6	185:20,24 186:7,25 187:9	woman 88:18	63:2,9 74:3,12,14,21 75:5,9
ways 242:4	187:13,17,19,25 189:6,8	women 55:25 56:1	75:12,17,21 76:5,19 77:24
wear 65:21	190:14,24,24 191:7,16,22	wood 47:23 62:17	78:12 79:7,15,20,22,23
wearing 112:19 118:14 128:18	191:24 192:4,7,18,23 193:4	word 57:21 59:19 156:14 184:23	80:2 83:5 87:25 89:11,14
178:12	193:4,9,11,23,25 194:6,10	185:2 213:15 224:5 234:20	89:18,20 90:3 91:1 96:6
week 4:23 41:4 52:14 53:3,22	195:13 200:6 207:3	248:24 262:12,17	130:5 131:25 154:12,13,14
151:20 152:2,3,4,7,13	westinghouse's 175:15 186:8	wording 20:16,17 92:16 122:23	193:5,15 196:3 199:19
	we've 14:18 35:3,3 56:14,15 57:1	262:21	237:5 240:14 244:6,18,19
	58:20 60:21 62:7 84:21	words 13:6,8 17:10 19:12 20:22	259:10,23 261:4,10,14
	94:17 111:13 125:7 128:1	28:17 39:3 43:17 51:10,19	262:20 271:14 278:22
	130:24 133:24 136:10		working 6:18,18 10:3 14:14,17,17
	142:7,9 160:5,9 182:2		16:17,17 17:4 29:11 65:21
	190:20 193:7,21 195:17,19		72:17 84:24 87:15 131:18
	207:18,25 218:9,9,10		150:15 160:5 222:8,8,9
	223:10 255:20		240:23,25 243:9 244:18
	wgk 115:15		252:12 260:1 262:20
	wheel 247:1		workmen 143:7,17 183:4
	wheeler 17:15,22,23 40:21,24 41:1		workmen's 38:17 80:11,12
	41:8 153:7 180:4,21 181:3		workpersons 183:5
	181:13,14,20 182:6 183:16		workplace 82:22 83:21 151:14 177:9
	184:8,15 185:23 186:6,23		workroom 98:24
	187:8,24 189:4 190:14		
	191:5,20 192:8,8,17,18		

[workrooms - yusho]

workrooms 58:14,15	years (cont.) 172:19,20,22 176:21,21
world 10:16 22:12 27:24 46:7 136:25 240:16 287:15,18	182:11,18 184:11 188:25 190:3 214:2 222:12 226:4 227:4,11,24 243:6,10 244:1
worn 96:5	246:1,10,13 259:25 261:15 261:16 262:23 269:14,18
worry 273:2	270:2,6 279:22 287:25 288:1
worse 163:11 249:2	yellow 112:10 120:16
worthwhile 80:5	yensen 208:3
write 19:23,23 117:15	yesterday 56:20,22 125:8 239:14 243:21
writing 92:11 129:19 289:15	york 52:23 55:18 74:1 197:17 223:11,14 286:18
written 5:22 20:11,12 99:3 125:19 215:10 274:23 277:4	young 6:10 49:3
wrong 71:14 72:5,7 98:6 108:23 140:23 255:6 261:12 271:2	younger 155:3 156:1 161:24 162:4,4 162:6 163:21 231:5 232:23
wrote 37:10 78:19 93:4 94:10 96:18 138:10	younger's 226:19
x	yucheng 171:11 274:13
xerox 120:5	yusho 168:12,16 170:8,14 171:13 171:19 274:13 280:21 281:10,12
y	
yard 146:9,9,9	
yeah 30:21 32:3 53:4 57:6,13,15 60:16 64:19 70:16 73:17 75:8 100:6,18,18 120:22 125:16 170:6 186:5 187:1	
year 9:9 12:15 15:1,3,4,10 16:10 23:16 27:5 40:1 45:18 46:4 80:25 81:4 85:7 92:8 96:22 96:22 106:16,17 162:10 166:11,15 168:6 171:15 172:10,15 192:15 226:1 228:22 229:3,6,7,8 234:23 246:6,6,9 267:6	
years 3:23 4:12,21 5:5 9:6 12:16 15:9 16:6,8 28:8 29:14 32:23,24 40:10 43:5 48:5 48:14,15 55:12 61:4 75:11 75:24 76:17,17 79:17 81:10 82:25 83:25 84:24 88:20 95:8 104:3 134:24 135:3 166:25 167:1,6 171:8	