IN THE CIRCUIT COURT
TWENTIETH JUDICIAL CIRCUIT OF ILLINOIS
ST. CLAIR COUNTY

FRANCES E. KEMNER, et. al.	)	
	)	
Plaintiffs,	)	
	)	
VS.	)	NO: 80-L-970
	)	
MONSANTO COMPANY,	)	
	)	
Defendant.	)	

REPORT OF PROCEEDINGS

Before the HON. RICHARD P. GOLDENHERSH

JURY TRIAL

February 13, 1986

APPEARANCES:

Mr. Rex Carr
Mr. Jerome Seigfreid
On Behalf of the Plaintiffs;

Mr. Kenneth Heineman
Mr. Joseph Nassif
On Behalf of the Defendant.

Debra M. Musielak, CSR, CM
Official Court Reporter

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EXHIBITS

BE IT REMEMBERED, that on the 13th day of November, 1986, the same being one of the regular judicial days of said court, the above-styled cause came on regularly for hearing before the HONORABLE RICHARD P. GOLDENHERSH, one of the Judges at the St. Clair County Building, 10 Public Square, in the City of Belleville, County of St. Clair, State of Illinois. Whereupon the following proceedings were had:

COURT CONVENED:

(The following proceedings were had in Chambers, outside the presence of the jury.)

MR. NASSIF: Judge, you sustained Mr. Carr's motion regarding the suspension of trial on the 20th and 21st so Dr. Suskind could attend a Lawrence Livermore Conference and asked that that be -- you commented that you would maintain that sustaining of that motion until we got back to you with some additional information.

THE COURT: No, I said on the basis of what I'd been told and what I had -- on the basis of that information I was ruling, I was sustaining the objection.

MR. NASSIF: I have some more information we'd like to tell the Court.

THE COURT: Fine. I'd like to hear it.

MR. NASSIF: The Lawrence Livermore problem is a very serious skin melanoma that they have -- which is

potentially life threatening, not --

THE COURT: I know melanoma is, and you told me that in the original argument.

MR. NASSIF: Okay. What they have done, they initiated their first meeting was in August of '85. They began preparing a protocol for an investigation as to what the disease agent is out there. Dr. Suskind is the only occupational environmental investigator on the committee, and they do weapons research out there, and the Defense Department is very interested in determining what is going on with the employees, and this meeting is to plan for the next six months, they met in August, they are meeting in February, is to plan for the next six months' investigation to define what they are going to do to the next meeting, the next protocol is reviewed.

Dr. Suskind advised us at the time that we asked to postpone his testimony from October, November, because of the delay in the trial due to Mrs. Melton's injury, or illness, advised us that he had to make this meeting, and we committed to him that he could make this meeting.

THE COURT: Well, let me tell you what the problem is with your entire position. You've come in here -- here is the problem. You've come in here with a witness who obviously you consider important. You've gone to some great

lengths to get him here. And, you say now he's available these days, these days, he has to be gone these two days, he's available three more days, then he has to be gone three more days, then he's available two days, or something like this, and then he's gone. Period.

MR. NASSIF: We have gotten some additional days from him --

THE COURT: Wait a second. In breaking everything up, number one -- and, see, every other witness that's been put on in this trial, even if they have had to be interrupted, and some of yours have and some of the Plaintiffs' have, have been here on a commitment that they are going to start here and they are going to finish here. Dr. Dost left for whatever he had to do with the legislature out in Oregon. He came back. He stayed until he finished. Dr. Carnow went up for something up in Chicago, I don't remember exactly what it was, and something in Washington, he came back and both times he stayed until he finished.

You are basically telling me with this witness that we are going to have him here for X amount of days. We are going to break it up with the equivalent of a week's worth of recess, and then he's not going to be here any more, and that is completely unacceptable. It is an arrogant position to take. You are here to continue this trial. When you start a

witness you have to make the commitment to finish that witness whether that witness is going to take three days, which is a rarety in this case, or 30 days. And that is not acceptable to me. That is absolutely not acceptable. That is not -- you don't put together a trial and the presentation of evidence in this trial like a jigsaw puzzle. You put it together with a commitment to finish what you start, put it together with a logical sequence of organization and not busting things up five different times. You do it in a manner that is professional like that and that encourages the understanding by the jury of what is being presented.

What you've presented to me is saying basically by the good graces of this witness, he's going to be available for X amount of days, broken up like this, and you've got to accommodate to it, and that is not the way a trial is going to be run. That is not the way that evidence is put before a jury in the truth-seeking process. That is not the logical and reasonable way to run the trial. It runs counter to any experienced way to run the trial, runs counter to the admonitions of the Appellate Court in Lowe in the logical and systematic presentation of the evidence in this trial. And I'm not going to allow it.

Now, we have everybody here. If you want to continue this discussion, we can continue it later. But, the

knock on the door by the Bailiff indicated that all the jurors are here and we are going to resume testimony at this time.

MR. NASSIF: We'd like to continue the discussion.

THE COURT: Fine. I'll allow you to continue it after court.

MR. NASSIF: Tonight.

THE COURT: Tonight.

MR. NASSIF: Fine. Thank you.

(The following proceedings were had in open court.)

THE COURT: Good morning.

RAYMOND SUSKIND

(being called as a witness on behalf of the Defendant, having been previously sworn, having resumed the stand, continued to testify as follows)

DIRECT EXAMINATION

BY MR. KENNETH HEINEMAN

Q. Dr. Suskind, when we recessed Monday, we were discussing the 1949 report with respect to the examinations you did at that time, sir. And, in connection with that examination, could you tell us what the laboratory test results showed on these four individuals?

A. Laboratory tests on the four patients who were

hospitalized in Cincinnati demonstrated that with respect to their blood counts and blood cells, they were all normal.

MR. CARR: Your Honor, is that in an exhibit, Counsel, that he's reading from?

MR. HEINEMAN: Oh, yes?

A. 1694.

MR. CARR: Thank you.

THE COURT: Go ahead.

Q. (by Mr. Heineman) Go ahead, sir.

A. May I proceed? The findings on urinalysis were essentially normal. Insofar as the blood chemistry analyses were concerned, we found that in at least three out of the four there were elevated total blood lipids or total blood fat. We did not find any abnormalities in their bilirubin or BUN, which is an analysis which reflects kidney function or elevation in blood sugar. We did find, however, that they had a decrease in prothrombin concentration. Prothrombin is a factor in the blood which reflects liver function and in this instance, the prothrombin time was markedly decreased reflecting an alteration in liver function which we suspected because of the fact that two out of the four, and possibly even three out of the four we examined had enlarged tender livers.

Their basal metabolic rates were essentially within

normal limits. We did notice that their urinary excretion of organic sulfates, inorganic sulfates as well were elevated and that simply reflected a -- the fact that they were detoxifying phenolic components.

Q. Thank you, sir. With respect to the summary of what you found on these four people, what were the -- how would you summarize the acute condition of these men?

A. Well, it was our opinion that these men were suffering from an intoxication characterized by chloracne, skin lesions, disturbed liver function or hepatitis and disturbed lipid metabolism as well as a peripheral neuropathy, and we also thought at the time because of their -- the complaints of irritability and nervousness, that there might be a central nervous system involvement as well.

Q. And, Doctor, their hospitalizations, sir, how did their conditions progress?

A. Their skin condition improved significantly during their hospitalization with treatment to their skin as well as vitamins and diet. And we felt that this improvement would be expected to continue under good hygienic care, and if they were kept free of any irritant chemical atmospheres.

Q. And, with respect to the symptoms that they had, was there any change in those while they were in the hospital?

A. Yes, there was. As a matter of fact, their neuritis in the case of all of them improved significantly.

Q. Now, with respect to these four men, did you at that time have a prognosis as to their conditions?

A. Well, we felt that because they improved so significantly during their hospitalization, that the prognosis was extremely good, and if they were, if they received adequate therapy as well as remaining free from any chemical insult from there on.

MR. HEINEMAN: Your Honor, at this time we would move admission of Defendant's Exhibit 1694, which I believe was marked and identified by the witness on Monday.

MR. CARR: We have no objection to it, Your Honor.

THE COURT: It's admitted without objection.

Q. (by Mr. Heineman) Now, Dr. Suskind, did you have occasion to do any follow-up with respect to these individuals?

A. Yes, we did.

Q. And, I'm sorry, when did that occur?

A. About six months afterwards, in April of 1950.

Q. All right, sir. If I may get this marked. Let you hand you, sir, what's been marked as Defendant's Exhibit No. 1700.

MR. CARR: Thank you.

Q. And ask you to examine that and identify it for us, please.

A. This is a replica of Dr. Ash and my report of the examination which we performed on six individuals at Nitro on April 14th, 1950.

Q. And, sir, at the time of that examination, could you tell us how that came about?

A. Well, the examination had been essentially planned for, and we felt that it would be a good idea to examine the same people again to see what their progress was, and in addition to look at the plant operation, the environment in which this problem had -- from which the problem had originated. So that we did visit the plant as well as examine these people.

Q. So this examination -- excuse me. This examination was conducted at the Nitro plant?

A. It was conducted at the Nitro plant.

Q. All right, sir. Would you tell us, please, what you did on that occasion?

A. Well, we examined clinically the four individuals who we had hospitalized at the Holmes Hospital in Cincinnati in October of 1949, and we also examined two additional persons at the request of Monsanto who were also -- had been exposed to the products of the runaway reaction in March of

1949.

Q. And what did you find, sir, when you conducted this investigation?

A. Well, if I may go over some of the individual findings to demonstrate what we found, the pipefitter and mechanic, Mr. McClanahan indicated that he was feeling very much improved. He gained 20 pounds and was back at work actually and the pains in the legs and the other muscle areas had subsided and he felt that he was in good physical condition. His loss of libido, or his decreased libido had disappeared and his marital sex life, he indicated, was normal. He expressed some concern that the symptoms and the problem might return, but we assured him that if he was improving he would would probably continue to improve.

And we did find on physical examination that his skin was markedly improved. He was probably, as we have demonstrated, he was probably the most severely affected of the four with respect to chloracne. And, his skin condition had improved markedly. There were a few cysts and comedones on the face and ears, but, there was a noteable decrease of all the lesions on the back. And over the rest of the body such as the upper extremities and the buttocks where there were numerous lesions before, he had only a few hyperpigmented residuals or scars, really, of the former

lesions.

We did find, however, that he had -- his liver was still palpable and slightly tender. And, in summary, on physical examination of this man, we felt he was markedly improved and his prognosis was excellent.

The chief chemical operator, Mr. Willard had attempted to go back to work, but, he indicated that his acne flared so he quit the job and he hadn't worked since November of the previous year. He did admit, however, and on examination we did find his skin was very much improved, his face was almost completely healed, and there was considerable decrease in lesions on his neck and back although he did have some lesions on the abdomen and the buttocks. He indicated that he didn't have any recurrence or any pains in the legs which he had previously complained about, but he gets an occasional aching in the right calf, but no other discomfort.

He did complain of some discomfort in his chest, and, some substernal aching, which usually he said came on exertion.

He, too, also gained weight since the last examination. He gained about eight pounds.

He admitted quite freely to us -- admitted quite freely to us that he didn't want to return to work and he was

avoiding work as long as he could. There was unpleasantness at home. He refused to do any other work because he was afraid that somebody might see him. And he indicated he spent most of his time in bed or in the pool hall.

Did complain of some burning sensation in the eyes and he visited his doctor for that once or twice a week. He complained of a cough and also occasional attacks of asthma, which was not verified.

On examination, again, we found marked improvement on his face and cheek. They were healed, except for a very few cysts and an occasional nodule. His liver, however, was still palpable, but not tender. And we felt that this man also, like Mr. McClanahan, had improved markedly and that he was essentially prolonging his disability unduly and we felt he was capable of returning to work as was Mr. McClanahan.

Mr. Steele did not return to work since that initial examination and he continued to have soreness in his -- on his right side. And, pains, especially on walking. He also claimed that continuous standing resulted in aching and in the muscles in the lower leg. He complained of soreness in his eyes, but there were no symptoms referable to cardiovascular or urinary, genitourinary systems. He also indicated that his sex life had actually returned to normal. Also that the pains in the shoulder and the nervousness and

loss of sleep, insomnia, had persisted until the end of March, but was at that time when we examined him was no longer present.

This man, however, had admitted to doing occasional jobs outside of the plant, and he apparently could tolerate these jobs.

On examination we also found that he was improved, and there were very few residual cysts on his face. This was Mr. Steele, and you see here he had a very large number of comedones and cysts on his face and by April of the following year, six months afterwards, with good treatment, these had healed. So that is the chloracne had improved significantly.

He had an erythematous rash involving the follicules on the shoulder and the upper arms and there were a few cysts and nodules on the back and the neck and the genitalia.

Q. Excuse me, sir, what is an erythematous rash?

A. It's redness. I'm sorry. It's a red rash. We felt that this man's symptom complex, his chloracne as well as his other symptoms were subsiding, except that he still had evidence of liver dysfunction, at least by physical examination. But, we didn't see why Mr. Steele could not return to work with the amount of physical improvement that

he had made.

The last of the four was Mr. Hurley, who returned to work in March of that year, as an assistant operator and he also indicated that his condition, both skin and systemic complaints had improved. The face lesions and the lesions on the trunk had cleared almost completely, except he complained of swelling of the eyelids. He also noticed that his nervousness, which he complained about previously, had subsided and he had complained, as you may remember originally of pains in the lower legs and he was the man who did the biopsy on and found some peripheral nerve abnormalities. And he indicated, however, that the pains in his legs and feet had improved. However, they do occur after a day's work. He's being treated, or he was being treated for his eyelid swelling.

He indicated that he might have some shortness of breath, but this improved in the last month before we examined him, and he also told us that his appetite was very good, and he had no problems with his gastrointestinal tract or his urinary tract. And on physical examination these things were borne out. His skin was much improved. And, there were a few active nodules in the groin, and on the thigh, and we did notice the redness and swelling around his eyes.

We were not able to detect any liver enlargement on the examination in this man. So that in his case as well, we felt that the symptom complex, skin and systemic manifestations were subsiding. The peripheral neuropathy, that is the pains still persisted, but at a much lower order, and he did have some swelling of the eyelids. However, we felt, too, that his prognosis was good.

The two others we examined, one was a head operator in that building where the accident was, and not -- had not been seen by us before, and he returned to the building on the evening of that accident in order to clean out that autoclave where the trichlorophenol was being made and he did that with caustic and water. And he found that about four days later, he thought he saw cysts and comedones all over the face and body, not sure this was accurate, because it's a little short for the development of chloracne. Usually takes longer than that to develop chloracne, but this is what he believed occurred. He was given a leave for one week, while the building was being cleaned up, then returned to work and then within a month because of his skin condition he was sent off work and he remained off for about four months. And during that time, during the time he remained off work, he developed peripheral neuritis and pains in the ankles and legs and shoulders. And he then returned to work and worked

for about five months after that, developed a severe conjunctivitis, and had not worked since January of 1950, or didn't work since January of 1950.

He'd been treated with x-ray following the observance of the skin lesions and after he was treated with the x-ray, his skin became pigmented. His skin became greyish brown, and remained that way for about a year, after which it lightened up. He was really terribly concerned about that hyperpigmentation and because of it, he became a little bit of a recluse and he gave up his social activities and his athletic functions and he remained in the house and when we saw him, he did have a deep greyish brown pigmentation of the skin and face, which we will believe was the result of not just the exposure to the chemical agent, but also the exposure to x-ray and perhaps even sunlight.

His summary, his symptoms included a conjunctivitis, or a problem with his eyelids and severe pigmentation. Did complain about loss of libido and impotence for six months. And, he also indicated that there was some shortness of breath.

When we interviewed him, we felt that this rather handsome man had an emotional problem which was related probably to the fact that he was concerned about his skin and his illness. And we examined him, as I say, we did find that

he had a greyish brown pigmentation of the skin, limited to the face and the neck where he was treated and there were some cysts on the face and the forehead, but they weren't red. And, he had a rather interesting -- I think I mentioned that chloracne does produce a thickening of the skin in some people. So that if you rub your hands over the skin, it feels like sandpaper. The follicles, hair follicles become spiny and that's called phrynoderma, which I believe we use in our report. And this man had characteristics of that thickening of the skin as well as the chloracne. This spiny lesions on the skin we call follicular hyperkeratosis or the thickening of the keratin layer around the hair follicles. And he had that not only on his face, but he had it elsewhere in the exposed skin. We found that his liver was palpable.

And the rest of his examination was within normal limits. We felt that he demonstrated the symptom complex which the others had exhibited, except that he needed additional time and treatment for improvement. And we made some recommendations with respect to treatment of this person, which hopefully was carried out.

The fifth individual or the second individual we did not see previously was a man named Lane. He was a pipefitter, and he developed his acne, he claimed, started about two weeks after the accident. And, it started around

the face and the lips and spread to the neck. And later the shoulders became involved and other areas of the body.

Thirty days after that, after the onset of his chloracne, he developed peripheral neuritis, pains in the legs and the knees and calves and heels and he -- it became so severe that he was unable to work. And he also complained of insomnia, and wheezing, and a cough which lasted for about nine months. In this person, there was no weight loss like there was among several of the first four that we saw, but, he said that his appetite had remained good. He indicated, however, that there was loss of sexual activity for a period of about nine months, but this had improved and was normal at the time that we examined him.

At the time of the examination he still -- he said he still had some aches and pains in the legs at night and nervousness. He indicated, frankly, he felt he had been ill, at the onset, but improved markedly. When we examined him, we also found numerous comedones or blackheads and cysts on the face, neck, shoulders, upper arms and back and there were a few inflamed nodules on the back like the others and some thickening of the skin and hyperpigmentation about the face like Mr. Young, the man I described previously. Had a mild conjunctivitis when we examined him or involvement of the lids. And, everything else appeared to be normal and we felt

that this man had the same skin problem and systemic problem that the others had had, and was also improving. Those are the findings.

We did some laboratory studies as well. Would you like me to go into them?

Q. Would you please.

A. In almost all of the -- of the persons we examined, and we did a -- we did laboratory studies on three others, we found that their prothrombin time was increased, indicated persistence of liver dysfunction. Their flocculation results were within normal limits. There was again an indication in about seven of the persons on whom we did laboratory tests that their total lipids where increased. All of the other laboratory parameters appeared to be within normal limits.

Q. In summary, Doctor, what was your diagnosis with respect to these men on this occasion and your prognosis as to their condition?

A. Well, as I indicated, with respect to the 1949 examination, that the people we examined were suffering from an intoxication which affected there -- which affected their skin, central nervous system. We felt that their complaints of nervousness were an indication of it. Peripheral neuritis, liver dysfunction and an effect on their sex life, which might be the result of an effect on their endocrine

system. They uniformly had problems or a disturbance in lipid metabolism or fat metabolism, and of course the most obvious symptoms that they had and most obvious findings were the chloracne. Some of them, or few of them, some respiratory problems which was limited to dyspnea and wheezing. The neurological problems were limited largely to pain and weakness, but, in the case of the four that we had seen previously, and the two additional ones, all of these manifestations were improving significantly. And I think our report reflects that in which Dr. Ash and I stated that all of the patients are markedly improved, and that there are no findings in any of those who were examined during our last visit which contraindicates returning to their former duties.

We did feel that the had operator, Mr. Young, required some special attention because of his emotional problems which were apparently related to that -- to the effects of the intoxication.

Q. That was the man that had the severe --

A. Hyperpigmentation and phrynoderma.

Q. Now, with respect to all six of these men, Dr. Suskind, what was the first thing that happened to them? What was the first condition that they got?

A. Well, the first thing that happened to some of

them, when they went in to clean out the building where the accident occurred, was that they developed what I would regard as the acute symptoms or the very acute symptoms of initial exposure to trichlorophenol synthesis accident and that is respiratory irritation, skin irritation, gastrointestinal irritation, headache, nausea, so on, which subsided as soon as they got out or subsequently to their getting out. But, the first manifestation of the exposure to the toxic agent which caused or was associated with the symptom complex, the first manifestation was chloracne. And all of them told us the same story. So they got the chloracne before --

A. Before they developed any complaints of pains and aches in the skeletal muscles, or dyspnea or shortness of breath, or loss of libido, changes in their sexual interests.

MR. HEINEMAN: Now, Your Honor, at this time we would move the admission of Defendant's Exhibit 1700.

MR. CARR: We have no objection.

THE COURT: It's admitted without objection.

Q. (by Mr. Heineman) Now, Dr. Suskind, did there come an occasion for an additional examination of the people at Nitro?

A. Yes, there was an additional examination.

Q. All right. And what gave rise to that examination and when did it occur?

A. It occurred in 1953, in April of 1953. Before that time, shortly before that time, we were in communication with Dr. Emmett Kelly the then medical director of Monsanto. And, we agreed that it would be a good idea to get into the plant and examine a larger number of persons, people who had been exposed to the runaway reaction in March of 1949 as well as those who were just exposed to the ordinary process of making 2,4,5-T. People who came into the employ of Monsanto some time after the accident and were working in the trichlorophenol process, or people who were working in the synthesis of 2,4,5-T, that is the actual making of that acid and the salt of the acid, which was the final product, and that was carried out in another building. So that we felt that it would be an appropriate thing to find out what the difference was between those who were exposed to the accident material, and those who were just involved in the ordinary process of making 2,4,5-T.

Q. And how many in all did you examine on that indication, sir?

A. We examined 36 individuals altogether. Now, we also had some other objectives. And, we wanted to determine the types of exposure that resulted in the development of the

clinical symptoms. What did these people do? They were not all chemical operators, they were not all maintenance people. They might have been involved in hauling. They might have been involved in some maintenance. And they might have had combined exposures. So we thought that it would be a good idea to find out just what kinds of work they did. In occupational medicine, that's an essential aspect of determining why things occur and under what circumstances they occur. Go into the plant and you look at the operations as well as finding out from individuals what specifically they were involved in from the beginning of their employment. And, at the time also we felt that it was, it would be appropriate to do a hygienic survey of the two buildings where the manufacturing process was going on. We knew that Monsanto had their own hygienists and their own engineers to look into these matters, but we felt that it would be a reasonably good idea for us to do it. And, we certainly had the expertise and the qualifications, so that two qualified chemical engineers went in and did a hygienic survey of the two buildings. And, the purpose of their visit was to find out what the conditions of the environment were and to recommend possible alterations which may be made to improve the hygienic conditions.

Q. Now, on the occasion of this particular incident,

did you prepare a report on that as well?

A. Yes, we did.

Q. Let me hand you, sir, what's been marked as Defendant's Exhibit 1701 and ask you to examine that and identify it for me, please.

A. This appears to be a replica, exact replica of the report which was submitted on a clinical and environmental survey of the Monsanto Chemical Company plant in Nitro, West Virginia, which a report which we carried out in April of 1953.

Q. All right, sir. Now, could you tell us with respect to the 36 people that you saw, how many had been exposed to the autoclave accident and how many were involved in the production?

A. Well, in this group, there were ten individuals who were exposed to the autoclave incident. And, the rest of the group of 36 were exposed to the, either the regular operations in Building 51, in which trichlorophenol was manufactured, a small number in that operation, and twelve were involved in the regular operations of making 2,4,5-T itself. And there were a few in hauling and several in maintenance, and there were about five who had combined exposures of different -- in different buildings, but most of them, most of these exposures had to do with the making of

2,4,5-T, so that essentially there were ten from the accident and 26 from the regular operation of making 2,4,5-T.

Q. Now, when you conducted your examination of these people, what was the scope of what you did?

A. Well, we did a -- we believed to be a thorough clinical examination of all of the 36, and we did laboratory studies on selected people, people that we felt were severe and we were very interested to know what their laboratory status was. On those individuals we did urinalysis and hemograms, that is blood studies, and we did some more, for instance, and prothrombin time and lipids and some liver function tests as other liver function tests as well.

Q. Now, with respect --

A. We only did those if the severity of the findings appeared to justify them.

Q. Now, what was the -- would you summarize for us, please, the symptoms that were presented by this group that you saw in 1953?

A. Well, I think it would be useful to separate the persons who were exposed to the accident material from the rest of that group. The ten individuals who were exposed to the accident material, all of them gave histories of fairly severe chloracne in the beginning. In the beginning. And, among them, most of them did have other systemic

manifestations following the appearance of the chloracne. Those who were not involved in the accident, the other 26, first of all, their chloracne in general was not as severe, historically or on examination than the -- those who were involved in the accident, and their systemic manifestations if they were indeed present, we felt were of a much lower order than those involved in the runaway reaction.

Actually, we found that all of the -- and they were chosen on that basis, all of the people who had chloracne were put into that group to be examined. There was one individual, however, who we felt did not have chloracne, although he did complain, he had a folliculitis, which is common in the workplace, it's an infection of hair follicle on the back, but his skin was essentially negative. But, he complained that he had aches and pains and when we really got to talk with him, he sounded like a complainer. That was a Mr. Kyle.

Q. When you say a folliculitis, what is that?

A. It's an inflamation of the hair follicles and it occurs in machinists. It occurs in persons of restricted hygiene, who don't bathe frequently or frequently enough so that their -- the soilage on their clothes is a factor in the follicular infections, infections of the hair follicle, and that is seen very commonly in industrial populations.

Q. Now, with respect to the symptoms that were presented, sir, these were -- were these by history?

A. Yes, each individual was interviewed and they were interviewed by physicians, and the physicians who interviewed them were myself and Dr. Davis, who was a board certified occupational physician having been trained at the University of Cincinnati and a Robert Akin, who was a dermatologist, and we interviewed all of these people. Dr. Ash was not involved in this study.

Q. All right. And, how did these symptoms presented by history, relate to the symptoms that you had previously received from the people on other examinations?

A. Well, they were all very similar. They were all very similar, except for severity, and it was our opinion that there was significant difference between the severity of the onset of the symptoms as well as the -- as the severity of the skin problem as well as the systemic manifestations between, that is, there was a real difference between those who were exposed to the accident and those who were just involved in the making of 2,4,5-T.

Q. And to what did you attribute that difference in the severity of symptoms?

A. We assumed, and I think it was a correct assumption, that the difference was due to the fact that

there was an acnegenic and hepatotoxic agent, that is a liver toxin, in the trichlorophenol accident, which was probably of a greater concentration than the -- than in the making of 2,4,5-T. It was something in the trichlorophenol which maybe eventually got into the 2,4,5-T and it probably did, because they also had, people working 2,4,5-T, had symptoms, but, those were not as severe. So that just thinking as a toxicologist, the assumption would be made that the accident material -- the accident-exposed individual had a heavier exposure to the toxic agent.

Q. All right. Now, when you actually examined those people, could you give us a summary of what you found?

A. Well, I think the first part of this summary should relate to the progress that we noted, because we had examined people before, and, we felt that those people whom we had seen before with moderate to severe degrees of the complexion characterized by acne and pains in the extremities and liver dysfunction and dyspnea, nervousness, all of those people had improved markedly. All of those that we had an opportunity to reexamine. And we had an opportunity to reexamine all but one.

Q. Now, had they improved from what you had seen in 1950?

A. And it was quite obvious that all of them had

improved significantly.

Q. From even what you had seen in 1950?

A. Absolutely.

Q. Okay.

A. And, like me to give you individual instances, I can, but I think that, for example, Mr. Hurley was markedly improved from even 1950. He still had some sensory loss in the feet, but all of his other manifestations, all of his other manifestations, the chloracne and everything else had subsided.

In the case of Harold Young, the individual who was -- had this pigment problem, which he complained about and the behavioral problem, as well as a rather severe case of chloracne, he had some residual lesions, just a few, but he was vigorous and energetic, and he held down full time on the plant, not only had a full-time job in the plant, but also operated a private business with his new wife in his off hours and weekends. He went into the drive-in restaurant business. But, he was really doing extremely well.

Mr. Willard at that time in 1953, physically was remarkably improved. But, he was complaining about cardiac palpitations and was worried about his heart, and one of the physicians indicated that he had a heart problem and there was no evidence from our examination that he did have a heart

problem, we believed, and it's in the record that he was an unstable individual who made a very important psychological adjustment, and there was a serious possibility that his heart disease was iatrogenic, that is he didn't have a heart disease but the doctor made a diagnosis of one and that does happen.

Q. I'm not sure I understand what iatrogenic means.

A. Iatrogenic means physician originated.

Q. Okay.

A. For example, if a physician prescribed a drug which produced an adverse reaction in the individual, this would be iatrogenic, the adverse reaction would be iatrogenic.

Q. Now, but you had examined -- this was Mr. Willard?

A. Mr. Willard, right.

Q. And in the opinion of the physicians in your group that examined him, did he have any signs of any cardiovascular problem?

A. There was no signs on our examination of any cardiovascular problem.

Q. Now, with respect to the, I'm sorry, did we cover the four people?

A. We didn't reexamine Mr. McClanahan.

Q. I'm sorry, did you say you did not?

A. No. No, he was not -- he was not available.

Q. With respect to all of the people from the 1949 and 1950 examinations, whom you saw again in 1953, what was the status of their health in 1953?

A. Well, as I have indicated already, they were all markedly improved, and even Mr. Willard who still complained a good deal, when we examined him, we couldn't find anything wrong with him except for some very few mild residuals of chloracne.

Q. Now, with respect to those in addition to those whom you had seen before, what -- can you give us in summary form, what you found with respect to those people?

A. Well, again, I indicated that those who were involved in the -- in the process accident, they all developed chloracne. And some of them did have the systemic manifestations which we found in the first four. The individuals who were not exposed to the process accident, but just to the normal operation of making 2,4,5-T, they had some chloracne, but the complaints were never as severe as a whole as those who were involved in the process accident, nor were there systemic manifestations. Some of them did not have systemic manifestations.

Q. And with respect to the liver dysfunctions that you had discussed on earlier examinations, did you find any liver dysfunctions in this group that you saw in 1953?

A. Those that we did laboratory studies on, we did not find any abnormalities.

Q. I see.

THE COURT: Is this a good point for a short break?

MR. HEINEMAN: Yes, sir.

THE COURT: We will take a short recess at this time and then we will resume testimony. I would remind you, you are not to discuss this matter among yourselves, with anyone outside the jury panel or as of yet form any opinions or conclusions about the matters on trial. Court is in a short recess.

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

THE COURT: Go ahead.

Q. (by Mr. Heineman) Dr. Suskind, did there, following the 1953 examination that you conducted at Nitro, West Virginia plant, did there come a time when there was a mortality study done on that Nitro population in which you participated?

A. Yes.

Q. All right. Can you describe for the Court and the jury the events which triggered or brought about that mortality study?

A. Yes. There were a series of events and I think it's appropriate to recount them. Events which led to the alerting of the scientific community and the community as a whole. Alerting them to the importance of studying, studying populations which had been exposed to, and by that time starting in 1957, we knew that the toxic agent, or the most important toxic agent in the trichlorophenol process was TCDD, 2,3,7,8-tetrachlorodibenzo-para-dioxin. This was discovered literally first in Germany and then published by two dermatologists from Hamburg, so that they were alerted as to the fact that the acnegenic agent and the toxic agent was 2,3,7,8-TCDD. The Viet Nam war came to pass and Agent Orange had as its two major constituents 2,4-D and 2,4,5-T and the 2,4,5-T was a herbicide, a defoliant which might have and did contain concentrations of TCDD.

In 1969, the interest was reestablished largely by the fact that the national government had a private laboratory do a study on the teratogenicity or the birth defect possibilities of TCDD in rats, in animals, and it was found that TCDD in rats produced birth defects. That was '69. In '68, there was an epidemic of chloracne and some systemic manifestations with it, which occurred in Japan as a result of accidental ingestion, eating of rice oil that was contaminated with PCB's. And I'm sure you've heard a good

deal about PCB's, and in this instance it was used as a heat conductor in a manufacturing process making rice oil and it leaked into the rice oil, and there were literally thousands of persons that consumed the rice oil who were affected. This was in Japan in the southern island of Kyushu and the population was largely in the area around the large city in Kyushu called Fukuoka. I've had an opportunity to visit that area and even examine some of the people who were affected many years later. This alerted the international community into becoming interested in PCB's and its contaminant and its contaminant happened to be the chlorinated dibenzo-furans which is related to TCDD. Which is related to TCDD. Because of these incidents, the National Institute of Environmental Health Sciences decided in 1973 to call a National Conference of Scientists including physicians on how much did we really know about the toxicologic effects, the environmental effects and the health effects of TCDD, and the dibenzo-furans. This was held in North Carolina and I believe the paper that I presented there is an exhibit, and what I talked about simply was my experience with the Nitro population. And what I knew about the acute and the subacute effects of making 2,4,5-T in which TCDD was a contaminant. It was the only clinical paper given at that time there. What was apparent is that we needed to have some kind of assessment of what the state of

knowledge was and we tried to do it at that meeting, and it was also obvious that what really needed to be done was to do a lot of work, to do a lot of scientific work, analytical work, as well as toxicologic and medical work. Especially with respect to the populations that were known to be affected by PCB's, as well as the contaminant of trichlorophenol, which is TCDD.

A couple of years later there was another meeting, and this was also in North Carolina in Quaila Roosa, lovely little place in which we were housed in a small home, and the people involved were just those who were really engaged in work in TCDD, toxicologic effects and environmental effects, health effects. That also was a kind of a progress report conference. That was 1975.

In 1976 there was Seveso, which was literally the same kind of a runaway reaction that occurred in Nitro. Exactly the same kind of runaway reaction. A kettle containing trichlorophenol had an accident, and the valve opened up and spewed out the material from the trichlorophenol kettle into the atmosphere. The so-called toxic cloud contained trichlorophenol and the contaminants including TCDD. And, as soon as that happened, because scientists in the United States had been working on those problems, the Italians asked for help, almost right away.

And, what happened was that the Governor of Lombardia where Seveso is. It's very close to the city of Milan, and scientists from the area, including University of Milan and the equivalent of our National Institutes of Health from Rome was there, Professor Pocchiari, and they came to the State Department to seek help.

Well, the State Department had the National Academy Of Sciences bring together a group of people, including myself, to meet with the -- to meet with the Italians, and we did this, and one of the things that we decided to do at that time was to send over at least one representative of this group over to Italy to survey the problem, and we did that. We selected one scientist from the group. That was 1976.

1978, after this had occurred, the World Health Organization in conjunction with our National Institute of Environmental Health Sciences called out an international conference on dioxins and dibenzo-furans in Leon, and the copy of the paper I gave there on what I knew, I think, is also an exhibit. What was interesting about that was that what we were asked to do was, is to develop some kind of protocol, a plan, with a set of objectives, and what kinds of populations should be studied and what kinds of analytical processes needed -- analytical methods needed development. And, all of the people who were there, which included persons

from all of the countries in which there were industries that had problems related to trichlorophenol and TCDD, so the scientists from Great Britain and Holland and Germany, Soviet Union, Jirasek from the Czechoslovakia was the first time he had ever been out of the country. He came to Leon to present his very interesting information about the problem at Spilano and he admitted that this was a very dirty plant. This was the plant in which they had --

MR. CARR: May we approach the bench, Your Honor?

THE COURT: Yes, you may.

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

MR. CARR: The witness is doing that which the Court has ordered he should not do. He is giving a statement from a man from Spilano in which he admitted that the plant was dirty. This is hearsay. It is inadmissible. Counsel knows it's inadmissible and I assume he had instructed this witness so that this witness knows it's inadmissible.

THE COURT: I think we went through this Monday.

MR. HEINEMAN: Right.

THE COURT: I told you to instruct him about that, and, apparently it didn't do much good.

MR. HEINEMAN: I told the witness about the Court's admonition with respect to statements of others being hearsay

and not admissible and that they should not be. He volunteered. He understood that.

THE COURT: Why did he just make that statement?

MR. HEINEMAN: I'm sure he was just in the midst of describing what happened at this meeting. It just slipped out. I don't know.

THE COURT: Well, this is a scientific person, a very intelligent person who has been at this longer than any of us have been alive. I don't think things like that just slip off, slip out. The next time we may have a discussion about contempt if it happens again. I'm going to order the jury to disregard this.

MR. CARR: I would prefer that you not order the jury because I think that might simply emphasize the statement.

THE COURT: Okay. Fine.

(The following proceedings were had in open court.)

Q. (by Mr. Heineman) Dr. Suskind, without describing what other people said at this meeting, would you please go on and describe the events that led up to the mortality study?

A. Thank you. I understand. As a result of that meeting and the events that I described previously, some of us, like myself, decided that we should go back and study the

populations which had been previously exposed. At that meeting we did develop a set of, and it's in the exhibit, the information gaps that needed to be addressed, what kind of information did we need from these populations. Well, what kind of information did we need from toxicologic studies. Prior to that -- prior to that, I called Monsanto in 1976, and asked that we be allowed to do a study of the populations, the population at Nitro that had been exposed, because this was of great international interest and great scientific interest, and Dr. Roush responded and indicated that he would take this up with the people at Monsanto, and as a result of that correspondence, we did get by 1978, when even before I went to Leon, we had a mortality, the beginning of a mortality study underway. That is we were attempting to determine who was still alive. We felt that it was kind of important to start with the population that had been exposed that we reported to a high level of TCDD, people from the runaway reaction. So we chose that population, concentrated on that population, and it was a first step, a mortality analysis of those people who were exposed to the accident.

Q. Now, Dr. Suskind, would you tell us generally, what is -- what is epidemiology?

A. Well, I think that epidemiology is defined differently by different authors, but I think that a most

general definition, which I think applies to the work that we do, is the distribution of disease in human populations and the factors which are associated or influence the frequency of those diseases or that disease.

Q. Now, what is it that one looks for in a study to determine association?

A. Well, one looks for the factors, the factors that may influence or determine the disease, and for example if we have a population that we know to be exposed to a chemical agent, and that we know or suspect that they have been affected, we would like to know in a mortality analysis, at least, what these people have died from as compared with let's say, an unexposed population, or the general population in the United States.

Q. The jury has heard the term statistically significant. What is -- what does that term mean and how does that relate to this association that you are talking about?

A. Well, one wants to know whether or not the differences between the -- let's say the exposed group, and the unexposed group, is really significant. From a statistical standpoint and there are ways of looking at the level of significance, for example, in looking at deaths for example, looking at deaths, one one compares the expected

frequency of death in a general population to these which one has observed in the population which has been exposed. And, then the probability that there is a difference has to be determined. And, that might be explained just on the basis of chance. So that the level of significance is really, real significance is determined by the so-called P Value, the P Value, and the P Value is the probability that the difference between the two groups is based on chance, so that the greater the P Value, the more likelihood it is chance, and the smaller the P Value, the less likelihood it is due to chance and the greater likelihood it is due to the factors we are looking at. Such as exposure to a substance. And usually the P Value which is regarded as statistically significant, not chance, but due to a -- a given factor is usually a P Value below that of .05. If it's above .05, we usually regard that as probably not statistically significant, so that a P Value of .02 or a P Value of .01 is statistically significant.

Q. Now, I don't want to get too complicated with this, but can the P Value change or be different from one group of statistics to another? Is it always the same?

A. Well, no, you have to look at different parameters. For example, if one looks at the P Value of -- let's say all causes of death in an exposed population as

compared to the general population, that could be different than if you just looked at the P Value of one cause of death, like lung cancer, or liver cancer. The P Value might be very different.

Q. Now, does an epidemiological study establish a cause and effect relationship?

A. An epidemiologic study attempts to do that but I think what is -- what is more significant about an epidemiologic study, it attempts to establish association and the cause-effect -- the cause-effect aspect of it is if you have a very large population, and you do a study, and there is is a very obvious, very obvious relationship between an exposure factor and one parameter of disease, and the P Value is .0001, it's very likely that there is some causal effect. However, in most instances, one can only say that there is an association, an association between the exposure, especially if it's a small population.

Q. Now, how would you then differentiate the term association from cause and effect?

A. Well, I think what one does say is there is, in association, there is a possible causal relationship. And, very often, that can be -- that can be further supported by other kinds of studies, other kinds of studies where you have cases of exposure, like to the toxic effects of a drug,

exposure and then effect. Exposure effect. But, if you are dealing with an epidemiologic study, then you are dealing with, especially a mortality analysis, then you are dealing with a retrospective -- retrospective study, which means that you go back and look at already existing statistics for let's say causes of death. If, for example, you were doing a study of the effects of a drug, and it's possible, association with risks for death, this might be very helpful, but I think that it is kind of, well not kind of, but it's also important to have other kinds of data, clinical data that actually demonstrate that there is a time, a quick time relationship between the -- the exposure like to a drug and a toxic effect.

Q. We have heard the term confounding factors used in this courtroom. I wonder if you could explain that to us. What does that mean?

A. Well, confounding factors are factors that may also influence, also influence the outcome. For example, in looking at the -- a problem of an exposure being associated with heart disease, one of the confounding factors in heart disease is age. In the United States and most civilized countries, the most common cause of death is heart disease. So that if you are looking at a population and attempting to determine whether or not there was a greater risk for heart

disease, you have to consider age. So age is a confounding factor. Smoking is a confounding factor. Alcohol consumption is a confounding factor. And in problems, for example, if you are looking at neurological consequences of an exposure, you have to consider the other common problems that cause neurological problems, like diabetes, like alcohol.

Q. All right. Are -- would it be fair to say the confounding factors are things that cause their own health effects?

A. Yes, I think that would -- that would be one way to look at it, but, when we are looking at -- these are factors for which in doing an epidemiologic study, you must make some adjustment. And it's difficult to make these adjustments if you are doing a retrospect and mortality analysis.

If you are doing a morbidity study, on the other hand, you have at hand from individuals that are being examined, you have information about these confounding factors.

Q. Okay. So, you would know in a health or morbidity or sickness study who smokes and how old they are and who drinks and that sort of thing?

A. Right.

Q. Is that right?

A. That's true.

Q. If they are still alive you can ask them?

A. (indicates affirmatively.)

Q. Okay.

A. In some mortality studies, I know that there have been attempts to find out from next of kin how much they smoked, or how much alcohol they consumed. That's often very difficult to do.

Q. All right. Now, what are the types of epidemiology studies that are normally done?

A. Well, there are two general types. One is a retrospective study, epidemiologic study, where you look back and take already existing data, already existing data and like in a mortality analysis, and you determine what the difference is from this already existing data like death certificate, or death certificate and hospital records and you compare that data to the frequency of causes of death to the general population. That's retrospective.

Then you have prospective studies, and prospective studies, the largest number of them are usually morbidity studies. You'll look at existing populations, and determine what the state of their health is of the population and you then compare an exposed group, if it's a chemical agent you are interested in, to a non-exposed group, but you must have

some kind of control group. And in a morbidity study, you usually don't use general population figures. You usually use control groups which you examine, too.

Then there are case control studies and case control studies are these. You take a population, for example, that has -- we know has died of certain type of cancer. We are interested in knowing whether or not that type of cancer is related to an exposure like cancer of the liver in China. Is it related to their high incidence of hepatitis. Is it related to their high incidence of hepatitis, and they have a very high incidence of hepatitis, and what you do then is to determine if indeed this group of persons with cancer of the liver have had hepatitis and when. And then you take another group that has no cancer of the liver, a control group. Matched demographically. Demographically means matched for age and socio-economic factors, education, and so on. And, you find out whether or not that matched group had the same frequency of hepatitis or very much less. Very much less.

Q. All right.

A. That's a case controlled study. That's a different kind of study. You start with the effect, people who are affected. And then you go back and find out if they were indeed exposed to a particular kind of disease or a

particular kind of chemical or particular kind of infectious agent.

MR. HEINEMAN: Okay. I see it's lunchtime, Your Honor.

THE COURT: Fine. Ladies and, gentlemen we will break for lunch at this time. We will resume again, excuse me, at 1:15. I would remind you that the admonishments I gave you earlier will apply to this break also. Court is in recess for lunch.

(Following a recess for the lunch hour, these proceedings were had in open court.)

MR. HEINEMAN: Your Honor, I'm informed that I neglected to move this morning the admission of Defendant's Exhibit 1701, which was the 1953 report, and I'd like to do so at this time.

MR. CARR: We have no objection.

THE COURT: Fine. It's admitted without objection.

Q. (by Mr. Heineman) Dr. Suskind, this morning you were talking about the Seveso incident in 1976, did there come a time when you yourself went to Seveso, sir?

A. Yes, I went to Seveso in 1982.

Q. 1982?

A. Yes.

Q. And, what did you do there, sir?

A. Well, I was invited to Milan to give a lecture to the Carlo Erba Foundation in Milan, at the same time the Lombardia office that ran the Seveso studies invited me to look at and talk with the people who were involved in the study. One of the experiences I had was to examine some of the people who had been exposed and developed chloracne, and there were three children who had been exposed in '76. And, they were now adolescents and I had a chance to examine them. It was an interesting experience, because on the day I arrived there, the examination study was resumed. They had terminated it for awhile, and there was a resumption of the clinical examinations studies at the at the Provincial Hospital, and I was asked to look at some of the cases.

Q. Okay. What did you find, sir?

A. Well, I found that among the adolescents that I saw, one was actually a pre-adolescent and had a little bit of acne vulgaris around the nose, but -- and also had minimal chloracne on the skin of the cheek bones. The other was a 15 year old girl who had rather severe chloracne at the onset, and at the time I saw her, there was a residual chloracne, not severe, and she also had some indication of acne vulgaris as well.

Q. Now, Dr. Suskind, we were talking just before the

luncheon break about certain types of studies, and you had just finished, I believe, telling us about the case control type study, is that correct?

A. Yes.

Q. One of the types of studies we have heard mention of is a cohort study. Could you tell us what that is, sir?

A. A cohort study is a study in which the epidemiologist identifies sets of populations for comparison. If it's a morbidity cohort study, it would involve a population perhaps that was known to be exposed to a certain agent, and a comparable control population which was not exposed to that agent comparable perhaps demographically.

Q. Okay.

A. In a mortality study, one can also use cohorts and in that kind of a study one would again use a population exposed and determine what the risk for causes of deaths were in that study as compared with the unexposed population. Now, in another type of cohort study, one can use an exposed cohort, and compare the results of the analysis of the mortality data to the frequency of death from the same causes or the same organ system involvement as it occurs in the general population. That is looking at the mortality statistics of the nation. This is a very common way of doing

it. One can use the mortality statistics of the same county, same state, if they are good mortality statistics, but in many instances one uses the mortality statistics for the nation.

Q. Now, can you give me an example of a cohort morbidity study?

A. Well, a good example, I suppose, is one which I conducted myself using the Nitro population which was exposed and compared their health status, their health status to a control population which was not exposed.

Q. We will get into that study in some detail later on, sir. Can you give us an example of a cohort mortality study?

A. Well, a cohort mortality study would again be one that I did in which we compared a cohort of persons known to be exposed to, in this instance the runaway reaction material from the Nitro plant in a certain period of time, with certain outcomes, like chloracne. That was the identity of the cohort, as compared -- and we compared their frequency of deaths from 22 different causes by organ systems as compared to the general population. That was a mortality cohort.

Q. All right. Now, there is one type that you have not yet told us about, sir, and that's a cross sectional study. Can you tell us what that is?

A. A cross sectional study is very simply, it's a state of health study of a given population, an identifiable population. Without identifying it perhaps by exposure, or non-exposure, just let's say a population working in a plant, what's the health status of a population working in a plant making solvents, perhaps. And, there are any number -- it's a very simple kind of study, and what one does is after you have identified some of the problems that have arisen in a population like that, then you might use those parameters as variables, variables that is you compare, let's say, people who work with solvents in a plant, compare people with dermatitis as compared with people who don't have dermatitis. And see what they -- their health status of those who had the dermatitis is by comparison to those who didn't have the dermatitis.

Q. Is an effort made in a cross sectional study to find a not exposed group?

A. Well, one might, as a result of doing it, find it, but you don't start out with that. Simply examine the population and it might be possible to determine that, yes, by history, by work records, you do determine that there is an exposed group and an unexposed group, but you don't start out with -- and a cohort that has that, has those characteristics.

Q. And, does that factor differentiate that kind of study from some of the other studies you've previously described?

A. Yes, it differentiates it from a cohort study where you've already established what the exposure characteristics are and maybe some of the clinical outcome characteristics are.

Q. Can you give us an example of a cross sectional study?

A. Well, one that comes to mind, because it's so close to my interest is the cross sectional study that was done at the Nitro plant by Dr. Marion Moses and her group, and they simply identified, they recruited anybody who wanted to come into the study, and they got a population of 226 people and then they examined them thoroughly, and they found out that there was a group that had at one time developed chloracne and another group in that plant who didn't develop chloracne. And what they did is to compare then the health parameters of the chloracne group as compared with the non-chloracne group. This was after they had identified a chloracne group and a non-chloracne group.

Q. Now, getting back to the mortality study which you were telling us about before, which you conducted at Nitro, does that mortality study go by a particular name in

scientific circles?

A. Well, it's a cohort study, but it is simply an attempt to determine the -- the possible increased risks for causes of death among an exposed population as compared to the general population. The exposed population being the cohort.

Q. Okay. Now, with respect to the mortality study that you are talking about, would you tell us how that got started? You already mentioned the conversations with Monsanto initially in '76, but how does that get started and whom did you work with on it?

A. Well, in 1978, we had been in communication with Dr. Roush, and then following that Judy Zack, and we decided that one of the places to start to determine what the long-term health effects were of working with 2,4,5-T and its contaminants, especially TCDD, was to do a mortality analysis of those who were the most heavily exposed, and back in 1953 we knew that there were at least 117 people who were identified with that runaway reaction. And, we wanted to know what happened to those people if there were indeed more of them, and there were, whether they were still alive, and to do a mortality analysis of that group, the group that we regarded as the most heavily exposed to manufacture of 2,4,5-T and especially because of the contaminant TCDD. And,

I was responsible essentially for determining what the protocol was going to be, the identification of the population, the kinds of records to be used, the program of the analysis as well as the -- programming the data as well as the analysis. Now, a very important aspect of doing that kind of a study is what in epidemiology we call shoe leather epidemiology. This means that the individual has to really go from house to house or place to place and dig out information about a population which was exposed 30 years before. And, Miss Zack was the individual who did that. And she got to the work records and the safety records and the medical records, and the -- and the workman's compensation records to see who had a medical record of chloracne, which was an indicator that they had some reaction and that they were involved in the accident, and 122 people were identified. And then she went on to find out who died. And she found out who had died of those 122, and she dug up the death certificate of those people, and she was able to get 100 percent of the death certificates. That's somewhat unusual, but this is a relatively small group, but she was able to do that. And, there were, out of the 122, there were 32 deaths. So she got all of the 32 death certificate.

Q. Now, Dr. Suskind, you had -- you said that there were 122 that were identified for the study, is that right?

A. Yes.

Q. Now, a moment ago you mentioned the figure of 117, what was that in connection with?

A. Well, I mentioned 117 because if you look at the 1953 report, you'll see at that time we knew that there were 117 who had been exposed to the runaway reaction. But, maybe they weren't all identified by 1953, so that when we really did a more thorough examination as to who was exposed to that runaway reaction, it came out to 122, not 117.

Q. Now, let me hand you for a moment, if I may, Defendant's Exhibit 92. Can you examine that and identify it for the jury, please.

Q. As I recall, this is a copy from the American Journal of Industrial Medicine, of the health status workers study that was conducted by Dr. Moses and her colleagues of some of the Nitro group. This was done in 1979, I believe. This is a copy of the report.

Q. All right. Is that the -- is that a report of the study that you referred to a moment ago as being the cross sectional study of Nitro?

A. This is a cross sectional study.

Q. By Moses. Now, I'd like to direct your attention to Page 167. You have that, sir?

A. I do.

Q. There is a statement at the top of the page that I want to ask you about, have to do with these numbers of people. Would you read aloud the second sentence from the top of the page that begins, only several years later?

A. "Only several years later was it further determined that a 111 other workers in 2,4,5-T production had chloracne prior," and it's in italics, "to the 1949 explosion." And the quotation is from Suskind, 1977.

Q. All right, sir. Now, I want you to tell me based upon your knowledge of that population, if that is an accurate statement?

A. Oh, I don't believe so. I don't believe.

Q. All right, can you --

A. First of all, I don't know of anything I wrote in 1977 about this incident. And if it refers to a paper given at Leon, which I think is an exhibit here, in 1978, what I had attempted to relate was that at the -- this was in 1953, we were able to determine that there were at least 111 persons with chloracne who had been exposed to the 2,4,5-T, 2,4,5-T synthesis, but not to the accident material, and it wasn't prior to -- to my knowledge as I recall, in 1949, the company was really alerted to the fact that something in the 2,4,5-T operation was causing chloracne, and they were first alerted by the accident. And then when they went back to

look at others, they found out that, yes, a few of them did have some chloracne. But it was in 1953 or '55, I'm not really altogether sure, that the figure of 111 emerged as the population which was exposed to the manufacture of 2,4,5-T, not the accident material, and also developed chloracne.

Now, in that same paper, there is a table which reads numbers of persons involved in the various accidents and the figure 228, I believe, appears and the 228 comes from 117 and 111.

Q. Okay.

A. So that in 1978, it was my impression from the information that I had that there were altogether 228 people who were affected by the making of 2,4,5-T as well as the accident.

Q. Was there anybody known to have had chloracne or were there a 111 people known to have had chloracne prior to the 1949 explosion?

A. I just tried to tell you, Mr. Heineman, that that's erroneous. That's not so.

Q. Okay.

A. By the time 1953 came around, well '55, again I'm not altogether sure, that figure of 111 emerged. And in 1949, when they looked at others who were not involved in Building 41, or had anything the do with it, they found that

there were a few people, yes, who had chloracne.

Q. All right.

A. Now, the numbers I can't tell you. I'm not altogether sure about numbers.

Q. Now, with respect to the mortality studies, sir, the jury has heard frequently expressed the term the Zack-Suskind study. Is that the name of the study that you are talking about?

A. Well, if you are referring to the mortality analysis which we have been discussing which is entitled mortality experience of workers exposed to tetrachlorodibenzo-dioxin in a trichlorophenol process which was offered by Miss Zack and myself, that's the study.

Q. Okay. Now, in connection with the development of that study, would you outline for the jury the manner in which the cohort was identified and who designed that manner, who decided how to do it that way?

A. Well, I believe I've already said something about it, Mr. Heineman. I believe I've already said that there was a discussion between Miss Zack and myself regarding the protocol for the study. And, who was to do what, and the essential objectives of the study was to determine the possible long-term effects of exposure to relatively high levels of TCDD, although we didn't know what the levels

were. We didn't know what the health effects were and we assumed that the levels were high, to determine what the long-term health effects were in terms of mortality risks, mortality risks for 22 different categories of causes of death, and, we felt that the population we needed was the runaway reaction population. And, we developed a strategy for getting the information. And then a strategy for the analysis. And that's how this study was constructed.

Q. Now, with respect to the ones the cohort had been identified, the 122, what was done to follow up on that, in order to actually put the data together?

A. Well, what we simply did, and it's a relatively simple kind of study, is we found out what the numbers of deaths were due to any of 22 different causes of death, as compared with the expected number for those 22 different causes of death. When we consulted the national statistics in this instance for white males, because there were all white males, 121 were, the person who was left out, because we had obviously no way of comparing her to a national statistics was the nurse, Louise Morris, who had -- who was involved in the process accident material because she used to go through the plant and she did a lot of nursing, practical treatments of the people who had chloracne. And she developed chloracne herself. And so we took her out of the

population, and then we simply determined the standard mortality ratio, which is the ratio of observed, observed deaths in the population, to what one would expect in that population.

Q. All right. I'm not quite sure I understand why Nurse Morris was eliminated. I wonder if you'd explain that.

A. Well, in order to get some understanding of what the difference in frequency is, the causes of death, you've got to have a sizeable population, 122, 121 was small enough, but you can't do it on the basis of one.

Q. Okay.

A. And we would have to compare her to white females, Caucasian females, you can't compare one, because there were no deaths in that population of one.

Q. Okay. She was still living at the time of the study?

A. Yes, she was still living at the time of this study, as well as the morbidity study.

Q. Now, how were the ones the causes of death were determined? How were they related to the categories that you talked to us about before, the categories of causes?

A. The categories are the causes of death, Mr. Heineman. May I read them?

Q. Okay.

A. The categories of causes of death are all causes of death, overall figure for causes of death, from any cause, then all malignant neoplasms, buccal cavity and pharynx. Digestive organs and peritoneum, and under that stomach, liver, and other digestive organs. Then respiratory system, and all aspects of the respiratory system. Then broken down into lung and other parts of the respiratory system like the nasopharynx, or the larynx. That would also be part of it. Skin; genitourinary organs. The genitourinary organs would include the kidney and the testes, or the penis; lymphatic and hematopoietic tissue; lymphomas like leukemia or Hodgkin's disease, diseases of the nervous system like problems that might lead to death that effect the nervous system. This would be like multiple sclerosis. That's a disease of the nervous system, or diseases of the circulatory system, not malignant, like arteriosclerotic heart disease, a very common disease, including coronary heart disease. All other diseases of the circulatory system which would include stroke. Diseases of the respiratory system like emphysema; disease of the digestive system other than cancer, like bleeding peptic ulcers, which can lead to death. And then all other diseases. Those that I've listed are the common diseases.

And then the external causes of death like suicides or accidents. So we looked at all of those categories and determined whether any of the observed deaths fitted into one of those categories, and then looked at the numbers that we would have expected from looking at the Munsen tables or the general population death statistic tables.

Q. Now, did you code those death causes in some way?

A. Well, yes. One looks at these death certificates and then has to determine in which category they would fit. And there is an international code which is used and for this coding exercise we used a qualified experienced nosologist, somebody who knows a good deal about classification of diseases and where they fit into the international classification series. For each of those categories that I have listed, there is an international classification of diseases code number. With --

Q. Is a mortality study of this kind designed to look at long-term health effects, is that accurate?

A. Well, not necessarily. It doesn't have to be long term. But in this instance it was long term. Doesn't have to be, but in this instance it was. Because, we were looking at a population that had been exposed in 1949, and here we were 30 years later, 29 years later, because the cut-off date for deaths for this study was December 31st, 1978, but it was

essentially 30 years after the fact. Now that's long term. Now, it could have been a study, there are studies that have been done on mortality statistics of exposures to drugs or whatever, and it's done five years afterwards or two years afterwards, or a month afterward, and you could still do a mortality study. So, this doesn't -- this long term is not the characteristic of this kind of mortality analysis. We use it for our long-term study.

Q. Okay. Would you differentiate, please, between -- and I get confused sometimes between a short-term or a long-term health effect versus an acute or chronic exposure. Can you differentiate between those two things for me?

A. Well, an acute exposure -- an acute exposure actually designates a brief high-level exposure like in the case of the runaway reaction. First came in they were exposed to a lot of material and they became acutely ill and then they were -- the some of the same people were exposed to this material because it was still around. And they may have been exposed for a week. They may have been exposed for two weeks. May have been exposed for more than that, if the material was still around. That would be a kind of subchronic exposure, but, the effect of it -- the effect of it could either be an acute effect or a long-standing effect, subchronic effect like in the case of dose, those exposed to

the manufacture of 2,4,5-T as well as the runaway reaction. What happened to these people, that's a chronic effect, chronic effect. What happened to these people a month afterwards, two months afterwards, a year afterwards, and if you are looking for long-term effect, then you have to look for years afterwards. If you really are interested in what happened after 15 years, or 20 years, or 30 years, you have to look at the end points after 30 years, and this is what we did here in this study. We were looking for what were the causes of death of these people over a long period of time.

Q. Now, these people then is it fair to say they had -- you were looking at a long-term health effect for an acute exposure?

A. No, we are looking for the effect over a long period of time, over a long period of time.

Q. Okay.

A. All right. The morbidity study on the other hand addresses the issue of a health status, what is the health status after 30 years. That's a long-term effect.

Q. Okay. Now, with the 121 people that were included in the mortality study, would you tell us what you found as a result of the examination?

A. Well, again, rather simply we found that for all causes of death, we observed 32, found 32 and the national

table told us there would be about 46 deaths so that the standard mortality ratio would be .69, which is statistically significant, that is the P Value, which I discussed earlier, is smaller than .05, and then we found that of the -- when you looked at the malignant neoplasms, we had 9 due to malignant neoplasms, the expected was also 9, so that there was a standard mortality ratio of one. It was what you would have expected. However, if you went and examined individual causes, each malignant neoplasm or the area of the malignant neoplasm, you found that there were no stomach cancers, nobody died of stomach cancer. Nobody died of liver cancer. And as you will remember, we found in the subchronic phase of the exposure to the runaway reaction, there was liver problems. We had hepatitis, and they had some dysfunction of the liver. So we were looking for deaths that could have been due to either malignancies of the liver or other diseases of the liver, like cirrhosis. We didn't find any -- 30 years later -- we found that lung cancer, there was five in this group, and the expected would have been about three, however, we then went to find out this was statistically significant, and it happens that the P Value of that SMR is larger than .05, so that it is not statistically significant. A small number, but still not statistically significant. We found that there were three cases of deaths

due to lymphomas or hematopoietic diseases, and we would have expected .088. .88, I'm sorry, .8. You'd expect one. But, the numbers are too small, so that if you -- if you did a statistical significance on it, wouldn't mean anything. Wouldn't mean anything if you compared three to one. With this small number of people, 32 altogether. In circulatory diseases, there were 17 observed and one would have expected 25. This would be heart disease and stroke, and though the SMR was .68, still wasn't statistically significant. There was a trend. There was a larger number of expected than observed. But, it wasn't statistically significant. If you broke it down to arteriosclerotic heart disease alone, we would have expected in this group, age group, would have expected 13. I mean we would have expected 17, and we actually only found 13. Sorry. It's 13 observed. 17 was expected. And that also is not statistically significant.

So that in summary, I think while the cohort epidemiologically is a small one, the only real significance is this overall causes of death, that is statistically significant. And, at the time we did it, we didn't think we could draw any firm conclusions from it. Although, and I have to underscore this, 30 years afterwards, if there were problems involving the liver, or cardiovascular disease, or pulmonary disease, we would have seen it even in this small

group, which we did not.

Q. Would you expect to find it in cancers after 30 years?

A. You might. The period is long enough, and if these people were going to develop liver cancer, which you do in, I have to point out in animals, in animals, and the papers so state, animals, you can produce liver cancer with TCDD.

Q. And the significance -- what is the significance of the fact that there wasn't any, or was there, that there wasn't any liver cancer in this group after 30 years?

A. Well, the fact is that the liver problem such as it was must have been a transient one. And we find that by 1953 the people we examined didn't have any liver problems. In 1949 and '50, those exposed to the runaway reaction did. But by 1953, the liver problems, everyone has to distinguish between hepatitis liver inflamation and liver cancer. And, none of the people whom we saw back in '49 or who were exposed to the runaway reaction ever developed liver cancer.

Q. Now, is it possible to consider the results of this study conclusive for association?

A. Well, I think the report says that we weren't prepared to consider this conclusive but I think that from the standpoint of good statistics, but I think that even though this is a small group, one has to recognize that there

are no obvious increase in causes of death from anyone at anyone's site.

Q. Sir, with respect to studies that had been done subsequently to this study by yourself and others, do you have an opinion as to whether or not this study is consistent with other studies that have been done on human population?

A. Well, the only long-term mortality study that I know about is the one done by Dr. Theiss on the badische aniline group. I wouldn't consider the Ranch Hand a long-term study because it was a relatively short period of time after exposure to Agent Orange. But I would consider that Dr. Theiss' study is as this is a long-term study, probably not as long a period had elapsed, and he found that there was -- there were some increased risk at least for one type of problem in his group.

Q. And that problem was what, sir?

A. He found an excess of cancer of the stomach. Now, there was no attempt to find out if there were other confounding factors which we discussed this morning, but this is what he found and -- if you look at ours, and ours is up until the point we did this, the largest group of persons exposed to TCDD after long-term follow up.

Q. Now, Doctor, you are aware, are you not, sir, that Dr. Carnow has testified in this case?

A. Yes, I am aware of it.

Q. And, are you aware, sir, that Dr. Carnow testified that in June of 1984 --

MR. CARR: Date please, counsel?

Q. June 18th, 1984, Page 41. Testified in this case that the fault to be found with this study that you've just been discussing was that it makes it appear that exposure to dioxin improves health and mortality. Do you agree with that statement?

A. Well, I wasn't aware that he said that, but I think it's a palpably ridiculous statement.

Q. Why do you believe that, sir?

A. Well, first of all, because if he's going by the overall, the SMR for all causes of death, in a work population, and American workers are known to be healthy people. And it's been shown that the health of workers in the last ten years has improved, twenty years, has improved. So that what we are seeing here is likely to be a healthy worker effect. Not -- not the effect of dioxin.

Q. Now, sir, you have -- oh, first of all, let me ask you to identify Defendant's Exhibit 62.

A. This is a reprint from the Journal of Occupational Medicine, January 1980, of a paper entitled, "The Mortality Experience of Workers Exposed to Tetrachlorodibenzo-dioxin i

a Trichlorophenol Process Accident." And it's a reproduction of the paper we have been discussing.

Q. All right.

A. By Doctor -- my Miss Zack and myself.

MR. HEINEMAN: Now, with respect to -- Your Honor, at this point I would like to move the admission of Defendant's Exhibit 62 into evidence.

MR. CARR: We don't object.

THE COURT: Admitted without objection.

Q. (by Mr. Heineman) Now with respect to the preparation of that paper for publication, would you tell us what participation you had in that?

A. Well, I indicated to you what participation, what my responsibility was in the organization of the protocol for this study. And after the data was in, a draft of the analysis was sent to me with a -- a first draft of a manuscript, and what I did essentially, I was responsible for all of, most of the introductory material which describes the acute and subacute and chronic health effects as it -- in the Monsanto Nitro population as Dr. Ash and I described it in 1949 and '50, and the report which I wrote in 1953. In the first two pages, almost two pages were consistent material that I contributed to this paper. Miss Zack assembled the data, put it into tables, and I reviewed it and edited it,

and the discussion and conclusions were essentially the result of our putting our heads together to determine what we had to say about the data, and what we concluded from the data. And there was a series of correspondence and telephone calls about this, and finally I wrote to the editor of the Journal of Occupational Medicine, Dr. Lloyd Temper and asked him if he would be interested in it. He said yes, and we sent him the paper. Judy Zack sent him the paper.

Q. Now, to your knowledge, sir, was that paper peer reviewed?

A. I believe it was. The review would have come to Miss Zack as the senior author.

Q. Now, at the time that that study was carried out, Dr. Suskind, did the University of Cincinnati, either the University of Cincinnati or you yourself personally receive any compensation from Monsanto Company for that study?

A. None whatsoever. My participation in it did not involve an application for funds or did we receive any funds for my participation.

Q. Now, Dr. Suskind, you spoke earlier about a morbidity study. I wonder if you would briefly tell us what a morbidity study is.

A. A morbidity study is a study of the state of health of a population at a point in time, and it usually consists

of a definable cohort which is looked at, examined, variety of ways, and to determine what the state of health is of that cohort, individually, and collectively. And if, for example, one is looking at an attempt to relate increased risks for specific kinds of disease processes, whether they are elicited by history, whether the diseases are elicited by history or by examination, one does then look at, examine a number of organ systems that one would like to see if there is any risk for disease.

Q. Now, you've used the term protocol, sir. What -- how do you develop a protocol for a morbidity study?

A. Well, a protocol is simply an attempt to provide a design for the study. It identifies objectives of the study. It identifies the population that you are going to be concerned with, the characteristics of that population, for example, if there is going to be an exposed group and the control group. It would identify what kind of exposure, how many people you would anticipate putting into a cohort, and what your control group would be like. Whether it would be an external control or internal control group. Then you would determine -- you would describe, what you were going to do with this population. How you were going to examine this population in order to accomplish your objectives. What kinds of examinations, what the scope of the examination

would be, and then who would be being the examination and how it would be carried out.

And then finally what kind of data organization you would anticipate, and what kind of analysis of the data you would desire.

Q. And, would you explain the difference between an internal control group and an external control group?

A. An internal control group is usually a group which is chosen from perhaps the same plant or the same industry and matched for demographic factors, if it's possible to do that, but it's much more possible to do that sometimes in an internal control than an external control.

An external control means going to another industry or another plant or another population.

Q. What are the practical limitations that an epidemiologist finds himself faced with in developing a protocol for a study, deciding to select the control group and what kind of control group you can have?

A. Could you repeat the question, Mr. Heineman?

Q. Certainly. Excuse me for being so obtuse with it. Let me try it a different way. When an epidemiologist approaches a problem or a study, are there practical limitations within which that study has to prey, based upon the group and the population and that sort of thing?

A. There are always problems of that sort that face epidemiologists. In order for a study to have the power to determine significant differences, the power to determine significant differences, you have to have a significant number of people involved, so that numbers are important and very often when you are dealing with an industrial population, you cannot fulfill the pristine requirements of classical epidemiology from numbers. But you have to do as best you can. You do the best you can and you get as much information as you can out of a limited number of people. Now, that's usually the case when you are studying or about to study an industrial population. And particularly if that industrial population was exposed him many ago, as in the case of the Nitro group.

Q. Now --

A. Go ahead.

Q. I'm sorry. Did I interrupt you?

A. No.

Q. The particular morbidity study that you conducted at Nitro, who are the authors of that study, sir?

A. The authors of this study are Hertzburg, a biostatistician, and myself. There were a lot of professional participants in that study, especially in the carrying out of the examination, and developing a strategy

for doing the study. But the major authors of the study are myself and Dr. Hertzburg.

Q. Would you characterize this as Monsanto's study, sir, something engineered by Monsanto Company?

A. No. I'm always amused to hear that, but I have to tell you that years before we did this study, we had been attempting to, as the records will show, to get a study done. And, the study from beginning to end was conceived, developed, and the outcomes were analyzed by myself and my staff and it's a University of Cincinnati study.

However, we couldn't have done this without the assistance of the group that ran the plant. They knew what the population was all about. They had the records, the employment records, the health records, the workman's compensation records. We didn't. So we had to depend upon them to provide us with a population to recruit from. Also from a strategic standpoint, needed assistance if we were to carry out that study in the locale of the Nitro plant to make it accessible to the workers there or the former workers who lived in the area.

So that the study itself was a University of Cincinnati study with me as the principal investigator and Dr. Hertzburg as the coauthor of it, since she helped analyze the data and organize it, a most important function in a

study like this.

Q. How was this study funded, sir?

A. Study was funded from three different sources. It was funded by the Environmental Science Center through a grant and the resources for doing a lot of these studies including the organization of the team and the resources that the team used, including the analytical work and the access to the computer, and the coders and all that, those were all supported by the resources at University of Cincinnati, were supported by the NIHS. Now, some of our salaries were paid for by the University of Cincinnati, including mine. And Monsanto, we attempted to determine how much it would cost to do it in Winfield, West Virginia, where it was conducted with -- where the examination was fully conducted, and we got a budget up, which included the cost of the various functions, including some of the people and their travel and Monsanto bore the cost of carrying out the study on site. Except for -- well, the participation of myself and the participation of the two people from NIOSH, and the participation of the two physicians from the Air Force. They didn't take care of them, of course.

Now, when you say the on site expenses, you are talking about someplace to house it, someplace to house it, the renting of the space, the clinic, the nurses then people

from Monsanto and that clinic that we used who assisted us in carrying out the actual examination. When you do a study involving 436 people over a period of more than 10 days, there has to be a real good organization so that the flow of traffic from the taking of the samples of blood and urine and to x-ray and ECG and nerve conduction velocity, to taking vital statistics and the interview, all that has to have some kind of traffic management, and the Monsanto people were very helpful in doing that. We had our own coordinators, yes, but without them, we probably wouldn't have done as good a job or as effective a job.

Q. This was people from the plant assigned to help?

A. People from the medical department of plant.

Q. I see. They just help move things along, I guess?

A. Right.

Q. You looked at how many people?

A. 436.

Q. Go ahead. Now, who conducted these interviews that you mentioned?

A. Well, these interviews were actually conducted by a team of trained individuals who were recruited by us from the University of Cincinnati, and they included nurses, nurses who had training in occupational health nursing and further training in interviewing people for such a study. They

included graduate students, senior graduate students in toxicology who were involved in therapy, also trained to do the interviewing, and they were very good. And, the number of interviewers were about six, and they were all from the Department of Environmental Health.

Q. Did any Monsanto personnel participate in the actual conduct of the study? By that I mean the interviews, the physical examinations, the laboratory work, any of that?

A. No, not at all. The Monsanto personnel were helpful in transporting people from the plant or there were retirees who came in from outside the city who were living in hotels or motels and they were transported by Monsanto people to the place of examination. They also helped -- that is again people from the medical department helped in making sure that people got to the place of the interview and examination on time. They transported them. They made sure that people who had to have their blood drawn before breakfast because we were doing chemical studies of blood on fasting persons. Make sure that they got to the proper place for the drawing of blood, and now the preparing of the sample was done by ourselves. But they helped in making sure they got to the place where the bloods had to be drawn and the urines were received and following that they made sure they had breakfast, because they were hungry people.

THE COURT: Is this a good point for a short break?

MR. HEINEMAN: Fine.

THE COURT: We will take a short recess at this time and then resume testimony. The admonishments that I gave you earlier will apply during this break also. Court is in recess.

(The following proceedings were had in open court.)

Q. (by Mr. Heineman) Dr. Suskind, with respect to making a determination as to who should participate in this study as Monsanto employees and former employees, how did you learn that information? How did you understand who it was that was going to participate?

A. Well, it wasn't that we knew who was going to participate, we decided on what the criteria were for participation. That was our job. But we needed to know how many persons were still living, where they were, and whether they were retired or terminated or still active, who had been exposed, and then of course we wanted an equivalent control group.

Now, originally we had thought that we should be in the original protocol. We thought that we would want a total population of anywhere from 450 to 500 with approximately 150 to 200 people who had chloracne and had been exposed. And

then people who did not have chloracne but were exposed. And then another population unexposed, and it turned out that when we looked at the information, which was gleaned from records that there were about 806 persons who would have qualified for the cohorts that we were seeking. And we got from Monsanto lists of people who were exposed and had chloracne and exposed without chloracne, and now these were both people exposed to the runaway reaction as well as the manufacture of 2,4,5-T. And then people who were so-called intermittently exposed. We are never sure about what that really meant, except that they have been in and out of the process and they may or may not have had chloracne. Most of them in that list that we got of so-called intermittently exposed did not have chloracne. Some of them did. A few of them did, and then there were those who were unexposed, and who did not have chloracne. We felt -- and this was after discussion, that we could recruit in the time that we had to do it, and this was between early February and June when we wanted to do our examination, all persons active or terminated or retired who were exposed to the runaway reaction. We wanted to have that group in as a population to be recruited. And all of the active or retired, who were exposed to the 2,4,5-T that had chloracne with records of it, that is workman's comp records, those were in the recruitable

population within the time that we had to do it. And, all active or retired, retired who were exposed to 2,4,5-T without chloracne in this group, it was almost impossible to locate because there were no records of it without chloracne. There were no records of where they were. So, that the terminated individuals which would be -- were different to find, they were essentially not recruited.

And then there was a control group of unexposed. We also felt that when we looked at this group of 800, that we had to exclude or should exclude, because it would only confuse the issues. People who were born 1951 or afterwards, by 1969, when the process of making 2,4,5-T ended, they would have probably been 18 years old or younger. And we felt that that would -- that would prejudice the -- askew the age match, which we felt would be difficult to do anyway because the exposed group was a new and older group, and we ended up with inviting 1,800 and 6,431 who were known to be exposed and 375 with no known exposure. And, letters were sent out first by the plant manager, Royce Scott, and in forming that population that there would be a study conducted in June, and I believe the letters went out in February of 1979. And, follow-up letters were sent as well and then the plant newspaper had stories about or publicity about the examination which was to be conducted. And then later on, I

wrote letters as well and the letters that I wrote, because of the ease with which they would be delivered was sent actually by the plant managers office at Monsanto. And that's how we did our recruitment and that's how we attempted to assemble our cohorts.

Q. Let me hand you, sir, what's been marked as Defendant's Exhibit No. 1702, and ask you if you would examine that and identify it for me, please?

A. This is a letter with the stationery of the Institute of Environmental Health at the University of Cincinnati with myself as the Director, dated May 16th, 1979 addressed to Monsanto retirees, I believe there were two such letters and this one was addressed to the retirees informing them of the study which would be conducted during the week of June 11th, 1979, of workers and retirees from Nitro, and that it would be a comprehensive examination, and he also informed them that we had begun the phase of this study in 1977 when we initiated an epidemiologic study with the epidemiologic team at Monsanto, and I believe we referred to the work we were doing with Judy Zack.

Q. And, who is --

A. We also included a return card indicating what day would be most convenient for their participation, and the fact that travel expenses would be paid for out-of-town

participants and the hours of the examination and how long the examination would require.

Q. And who signed that letter, sir?

A. I signed the letter.

Q. All right. The second page is what, sir?

A. Second page, I believe, is the reverse side of the post card which asks to be returned whether you intend to participate or not, and there is a line with an area to check I will participate in the health examination, and another line I will be unable to participate, and the two most convenient days to be circled, and the persons to call for additional information about assistance in transportation. These people were two very helpful Monsanto employees, one of them is Owen Dolen, and the other is the nurse Sarah Anthony, both of whom were very helpful in the scheduling as well as the strategy of carrying on the examination.

MR. HEINEMAN: Now, if the Court please, Your Honor, we'd offer Defendant's Exhibit 1702.

THE COURT: Any objections?

MR. CARR: None, Your Honor.

THE COURT: Admitted without objection.

Q. Let me hand you next what's been marked as Defendant's Exhibit 1703, and would you identify that for us, please, sir?

A. This is a letter with the same date and stationery University of Cincinnati, Department of Environmental Health, signed by myself, which indicates as well and this was addressed to Monsanto employees, that there would be a health examination of Monsanto workers and retirees in Nitro during the week of June 11th to 18th and that it would be a comprehensive examination and many tests would be made to determine the state of health of each individual and to identify health problems which might be related to occupational environments. And again we write about the epidemiologic study which was underway at the time, as well as inserting a post card for a reply from the individual to whom this letter is addressed asking to check off whether they will or will not participate and what the two most convenient days were.

Q. Now, sir, one letter is to retired persons and one letter is to current employees, is that right?

A. Right.

Q. Was an identical letter sent to every retiree?

A. An identical letter was sent to every retiree, yes.

Q. And how about every employee? Was an identical letter sent to every one of them?

A. Yes, to my knowledge, it was.

Q. Was there any --

A. That included the 886 individuals.

Q. Was there any effort made to dissuade anybody from participating?

A. If there was, we would have quit, Mr. Heineman.

Q. So the answer to my question, sir, is there was not?

A. Not to my knowledge.

Q. And, you mentioned a moment ago that Mr. --

A. Owen Dolen.

Q. Owen Dolen and Mrs. --

A. Sue Anthony.

Q. Mrs. Anthony participated in it. Was it the strategy of the examinations, did I understand you correctly?

A. They participated in the carrying out of the examination, but they also participated in the recruitment, because they followed up these letters especially if there were replies that were uncertain, or if there were two dates chosen they had to give them one day to participate, and they would then call this individual back to tell them what day they were going to participate.

Q. Now, what exactly did these two individuals do in connection with the examinations themselves?

A. Mr. Dolen didn't do anything about the examination, he was the -- he assisted in the strategy of recruitment and

strategy of getting the people who had been recruited to the examination with proper transportation and so on.

Mrs. Anthony was very helpful in the scheduling, along with our coordinator, Pam Winter, who was a very effective administrator, happened to be a graduate in industrial hygiene, and she was a very efficient coordinator and she and Miss Anthony and others from the medical department at Monsanto really organized the scheduling of the 436 individuals over a period of 10 days or more.

MR. HEINEMAN: Now, first of all, Your Honor, I'd like to move the admission of Exhibit 1703.

MR. CARR: Again, we have no objection.

THE COURT: Admitted without objection.

Q. (by Mr. Heineman) Now, when you got a list of these 800 and some people, did you get any records from the -- from Monsanto with respect to those 800 people?

A. Well, I'm not altogether sure my memory is correct that we got them at the same time or later, but we did eventually get the medical records, the medical records of the people who were recruited and the work records as well.

Q. Now, did I understand you to say that Monsanto provided you with their impression as to who was exposed and who wasn't?

A. Well, I don't believe it was an impression, I think

that they went through their records, and they determined, I believe, that the department of -- or Division of Epidemiology, their office, went through those records to determine where each of the individuals on this list of 806 could be classified, whether they were in the active employee list, and they were exposed with or without acne, or whether they were unexposed and didn't have acne.

Q. Now, in making your determination in conducting the study as to who was exposed and who wasn't exposed, what did you rely on?

A. Well, after the examination was conducted, we looked at the histories that we took from the workers themselves, and we contrasted them with the work histories that we got, or the categories that they were placed in by Monsanto, and we found that there were really some discrepancies between the workers concept, and the work histories were very thorough, as to whether they were indeed working in either Building 41 or 34 or 51 or 92, which were the exposed areas, or whether they were maintenance people and mechanics that had access and were assigned to those areas, so in some instances there was a discrepancy and some of the people that Monsanto had designated in those sheets as unexposed, we felt they were exposed, and also there were some instances where the opposite was true. So, we really

relied for the final cohort designation of exposed and unexposed, and we decided that we had better just use those two categories, and we also developed a third category and a third category was questionably exposed. There was some doubt in our minds as to whether they were really exposed to the 2,4,5-T process. And there were over 50 of those in our group. So that we really had in the final cohort designation three groups, exposed, unexposed, and questionably exposed. And then what we decided to do was to not use chloracne as a criteria for a cohort, but to use it as a variable. This would allow us to determine who among the exposed had chloracne, what the severity was, who among the non-exposed had chloracne, and who among the questionably exposed had chloracne, and then we could use chloracne as a variable. And, it was a very important variable. That is did they ever have chloracne, did they have chloracne in the past but we didn't find it on examination, or did they, or was there residual chloracne. And those were three variables we used, but not in establishing a cohort.

Q. Now, that's what I want to get back to for a moment in establishing the cohort. In those instances -- well, as between the way Monsanto designated them as exposed versus unexposed, and on the other hand the way the people who participated classified themselves by work history, which did

you rely on in classifying them for your study?

A. We relied to a large degree on the workers' history of exposure and we knew what buildings were involved, and the workers themselves were very alert and conscious of the fact that they might have been exposed if they had worked in an area as a maintenance worker or a hauler or whatever. And, we relied on those histories as the -- as the criteria for designating exposed versus non-exposed and questionably exposed. We also did this -- we had to make some judgments which were important. We also went to the work records to find out whether or not indeed there was any evidence of exposure in the Monsanto work records. Now, the work records had some limitations. The work records didn't tell us what the worker handled in that building or in any of the activities. It usually provided designation as to known classification, and sometimes assignment to building but not what they did in that building.

Q. Okay. So when you said you relied upon the workers history, that's the history that that worker gave to your interviewers during the study, is that right?

A. Yes, indeed.

Q. And not how far Monsanto had characterized them?

A. Yes.

Q. Now, were there instances in which Monsanto

characterized them as unexposed but the worker characterized himself in such a way that you believed he was exposed?

A. Yes, there were.

Q. Okay. Were there instances in which Monsanto would characterize a person as exposed but from what you got from the worker you drew the conclusion that he was unexposed?

A. Um, there were a few, and there were more of the so-called intermittently exposed, which the Monsanto classification of intermittently exposed in which we found discrepancies. We didn't use the designation intermittently exposed. We used a designation of exposed, unexposed, and then questionably exposed. Q. And, with respect to what the workers told you about their exposure, were there just -- would they just say, well, I was exposed or unexposed or would they be questioned about where they work, what they did, that sort of thing?

A. Yes indeed, there certainly were questions within the work history material, the questions which allowed us to determine whether they were exposed and what they did, what they did so that they felt that they were exposed.

Q. Okay. Now, I'm not sure I understand about the difference between the group originally identified that you wanted to include in the study, as compared to the group that you eventually sent invitations to. Did I understand there

was a difference between the two?

A. No, not at all. We sent invitations to everybody who we felt would be recruited, or satisfied the criteria that we set. And there were 806 of them.

Q. Okay.

A. And we didn't know -- we didn't know at that time whether they were intermittently exposed or how they were exposed, with or without chloracne. These were people who were employed or retired or terminated and had worked or were working at Monsanto.

Q. Was there an original protocol for recruiting or criteria that you would look for?

A. Sure, but you had to start out with -- you had to start out with a large group and then determine what class they were going to be put in. What if we originally in our original protocol wanted people with exposure and chloracne, or exposure without chloracne, or no exposure, no chloracne, we would have gotten that eventually, and we did. We did. We got a list of the people that Monsanto felt were exposed with chloracne or exposed without chloracne, or they had an intermittently exposed group which we didn't participate prior to when we originally wrote the protocol, with or without chloracne and an unexposed group.

Q. Okay.

A. So that in a sense, the information that we got, the list that we got also allowed us to determine what Monsanto felt the cohort that they might be put in.

Q. Were there people that you couldn't trace? Was there anyone you couldn't trace?

A. Well, I assume that there were. These were -- the lists that we got were the only traceable people. The 806 were the traceable people.

Q. I thought I understood you to say something about the people who had been terminated. Could you phrase everyone who had been terminated either voluntarily or in voluntarily?

A. No, that's why -- that's why they were that recruitable, because those who were terminated and had no medical records, like workman's comp records, were difficult to trace. They might have been traceable if we had months in which to do it, but we didn't.

Q. Now, what about the people who had been exposed in the '49 runaway reaction?

A. They were all traceable, because they all had medical records and workman's comp records.

Q. Okay.

A. Whether they were retired, terminated, or active.

Q. Which group did you feel was the most heavily

exposed, the highest exposure group?

A. Well, I think we have discussed that before, Mr. Heineman, and I think that we had felt that originally that's why we did our mortality analysis, that the group that was exposed to the runaway reaction was the most heavily exposed.

Q. Now, with respect to the questionably exposed group, did you include the questionably exposed group in your ultimate paper written with respect to this study?

A. Yes, we did. Yes, we did. However, because of the length of the manuscript, the editors of the Journal of the American Medical Association felt that it had to be shortened and we had to make a choice as to how to shorten it. And one of the ways that we could do that was to take the exposed and take out the questionably exposed and take out the data of the questionably exposed so we were just comparing the data on the clearly exposed versus the clearly unexposed, so that the final manuscript which was submitted for review contained those data on the clearly exposed and the clearly non-exposed, and that was the material which appeared in the publication in the Journal of the American Medical Association.

Q. Now, with respect to the control group, the clearly unexposed group, were they an internal control group?

A. Yes, they were an internal control group.

Q. And, on what basis did you make the determination that they were clearly unexposed?

A. On the basis of the fact that in their work histories, there was no evidence on the review of their records, the work history records that we took, that we elicited. There was no evidence that they were ever exposed to the 2,4,5-T material or operation.

Q. Were there occasions when these work histories that you took conflicted with what the Monsanto records of work history showed?

A. Well, as I pointed out, in some instances many instances the work records that we got from Monsanto did not designate frequently what building they were in, or what they did, so we had to depend upon the worker to tell us that. And, the work histories were not marked exposed or not exposed. No such designation on a work record. Work record is really a personnel record. And, the personnel record simply designates assignment, classification of job, and where they worked. Sometimes, if it was a pipefitter or maintenance worker or machinist, sometimes they were floating, and they would be in many parts of the plant, but that wasn't on the work record, just the job was on the work record. So, we had to elicit from the participant where they worked, did they ever work in Building 41, or 34, or 51.

Q. Now, with respect to the, I believe 436 who volunteered to participate, were there any others who ended up participating in the study?

A. No, the 436, Mr. Heineman were the number of people examined, not the number who were recruited before the examination. The final number examined.

Q. Right.

A. Now, some of those people, because we continued, we wanted as many participants as possible, some of those people actually said that they would participate in the examination during the week of the examination. And we turned nobody down. And some of the people who volunteered were active employees, not exposed. Some of them were active employees, exposed. So -- but the total number that we examined during that week were 436.

Q. And they included people then who were not in the original list of invitees?

A. No. Those were all invited, but they didn't choose to participate originally.

Q. So they changed their mind?

A. Yeah, there was just one individual who was not invited, and we can discuss that and the reasons for our wanting to examine him. We can do that later on.

Q. Okay. Now, would you tell us who it was that

conducted this study, who participated in it, with respect to the University of Cincinnati, and anybody else that assisted?

A. Well, the people involved in the examination itself from the University of Cincinnati included the program coordinator Pamela Winter who had designed the strategy of the examination along with Susan Anthony and Owen Dolen and myself and paid many visits to Nitro before the examination took place. And there was myself as the principal investigator and the responsible person for the examination. Then there were a group of physicians and they included a number of dermatologists, five physicians who were trained and certified in occupational medicine, two scientists from NIOSH, who assisted in the conduct of the nerve conduction velocity part of the study. And two medical officers from the Air Force, who asked to participate because they were preparing the protocol for the Ranch Hand study and they wanted to see how an examination of the size that we did was conducted. Their study was a much larger one involving a larger population and conducted later. There was -- there were four registered nurses. There was in the design of the study, there were two people from the department who are biostatisticians. They were were helpful in the design of the study. There were two persons who did run our pulmonary function laboratory in the department, and they were involved

in running the pulmonary function tests at Winfield where the examination was conducted.

Q. Excuse me, when you say in the department, you mean --

A. In the Department of Environmental Health.

Q. At the University of Cincinnati?

A. University of Cincinnati. There were four graduate students, sorry, three graduate students, who were trained and assisted in the conduct of the nerve conduction velocity examinations which was supervised by the two people from NIOSH. There was three laboratory technicians and there were six trained interviewers. Among these interviewers there were nurses, and senior graduate students in toxicology, who received training in interviewing before we went to West Virginia, and the business officer for our department, at least in this study, was Mr. Curtaine, who is the senior business manager of the department.

Q. Now, was there a particular form that you used in order to conduct the interviews and the physical examination?

A. Yes, there was.

Q. Let me hand you, sir, what's been marked as Defendant's Exhibit 1704, ask you to examine that and identify it for me, please?

A. This is a reproduction of the 29-page form which

was used by the examining personnel including the interviewers and the doctors and the people performing the tests. And it includes a large number of items for the interviewer to question about and for the physician to complete including a physician's history as well as the record of his physical examination and the abnormal findings and the impression on diagnosis.

Q. Okay. Is that the form used in the Nitro morbidity study?

A. This was the form used by the interviewers and examiners at the study that we conducted.

Q. Would you briefly tell us, sir, if you would, the kinds of information that that elicited, particularly by the interviewer?

A. Well, on the front of this document, and I don't believe it's included in the form that you have here, is an informed consent statement, so that this is really incomplete. It should contain an informed consent statement, which the participant had to read and sign, and it provided us with the agreement for the person to participate in the study, and to understand what the parameters of the study were.

Q. This is a requirement by the university, by the Public Health Service, so that that was also part of the

form. There is a second page which is, I believe, omitted, and as you see this document starts on item 18 and 19, and it should really start on item 1.

Q. All right.

A. This is to be complete. And I think that it's kind of necessary to understand what the complete examination, complete form consisted of. The second page, the head sheet is missing, the consent form. The other thing that we need is Page 1 of this questionnaire and that is some of the demographics, name, address, telephone number, social security number, present status, active, retired, terminated, the current department, title, clock number, very important information, and then as this starts on Page 2, we have again the personal data, birthdate, sex, race, ethnic origin, marital status, number of marriages, education. These things are kind of important, and I don't think that one should say well, yeah, that goes on in all records, but if you are to compare two groups, you want to make sure that you compare them with respect to age and education and marital status, because those parameters or those variables can be influential.

Then there is an occupational history. And there are really four pages for occupational history, what their job titles were, the department, and main jobs when they

started this job, when they worked for Monsanto, and there are 15 lines to indicate, because some of them had worked for Monsanto for many years. We had to find out where they worked and what they were exposed to. So we went back 30 years if we had to, and all of their jobs, the job title, the dates, and what they did, and this information was really very important, because it told us whether they were exposed or not exposed. What you did. A work description was really critical and there are 15 different lines for that. Some of them who hadn't worked with Monsanto long could be covered in two lines, but some of them took all the fifteen lines. Then, if they were retired or terminated, what they did since, that was important, too. If they were retired ten years ago and they went into the construction business or were terminated ten years ago and went into the -- into another industry, we had to know what they did in that other industry. And there are a large number of lines for that, and what they did before they worked for Monsanto. So, that the history of the work history was rather critical and to find out what they did before they worked for Monsanto, what they did after they may have worked for Monsanto, and other kinds of employment while they worked for Monsanto, too.

Some of the confounding factors that we had to contend with. Some of these people were miners before they

came to Monsanto, it's a mining area, and if they had x-ray findings of pneumoconiosis, black lung, or x-ray findings of black lung, it didn't come from the Monsanto job, it came from the mine. So we had to know all of these things. Some of the people who were active did mechanical work on the side, worked the gas station. Or they did farming. Many of them did some farming, and we wanted to find out what they were exposed to on these other jobs, dust, solvents, pesticides, welding, fumes, solder, fertilizer. Were they exposed to weed killers on their other jobs, so that I think you can tell by that that we made every attempt to get a pretty thorough history, and we felt that the interviewer should pay attention to all of that.

We were then concerned with the work hygiene at Monsanto. Did they smoke at the work site? Did they eat at the work site? Did they wear long sleeves or short sleeves? Did they wear gloves or aprons or protective sleeves or masks or boots or respirators, eye protection. We wanted to find out what kind of protection they actually used during any job that they had. Not just if they were exposed but any job that they had; whether their clothes were laundered; whether they were laundered at Monsanto or whether they were laundered at home. Did they take advantage of the lockers and the showers that were provided by Monsanto later on in

the fifties, and use the personal hygiene facilities. Did they use a waterless hand cleaner? Did they supply the soap themselves. And then we asked them perhaps a leading question, but it really had to be asked, and that was did you ever develop an illness which you believe related to the work at Monsanto. And, in some instances we got the answer yes. And we -- and if yes, where did you work at the time? What type of work and what was the date of onset of your illness? Had to find out how much they smoked. Terribly important. So, we got a history of when they started to smoke. If they smoked cigarettes or a pipe or tobacco. If they now smoked cigarettes at the time of the examination or they smoked in the past and then quit, or they never smoked. And this was an important variable because for many of the health effects that we looked at, many of the like pulmonary function or lipids, we wanted to know if they currently -- if they smoked in the past, or if they never smoked. And that variable happened to be a very useful one, and it is in almost all epidemiologic studies, especially morbidity studies, alcohol consumption. I think we went through this morning why we need to know how much alcohol people drank and we had to establish some criteria for determining if they were drinking a lot or drinking very little. If their drinking habits changed over the time.

Then we went into -- this again is important, family history. Some of the problems that these people some of them had, could be traced to their family. It's quite well-known that cardiac complaints often run in families. Problems involving lipid metabolism often run in families. Sensitivity to certain environmental agents may run in families. Whether they have asthma or hayfever, acne vulgaris runs in families. So we wanted to find out if the father, the mother, or brothers or sisters had these problems. Whether they had peptic ulcers or colitis, or heart conditions, including high blood pressure or stroke, or had lipid disturbances that they knew about or diabetes, or liver disease such as cirrhosis or nervous or mental disorders.

Then we came to the item of cancer in families and we wanted to know the father, the mother, the brother or sister ever had cancer and what type of cancer they may have had. And we had 18 types specified. Now, I think it's important that we remember this, because in the analysis of the data, in the analysis of the data we analyzed our data according to an international code called SNOWMEN and we analyzed our data and didn't lump all cancers together, we kept them separately. And, we could total them up but we had to know which cancers were involved. And this is not only

for family history, but especially personal history, and that's the next item on Page 15, a crystal page in our data bank. A history of skin problems, liver disorders, neuritis, nerve injuries, nervousness, stomach ulcers, bowel trouble, kidney trouble, bladder. But we asked if they had this at any time. Didn't matter whether they had it in 1944 or '43 or 1960, but we wanted to know if they ever had it and what year they had it, and was it confirmed by a doctor. And in some instances we had to know what area of the body, for example, if they had dermatitis or acne or abcesses, what area of the body. If they had recurrent infections. It's been known in animals that the immunologic defenses of animals may be altered by TCDD so that we had to ask the question, do you have frequent infections. This would give us a clue as to whether or not they had any immunologic problems from a clinical standpoint. From a clinical standpoint. And again if they ever had emphysema, asthma, pulmonary edema which comes from heart failer, or from a toxic agent, pneumonia, pleurisy, or stroke, and again we asked them if they ever had cancer. And we listed these 18 categories of cancer, and asked them in what year it occurred, and what type of cancer they had. Then we asked were they ever hospitalized, if they were what were they hospitalized for, what condition and what hospital. This

would give us an indication as to whether or not they had problems which might be related to their job as well. Or did they have a hernia, or a -- were they operated on for flat feet, which is not likely to be occupational, but we also wanted to know if they were ever hospitalized for their chloracne.

Then we had a special category of -- we were interested in gastrointestinal things, so we asked a fairly large number of questions about stomach and intestines, then a neurological history, including sleeplessness and nightmares and muscle or joint pains, muscle weakness and dizziness, depression, and then we asked about their sexual history. Now, after -- I have to tell you that for all of these, we again wanted to know if they had it at any time, if they had it last year, or even if they had it in 1930. We wanted to know and identify when they had these problems.

And then we had a question on reproduction, marriages, dates, how many children were born alive, how many died within a short period of their births, how many miscarriages or spontaneous abortions they recalled their wives having, how many still births, how many children with birth defects. And if they had problems having a family. Did they want children and couldn't have them. And again the number of miscarriages or still births with individual

spouses. Some of them may have had one wife, some may have had more than one wife. Then we wanted to know what kind of medicines they took. That's always very important in determining relationship between whether or not a symptom or a finding may be caused not by the job but by some medicine, some prescribed or not prescribed medication which they might be taking. And in that we asked if they ever had acne and what kind of treatment they might have got for their acne. If they were allergic to drugs or did they ever have any drug reactions. And after that, it's a long history. I don't apologize for taking the time to tell you about it because I think it's important to recognize how thorough this examination was.

We then went on to the examination, the physical examination itself. The individual went to a nurse who took vital signs. Vital signs are size, weight, height, blood pressure, pulse, respiration and a general appearance of the individual. Where they were, they looked sick, they looked depressed or they looked well, and we wanted an impression from the person who took the vital signs before the individual went to be examined by the doctor and the doctor took again took an additional history and took a history of skin problems, respiratory problems, dental problems, eye problems, problems involving swelling of nodes, problems

involving the respiratory tract, the heart, any other aspect of the thorax. Whether they had any history of gastrointestinal problems, whether they had a history of liver problems. The history of sexual disturbances and libido, again, any time, not just during any restricted period. Any problems in there referable to their skeletal structures, bones, their muscles. Any kidney problems, bladder problems, general problems including reproductive problems, blood vessel problems. Some of these people may have had vericose veins, and those are blood vessel problems. Some of them may have had angiomas of the skin, which are blood vessel dilatations in the skin. Neuropsychiatric history. Then a history of infections, and then the doctor examined the patient or the participant thoroughly, and the skin examination was done by a dermatologist. The skin examination was done by one of the dermatologists. If there was need for an opthalmologic examination we had a certified opthalmologist there. And then the doctor usually cited the abnormal findings from history, and abnormal findings from physical examination and then gave in most instances an impression or diagnosis and wrote comments.

The individual then could have done before his examination, his or her examination, went to the pulmonary

function lab where they did breathing tests, and two very qualified people conducted the breathing tests, and kept a record of it, which was part of the chart. And then nerve conduction velocity tests were conducted, and that was recorded as to what the findings were and then another part of the form had a check for the laboratory tests which were done to make sure that we had in our record that they had all the laboratory tests which we wanted to know done. But the blood samples were taken, urine samples were taken. We took skin biopsies. We took skin scrapings. Since the skin was a critical issue here, we wanted to make sure that the diagnosis of the skin problem was a proper one, and we took numerous biopsies, not only of chloracne, but other skin lesions and some of them were lesions that were suspected of being a skin cancer, or an eczematous lesion like in contact dermatitis. We did cultures of the skin, scrapings for fungi and for bacteria where they were indicated.

We took photographs of the participants so that we had a record of them. And, of course, there was a check-off sheet whether they had their x-rays done and they had their EKG's done. This was all done in Winfield although the readings of the x-ray and EKG's were done in Cincinnati.

That essentially constitutes the examination of the 436, people and everybody got the same kind of examination.

Q. Dr. Suskind, who came in and did the urine and blood samples? Who participated in that?

A. Well, the urine and blood for the regular urinalyses, the urine chemistries, the blood chemistries and the blood counts, we had technicians who took the blood, took samples of the urine, and they prepared them for shipment to the MEDPATH Laboratory, and the MEDPATH did those, did those analyses. However, we had some special lipid analyses done of blood and they were sent separately to a lipid research center laboratory at the University of Cincinnati and those -- that laboratory used the methods of the National Lipid Research Project, which we felt we needed in order to make sure that the lipid determinations were done correctly and by an extremely well-qualified laboratory, which we have at the University of Cincinnati.

Q. Now, did anyone from MEDPATH participate?

A. We had a MEDPATH representative who assisted in the -- not only in the collection, but the packing and shipment of the bloods and urines to MEDPATH.

Q. What, if anything, Dr. Suskind, was done with the results of this examination?

A. Well, the data from the questionnaires and the subject's medical history were coded by assigning -- epidemiologic study, you are really not interested in names.

You are not interested in who the people are, you are interested in the collective information because you are comparing groups and you are comparing the results in a group with a defined characteristic to a group that does not have that defined characteristic so that the data from these questionnaires and medical history were coded by assigning values to the responses given, and they were coded according to SNOWMED or this is a code using the systemitized nomenclature of medicine system of the International Association of Pathologists. A coding system which is used universally in epidemiologic studies as well as in record keeping. When a hospital record is coded for findings and diagnosis, the SNOWMED system is usually used.

Q. Was this --

A. I --

Q. I'm sorry?

A. I say the medical history was usually coded that way and the laboratory data was entered just as received and then keypunched and verified. The numerical data was entered into the computer and the computer data was then compared to the original files for their accuracy and this verification process goes on all the time, if you want to make sure that the computer has received the proper information. And then multiple linear regression analyses were done. When we

compared the exposed group to the not exposed group and we compared as I said, we used Chlorance as the variable. Those who had chloracne at any time had a history of Chlorance, those who had a residual chloracne and those who never had chloracne, and multiple linear regression analyses were used to compare the exposed versus unexposed and the chloracne groups with respect to laboratory data plasma lipid levels, pulmonary function levels, all clinical laboratory values, nerve conduction measurements, after adjustment for covariables. Adjustments for covariables were age and smoking and alcohol.

Q. With respect to the --

THE COURT: Before you get into that next question is this a good point to break? It's about ten to.

MR. HEINEMAN: I'm sorry, sure, Judge.

THE COURT: We will recess at this time for the day. We will start again tomorrow morning at 9:30. I would remind you as I do on any overnight break that you are not to read, listen to, or watch anything about this case in particular, subject matter in general, in any of the media. Thank you for your attention and cooperation.

(The following proceedings were had in Chambers, outside the presence of the jury.)

MR. NASSIF: Judge, I was going to explain to you

this morning but we didn't have the time --

THE COURT: Right.

MR. NASSIF: -- That Dr. Suskind has canceled his conflict on -- he's not cancelled the conflict he's just not going to be available at Cincinnati for the seminar on the 6th and 7th, but will be there to host it on the 5th and then he has --

THE COURT: Run that past me again.

MR. NASSIF: If you remember -- I should try to do this in sequence, I'm sorry I'm skipping here. Dr. Suskind, originally we had advised you, would not be available on the 20th, 21st and the 5th, 6th, 7th of March.

THE COURT: Right.

MR. NASSIF: He is now -- he is hosting a conference on the 5th, 6th, 7th. He only has to be the host for the 5th, and I've advised counsel for the plaintiff of those three dates. In other words, February 20th, 21st, and March the 5th and said that he will be available to finish his testimony into March as we need him, subject to the two days that you are going to be gone, the 13th and 14th. He will be here the 17th and the other days of March before that except for the 5th.

THE COURT: Wait a second. We are missing some days here. Let me get a calendar so this makes some sense.

He had talked about being here the 3rd and 4th not the 5th of -- 7th -- you are saying he can be here the 3rd, 4th, 6th, 7th and the rest of March until he's done?

MR. NASSIF: Until he's done, subject to your thing on the 13th and 14th.

THE COURT: Which would the 13th and 14th, which is when I'm in this conference.

MR. NASSIF: Mr. Carr has agreed to withdraw his objection subject to that commitment that I have made to you and I wanted to ask then, Judge, that you withdraw your order.

THE COURT: So in other words this is by agreement that he would be gone the 20th, 21st of February, and March 5th. He will be available for the rest of the time until he is done?

MR. NASSIF: Yes, sir.

MR. CARR: It's not by agreement. What I have said is since they have committed him to be here when he's needed, except for those days, that I will no longer object to it. It's up to the Court.

THE COURT: Okay. That is agreeable with me also. And, so he will be gone February 20, February 21, and March 5th. Okay. I will announce those dates plus those two March dates. I'll just catch up on all the dates for March.

MR. CARR: The jury hasn't been told about that 24th yet, have they?

THE COURT: I don't know, but I will tell them again or tell them for the first time, whatever. And, then he is ours until we are done with him, basically?

MR. NASSIF: Yes.

THE COURT: Great. Good. I think that cures any problem that I had with him.

MR. NASSIF: Okay, Your Honor, thank you.

MR. HEINEMAN: No court on the 13th or 14th?

THE COURT: I'm on this faculty and I can't get out of it.

MR. NASSIF: Those are it? Those are the dates?

THE COURT: Yes.

COURT ADJOURNED:

STATE OF ILLINOIS)
)
TWENTIETH JUDICIAL CIRCUIT) SS
)
COUNTY OF ST. CLAIR)

I, DEBRA M. MUSIELAK, certify the foregoing to be a true and accurate transcript of the testimony and proceedings in the above-entitled cause.

Dated this 20 day of February, 1986.

Debra M. Musielak

STATE OF ILLINOIS)
)
TWENTIETH JUDICIAL CIRCUIT) SS
)
COUNTY OF ST. CLAIR)

I, RICHARD P. GOLDENHERSH, one of the Judges in and for the Twentieth Judicial Circuit, do hereby certify that I have examined the aforesaid transcript of proceedings, and certify the foregoing to be a true and accurate transcript of the testimony and proceedings in the above-styled cause.

Dated this _____ day of February, 1986.

HON. RICHARD P. GOLDENHERSH