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IN RE:

ASBESTOSIS CASES

DEPOSITION OF GERRIT W. H. SCHEPERS, M.D.

VOLUME I

JANUARY 19, 1980

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The deposition of GERRIT W. H. SCHEPERS, M.D., called as a witness at the instance of the plaintiffs, for use in evidence, pursuant to Tennessee Rules of Civil Procedure, taken by agreement on the 19th day of January, 1980, at the Sheraton Inn, West, Knoxville, Tennessee, before Joseph J. Rusk, Registered Professional Reporter and Notary Public, pursuant to the stipulation of counsel.

S T I P U L A T I O N

It being agreed that Joseph J. Rusk, Registered Professional Reporter and Notary Public, may swear the witness, report his deposition in machine shorthand, afterwards reducing the same to typewriting.

All objections except as to the form of the questions are reserved to on or before the hearing.

Any objection on the part of any one attorney is to be treated as an objection of all of the attorneys and all parties.

It being further agreed that all formalities as to notice, caption, certificate, transmission, etc., including the reading of the completed deposition by the witness and the signature of the witness, are expressly waived.

GERRIT W. H. SCHEPERS,

called as a witness at the instance of the plaintiffs, for

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use in evidence, having been first duly sworn, was examined and deposed as follows:

EXAMINATION BY MR. GILLENWATER:

Q Will you please state your name to the Court and jury, sir?

A Yes sir. My name is Gerrit, spelled G-e-r-r-i-t, middle initials, W. H., surname, Schepers, spelled S-c-h-e-p-e-r-s. I --

Q What -- excuse me.

A I reside at 6527 Sunnyhill Court, McLean, Virginia, zip 22101.

Q What is your profession, sir.

A I am a physician and I am a scientist.

Q Dr. Schepers, will you tell us your educational background, please, sir?

A Yes sir. I was trained as a scientist originally, in South Africa, at the University of Witwatersrand, spelled W-i-t-w-a-t-e-r-s-r-a-n-d; obtained my first degree of Bachelor of Science there in 1933; continued scientific training through to 1934, then commenced study for degree of Doctor of Medicine, continuing that through until 1938.

Between 1938, I also completed a degree

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of Master of Science concurrently with medical studies. I was registered as a physician in South Africa in December of 1938, and immediately thereafter, continued study and research, both in science and medicine, at the same university, where I also, by then, had been a member of the staff for some years.

I continued there until 1943, I believe, at which time I started up a new university medical school at Pertoria, a city nearby to Johannesburg, and in the meanwhile, continued my scientific education and research, and in 1945, obtained the degree of Doctor of Science -- I'm still just on education.

And, then, subsequently, continued my medical phase of my training through to 1948. This is on a part time basis, because I was working at my profession by then. And obtained an advanced degree of Doctor of Medicine from the university, which is the method of specializing overseas.

After 1948, I gained a scholarship known as the Fellow -- Commonwealth Fund Fellowship awarded from this country, Commonwealth Fund of New York, sort of a reverse Rhodes Scholarship, and came to study in the New York University, from 1949 through 1950, studying the subject of industrial medicine at the Institute of Industrial

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Medicine of that university.

Then, I returned to South Africa, continued with my professional work, until I resumed studi again, here in this country, in 1957, at which time I spen a year at the University of Michigan in Ann Arbor, Michiga devoting that year to the study of pathology and doing research on industrial medicine.

That array completes the formal train except for short intervening courses in various subjects.

Q Dr., after you received your medical degree back in the 1930's, I believe you said, did you have occasion to see and treat patients?

A Yes sir.

Q Dr., do you have any specialities, either in the medical or scientific field?

A In the scientific field, my work was predominantly, initially, in the field of nervous system diseases and, later on, diseases of the heart and lungs.

I spent the greater part of my career in the scientific exploration of the problems of heart and lung disease health, particularly as these relate to the environment, externally caused disease processes.

In the sense of treating patients, I have limited my professional contributions to the specialit

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of chest diseases, heart diseases and pathology.

I have some knowledge of other subjects, but these are the three subjects that I have predominantly spent my career in.

Q When did you primarily become interested in heart and lung diseases with reference to environment?

A Well, in a full time capacity, sir, I started that in 1944, I believe, when I was appointed as an internist on the staff of the Pneumoconiosis Bureau of the government of South Africa, and I was involved with that work for a period of ten years.

Prior to that, of course, the university and the bureau, and the Institute of Medical Research of South Africa, was one large university, researched in complex, and I really commenced my studies of the problems of pneumoconiosis in the early 1930's, since many of the staff of the university and the Institute of Industrial -- of Medical Research of our university, were all deeply involved with the problem of pneumoconiosis in South Africa, and were primarily specialists in this field.

Q Dr. Schepers, what is pneumoconiosis?

A Pneumoconiosis is a group of lung diseases which are caused by the inhalation, usually occupationally encountered, of injurious substances of many

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kinds.

Q Dr. Schepers, how long have you been in the United States of America?

A Permanently, since 1954, April of 1954. I spent, as I said earlier, a year here as a post-graduate fellow, at the Institute of Industrial Medicine, during 1949 through 1950, but I did return to South Africa in 1950.

Q Dr. Schepers, are you a citizen of the United States?

A Yes sir, I became a citizen of the United States, I believe, in 1959 or '60, somewhere around there.

Q Are you licensed to practice medicine in any state in the United States of America?

A Yes sir, I currently hold a license in the State of Delaware.

Q Dr. Schepers, in the course of your studies and work professionally, have you had occasion to publish various and sundry articles concerning the pneumoconiosis or lung diseases caused by the environment?

A Yes, I have published a number of articles on these subjects.

Q Dr., I hand you plaintiff's Exhibit S-1, and ask you if this is a partial list, or as the

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medical profession calls it, curricula vitae, of some of the articles that you have published in medical journals and scientific journals?

A Yes, it's a very abbreviated curricula vitae, and it includes articles relating to the pneumoconiosis, through to 1963, with some references to some -- no, 1971 -- '75. I missed some of the pages. '75. There have been some after that.

Q Dr. Schepers, since you compiled that list, have you involved yourself in other publications and done additional work?

A Yes, I'm still currently writing. I finished a large paper, which took me twenty-five years to write. December 31, 1979. I started another paper on January 1, 1980.

MR. GILLENWATER: I ask that that document be offered in evidence as Exhibit No. 1.

BY MR. GILLENWATER:

Q Dr. Schepers, what is your present employment and duties?

A I am currently employed by the Veterans Administration in its headquarters in Washington, D.C.

My duties there consist of providing organizational guidance with regard to the management of

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Q How long have you been with the Federal Government?

A I've been with the Central Office in Washington, D.C., since 1974. Prior to that, I worked in the field, as a chief of medicine, at various of our hospitals, chief of pulmonary diseases, and so on.

Q Dr. Schepers, could you, in lay terms, tell us, what is asbestosis?

A Yes sir. Earlier, we mentioned the word, pneumoconiosis, which I said was an all embracing term, to give a label to all the various diseases that can be caused, or have been recognized as being caused by the inhalation of materials that later proved to be harmful.

Asbestosis is one of these pneumoconiosis, and it is caused by the inhalation of asbestos particles. The asbestos particles are little, short, thin fibers which can be released into the air of a working place wherever asbestos material is handled in such a manner that it is broken up into a powder.

There are many types of asbestos material in nature. Essentially six varieties have been commercially exploited for human use. Predominantly, in America, and in Europe, Africa, three main varieties of asbestos have been used.

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In this country, about three-quarters of the material used, if not more, is a substance known as chrysotile, spelled c-h-r-y-s-o-t-i-l-e, which is mined in Quebec, in Canada.

The rest of the asbestos which occurs here in this country, is predominantly imported from other countries, very largely from South Africa, and the two varieties that are most frequently found in industry, are known as amosite, spelled a-m-o-s-i-t-e, and crocidolite, c-r-o-c-i-d-o-l-i-t-e.

These two types of African asbestos are grouped together chemically or mineralogically, as amphivoles, a-m-p-h-i-v-o-l-e-s, and they're a totally different mineralogical group from the North American variety of asbestos, which is known as a serpentine, and which is more related to substances such as talc, which also occurred in great abundance here on the North American continent.

Q Dr. Schepers, how long has it been known in the medical and scientific community, that such a disease as asbestos, existed?

A My person knowledge, of course, only goes back to when I first encountered it, which is in the early 1930's, when I first, saw my first cases at the university in Johannesburg, while working with Professors

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Strachan, spelled S-t-r-a-c-h-a-n, and Simpson, S-i-m-p-s-o-n, and also another scientist known as Mavro Gordato, M-a-v-r-o, G-o-r-d-a-t-o.

Actually, in a sense, I was a late-comer, because many others had already been describing the condition and publishing articles on it for at least another thirty years prior to this. One could say the greater part of this present century, the disease has been known to science in its present manifestations.

Q Dr. Schepers, what happened when a piece or fiber of asbestos gets into the lung of the person that breathes it or inhales it?

A Well, there are two things that could happen to it. He might, again, exhale it, and then nothing happens. It just goes back into the air, unless he then rebreathes it once more.

The important event that can occur is that it becomes trapped in the lung and does not find a way to get out of the lung. Then, it remains there for a very long time.

Q Dr. --

A Decades, tens of years, thirty, forty years, the same fiber will stay in the lung, and two things can happen to these fibers.

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One, they may just remain the way they are. Nothing happens to them, they just stay as they are, because many of these asbestos fibers are not, not destructable by body tissues, so they're not affected by the body's tissues. They just lie in amongst the tissues and irritate them.

Some larger fibers, especially if they're bundles of fibers, tend to become wrapped around by cellular material and proteins that the body itself contributes, that come from the lung.

And, then, these larger fibers become asbestos bodies, and so this is why I said there are two ways in which they can manifest.

There is a third thing that can happen to some asbestos fibers. These are the chrysotile fibers. They may, after a very long time in the body tissue, dissolve and only their skeletons may then remain, and only these wrappings as I've just described as part of the asbestos body, then remain as the proof that there was a chrysotile fiber there previously, but the chrysotile fiber itself may dissolve.

Q Dr., let me show you a photograph that is marked Exhibit S-2, and ask you if you can identify that photograph, and if so, please tell us what it is.

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A Yes sir. This is a photograph I made myself and gave to you.

Q Will you turn it around, Dr., so the camera can pick it up, please, sir.

A Can you see it?

Q Would you tell us what that photograph represents? You say you made it yourself?

A Yes sir. This is a good example of an asbestos body, and the -- the long structures on the photograph, this long thing that looks like an earthworm, is the actual asbestos body.

If one looks in the center, particularly over here (indicating), you see little dark line in the center. That is the remnant of the fiber. The actual fiber actually continues beyond here and up to the top, but it's not visible because it's too thin.

The little dots all around it are body cells. They are fibrous tissue cells, and this is from a human lung, and it is magnified over two thousand diameters, so it is a very high magnification of this structure.

And, as the label at the bottom says, the name is Steve Grover, and that is one of the patients who died, who was an employee of the Johns-Manville Corporation, and whose tissues I examined for the

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Johns-Manville Corporation, during 1955, I believe.

Q Does that fairly represent, Dr., what an asbestos body looks like after it gets into the lungs of a human being?

A This is a typical large asbestos body. There are smaller ones than that, also.

MR. GILLENWATER: I offer that as Exhibit No. 2.

BY MR. GILLENWATER:

Q Dr., could you tell us a little something about the term, dose and time, with reference to the development of the asbestos process and asbestosis disease?

A Yes sir. The majority of the pneumoconiosis are what one calls quantitative diseases, in the sense that the amount of disease one develops in the lung, is related, in almost linear sense, to the quantity of dust that is inhaled.

In the case of asbestosis, this quantity and the amount of disease and the severity of the disease, do not relate simply to the quantity of dust present in the lung.

There is another factor that comes into operation, namely, the amount of time that has elapsed since first the dust particle, the asbestos particle was inhaled

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and retained in the lung.

I would have to explain it this way. If one inhales and retains a large quantity of asbestos fibers of respirable size, very rapidly, during very heavy exposure, asbestosis may develop to a severe degree relatively rapidly.

On the contrary, if one inhales that same type of asbestos fiber in small quantity, slowly, the same degree of asbestosis, the disease reaction may still appear in the lung, but only a great deal later.

This, therefore, brings into effect the concept that in asbestosis, the amount of disease is a function of both the amount of dust inhaled, namely, the dose, itself, and the duration of stay of that dust in the lung tissue itself. This is the dose, time, the quantity, time concept of dosage in the case of asbestosis.

Q Dr. Schepers, is that an accepted medical principle that you have just stated?

A It has been known to be the case, with respect to asbestosis, since at least the middle 1950's.

I knew of this problem, myself, personally, through my work in South Africa, previously to that, but I only published on this in 1962, but in 1955, I believe, two English scientists called Beatty and Knox,

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published this concept, and it has been an acceptable explanation for this phenomenon of delayed appearance of asbestosis, ever since then.

Q Did Dr. Sears and Dreson publish an article in 1938 in connection with that?

A As I recall, their work, in a sense, confirmed that. They didn't express it as precisely as Beaty and Knox did that, but their work was also consistent with that principle.

Q And that was in what year, sir?

A That was in 1938.

Q Dr., does the length and shape of the fiber have any bearing on the disease, asbestosis?

A Absolutely.

Q Could you briefly tell us in what respect that has a bearing?

A Yes sir. First of all, I mentioned that there are different kinds of asbestos material. Basically the two major varieties, the amphiboles and the serpentines. The serpentine being the chrysotile: the amphiboles being the crocidolite and the amosite.

If I could make a little quickie drawing, I might be able to simplify it, if I may do so.

Q Please do. Yes sir.

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A The serpentine fiber is a hollow tube. In other words, it's hollow, and if you cut it in cross section and magnify twenty thousand times, it's really like so (indicating).

It is a flat sheet which has been curled on itself, very much like one makes a sticky bun, rolled up from a slab of dough, and they cut it across. This is a hollow fiber, and it's totally different, and it's -- that's why I say it's related to talc, and it has a big surface area because of the surface on either side of these things, that's why the whole action is different.

The amphiboles are solid rods, and they consist of a piece of asbestos which is arranged in rods like that (indicating).

In the case of amosite, this results from crystals forming as the material grows in nature and arranging themselves alongside one another. They start as little vertical crystals and they grow in parallel.

In the case of crocidolite, it starts as a sort of a solid polymer, and then it splits into these solid rods. As you can see, they are totally different structures.

Now, this composite thing, consisting of say two hundred of these individual fibrils, cannot get into

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the lung tissue very far, because the lung tissue will only accept only very thin things, so not until these heavy clusters -- if I take this bunch of pencils, like so, that is what I'm trying to talk about, that this is like so (indicating).

Not until they split into their individual component fibrils, each one of these separate things, will they become acceptable to the tissues, and that is one of the first things that must happen to produce disease.

This material occurs in bundles, and it has to unravel, and these individual fibrils are easily separated from one another. These are not so easily separated (indicating). They have to be separated mechanically.

If these are broken up into little short particles, supposing they get broken across like so (indicating), then you have little short rods, and these can be breathed by the lung, and they can be retained.

If they are too long and too fat, they will only stay in the air spaces and will do no harm.

If they are broken into these very minute, thin structures which are invisible and hardly visible under a microscope, you need an electron miscroscope to see them. These are the particles that do the harm.

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They are the ones that can get into the tissues and into the cells and cause harm.

They have to be of a certain length, at least five times as long as they are thick. They may be as thin as 0.02 of a millimeter, or even thinner. But they must be at least five times as long -- to be able to produce disease.

If you break them up into minute particles so they're equally long as they are thick, they apparently do not do any harm. That was one of the great experiments done by Dr. Gardner in the Saranac laboratory, where I worked.

Q Are some of the fibers which you just described, visible to the naked eye?

A No, no, no, you cannot see them at all.

Q Dr., may we mark -- have you finished with that chart?

A I think that's roughly it.

MR. GILLENWATER: May we mark that as Exhibit No. 2-A, and I offer it in evidence.

A Shall I write it for you?

MR. GILLENWATER: Yes sir, if you'll just put 2-A on it, please.

BY MR. GILLENWATER:

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Q Dr., is there any medical consideration to the term, mechanical and chemical reaction, insofar as the causing of asbestos is concerned?

A Yes sir, that is an issue of some relevance. And I again have to go to the blackboard to explain something to you.

Q All right.

A This substance --

Q Would we be -- oh, I'm sorry, go ahead.

A -- which is the chrysotile, is soluble. soluble in tissues. And, therefore, the chemicals in it, which is all magnesium silicate, can be dissolved and can go into tissue cells and exert their effect, both by virtue of the fact that this is a fiber and subsequently on solution by virtue of the fact that they've gone into solution.

These fibers, the amosite and the crocidolite, are not soluble, or barely soluble in tissues. Therefore, their chemical composition does not affect the outcome, because they do not dissolve.

There are substances which go into the cracks between these fibers, particularly this amosite, chemicals like metals, chromium salts, arsenical salts and so forth, oils which are in the earth, may go in these interstices between the little fibrils, and so those things

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may get dissolved out and go into the tissues and make a chemical effect on the tissue cells, but the actual silicate material does not dissolve.

What it does, is it produces its irritating effect on the tissue mechanically. It's just like having a needle stuck in your tissue for comparison. It's not as crude as that, because it's so delicate, but it causes inflammatory reaction because it's a foreign body, and a large part of the effect of asbestosis is produced by that.

Irritation effect

Q Does the chemical reaction cause any irritation on the tissue of the lung?

A Yes, it does, sir.

Q Dr., can asbestosis cause emphysema?

A Yes, in a certain way. Before I can explain that, I have to perhaps tell you a little bit about emphysema, if you'll permit me. Otherwise, I might mislead you. Can I make another drawing?

Asbestosis-emphysema

Q Yes sir.

A Emphysema is a space disorder of the lung, as you might call it. It's -- everybody knows about emphysema and cigarette smoking, so it looks like bringing bringing colds to your castle, but there are many varieties of emphysema, and I have to show you, first of all, how, what we're talking about.

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If we take the air tubes which are called the bronchi, they break up into smaller bronchi, and the smaller bronchi again break up into very minute bronchi called bronchioles. And they lead to things called alveolar ducts, and then the alveolar ducts lead to little sacs like that (indicating). These are the alveoli. And these are the breathing sacs.

Emphysema is produced when these sacs, which have a normal defined size, in a normal human being, and function because of their size and shape and structure, when they change in size by becoming larger.

Now, there are several ways they can change in size. They may become larger by becoming expanded. In other words, they have -- each alveolus has increased in size. That's called hypertrophic vesicular emphysema.

They may become larger because adjacent alveoli -- let's make another one here (indicating), and another one here (indicating). Because they flow together. In other words, the walls break down, and that wall breaks down, and now, you have one single sac like this (indicating), looks like this, but it's made up of many of these (indicating). That is called destructor emphysema.

Then, there is a third variety of emphysema -- we're going to have a messy drawing here in a

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moment -- which comes from this portion, the alveolar duct, and the bronchioles, this portion (indicating), which not originally was an alveolus, being ballooned up. And, so, little bubbles form in the lung all over, wherever these are, and this is called focal emphysema.

This is hypertrophic, destructive, focal (indicating).

Now, there is a fourth variety also. And for that, I'll need a small other drawing. Let's look at a lung -- this is supposed to be a whole lung. This is this going into the lung (indicating). If one portion of the lung collapses, supposing this becomes solidified (indicating) by asbestosis, because the fibrous tissue can make the whole thing solid, and it can collapse and all the air can leave it.

Since this is inside the rib cage, the rib cage itself will not collapse, but if this portion collapses, it will take up less space, and so, while this gets smaller, this, of course, has to get larger (indicating), because this still filling the whole space. And that is called compensatory emphysema.

Q Dr. --

A The reason why I mentioned that -- if I can just finish, because otherwise, I'll have you confused.

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Is that this occurs in asbestosis, this can occur in asbestosis, this can occur in asbestosis, and this can occur in asbestosis (indicating). They are all different forms of emphysema.

Q Dr., can cigarette smoking cause emphysema?

A Oh, yes, absolutely.

Q Is there a difference in the kind of emphysema that cigarette smoking causes as opposed to the types of emphysema you just described there on that chart?

A Cigarette smoking causes only this variety here (indicating), this one here, this is cigarettes. It's hypertrophic, and it's reason is because there's obstruction to the flow of air here because the person has bronchitis. He develops the bronchitis from breathing the cigarettes, this causes irritation, this -- the flow of air goes in fairly easily, but it will not go out. These have very thin walls and so they balloon up, so it's just like kids playing with bubble gum and blowing up that piece of bubble gun, and this is what happens in the lung, and that's the disease caused by cigarettes.

Q Dr., while you're up here, will you please mark that as Exhibit No. 2-B, and I offer it in evidence.

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Dr., could you tell us what the term, interstitial fibrosis, is, and whether it has any relation to asbestos and asbestosis, and explain that term for us, please.

A Yes sir. Interstitial fibrosis is one of the several forms in which asbestosis disease manifests itself.

The term has unfortunately, sometimes, become synonymous with asbestosis. It is not, because asbestosis is a far more complicated disease than interstitial fibrosis. But you'll see it often in textbooks, and, again, I'll have to make a little drawing to simplify it for you.

Q All right, sir.

A We're going to draw this part here (indicating), and we're now drawing --

Q Is that part in the lung itself, Dr.?

A Yes. These are the alveolar spaces, and they have little walls, like so (indicating), and here's another one, like so, this would be another one, like so. You're now making a cross section of the lung and looking at it under a microscope.

This is air here (indicating), and these are the walls of the alveoli.

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What happens in asbestosis is that the asbestos particle comes in through here or through there, and finally finds its way in here or there, or there, or there (indicating). And it sits there.

Then, it makes fibrous tissue, the body then makes fibrous tissue, fibrous tissue forms, rather.

Q What is fibrous tissue, Dr.? Can you describe it in lay terms, very briefly?

A Maybe we went too fast. The body has many types of cells, but one can classify the cells of the body basically into two broad categories.

The epithelial cells and the connective tissue. The epithelium is the layer lining the, lining tubes in the body, like so (indicating). That is an alveola duct, and it has a single layer of cells on it, known as the alveolar duct epithelium. And then gets spread out over very thin, over the inner surface where it has a layer of cells. Now, that is epithelium.

The connective tissue is what is in between here, and it consists of many things, but basically, it has as its predominant cell, component, a cell known as as a fibrocyte, , which comes from a parent cell known as a fibroblast, and the function of the fibroblast is to make a fibrocyte, and the function of a fibrocyte is to make a

substance known as collagen. Goes to many chemicals, it starts off as a chemical known as phyhydroxyproleen, and then it jells, very much you make nylon. It's a jelly at first, and then it solidifies and becomes a solid, so the phyhydroxyproleen becomes collagen, and then that is a solid fiber.

And that's a binding material, and it binds together the different structures in the lung.

Now, in the lung, there is almost no collagen excepting around the little tubes, very little of it there, too. Virtually none here (indicating), because the lung has to be expansile, has to move all the time, and doesn't need any of this stiff stuff which is there for structural strength.

What happens is that when the asbestos fiber gets lodged in here, in the connective tissue, is the fibroblasts are stimulated and fibrocytes are formed, and here they are, in that picture, these little tiny dots, they are the nuclei of the fibrocytes, and they then make collagen fibers. Each one keeps on making more collagen fibers, like a spider walking away, making its web, and it leaves its web behind, and that's all it is.

This never goes away, it doesn't get dissolved, it stays behind. The cell may disappear, but

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this remains behind, and that is the fibrous tissue that forms here and increases and increases, until all of this is fibrous tissue, and then you talk about interstitial fibrosis.

Q What is the significance of this formation of fibrosis to the lung, does it have any adverse effect on the ability of the lung to function, Dr. Schepers?

A Initially, its purpose is to protect the lung. It has a beneficial purpose initially. And, in some respects, it does protect the lung. For instance, it will protect it from cigarette smoke in an asbestos worker.

Later on, something goes wrong with this collagen. The collagen fiber which started off that long originally (indicating), shrinks as it gets older, and it shrinks to one-tenth of its original length.

If I can give you an example, if you know about thongs and rawhide thongs, if you leave them in the sun, they shrink and tighten up and become hard. That's very similar, only to a much worse degree, because it shrinks down to one-tenth of its original length.

As this thing shrinks, it pulls the things together that it is attached to here and there (indicating), so fibrous tissue which is anchored here and

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there (indicating), and shrinks will pull this all together, and one of its effects, then, is finally to collapse these aveoli, so one of the effects of the asbestosis, as we showed in the previous chart, is the collapse of certain portions of the lung, called atelectasis. Eventually, all the air is squeezed out and no breathing can take place into these tubes.

define

And, then, obviously, other portions of the lung have to over-expand and that is the compensatory emphysema that we mentioned, but that is interstitial fibrosis.

Q Dr., does that have any effect on a person who has progressed to that point insofar as their ability to breatheis concerned?

A Oh, yes, it will absolutely eventually stop his breathing, because the work of breathing just gets progressively harder and eventually insufficient air comes into his lungs to be able to provide him with oxygen.

Q Dr., before you sit down, may I ask you, please, sir, to mark that as Exhibit No. 2-C, and I offer that into evidence.

Dr. Schepers, is the disease, asbestosis, a progressive disease?

A Yes sir.

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Q Could you explain to the jury what you mean by progressive disease, or what that term means?

A There are two reasons for its being progressive, and the meaning of the term is as follows:

First of all, because of the permanent nature of the fiber, the asbestos fibril itself, as I explained to you, particularly in the case of amosite and crocidolite, the fiber never goes away, and it doesn't change, from so from start to its finish in the life of a person, it retains the capacity to irritate the cells and evoke more collagen and more fibrocytes.

So, as long as the fiber stays there, it keeps on causing the lung to make more collagen and fibrous tissue. And other things, too, we didn't mention the proliferation of epethelium, and all that stuff, that also happens.

So, that is one explanation for the progressive nature of asbestosis.

The second is this very point I made here. That the collagen which started off being made so long, shrinks, and then it makes changes in the lung, and that causes the disease to progress. If the collagen did not shrink, all it would do would be to sit here as interstitial fibrous tissue and you'd still be able to breathe.

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But since it shrinks and collapses the lung, you squeeze the air out, and that is progression of the disease, so that the condition as it was ten years ago, ten years later is totally different situation.

And the other way it progresses is with reference to epithelium which keeps on being added. That epithelium tends to proliferate, gets more numerous and sheets of epithelium form inside the alveolar spaces here, so, later on, you get epithelization of the lung, or epithelium proliferation, that's another progression. It takes time for that to happen, it doesn't start immediately.

A third thing that happens is that fibrous tissue which is not interstitial -- we've only talked about interstitial so far, but there is also fibrous tissue which is laid down at other places in the lung, in the plura of the lung, around the bronchioles in the lung, around the blood vessels in the lung.

That fibrous tissue will also continue to increase, and it will also shrink, and so, if it is wrapped around the bronchus or bronchioles, supposing we picture the bronchiole as a round structure there, make it in cross section, there's a hole this size, and we have fibrous tissue forming around it (indicating).

Ten years later, it will look like this

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(indicating). The fibrous tissue has increased. There is progressive fibrosis around the bronchiole and collapse of the size or the bore or the caliber of the bronchiole, and now you get obstruction and then you get one of those hyper-inflation type of conditions again, that relate to emphysema.

The opposite can also occur. That's another progression. It's called bronchiectosis. The fibrous tissue between these two, supposing there's fibrous tissue here, and this is another bronchus, this fibrous tissue can shrink, get shorter and shorter, and then, what it will do, as an alternative to that, you'll pull it open like this, and this fibrous tissue will still be around it, so it wouldn't be -- it wouldn't be as strong as the fibrous tissue that was pulling it that way. That fibrous tissue, that is pulling it this way, and this pulling it this way, so this opens up, and then you get a tube that is much wider than before, and that is known as bronchiectosis.

Q Dr., can asbestos bodies cause all those things to happen once a person gets them in their lungs?

A Absolutely. Both in animals, experimentally, and in human beings.

MR. CAMPBELL: Object to the form of that question.

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BY MR. GILLENWATER:

Q Dr., is there any treatment or cure for asbestosis?

A There is none that I know of. In experiments that we conducted many years ago, we tried to use of cortisone, because cortisone, which is one of the chemical substances made by the body itself, is a protective agent, and prolonged use of cortisone in experimental animals and in man, from some cases I've observed, will delay the shrinkage of this collagen.

So, it can retard the consequences of shrinking. That's about the only treatment I know of. Cortisone will also prevent the swelling of the membrane of the bronchi so the air flow will not be resisted as much as later on happens when this thing is narrowed and the epithelium is all crinkled up and swollen.

So, that is about the only drug that has been used. Unfortunately, one cannot administer enough cortisone to a person with asbestosis to do him this much good and then not cause harm by itself.

In a few cases where cortisone has been tried as a treatment for asbestosis, it has led to dreadful complications, necrosis of bone, and had to be stopped. And, then, the disease just picks up again and starts all over

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again.

Q Dr. Schepers, is the disease, asbestosis, a life-threatening disease?

A Yes sir, absolutely.

Q Dr., the opinions that you have expressed there, are they your opinions within a reasonable degree of medical and/or scientific certainty?

A Yes sir.

Q Dr. Schepers, when did you first become involved in asbestos research?

A Essentially, as I briefly mentioned, when I served as a student assistant to Professor Strawn at our university, and observed the research that was going on in our university, which was sort of a leadership place in this field, in the 1930's.

Q What year was that?

A Early 1930's. But I became, professionally, and on a full time basis, so to speak, involved with this, since 1944.

(A recess was taken.)

BY MR. GILLENWATER:

Q Dr. Schepers, earlier, you told us that you came to the United States in 1949, I believe you said to study with Dr. A. J. Lanza?

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A That's correct, sir.

Q What was the nature of your mission, or the purpose in leaving South Africa to come to the United States to study with Dr. Lanza at the New York University, in 1949?

A Well, as I explained, I was awarded a special scholarship, called Commonwealth Scholarship, and in collaboration with the staff at the institution where I worked called the Pneumoconiosis Bureau, the area of special study was selected -- the government of South Africa also continued my salary at the same time. I had a dual responsibility, one to myself and the other to the government.

Q The government of South Africa?

A South Africa, yes. And, so, we agreed that I would use as much of my time in the United States to ascertain firsthand, from the leading authorities in the industrial medical field, what was known here and selectively demonstrated here with respect to the pneumoconiosis and not yet perhaps known to us.

Dr. Lanza was selected by me, more particularly, because his name is very well known to us in South Africa, as a prominent scientific authority in the field of pneumoconiosis. He had authored a very fine book in the subject in the 1938 period, I believe, and I had become aware

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of the fact that he was going to develop an institute of industrial medicine of New York and, therefore, asked to work with him.

I also asked for an opportunity to study at the Saranac Laboratory in New York, which was also world wide known institution at the time, to ascertain what was being researched there, so that I would bring this back to South Africa.

Q What were they researching at Saranac Lake Laboratory, Dr.?

A The research laboratory at Saranac Lake, the Saranac Laboratory, was, at the time, the most prestigious research laboratory in the field of dust-caused diseases and tuberculosis, in this country, in the United States.

Q And the time being?

A At the time when I came to the United States.

Q 1949?

A '49. And, of course, prior to that. And that is why it was particularly important to me to study there. I asked Dr. Lanza if he could place me in touch with institutions like mines and factories, other university scientists who would be knowledgeable in this field, and he

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agreed to do so, and did do so.

Q Dr., as a result of your coming to this country, and your association with Dr. Lanza at New York University, did you, in fact, go to the Saranac Lake Laboratory at Saranac Lake, New York?

A Yes sir, I spent about three months at the laboratory during my year here in this country.

Q Did you meet a doctor at Saranac Lake, named Vorwald?

A Yes sir, I studied with him, and we became personal friends, and I stayed at his home.

Q His full name, I believe, was Leroy U.-- no, I'm sorry. What was his full name?

A Arthur J. Vorwald.

Q Arthur J. Vorwald. What was Dr. Vorwald's connection, in the 1949 era, with Saranac Lake?

A He was, at that time, the director of the laboratory, sir.

Q Did -- based on any firsthand experience you had with Dr. Vorwald at Saranac Lake, did you learn whether or not Saranac Lake had been conducting any experiments in the field of asbestos and asbestosis, on any products, insulation products?

A Yes sir. There had been a long period

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of research at Saranac Lake by Dr. Volwald's predecessor, Dr. Leroy Gardner, who had been deeply involved with research on asbestosis since the early 1930 period, and had indeed published many of the very authoritative animal experimentation studies on this subject.

Q Had Dr. Gardner died before you got to Saranac?

A Yes sir, he died in 1946, I believe.

Q Dr., in connection with your association with Dr. Volwald at Saranac, did you have occasion to observe the experiments that Dr. Volwald and Saranac Lake were conducting, and review any slides of animal tissues and things of that nature --

A Yes sir --

Q -- insofar as any experiments they were conducting with regard to asbestos and its diseases, insofar as insulation materials were concerned?

A Yes. I studied everything I could within that period, and this included reviewing the tissue sections from animals that had been experimentally exposed to various types of substances, including asbestos and hydrocalcium silicate and various other materials that they use in construction and insulation.

And I also studied the tissues of

Animal experiments

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human beings which had been analyzed at Saranac Lake, and many of these had been employees in various industries involving dust exposure.

Q Dr., was one of the purposes for you coming over and going through the Saranac and studying under Dr. Lanza and Dr. Volwald, to prepare a paper for the government of South Africa?

A Yes sir, I had to prepare a special report for the government on what I had observed.

Q Was it your intent to have that paper published when you returned to South Africa after you completed it?

A Yes sir. Yes sir.

Q While you were at Saranac and New York University, during the 1949 period, I'll ask you, Dr., whether or not you met a man named Vandeveer Brown?

A Yes sir, I did.

Q Will you please tell the members of the Court and jury who Mr. Vandeveer Brown was and when you first met him?

A I met Mr. Brown in his office of the Johns-Manville Corporation, I believe, in August of 1950, either August or late July, I forget the precise time. And the reason for meeting with him was

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that I had commenced preparing part of my report, and had discussed components of my report with Dr. Lanza, because I was both with Dr. Lanza in the capacity of being a visitor, and I was also a student at the university. My report substituted as part of the thesis that Dr. Lanza required of me to write on my observations in America.

Thesis 1950

And, in that report, I had mentioned certain observations I had made pertaining to the severity of asbestos type disease that I had observed, both in tissue material seen at Saranac Laboratory, derived from asbestos industries in this country, and also x-rays and other physiological records which had been demonostrated to me by physicians at factories where industrial materials were being developed and where human beings had become exposed to these.

Basis of paper

The findings were astonishing to me, because I had reason to believe that the American industrial institutions were making efforts to suppress dust diseases, and I was astonished to find that with respect to asbestos dust disease, there was far less information I could take back to South Africa to guide us in doing our work better, so that my report, in fact, would have been a condemnation of the type of health control in the industry, asbestos industry in this county, as I observed it in 1940 through '50.

concluded that US industry made little effort to suppress dust diseases

Dr. Lanza was alarmed at what I told

him. He accepted what I told him, and asked me if I would mind repeating all of what I had told him, to this Mr. Brown.

Q Of Johns-Manville Corporation?

A Of Johns-Manville. I did not, at the time, know who Mr. Brown was. I just knew he was an important official of the company, so Dr. Lanza and I both went to visit Mr. Brown, and I then told him what I had observed and what my intended purpose was with my report.

Q What, if anything, did Mr. Vandeveer Brown, of Johns-Manville Corporation, tell you about publishing this paper that you were going to go back to South Africa to do?

A His position was that I did not have the company's permission to reveal this information, and he instructed me not to reveal it, and I clarified to him that I would do so nevertheless.

Critical conversation with Brown

Q Do you know what Mr. Vanderveer Brown's job was with Johns-Manville?

A I did not know at the time what he was. He seemed to me to be a lawyer of some sort. And a highly intelligent man, obviously. And seemed to be very important person in the Johns-Manville Corporation.

Q Did Mr. Brown tell you that before any paper could be published, by you, that he would have to edit

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it?

MR. CAGLE: Object to the form of the question.

BY MR. GILLENWATER:

Q What did Mr. Brown tell you with regard to your publishing of the paper, insofar as he was concerned?

A He said that the only way I could release any information would be if I submitted my report to him for review and criticism, but since he had already expressed an condemnation of it, I declined to do so.

Q Did you then return to South Africa and prepare the paper?

A Yes sir, I did submit it to the Secretary of Mines, and then discovered he had been in communication with the people in the United States --

MR. CAGLE: We object to the testimony of this witness. Hearsay.

A And, so, the report was suppressed.

BY MR. GILLENWATER:

Q By "he", who do you mean?

A The Secretary of Mines.

Q And who had been in touch?

A The Secretary of Mines had been in touch with the -- Dr. Lanza, Mr. Brown and various people.

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MR. CAGLE: Object to this testimony.

BY MR. GILLENWATER:

Q Was that paper of yours, Dr. Schepers, ever published?

A No sir.

Q Did you, after you returned to South Africa, in '49 or '50, come back to the United States?

A Yes sir.

Q When did you return to the United States?

A I returned on invitation of Dr. Lanza, in 1959, December, to consider the position of being appointed as director of the Saranac Laboratory, and --

Q Excuse me, Dr., you said what year?

A December, '53, that's when I came --

Q December of '53.

A That's when I came to review the position, and the government of South Africa wouldn't let me go accept the position, and there was a long struggle, lasting three months, and so, it was April of '54, before I could return to assume the duties.

Q And you assumed the duties of what, Dr.?

A Of director of the Saranac Laboratory, in place of Dr. Vorwald.

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Background cross

1954 Director - Saranac

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Q Now, at that time, when you went to Saranac Lake, in early 1954, could you briefly tell us what the objectives of the Saranac Lake were, and what your duties and responsibilities were at Saranac Lake?

A Yes sir. The -- my duties were those of director of research, as far as the research functions of the laboratory are concerned, and to be an executive vice president, as they called me, of the Trudeau-Saranac Institute, which is a complicated combined corporation that had been created to combine the Trudeau Hospital with the Saranac Laboratory.

And my functions with respect to the latter, were managerial and financial management with respect to research, which was ninety percent of my task. The job was to keep the staff busy doing research on projects assigned to them by virtue of research grants which we had obtained, either from industries or from grant-giving agencies, some from the government, some from private agencies.

We also had contractual duties to perform studies for different industries on matters relating to the health of the employees of the industries. This included engineering studies, radiological surveys, physiological examinations of patients, tissue studies of deceased or operated on patients.

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Q Who were some of the companies, asbestos insulation manufacturing companies, that were involved with Saranac, Dr.?

A The two primary companies that I dealt with, were the Johns-Manville Corporation and the Canadian Asbestos Association people across the border, and to some extent, I never really dissected them separately from Johns-Manville.

Q Would that be the QAMA, Quebec Asbestos Manufacturing --

A That is correct, yes sir.

Q Was Owens-Illinois in any way associated with --

MR. WOLFE: Object to counsel leading the witness.

MR. GILLENWATER: I don't think that's a leading question, but I won't debate it with you.

BY MR. GILLENWATER:

Q Was Owens-Illinois in any way associated with Saranac Lake?

MR. WOLFE: Well, one of the reasons I object, counsel, is because you asked Dr. Schepers as to who he was involved with, and he

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answered two, Johns-Manville and Canadian Asbestos Mining Corporation.

I would suggest, therefore, that you are, in fact, leading the witness.

BY MR. GILLENWATER:

Q Were there any other companies, Dr.?

A Relating to asbestos, they were not called asbestos companies.

Q Maybe I used the wrong term.

A The ones that I can recall. It's now unavoidable for me to remember that there was a company called Owens-Illinois.

Q I didn't mean to suggest it, and I didn't -- properly phrase my question. I apologize.

A A major activity of ours was in relation to the Owens-Illinois Corporation, and some of the work for them involved the study of the substance which had asbestos in it.

So, in a sense, they were one of the groups that had something to do with asbestos.

We also worked with an Owens-Corning Fiberglass Corporation. The primary purpose of working up materials for them, was to study the fiberglass insulating material that they were promoting, and also the structural

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material called fiberglass plastic.

Q How long were you associated with the Saranac Laboratories, Dr. Schepers?

A From 1954 through to 1957, June, at which time, I left for the University of Michigan, but I continued working up research studies for companies that had contracts with the laboratory, which was in the process of closing at that time.

I continued completing those research studies through to 1960. The main groups were Owens-Illinois and Owens-Corning.

And I also completed research studies for the DuPont Company that had projects going there. Of course, I joined DuPont by then, so I probably did it because of my prior association with DuPont, and current.

And I continued my work for the Pittsburgh Plate Glass Company, now known as PPG Company, and I'm still working for them, still based on the research that I conducted for them at Saranac Lake, and the paper I said earlier I finished on December 31, is for the PPG Company.

Q Dr., in 1949, and again in 1954 through 1957, did you learn whether or not any research was being done at Saranac Lake on behalf of the Owens-Illinois Company,

Continuing research studies today

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with regard to asbestos?

A Yes sir.

Q When did you first learn that?

A Early in 1954, Dr. Shook, the medical director of Owens-Illinois, and Mr. Hazard, William Hazard, I believe he was an engineer, came to see me --

Q Who was Mr. Hazard with?

A He was also with Owens-Illinois, one of their engineer-type biologists.

And they asked me if I would reveal the tissue sections and write a report for them on a study which had been conducted by Dr. Gardner, between 1943 and 1947, I believe, and the substance to be studied was generally known as material called Kaylo, and known technically as hydrous calcium silicate.

I did review these tissues. We had to cut new sections for them, because Dr. Vorwald had taken the original tissues with him, and, so, it took to about the early 1955, before I finished that report. Then, I presented the findings at the conference which was held there, in Saranac Lake, and a conference which I had organized, called the McIntyre-Saranac Conference. I believe it was in February, 1955.

Q Dr. Schepers, had Dr. Vorwald done some

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studies while he was at Saranac on the Kaylo hydrous calcium silicate product?

A I discovered that later. I did not know it at the time. I found later that he had reviewed the studies which Dr. Gardner had completed prior to his death.

Q As a result of your conversations with Dr. Shook and Mr. Hazard, did you review the literature that was available at the Saranac Laboratories, with regard to the investigation by Owens-Illinois, or by Saranac Lake, on behalf of Owens-Illinois?

A Yes sir, I did.

Q Into the hydrous calcium or Kaylo product?

A Yes sir.

Q I hand you a letter marked Exhibit S-3, and ask you if you can identify that.

A Yes, I can identify it. It's a letter from a Mr. Bowes, whose title is director of research for the Owens-Illinois Glass Company, and it's written to Dr. Leroy Gardner of the Saranac Laboratory, on February 12, 1943, and provides him with information relating to hydrous calcium silicate.

Q Does that ask that any investigation be conducted with regard to hydrous calcium silicate?

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A Yes sir, it does.

Q Does it ask that any particular attention be paid to any type workers or people using --

A Well, he asked the following: He says, "The following points merit consideration: Does the hydrous calcium silicate of itself constitute any air hazard from an air hygiene standpoint; (2) Are the few residual particles of silica of such size and frequency as to constitute a hazard; (3) It should be considered from the standpoint of employees working in the plant where the material is made or where it may be sawed to desired dimensions, and also considered from the standpoint of applicators or erectors at the point of use."

Q Dr., did you see that letter during the period of time that you were at Saranac Lake Labor, 1954 --

A Yes sir, I saw this, I believe in 1955, somewhere around there.

Q And was that letter among the records of Saranac kept in the ordinary and normal course of business?

A Yes sir.

MR. GILLENWATER: I ask that that be introduced as Exhibit No. S-3.

BY MR. GILLENWATER:

Q Dr., also in connection with your review

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of the materials at Saranac during that period of time, 1954-1957, I'll ask you whether you saw another letter dated November 16, 1948, from Mr. Bowes -- to Mr. Bowes, from Dr. Vorwald.

I have marked it as Exhibit No. S-4.

A Yes, I have seen this letter before.

Q Does that letter transmit to Mr. Bowes, of Owens-Illinois, a report?

A It refers to three copies of a report on the results of animal experiments with Kaylo dust.

Q Let me show you Exhibit No. S-5, and ask you if that is the report the letter refers to?

A Yes sir, the letter refers to the copies of the report as being an interim report, dated October 30, '47, and this refers to an interim report, of same title, October 30, 19 -- either '47 or '48, looks like a 7 is struck over the 8, so it's either of the two.

Q Dr., would you please refer to the letter and read the last paragraph of the letter for us?

A Of the report?

Q Of the letter.

A Of the letter. The last paragraph is on Page 3, and the letter is dated November 16, '48, and Dr. Vorwald writes to Mr. Bowes as follows:

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"I realize that our findings regarding Kaylo are less favorable than anticipated. However, since Kaylo is capable of producing asbestosis, it is better to discover it now in animals rather than later in industrial workers. Thus the company, being forewarned, will be in a better position to institute adequate control measures for safeguarding exposed employees and protecting its own." interests."

Q Dr., did you see those letters in the records at Saranac Lake Laboratory, when you were there in the 1954 to '57 period?

A Yes sir.

Q Were they kept in the ordinary and normal course of business?

A Yes sir.

MR. GILLENWATER: I'll ask that those Exhibit Nos. S-4 and S-5 be offered in evidence.

BY MR. GILLENWATER:

Q Dr., I have another letter, dated February 7, 1952, from Dr. Vorwald, to Mr. Hazard of the Owens-Illinois Company, that I had marked Exhibit S-6, and ask you to look at that letter and tell us whether or not in your review of the records at the Saranac Lab, during the period, 1954-1957, you had occasion to see that letter?

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A Yes, I have seen this letter before.

Q And was that letter kept in the ordinary and normal course of business at Saranac Lab?

A Yes, it was kept with the Kaylo file.

MR. GILLENWATER: I would ask that that be introduced as Exhibit No. 7-S.

BY MR. GILLENWATER:

Q Is that Exhibit No. 7, Dr.?

A S-6.

Q S-6, I'm sorry. And I show you a document entitled Investigation Concerning the Capacity of Inhaled Kaylo Dust to Injury the Lung." It's dated January 30, 1952; it's marked Exhibit S-7, and ask you if you saw that letter in 1954 era when you were at Saranac Lake, and if that letter was kept in the ordinary and normal course of business?

MR. WOLFE: Counsel, that is improperly identified as a letter.

MR. GILLENWATER: It's a report, I'm sorry.

MR. WOLFE: As a matter of fact, it is a report, and should be so identified.

MR. GILLENWATER: I'm sorry, I meant to say report, and I apologize.

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A I concur that this is a report and not a letter. Yes, I have seen this report before. It is one of the reports of the laboratory, that were filed with the Kaylo materials.

MR. GILLENWATER: Introduce that as Exhibit No. S-7.

BY MR. GILLENWATER:

Q And, lastly, with reference the material at Saranac, I show you Exhibit No. S-8, which is a letter from Mr. Hazard of the Owens-Illinois Company, to Dr. A. J. Vorwald, and ask you if you saw that letter while you were at Saranac Lake in the 1954 era?

MR. WOLFE: Counsel, what is the date of this document. I didn't hear your statement.

A It's January -- may I answer Mr. --

MR. WOLFE: Dr. Schepers, I'm referring to the last exhibit that counsel that handed to you.

A It's dated September 21, '48. Yes, I have seen this letter before, too.

MR. GILLENWATER: I introduce that as Exhibit No. S-8.

BY MR. GILLENWATER:

Q Dr., while you were at Saranac Lake,

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did any companies manufacturing asbestos-contained insulation materials, or involved with asbestos, ask you to prepare, to examine documents, give opinions and prepare reports with reference to the health of their employees?

A Yes sir.

Q I show you what's marked as Collective Exhibit No. S-9, and ask you if you can identify these?

A Yes sir, these are all reports I wrote for different organizations, or doctors, or lawyers, or institutions, relating to health matters of mostly deceased persons.

Q Could you just name some of the companies that you prepared those reports for?

A Well, number one is, the first one on this list is called OCD 75, and this a report on a deceased person called Taylor, and it's a report to a legal firm called Olson and Olson of Pasco, Washington State.

The second report is on a John Sayrwil and it is a report to the Johns-Manville Corporation, and I mention Dr. DuBow, and Mr. Jackson, and a Dr. Gewanter, as persons who were involved with the report and materials sent to me.

Q Who was Mr. Jackson?

A Mr. Jackson was, I believe an industrial

Includes many pts done for JM 1954-57 See next p. 60

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engineer for the Johns-Manville Corporation, at that time. However, I didn't send him this report in that capacity. There was another reason for it.

Do you want me to read more?

Q I'd just appreciate it if you'd tell us the names of some of the companies that ordered these reports.

A Just the names, now, here's a Johns-Manville; here's the Veterans Administration; here's a private doctor, Dr. Ormsby; here's a Johns-Manville Corporation; this is the Thetford of the Quebec Mines; here's Robert Green, Associate Dean of Student Affairs at the University of Michigan; Johns-Manville Corporation; Thetford Industrial Clinic in Quebec; Johns-Manville of Waukegan, Illinois; Johns-Manville at Nashua, New Hampshire, or so it seems; Johns-Manville Corporation relating to some Quebec cases; Johns-Manville Corporation; again the Thetford Clinic and the counsel for the Quebec Asbestos Asscciation; again the same; counsel for Quebec Asbestos Association and the Thetford Clinic; again another one, same kind; Johns-Manville Corporation; Johns-Manville Corporation.

Q Are those all of the reports you did, Dr., or were there more?

A Oh, no, this is a small fraction of the

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reports I did. These are selected cases which I had retained in my records for research purposes, because I found interesting things in the, in the tissues, that I wanted to write about.

Q Now, we mentioned Mr. Jackson of Johns-Manville Corporation. Do you know Mr. Jackson's full name?

A Yes, I got to know him in 1954.

Q What was his name?

A Hugh Jackson.

Q And you actually met Mr. Jackson?

A Yes sir.

Q Did Mr. Jackson receive -- what company was Mr. Jackson with?

A He was with the Johns-Manville Corporation at the time I met him.

Q Did Mr. Jackson, with the Johns-Manville Corporation, receive copies of all such reports like those that you did and submitted?

A All reports relating to asbestosis were sent to Mr. Jackson?

Q Why was that, Dr. Schepers?

A Well, it's for a special reason. I attended a meeting of the Asbestos Textile Institute, at their invitation, in October of 1954, I believe, and at that

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meeting, there was some discussion about the possibility that some frivolous claims, law suits, were being made against asbestos manufacturers and users, and that the doctors were encouraging lawyers to make law suits, by not providing adequate scientific evidence that the people actually do have asbestosis.

And, at that meeting, it was agreed that the Saranac Laboratory, with me as their current leader, wouldserve as a resource institution to which the different participating members of the Asbestos Textile Institute, or anybody else who wished to, could refer problem cases, people who died or people who become sick from whom tissues had been recovered, and where the question of possible asbestosis might be at issue.

Did Co's really turn to Saranac for "accurate diagnosis"?

And, it was then agreed that I would report back to the Asbestos Textile Institute, on my findings, after we had done a large number of these. The purpose of it was to review the situation and come to a conclusion as to which direction to go, and Mr. Jackson was the secretary of that society, and it was agreed that I should send reports to him for distribution to the members of the society, because they were constantly changing with different names, and he kept the records of that.

Q Dr., look at the top report, if you

would, please, the one involving the man named Taylor, dated 1955, and just as an example, tell us a little something about that, what the history was, what the findings were.

A Well, this is a deceased person whose tissues were referred to me from Pasco, Washington State. And in this case, I received not only the tissues but also the x-rays and so on.

And, in this case, the employee, the deceased employee, had -- there was a question whether he had asbestosis or not, and to make a long story short, a very short history of working as an asbestos mechanic, for various insulating companies and shipyards, was developed, five years and six months.

Q That was his length of employment?

A That was the length of his employment, and the period of the asbestos exposure was '43 through to '52 period.

The man died in June, '53, and the finding was that he had asbestosis as the primary disease.

Q What is the date of that report, Dr. Schepers?

A My report is dated November 5, 1956.

Q Was that report sent to Mr. Hugh Jackson of the Johns-Manville Corporation?

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A Yes sir.

MR. GILLENWATER: I'll ask that those documents be introduced as Collective Exhibit No. 9.

BY MR. GILLENWATER:

Q Dr., during your tenure as director at the Saranac Lab, did you do research or have contact with the Owens-Corning Fiberglass Company personnel?

A Yes sir, I did.

Q During that period of time, did you have an opportunity to discuss with the Owens-Corning Fiberglass personnel any of the hazards associated with breathing of asbestos products?

MR. CAMPBELL: Objection to the form of the question.

BY MR. GILLENWATER:

Q Did you discuss with any personnel of Owens-Illinois, anything about asbestos?

A Yes sir, the Owens-Corning Corporation had submitted for our research, the material known as fiberglass plastic. There are two forms of this, the sheet fiberglass plastic, which had one kind of filler, and formed, molded fiberglass plastic, which had another kind of filler. This material was very similar, from my

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point of view and their point of view, to the other material which I had studied for the Owens-Illinois Corporation, namely, the hydrous calcium silicate, because this was also molded material which had, instead of fiberglass, asbestos as a filler.

And the Owens-Corning Corporation was promoting the acceptance of the fiberglass plastic as a structural material, for use in industry and automobiles, boats.

And during the course of the studies, we made certain observations, because of the similarities of glass fibers, to some extent, to asbestos, we had to have a standard of reference, to be able to see whether the effects of glass fibers on the lungs would be comparable in any way, to asbestos effects on the lungs.

And in order to explain to the staff of the Owens-Corning Corporation, what the tissue effects meant as found in the animals that had been exposed to fiberglass dust, I had to do so by explaining to them, and just supposing, in these explanations, the typical tissue reactions to asbestos, and I used, for this purpose, our experiments with the Kaylo because it has the similarity to the fiberglass plastic, in that it was also another substance diluted with a fibrous silicate, the glass, and Kaylo was a substance

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diluted with asbestos as a fibrous silicate.

Q Who did you have -- excuse me, I didn't mean to interrupt. Who did you have these conversations with that were representatives of the Owens-Corning Fiberglass Company?

A There were many officials of the company that I discussed this with, but the only name that now clearly comes to mind, after the passage of so much time, is a Dr. Charles Bishop, who was one of the medical officers, and he was a frequent visitor to the Saranac Laboratory, and I frequently visited with him, to review matters.

There was also an engineer from Notre Dame University, who was a consultant of theirs on this matter, and we reviewed this with him, and this particularly occurred during the period when I was completing the report for them, while I was at the University of Michigan, because Notre Dame and Michigan are so close together, we could frequently meet with one another.

There were others, a large number of them. I remember making a presentation very similar to the presentation I'm making here today, at a place called Granville Inn, in Granville, Ohio, in which I discussed and compared the different effects of fiberglass plastic dust to the Kaylo dust and asbestos dust and silica dust.

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Q Dr. Schepers, what did you tell these representatives of Owens-Corning Fiberglass, about asbestos?

A Well, I encouraged them, as best I could, to promote the concept of substituting glass fibers for asbestos fibers.

Q Why?

A For the simple reason that the asbestos is clearly harmful, that even if you diluted it in such a substance as hydrous calcium silicate, where you would think the fibers would remain locked into the baked product, the body seemed to have the ability to dissect those asbestos fibers out from the rest of the material, and still be hurt by it.

And there was a discussion at the time, whether it wouldn't be a nice idea to make fiberglass plastic, not from fiberglass, but from asbestos, and I tried my level best to discourage that, showed the scientists of Owens-Corning how the body would even take the fiberglass particles, separate the glass fibers from the plastic fibers, dispose of the plastic, retain the glass fibers, but since glass fibers were not harmful, that didn't amount to very much.

Whereas, if they had mixed asbestos in instead of glass, I would have expected to find the same

REDACTED

result as was found with Kaylo.

Q Dr., did you have any conversation with these people at Owens-Corning Fiberglass about asbestos in their finished products, comparing asbestos -- I'm sorry?

MR. CAMPBELL: Object to the form of the question.

BY MR. GILLENWATER:

Q Dr., did you have any conversation with any representatives of Owens-Illinois about asbestos in the finished product?

MR. WOLFE: Counsel, are you referring to Owens-Illinois or are you referring to Owens-Corning?

MR. GILLENWATER: I'm sorry, I meant to say Owens-Corning Fiberglass.

Let me strike the question and do it again.

BY MR. GILLENWATER:

Q Dr., did you have any conversation with the representatives of Owens-Corning Fiberglass, about asbestos in any finished insulation products?

MR. CAMPBELL: Same objection.

A If I am permitted to reply, I would say that the product we studied was a finished product. The

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material they gave us to study, one of them was automobile bodies. We ground up the automobile body and made dust out of it, they did it for us.

So, the discussion of finished products and how this could be used and how people could be hurt by it, and the differences between the harm that could come to their employees, while making the product, as compared to the harm that could come to people who would be sanding, and shaping, and cutting and sawing and drilling, through finished product, that was a frequently occurring thing.

Q Did you discuss with them insulation materials?

MR. CAMPBELL: Object to the form of the question.

A Well, only in the sense that to compare the fiberglass product with the Kaylo product, one would say, well, if you use it in like manner, you would also create dust, and the dust would contain asbestos, so in fairness, asbestos dust would appear as harmful.

(A recess was taken.)

BY MR. GILLENWATER:

Q Dr. Schepers, I hand you article entitled, "Effect of Inhaled Commercial Hydrous Calcium Silicate Dust on Animal Tissues", marked Exhibit S-10, and

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ask you if you can identify that document, please, sir?

A Yes, I can.

Q Who is the author of that document?

A I wrote this paper, and I wrote it in collaboration with Mr. Thomas Durkan and Mr. Anthony Delahant, both of the Saranac Laboratory.

Q What was the reason for you writing that article, sir?

A This was the report which Dr. Shook and Mr. Hazard had asked me to develop from the analysis of the animal tissues which had been exposed to the hydrous calcium silicate in prior years, under the direction of Dr. Cardner.

Q Dr. Schepers, what is hydrous calcium silicate, does it have a trade name?

A Well, it is more popularly known by the trade name of Kaylo. In the laboratory, we just call it K-lo, but in the trade, it is known, sold under the trade name Kaylo, K-a-y-l-o.

Q Do you know the name of the asbestos manufacturing company that produced Kaylo?

A At the time when this study was made, the manufacturer was Owens-Illinois Glass Company.

Q Could you tell us what Kaylo was, or is?

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What kind of material.

A The Kaylo is a microcrystalline product of calcium and silica, which is manufactured in a special way, so that the microcrystals are separated by little spaces, and this manner of making the substance, enables it to be lightweight and bulky and thus serve as an insulating material, and a strong insulating material, because it can be baked into a pre-molded form.

Q Did that material contain asbestos?

A Yes. In Kaylo, of this experiment, about fifteen percent of its contents was chrysotile asbestos.

Q Did it have any amosite in it?

A In this experiment, there was no amosite in the raw material, but in some of the samples of the hydrous calcium silicate, we obtained from the Owens-Illinois Corporation, ther were variable quantities of amosite, up to forty percent.

MR. GILLENWATER: I ask that that be introduced as evidence as Exhibit No. S-10.

BY MR. GILLENWATER:

Q Dr., prior to writing that report, did you do any experiments, or conduct any studies, with the product called hydrous calcium silicate, Kaylo?

A I did not do the experiment. The experiment was done entirely by Dr. Gardner and his two assistants who are cited in this paper, namely, Thomas Durkan and Anthony Delahant.

Dr. Gardner died before the animal phase of the study was completed. Dr. Vorwald was appointed as his successor, but there was a time interval, so that the total experimental phase was completed prior to Dr. Vorwald's arrival.

And, then, when I got involved with this, the study had already been finished some years ago, and I was only asked to review the tissue sections in collaboration with Mr. Delahant and Mr. Durkan.

Q Did you conduct any studies using Kaylo dust similar to the studies that Dr. Gardner and Dr. Vorwald conducted?

A The analysis of the tissues is, of course, identical, the identical scientific process, to that which Dr. Vorwald had conducted.

I do not know whether Dr. Gardner ever had an opportunity to review any of the animal experiments himself. He was involved with setting up the experiment, designing it, ordering it to be done, and obtaining the financing for it, and getting it started, but he died before

it was completed.

Q Well, did you conduct any studies similar to those that Dr. Gardner or Vorwald had conducted in animal dust experiments or injection experiments?

A I did studies similar to that, but not on Kaylo, but on other substances.

Q Dr., could you tell us what the term, T.L.V., means?

A I believe the "K" is the -- an engineering term referring to the ability of the material to resist the --

MR. WOLFE: Object to the answer of Dr. Schepers, in that I think he misunderstood the question.

A Oh, possibly.

BY MR. GILLENWATER:

Q I asked you if you could tell us -- you thought I said "Kaylo", and I said "T.L.V." Could you tell us what the term, T.L.V., means?

A Oh, T.L.V., I'm sorry.

Q I think you just misunderstood the question.

A I thought I was deaf in this ear, but it seems I'm deaf in that ear. Sorry.

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T.L.V. means threshold limit value. It's an abbreviation for that term. And threshold limit value is an arbitrarily selected number assigned to any product under discussion. It could be a count of dust particles; it could be quantity of chemical or gas or fluid, and it is the theoretical limit above which industrial exposure of human beings is likely to invariably to cause harm.

Q Dr., taking the number five million particles per cubic foot, would it be possible for the naked eye to see dust concentrations of five million particles per cubic foot?

A No sir, they would be invisible.

Q Dr. Schepers, based upon your work before coming to the United States, the contacts you had with representatives of various asbestos industries, the scientists that you had contact with concerning asbestos, please tell us whether or not there was ever any distinction made between people who were exposed to asbestos dust.

A Not that I know of. Did I understand your question correctly, perhaps?

Q Well, what I'm asking is, was there ever any distinction made, by any of these scientists that you worked with, or any representatives of industries, as to

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the jobs that people performed and the hazards that they may be associated to, with reference to breathing asbestos dust.

A There was no distinction made. Articles had been written and discussions have been held about selective hazards relating to selective and special occupations, but it is generally assumed, by all people that I know who are knowledgeable in this field, that a human being will react in identical manner on the inhalation of the same substance, no matter where and how the inhalation occurs.

Q Dr. Schepers, are you familiar with an organization called the Industrial Hygiene Foundation?

A Yes sir.

Q Will you please tell us what it is?

A Well, Industrial Hygiene Foundation, now called the Industrial Health Foundation, I believe, was at the time when I was frequently associated with them, which was from the 1950's on, when I first became acquainted with them, a collective effort institute based on the Melon Institute at Pittsburgh, funded by subscriptions, voluntary subscriptions by voluntary members, who are representatives of various industries.

At one time, I knew of about two hundred such industry members, who made contributions to the

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finances of the institute, and used institute at various times, to conduct elements of research for them.

Q Were any members of the asbestos producing or manufacturing community members of the IHF?

A As far as I know, yes sir.

Q Dr., let me hand you what has been previously marked Collective Exhibit S-11, and ask you if you can identify those documents?

A Yes sir, I know what these are.

Q Would you please tell us what they are?

A This is an abstract series that was one of the products of the Industrial Hygiene Foundation, and one of the benefits of being a member of the society, would be that the library of the institute in Pittsburgh, would develop these abstracts on selected topics, and would disseminate them to members of the society.

Q Dr., please --

A This seems to be a collection of, from what it seems like to me, strangely enough, asbestosis.

MR. GILLENWATER: I would ask that that be marked as Exhibit No. S-11.

BY MR. GILLENWATER:

Q Let me show you an exhibit marked S-12, and ask you to briefly compare this with those documents, and

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tell us whether or not that is an index of those documents that you have just identified.

A Yes sir, it appears to be a serial index, numbered sequentially from 1 to 220, starting with the date of 1929, and going through to the date of 1964, and the topic, as I've mentioned, is asbestosis and asbestos-related diseases.

MR. GILLENWATER: I ask that the index be marked as Exhibit No. 12.

BY MR. GILLENWATER:

Q Dr. Schepers -- or introduced in evidence as Exhibit No. 12, I should say.

Dr. Schepers, was there any medical literature published in the 1930's, 1940's, 1950's and up to 1964, in accepted and recognized medical journals or publications, to indicate people in the work place, using asbestos insulation materials, that is, cutting, sawing, routing, mixing, installing, applying and tearing out, were at risk to develop, were at risk and exposed to asbestos, to the extent that they would develop asbestosis?

MR. CAMPBELL: Object to it as leading.

A There is considerable literature on that subject. You're referring to construction workers and insulation workers, and so on, yes, there's considerable

literature on that.

Q Dr., so that I can be perfectly clear in my record, let me ask, again, the question.

Was there medical literature published in recognized and accepted medical journals, from 1930 up to 1954, indicating -- '64 -- indicating people in the work place were at risk --

A Yes sir.

MR. CAMPBELL: Same objection.

MR. CAGLE: Objection to the form.

BY MR. GILLENWATER:

Q Let me show you a series of documents marked Collective Exhibit No. 13, and ask you to take, to look at those, if you will, please, sir, and tell us whether or not -- what they are, first.

A This group of Xerox copies before me, titled "S-13", start with Chapter 15, Asbestos Industry Regulations, 1931, and continue on with such titles as Silicosis and Asbestosis, Home Office, Memorandum on Industrial Diseases, 1932.

Journal of Industrial Hygiene --

Q Dr., let me try to save a little time. Do you recognize those as being the same documents that we previously reviewed before your deposition?

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A That is correct, yes sir.

Q Are those documents published in recognized and accepted medical journals?

A Yes sir.

Q Were those documents available at or about the time they're dated, to the medical and scientific or industrial community, for inspection?

A Approximately the dates that are stated on here, within a year from them, they would be available, either to subscribers or in the libraries.

Q Dr., do all those documents deal with the subject, asbestosis?

A They --

Q And other related things.

A They appear to deal with the diseases which may result from exposure to asbestos dust.

MR. GILLENWATER: I ask that the Collective Exhibit No. 13 be introduced in evidence.

BY MR. GILLENWATER:

Q Dr., let me show you Exhibit No. S-14 -- I should have shown this to you a moment ago, and ask you if this is an index of those articles?

A Yes sir, this is an index.

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Q And, Dr., based on your review of the documents shown in Collective Exhibit No. 13, ask you whether or not all those documents were published before 1964.

A They were all 1964. There is a reference on the index of a paper by Enterline, in 1979, I'm sure it is there by error, but the series starts with articles dated '31, and No. 59 is an article dated 1963, and that is the second from last, the last one is '79.

Q Dr. Schepers, will you tell the members of the Court and jury what the Journal of the American Medical Association is?

A Yes sir. The American Medical Association is a medical society, to which many American physicians belong. At one time, it was mandatory for physicians to belong to it, but that's no longer so.

And one of the functions of the American Medical Association, is to produce a journal, a medical journal which has been of worldwide significance for at least as long as I have been involved with medicine, since early 1930's. It's a very prestigious journal.

Q What was its stature in 1949, specifically, Dr. Schepers?

A Around the 1949 period, this journal was of much greater significance in this country and

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internationally, than it may be today. And the reason for my making that distinction is that in the 1949 and prior era, there were far fewer medical journals. Today, there are so many sub-speciality journals, there are hundreds of them, that it is possible for doctors to subscribe only to their sub-speciality journals and not bother with the American Medical Association Journal, and the American Medical Association Journal has shrunk somewhat in size, and its status, but in the 1949 era, it was the most prestigious journal relating to medical matters in the United States and probably in the world.

AMA Journal

Q I hand you a document from the Journal of the American Medical Association, dated November 15, 1949, marked Exhibit S-15, and ask you if you can identify that?

A Yes sir, I know this article.

MR. GILLENWATER: Dr. Schepers, I would ask that that copy of the article be marked -- be introduced in evidence.

BY MR. GILLENWATER:

Q Dr. Schepers, I have a blowup of that article that is being -- a blowup of that article, and I would ask that that document be marked as Collective -- as Exhibit No. 15-C.

MR. WOLFE: Counsel, may we go off the

record for a moment?

MR. GILLENWATER: Yes.

MR. WOLFE: For the transcript, but not for the video tape, the article you're about to introduce, deals with cancer, the subject matter of a separate case. Proceed at your own risk.

(Off the record discussion)

MR. WOLFE: The record shows the objection, and now, we will go back to the video tape.

BY MR. GILLENWATER:

Q Dr., referring back to Collective Exhibit 13, the medical articles, I'll ask you whether or not any of those medical articles discuss workers exposed to asbestos dust, whose jobs were such things as coating lead pipes, insulators, people in the work place where the insulation materials were being used?

A Yes sir, they do.

MR. GILLENWATER: Dr. Schepers, are you aware of an unpublished report, dated June, 1947, for the Industrial Hygiene Foundation of American, Incorporated, entitled "Report of Preliminary Dust Investigation for Asbestos Textile Institute, June, 1947, by W. C. L. Hemeon?

A Yes sir.

Q I hand you a document marked Exhibit 17, and ask you if you can identify that document? First, let me ask you, before I introduce that.

Did you know Dr. Hemeon?

A Yes, I did, sir.

Q When did you first meet Dr. Hemeon?

A I believe in 1949 or early 1950, when I had my first opportunity to visit with the Industrial Hygiene Foundation in Pittsburgh.

Q Let me show you a copy of a photograph that's marked Exhibit No. 16, and see if you can identify that, please, sir.

A Yes. This is -- it's a photograph of three distinguished looking gentlemen, one of whom is myself. And it's at a chemical toxilogical conference held at the Industrial Hygiene Foundation, and if I'm not mistaken, one of these smart looking fellow is Hemeon.

Q Which one is Dr. Hemeon?

A I've forgotten now which one he is, either this one or that one (indicating). I haven't seen him in years.

Q All right. Dr. --

A I had a conference with him and some other fellows at the time.

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MR. GILLENWATER: I introduce that as Exhibit No. 16.

BY MR. GILLENWATER:

Q Now, Dr., with reference to the article that I handed to you a moment ago, which was Exhibit No. 17, do you recognize that as the report done by Dr. Hemeon?

A Yes sir.

Q Do you know the circumstances, of your own knowledge, under which that report was submitted?

A Well, this report, if I recall correctly, was the result of a special study of practices of health care and dust containment in the asbestos textile industry, and I -- from what I recall, it was prompted by the Asbestos Textile Institute, it was done on their behalf.

MR. GILLENWATER: I introduce that as Exhibit No. 17.

BY MR. GILLENWATER:

Q Dr. Schepers --

MR. WOLFE: Counsel, excuse me, it should be 16.

A This is 17. They dignified this as 16 (indicating).

MR. WOLFE: My error.

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BY MR. GILLENWATER:

Q Dr. Schepers, at any time, either 1949, or 1954, did you discuss with respresentatives of industry, the placing of warning labels on their asbestos-contained insulation materials?

A Yes sir, I did.

Q Would you please tell us who you had those discussions with, about when they were had, and what companies the individuals represented?

A The main person with whom I had such discussions, was a Dr. Kenneth Smith, who, at the time, was the chief medical director of the Johns-Manville Corporation, in New York headquarters.

Dr. Smith was a frequent visitor to the Saranac Laboratory, and I often saw him in New York or at various meetings.

Q What period of time was this?

A This was in the period of time after I became the director of the Saranac Laboratory, through later beyond my --

Q Commencing 1954?

A Commencing '54, and extending beyond that period of time, to '60.

The circumstances that brought about

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this discussion was that the company had, at that time, a product known as Celite, spelled C-e-l-i-t-e, and because of the hazardous nature of Celite, discussions and planning had been initiated to label the product containers with some information on what Celite is likely to do to human beings, based on animal experience and human experience.

And during those discussions, again, we had to make a -- Dr. Smith consulted me about this, and to arrive at a standard of what words to select to put on the warning instructions on the containers, again, we had to make a comparison with something else, so that there would be a standard, and in this process, we discussed how Celite might compare in its effects with silica, asbestos and similar products --

And we, at that time, discussed whether it wouldn't be advisable, also, to warn the public of hazardous nature of asbestos, because it was my opinion that the harm that could come from asbestos could be more insidious than the harm that could come from Celite, and it was in that spirit and under those circumstances, that I discussed this with Dr. Smith.

I had no official role, I was not part of the government at the time, I was just private citizen, scientist, consultant, talking to another colleague.

Q Did you specifically discuss with Dr. Smith, the placing of warning or caution labels on the asbestos-contained insulation materials manufactured by Johns-Manville?

MR. CAGLE: Object to the form of the question.

A I can't recall that it was all that specific. We discussed the need to say to the public, and in relation to whatever product contained asbestos, what the hazard would be from the inhalation of the material.

So, naturally, that would embrace construction or insulation materials, as well as other things that might be made.

Dr. Smith was -- my impression of Dr. Smith was that he was equally interested in achieving this objective. He considered it to be a desirable thing, and we had quite a number of detailed discussions on what might be done.

What happened to it, I'm not sure.

(A recess was taken.)

MR. GILLENWATER: On behalf of the plaintiffs, at this time, we would voluntarily withdraw Exhibit S-15 and 15-C, the J.A.M.A., 1949 article, and the blowup of that article,

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subject to further ruling from the Court.

In the event the Court should sustain our position with regard to the cancer issue, then, in that event, we would want to put the document back in at the time that we introduce the documents.

BY MR. GILLENWATER:

Q Dr. Schepers, from your education and experience, studies in the field of asbestos, do you have an opinion within a reasonable degree of scientific certainty, as to when the asbestos insulation manufacturers should have known, through the available medical and scientific literature, that construction workers exposed to finished insulation products, were at risk to contract the disease of asbestosis?

MR. CAMPBELL: Object to the form.

A I do have such an opinion.

BY MR. GILLENWATER:

Q Would you please tell us what your opinion is, Dr. Schepers?

A My opinion is that the knowledge that any form of asbestos inhaled in any manner, was available in the scientific and medical literature, conclusively, from the early 1930's, onwards.

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And that there is essentially no difference between any named occupation -- you named a specific one, construction or insulation manufacturing, and any other industry involved with asbestos, in the sense that if any aspects of working with a product, whether making the primary product, or using the product, involves the generation of dust, so that persons may inhale that dust, it was known from the 1930's on, that such persons could and probably would develop asbestosis.

MR. GILLENWATER: Thank you, Dr. That concludes my direct examination of Dr. Schepers.

Sworn to before me this ____ day of _____, 1980.

_____
Notary Public at Large

My commission expires 1-19-81.

Any activity generates dust - dust causes asbestosis (But cross on time spent in areas of dust) - as well as conflicts in MT's

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