We will be proceeding today until 5 minutes to 12, and then we are going to take a break until 3:30 and we will resume at 3:30.

The reason for that is that I have a funeral that I have to attend in Annapolis at 1:00, so I have got to leave here at 12:00 in order to be there on time, and after the funeral I will return and then we will continue with the balance of the presentation of the plaintiff's case, with the exception of one live witness that they will put on on Monday afternoon.

Is that my understanding?

MR. IGNATOWSKI: That is what we are trying to do, yes, Your Honor.

THE COURT: All right.

So you will have from 12:00 until 3:30; so you will be excused at that time and return to the jury room.

In fact, I could probably make it at 3 o'clock, so we will have from 3:00 to 4:30.

If you will be back at 2:45, we will go from 3:00 to 4:30; is that acceptable?

THE JURY: Yes.

THE COURT: Then we will conclude the balance of the plaintiffs' presentation.

Mr. Smith.

MR. SMITH: Good morning, Your Honor.

THE COURT: Good morning, sir.

MR. SMITH: Good morning, ladies and gentlemen.

THE JURY: Good morning.

MR. SMITH: At this time the plaintiffs in the Grewe case call Dr. James Millette.

(Whereupon, witness present.)

WITNESS ON STAND

Whereupon,

DR. JAMES R. MILLETTE,

the witness herein, being first duly sworn to testify the truth, the whole truth, and nothing but the truth, was examined and testified as follows:

THE COURT CLERK: State your name and your business address, for the record.

THE WITNESS: James R. Millette, the company

is MVA, we are in Norcross, Georgia.

THE COURT CLERK: How do you spell your last name, sir?

THE WITNESS: That is M-i-l-l-e-t-t-e.

THE COURT CLERK: Thank you.

DIRECT EXAMINATION

BY MR. SMITH:

Q Good morning, Dr. Millette.

A Good morning.

Q Can you please tell us what your present occupation is?

A I work for a company called MVA. We are an analytical laboratory that does research and consulting primarily with particle contamination questions.

We work on a variety of different projects dealing with identification and counting of small particles, and maybe contaminants and maybe materials oriented.

We use a lot of microscopes and other techniques to identify and characterize these

particles.

Q Where are your offices located?

A We are outside of Atlanta.

Q Can you describe briefly for us your educational background?

A Yes. I have a Bachelor's in physics from the University of Dayton in Dayton, Ohio, and I have a Master's in environmental science from Miami University in Ohio and then a Ph.D. in environmental science from the School of Engineering from University of Cincinnati.

Q Can you briefly tell us what environmental science encompasses?

A Environmental science is the information and problem solving of environmental and other kinds of problems.

It requires that you use other scientific areas and essentially mix them together to come up with a solution. So often I will be using parts of physics and parts of chemistry and parts of biology and parts of other sciences to develop a solution for

an environmental or other type of product.

Q So it is interdisciplinary-type of area?

A That is correct, yes.

Q You mentioned that you received a Ph.D.

Have you used what you learned in your present work?

A Yes. I have used a lot of what I did.

My Master thesis was on developing the method for the analysis of asbestos using the electron microscope.

My Ph.D. dissertation dealt with corrosion problems with asbestos materials.

Q And did you have any asbestos-related work while you were studying for your Ph.D.?

A Yes. While I was studying for my Ph.D., I was working full-time at the Environmental Protection Agency Research Center in Cincinnati, and there I was involved in a variety of projects dealing with asbestos.

Q Briefly what type of projects would those have been?

A There were epidemiological projects dealing with the study of disease. There were exposure assessment projects dealing with looking at and counting fibers and various exposures.

A lot of work dealt with EPA's development of drinking water standards dealing with asbestos.

Some of the projects I worked on were also toxicology of how asbestos worked in the cells, and the lungs and so on.

I was the coordinator for a variety of EPA-sponsored research projects with the National Institute of Environmental Health Sciences and universities that were doing research on asbestos for EPA.

Q And how long did you perform work for the EPA?

A I worked there 11 years.

Q Where was that work located?

A That is in Cincinnati, Ohio. It is one of their national laboratories.

Q Have you authored any publications

regarding asbestos fiber types and fiber release?

A Yes. I have over 50 publications dealing, a lot of them, with asbestos fiber release, or identification of asbestos, or other issues dealing with either the microscopy of analyzing for asbestos, or studies looking at fiber release from different materials.

Q And these publications were in scientific literature?

A Yes, they are.

Q And have you had any teaching responsibilities in the areas that you specialize in?

A Yes, I have.

I have taught at Georgia Tech in the asbestos program they have there.

Also the Environmental Institute, which is a group that is located in Atlanta that teaches courses for OSHA and EPA.

And then I have also taught some courses in various places in the country, in Chicago at the McCrone Research Institute which teaches microscopy

techniques.

And then SUNY, which is part of the New York State program, I taught a week-long course there on asbestos analysis.

Currently I am teaching a course on asbestos and dust through the American Society for Testing Materials.

We have courses in various places throughout the country.

Q You mentioned teaching EPA personnel.

What exactly did you instruct them on?

A These are courses that EPA people are looking for accreditation, for various EPA requirements would be taken, and they will deal with asbestos inspection or lead inspection or some of the other contaminants.

Q The EPA, of course, is the Environmental Protection Agency?

A That is correct.

Q Can you briefly describe what professional associations you belong to?

A I am a member of the American Association for the Advancement of Science, which is the organization that deals with all branches of different types of science.

I am a member of the Electron Microscope Society, and the Environmental Information Association which deals with environmental-type problems. There I serve as an executive director with that group.

Also, American Society of Testing Materials, which is a group that deals with a lot of people from industry, laboratories, government, trying to come together and form consensus standards on various things, and I am a vice-chair for the asbestos group in that organization.

Q Have you provided or given any presentations to any professional groups on topics related to asbestos and fiber release?

A Yes, I have. I am sure it is over 100 presentations at various places like the American Industrial Hygiene Association. I have given some professional development seminars there.

The Environmental Information Association, I have given a variety of presentations. And then some international organizations as well, I have given presentations on asbestos.

Q And have you ever had the opportunity to work with a group known as the ASTM?

A Yes, the American Society for Testing Materials, as I mentioned before, I am a vice-chair of one of their working groups, and we deal with developing methodologies for asbestos.

Currently I am working on the asbestos in air method which will become an ASTM standard.

Q Now, have you in the past participated or advised any governmental regulatory agencies on asbestos exposure?

A Yes. I served on the Asbestos Hazard Emergency Response Act which is called AHERA.

This was a group pulled together by EPA to come up with methodology for clearance of school buildings after asbestos had been removed.

We currently have a contract with EPA to do

audits of laboratories, to do asbestos of drinking water studies, and we also have done work for the Consumer Product Safety Commission and some work for various universities and state agencies that deal with asbestos.

Q A few moments ago, Doctor, you mentioned microscopy.

Could you define that for us?

A Microscopy is the broad term for using microscopes.

These are either a light microscope which is similar to what you may have seen for biological study, and we generally use them for study of minerals or particles.

This is where the sample is placed under the microscope and then the light comes through the sample, increase the magnification, usually up to maybe 1,000 times magnified is the maximum there.

Most of the work with the light microscope is done at lower magnifications.

Then we also use electron microscopes,

either scanning electron microscopes or transmission electron microscopes, which allow you to identify and magnify images over a million times magnification.

Q And you have these various types of microscopes in your lab in Georgia?

A That is correct.

Q And do you yourself analyze asbestos and other substances through those microscopes?

A Yes, I do.

Q What other substances besides asbestos have you worked with? I think you mentioned lead.

A We have several projects ongoing with lead, lead arsenic. Some of the projects deal with Super Fund Sites, and how far away from the Super Fund Sites, from these particles gone into individuals' homes and so on. So, we will collect dust and air samples in homes to get an idea of how far the particles may have gone.

I also do work with an EPA refractories ceramics group consent decree, where I am the auditor for their laboratory, and their collecting of samples

for refractory ceramic fibers, a new fiber coming out that will replace asbestos for a lot of things used for insulation primarily, high temperature.

And then we also look at indoor air quality particles, concern over spores and fungal material, pollen and things like that may be a concern in air quality studies.

Q Will you and your organization go to a jobsite to make measurements, or do the substances come into your offices?

Does somebody bring them in?

A Well, it happens both ways. Some cases we do travel to the various places to collect the samples.

Other projects we work as a laboratory -- in some cases it is a laboratory that we are involved with, more routine kind of analysis, and they will send us more sophisticated projects, and they don't have the equipment or know-how to do that.

So we get samples from both types. We collect it, or we may be involved in receiving from

various groups.

Q Would it be fair to say, then, that your operation is more of a research laboratory?

A That is correct.

Q A moment ago you mentioned Super Fund.

Can you describe what you mean by that?

A EPA has called a number of dump sites, where people dump materials or have not taken care of material properly from different companies.

Often these places have now been abandoned, and someone goes in to decide how to clean it up. And so EPA goes in and decides how to clean up that particular site; and we are involved in how far away they need to go to clean it up.

One site we are working on is an old factory that made pesticides. And we found they needed to go further than the first houses around the place. They had to go to houses further away and do cleaning of the interior of the houses.

Q In the course of your work, Doctor, have you performed tests on asbestos for fiber release from

various products?

A Yes, I have.

Q Can you briefly identify for us what types of products you have tested for fiber release?

A We looked at gaskets, which are used as a seal between pipes. We have looked at packing, which is used in valves which also contains asbestos.

We have looked at asbestos gloves to see if men were doing certain types of activities and the fibers would become released and in what quantities.

We have looked at other kinds of materials such as acoustical plaster, fireproofing of buildings, some floor tile and other kinds of things like that.

We did one project dealing with a railroad brake where we looked at fiber release just from handling the brake piece that we looked at.

Q Did you find fiber release in the railroad brake?

A Yes, we did.

Q I take it railroad brakes are fairly large?

A Yes.

Q Have you ever had the opportunity to publish any of your test results on fiber release of asbestos-containing products?

A Yes, I have.

Q Can you give us an example?

A We have one publication from the Manchester Steam Plant, which is a steam plant that was out of service.

And we set up a containment, which is essentially a plastic room around some pipes, and then in the experiment where we had a man take out the packing of a valve, we collected air samples while he did that to get an idea of what the fiber release would have been on that kind of thing.

And then we published this article in one of the scientific journals.

Q In the course of your work and testing asbestos-containing products for fiber release, was there ever a time when there were no demonstrable levels of fiber release, or minimal levels?

A Yes. We have tested some materials that did

not release particles during the activities that we tested them with.

One instance was from wire and cable material, where we were looking at cutting the wire and cable, which had an asbestos sheath on it. That particular study, we did not find high concentrations in the air.

Q Were all of your tests on asbestos-containing products performed for litigation?

A Not all. We have done some for litigation, some which we did initially not knowing whether they would be involved in litigation, but eventually were.

And some we do for building owners primarily who are interested in knowing whether fibers are released and in what quantities, for various activities such as buffing a floor that may contain asbestos, or doing some kind of other operations procedures the maintenance men may be involved in.

Q Is there a main focus of your laboratory now, the type of work, is there a particular area you focused on recently?

A Well, our laboratory does projects. There is an industrial part where we look at corrosion problems, and we look at problems with building materials, and then in some cases we have been doing some work on some brake pads, a new development of brake pads.

Some of our people are criminologists who study for forensic cases, might do hairs and fibers.

In fact, one of the guys will be going to an aircraft carrier to be involved with the litigation there where they are doing some sort of analysis.

So there is a whole variety of different things we do. I don't know that we really are involved in any particular projects.

We do some patent work when we are dealing with whether a product meets or infringes on a patent.

So there may be, at one time, 20 different projects in the laboratory.

Q I take it from your answer not all of your projects are involved with litigation?

A That is correct.

Q And, in fact, have you assisted and testified on behalf of both plaintiffs and defendants in asbestos litigation?

A Yes, I have.

Q A moment ago you mentioned work on brakes.

Can you describe to us what current work you are doing for brakes, and for whom?

A We are doing some work for a couple of companies that develop brake pads.

One company, I think it is a high performance brake for sports cars, and they are interested in knowing what the form is of the material that goes into the brakes.

They know what they are putting in, but they don't always know how it ends up in the final brake pad.

So we will look at the surface of the brake pad, and then determine where the different particles are, the different kinds, Kevlar, the material being used in some brakes now, also iron oxides and some other types of materials. So we will give them an

idea of how the brake works.

And they will send us maybe two or three different brakes, one of which seems to work real well; the others they know they used the same materials, but they don't work as well.

And we will help them understand why one worked better than the other.

Maybe the material supplied to them is the same material, but in a different form, so they need to know how it came together.

Q Do you have industrial hygienists who work for you?

A We do use a number of industrial hygienists. It depends on a particular project we are working on.

Q You yourself are not an industrial hygienist?

A Not per se, no.

Q Have you ever had the opportunity to testify as an expert in the State of Maryland before?

A Yes, I have.

Q Can you tell us briefly when that was, and for whom?

A Well, I testified on behalf of the Attorney General's Office for the State of Maryland in a case dealing with products of asbestos in buildings, in the State Buildings.

There I testified first before a Masters Court by identifying whose product was in a building.

We were given formulas for a range of whole different companies who made materials, and given materials from a building and determined who made the material.

Also in terms of asbestos fiber release and re-entrainment through the asbestos in the dust.

I have also testified here, I guess at least, one other occasion in a case dealing with personal injury.

MR. SMITH: Your Honor, at this time we would offer Dr. Millette as an expert in the field of microscopy and environmental sciences.

Your Honor, excuse me.

THE COURT: Yes, sir. I heard you. I was writing it down.

MR. SMITH: I apologize.

(Whereupon, laughter ensued.)

THE COURT: Thank you, Mr. Smith.

MR. SMITH: You are welcome, Your Honor.

THE COURT: Mr. Williams, cross-examination on the issue of Dr. Millette's expertise?

MR. WILLIAMS: Yes, briefly, Your Honor. Thank you.

THE COURT: Go ahead, sir.

MR. WILLIAMS: Good morning.

THE JURY: Good morning.

VOIR DIRE EXAMINATION

BY MR. WILLIAMS:

Q Good morning, Dr. Millette. I believe we met just last week?

A That is correct.

Q You have been offered as an expert in, among other things, environmental science.

Would it be fair to say that part of what

makes up environmental science is industrial hygiene?

A I would think so. There are a number of overlaps.

Q Okay. I think you testified that you are not, per se, an industrial hygienist; is that right?

A That is correct.

Q Okay. We heard yesterday from Dr. Fowler about the letters CIH; are you familiar with those letters?

A Yes, I am.

Q What do those mean?

A That is a certified industrial hygienist.

There is a group of industrial hygienists that have an association and they will certify those, they take a test and so on to learn about -- I guess they learn about the specifics of industrial hygiene, and then they take a formal test for this group, to be certified by the group.

Q Okay. Am I correct in that you are not an industrial hygienist, per se, and you are also not certified by CIH, or by that procedure, right?

A I have not been certified by the Industrial Hygiene Board, that is correct.

Q Okay. I think you were also testifying about some of the work that you did while you were working at the Cincinnati EPA office; do I have that right?

A That is correct.

Q You said that you worked on some toxicology projects concerning asbestos; is that right?

A That is correct.

Q Could you tell the jury what toxicology is?

A This would be the study of, I guess, the toxicity of asbestos.

We were involved in a number of studies dealing with either animals ingesting asbestos, or cells that were exposed to asbestos to learn more about the -- how the asbestos worked with the various animals or cells.

Q When approximately did you do that work?

A It would have been before 1985.

Q So either during that work, or at any other

time, have you become certified as a toxicologist?

A No.

Q Okay. There is a certification procedure, isn't there, for toxicology?

A That is my understanding.

Q Okay.

A I don't know which group is certifying, or is the certifying group.

Q Okay. I think Mr. Smith asked whether your company goes out to work sites to monitor, or receives samples and does the analysis in your lab, and you do both, correct?

A That is correct.

Q Would it be fair to say that going out and actually collecting the samples really would fall within the purview of industrial hygiene?

A I guess it would depend on what the samples were. It is something that I have done, so it would probably fall -- well, I would think so.

Q Okay. Thank you.

MR. WILLIAMS: Nothing further, Your Honor.

THE COURT: Very well.

Dr. Millette will be permitted to testify as an expert in the areas offered.

MR. SMITH: Thank you, Your Honor.

THE COURT: Which I wrote down.

MR. WILLIAMS: I did, too, Your Honor.

(Whereupon, laughter ensued.)

THE COURT: I had a difficult time writing microscopy. I wanted to get the C after the second S correct.

DIRECT EXAMINATION (CONTINUED)

BY MR. SMITH:

Q Dr. Millette, would you briefly describe for us some of the advantages and disadvantages of the electron microscope and the optical microscope that you identified earlier?

A The two types of microscopy -- two types of microscopes generally used in studies of asbestos are the light microscope, and it is called a phase contrast microscope because of the way it uses the phase of light to increase the ability to see small

particles.

And the usual OSHA procedure, the Occupational Safety and Health Agency procedure, is to use the light microscope.

You collect the sample of airborne fibers, a filter, and then you take this filter and partially dissolve it so you can see through it. And you put this under a microscope, and the light goes up through the microscope magnified about 400 times, and you count the individual fibers that you see when you move the thing around and mark down how many fibers you have.

Now, this technique will not allow you to identify those that are asbestos and those that are not.

It also doesn't allow you to see all of the small fibers that are present in the air.

So the electron microscope, which gives you much higher magnification, usually about 20,000 times magnified, uses the same filter, but you prepare it a little bit differently.

You end up preparing the filter so that it is transparent to the electron beam, and the electron microscope is a much larger instrument, probably about the size of the table there. And then the electron beam comes down through the sample and it appears on the screen at the bottom. And just to give you an idea, a human hair magnified 20,000 times would be about six feet wide. So we are looking at individual fibers that are much smaller, thinner than that.

So with the electron microscope you can see all of the asbestos fibers that are in the air, all of the different sizes. So you can come up with a really good number of how many fibers are present there.

And the Environmental Protection Agency in their clearance of schools, uses the electron microscope as the test for final clearance, whereas the OSHA or occupational groups use the light microscope currently for doing monitoring.

They acknowledge that there are a lot of smaller ones there, but they will count the large ones to give some idea of what the total amount is.

They use it as an index of how many fibers are there.

Q Why is it that the EPA prefers the transmission electron microscopy?

A Well, they acknowledge that you can see only the larger fibers using the light microscope, and they are interested in getting a full, I guess, collection of all of the fibers.

The electron microscope techniques have become much more prevalent and easy to use.

The cost has gone down considerably from when they first came out, so it is now possible to get very rapid turnaround using the electron microscope.

You get a full count, then, of all of the fibers present.

EPA, in setting up the final clearance of school buildings, decided that they really didn't want the school children exposed to small fibers you couldn't see with the light microscope. They wanted all of the fibers to be counted.

There have been some recommendations to

OSHA, also, to use the electron microscope. And there are some of their groups -- for instance, their Salt Lake City Research Lab uses the electron microscope in a lot of their studies, but they have not made that a requirement for monitoring of occupational settings.

Q Why hasn't OSHA used the more advanced TEM, transmission electron microscopy, in their regulations?

A My understanding is that a part of it deals with the fact that they have a lot of data on the light microscope system, and they don't have as much on the electron microscope system.

Until they can get a lot more information, they don't want to shift over and deal with better technology.

They do admit they are only counting a portion of the fibers, that there are a lot of them they don't see.

Q A term that we have heard here, Dr. Millette, is encapsulation as it relates to asbestos.

Can you define and describe for us what that

means?

A Well, encapsulation of some materials means that -- let's say we have asbestos on the ceiling in this place, and if you come in and put an encapsulant on it, which would be a spray that would form a hard surface so you couldn't easily scratch that surface.

In various types of products, the attempt is to encapsulate the asbestos in a product so that it doesn't come off easily.

So obviously a brake, friction products, you are interested in having something that is fairly tightly held.

You don't want it to be easily abraded, so you mix the asbestos with binding material to try to hold it in tighter.

The encapsulant will form around the various asbestos bundles, and clusters and so on, but it doesn't actually encapsulate each of the individual fibers. So if you break this encapsulant, you will release individual fibers into the air. So the encapsulant forms a barrier as long as you don't

abrade it or disrupt it.

Q Can you describe for us what you meant by bundles and clumps or clusters of asbestos fibers?

A Well, asbestos fibers, and we have some photos that I think we will show a little bit later -- but the fibers of asbestos are individual fibrils that are then put together as bundles, and asbestos is a natural mineral, and they will be sort of like a group of soda straws all together and that will form a fiber, and then you may have a number of fibers that are together in odd positions.

Like if you took the soda straws and dropped them on the table, they would be all mixed around and that would be a cluster of asbestos fibers.

In some cases you get particles on top of that as well, something that is not asbestos will form and that will be a matrix.

Sometimes the asbestos fibers are in part of the matrix; sometimes they are just a piece associated, or on top of it.

When we look at it in the microscope, we

will see all of these different types of things.

We will see individual soda straws, we will see a group of soda straws together to form a bundle, and we will see a cluster of fibers so numerous you can't count them, and sometimes you will find them attached to another particle so it is a matrix piece; and we will count these various things.

Q Are all of the different fiber shapes and sizes that you have just described respirable?

A Well, they can be if they are small enough. In some cases you get fibers that are too large to be really respirable. They don't get deep into the lungs.

Many of them will be inhalable. Generally the fibers that we collect on our filters, these are air filters, generally those fibers are respirable.

Q And when you perform your studies on fiber release of asbestos products, do you look for different fiber types and sizes?

A In the light microscope we just measure the number of fibers there, and those are -- because they

are larger, they are really fiber bundles.

In the electron microscope we divide it into the various components of individual fibers, clusters of fibers, matrix pieces, and we call all of those asbestos structures. So we give a number in terms of asbestos structures per amount of air that we collect, or the amount of air that someone might be breathing.

Q Are asbestos fibers categorized by shape or size?

A Well, they would be -- there are different types of asbestos fibers. Different types of asbestos.

Generally the fibers are characterized in terms of bundles or clusters in terms of shape.

Q Back to another point you discussed briefly.

You mentioned that there was different approaches for -- different standards used by the EPA and OSHA for fiber size.

What are the different fiber sizes that EPA and OSHA looked at?

A The OSHA analysis for the light microscope looks at those fibers longer than five micrometers.

A micrometer is about a millionth of a yard, so think of a yardstick divided in a million little particles or sizes, and one micrometer would be about a millionth of a yard.

And they looked and are interested in those fibers longer than five micrometers.

EPA is interested in fibers longer than .5 micrometers, about a tenfold smaller size.

Q In connection with brake friction products, has the EPA published any information discussing the subject of fiber size?

A Yes. In one of their guidance documents, they indicate most of the fibers released by friction products would be smaller than normally what you see by the light microscope size, thinner and physically smaller than the others.

MR. SMITH: Your Honor, may I approach?

THE COURT: You may.

MR. SMITH: I have the EPA Guidance for

Preventing Asbestos Disease Among Auto Mechanics.

BY MR. SMITH:

Q Is this the publication you are referring to?

A That is correct.

Q Could you read for us the section which you are referring?

A This is on page 1 and talks about -- it essentially says like germs, asbestos fibers are small enough to be invisible and can remain and accumulate in the lungs.

When you see a dust cloud during brake work, you are seeing clumps containing thousands of fibers.

Most of the smaller fibers will not show up with the methods commonly used for measuring asbestos levels in the air, such as the method used to determine compliance with the OSHA asbestos standard, since most asbestos fibers in brake dust are too small to be measured by these methods.

MR. SMITH: Your Honor, we have premarked the publication that Dr. Millette is looking at as our

Ford Exhibit 27, and at this time we would offer it for evidence.

MR. WILLIAMS: No objection, Your Honor.

THE COURT: Without objection, Ford Exhibit 27 will be admitted.

(Whereupon, Plaintiffs' Exhibit Number Ford 27 was marked for identification and received into evidence.)

MR. SMITH: Thank you, Your Honor.

BY MR. SMITH:

Q Doctor, were you asked recently by our office to perform some fiber release tests on Ford Motor Company disc brakes and brake shoes?

A Yes, I was.

Q Are you aware of any fiber release test results on Ford brakes published in the scientific literature?

A There was none that I could find specifically dealing with Ford brakes.

Q And did we forward to you some Ford brake linings, brake shoes and disc pads?

A Yes, you did.

Q If I could ask you to identify what I have in front of me, were these the products that you received from our office?

A That is correct.

Q Do the boxes -- well, let me show you.

Do the boxes themselves have any asbestos in them?

A We have cleaned them in the laboratory using a HEPA vacuum and damp wipe to make sure that they didn't have any asbestos dust.

Q Has your lab performed some tests on these products at our request?

A That is correct.

Q I take it your lab has put these products in the plastic bags?

A That is correct.

Q Did you have an occasion to see any caution statements on these boxes?

A Yes. Each box has a caution statement dealing with asbestos.

Q Do you know why they would be there?

A Well, they would be in, I guess, compliance or following EPA guidance of suggesting to people that they take proper precautions when dealing with asbestos-containing material.

Q Did you follow a certain methodology and have a protocol for the testing of these products?

A Yes, we did.

Q Can you describe briefly the outline of what that was?

A We were interested in testing these specific products during specific activities.

There are other publications which deal with brake shops and so on, but there the question may be -- there may be other sources of asbestos in the environment, too.

What I was interested in looking at were these specific things doing specific tasks. So we looked at the question of, are fibers released during sanding, filing and grinding of the brake shoes and pads, and during the sweeping of debris and dust

following that activity.

Q Okay. And before you actually performed the sanding and the other tests that you have described, did you have an occasion to look at what type of asbestos was in these products?

A Yes. We did an additional inspection of the samples, and then took a small amount off to study it in the microscope.

Each of the products contained about 50 percent of chrysotile asbestos by volume.

Q And how did you -- what tool did you use to perform that analysis?

A That was done with a polarized light microscope. It is a light microscope used for bulk samples primarily.

I also used a scanning electron microscope on one of the samples.

We picked off a small amount of the fiber, but primarily it was the polarized light microscope analysis that gave us the identification of asbestos and the amount in the brake shoe or brake pad.

Q And in your work did you see any tremolite asbestos in these products?

A No, we did not.

Q Would you describe the Ford brakes that you looked at and studied as encapsulated?

A Well, they have a binder which holds the fibers in.

What we did find was on the surface of this -- of these pads, there were asbestos fibers sticking out, so I would have to say that they are really not encapsulated. They are not covered totally.

Q Was there any dust on the linings, the brake linings themselves, before you did any manipulation of the products?

A You could cause dust to be created just by rubbing your finger across the surface.

Q And would that dust have contained chrysotile fibers?

A Yes, it did.

Q With respect to the actual testing, could

you describe for us the area in the containment area that you used before you actually manipulated the products?

A We had built a plastic room which is about eight feet by eight feet by seven feet high. And in this room, we have just the plastic floor, plastic ceiling and plastic sides.

And then outside of the room we have another larger area, so that if any of the fibers were to get out of the plastic room, we would collect them in an outer area in which we always have a fan with a very fine filter running.

So that keeps that area from -- no asbestos fibers from somewhere else can come in, and no asbestos fibers if they are released from the product can get out.

So we have what we call a double containment to do the study. The containment has a window so we can look in and take pictures of the various activity.

Q The containment ensures that the area is

pure and essentially free of asbestos fibers?

A That is correct, that there isn't any asbestos fibers coming from the outside in, and none of the asbestos fibers that might be produced get out of the area.

Q How long would it take you, or did it take you, to build the containment area you have just described?

A Well, we had the basic containment parts of it put together previously, and we rebuilt the inside for each type of experiment we might be doing.

That took probably about a day and a half.

Q And the procedure and containment unit that you just described, is that the same type of procedure and unit you would use in other tests on other asbestos products?

A Yes. We have used it for a number of fiber release studies.

Q Now, the personnel that were involved in the test actually inside the containment unit, were they protected in any manner?

A Yes. Anyone going into the containment area, either myself or the industrial hygienist working with us, has a complete coat, suit that you wear that forms a barrier and then wears respiratory protection before going in.

Q And why would they wear a complete suit?

A Well, that is to prevent any fibers that might get on your clothing from being brought out into the general environment.

They put on a clean suit to go into the containment and then you take it off, this outer suit, in a small dressing area outside of the containment area.

Q And the activities that you performed on these Ford brakes that you identified, sanding, the grinding, the sweeping afterwards, the filing, who actually performed those manipulations?

A The industrial hygienist named Todd Dawson that I work with.

Q He was under your direction?

A That is correct.

Q Was there any ventilation inside the containment unit during your test?

A Not during the test.

Q Why not?

A Well, the interest is in determining what was released into the air during the activity. And there may in an actual setting be various kinds of air currents that may cause fibers to be re-entrained from the floor during the dust, and it could be a variety of different things.

Rather than try to reproduce any of those, we set it up with just a static system where there wouldn't be any air movement, other than what happens during the activity.

Q I think you mentioned the term re-entrainment.

Can you define that for us?

A When fibers are in the air and settle out, you can do various activities that might cause them to be re-entrained or put back into the air, so sweeping, for instance, would be one re-entrainment activity.

Q The activities that you performed, that your laboratory performed on these Ford brakes, how did you know what product manipulations to do?

A I had been sent part of a deposition from Mr. Grewe that dealt with what he did when he was doing work, and talked about sanding the brake shoes and about filing grooves in brake shoes.

And I subsequently also learned in some cases they used a grinder to cut the grooves in the brake shoes.

Q And do you recall what tools Mr. Grewe would use for the filing processes he identified?

A He indicated that it was a metal file, as I recall.

This would be a file that you would have in a shop, and it is a typical-type of file with a variety of steel edges in it.

And then for grinding, I understood that you would use a muffler cutting, which is a spinning wheel, grinding wheel, that you use to cut various things in the shop that you would also use to cut

brake shoes.

Q And did you consult any brake mechanics about these product manipulations that you identified?

A Not before we did the studies.

I had a general feeling for what was done. It was fairly straightforward in sanding the edges of the brake shoes and so on from reading various papers and articles.

Subsequent to that, I did talk to a young student actually in technical school taking disc brake work, and I asked him, do you ever cut any of the brakes or grooves and things like that. And he said oh, yes, not for the asbestos brakes, but for other brakes where they cut them with files and drill holes in them.

Q So do you believe the product sanding and filing accurately replicate what Mr. Grewe did?

A I believe so, yes.

Q Where did you get the tools that were utilized during the brake tests?

A Well, the file was purchased at an auto parts place, and the grinder was sent to me. It is a pneumatic grinder for muffler cutting.

The sandpaper was also purchased at the automobile parts place.

Q Our office provided the grinder you described?

A That is correct.

Q You brought that with you today.

Can you identify this?

A Yes, that is the grinder that we use.

Q Does this have any asbestos on it?

A We have cleaned it and checked the grinding wheel itself, and the wheel does not contain any asbestos.

Q How would this particular tool be utilized?

A Well, it is attached to a cord which sends pressure air through the end and then by pushing the little hand piece there together, pushing that down, the end of the grinding wheel spins and then we use

that to cut as a grinding cutter.

Q And do you recall how fast are the revolutions of the grinding wheel?

A I don't recall what that is. I think it is listed on the surface, although it may not be real clear. It is on the surface of the grinding wheel itself.

Q The surface is a little bit worn down.

Of the air sampling that was performed during the test, where were the samplers themselves located?

A There were two samplers on the individual doing the activity within the breathing zone of the individual.

Then there were two other samplers that were about five feet high on the walls of the containment, and they were about five or six feet away from the actual activity.

Q And the ones that were -- were they actually hooked to the suit of the operators who were performing the tests?

A Yes.

Q Personal air samplers?

A That is correct. They had pumps worn on the waist, and they pump air from the breathing zone through the pumps which he holds on his waist.

Q What times were the air samples taken?

A Air samples were taken before we did anything in the area and taken while the activity was going on. And then we had separate air samples for the sanding operation and for the sweeping operation. And then we stopped and we cleaned the inside out.

We put the pad and brake pad in, and we took some air samples before we did any brake work to get background.

There was still some residual in the area. We used a leaf blower to blow it around to be the essentially worst case background.

Then we had air samples collected while we did the filing on the brake pads and, again, we stopped and cleaned everything up and took some background samples.

And then we used the grinder to do the last part of the testing, and we collected air samples while the grinding was on.

Q You mentioned initially you took air samples prior to any testing, and I take it that was to establish background levels of asbestos fibers?

A That is correct.

Q Was there a particular standard you had to follow to measure the airborne asbestos?

A Well, the two procedures we used, one is the OSHA procedure, which is called NIOSH 7400, and that is a standard procedure for preparing with the light microscope.

And for the electron microscope, we followed the direct preparation procedure, and it is essentially what is done in AHERA, the Asbestos Hazard Emergency Response Act.

We did some additional measurement of the structures that we found.

Q Is there a certain NIOSH standard you have to follow or you did follow, in your testing

procedure?

A Yes, that is the 7400 that I mentioned.

Q Can you describe the difference for us between the direct preparation method and the indirect method?

A When the sample is collected on a filter, if there are a lot of particles on the surface of the filter, then when you look at it under the microscope, everything is overlapped, you can't really count anything.

So an indirect procedure, there are a couple of different ones, one of which you take the filter with all of the particles, and you ash it in a low temperature asher to get rid of the filter and then you put that in water, all of the particles in water, redisperse them and put them on another filter in a diluted situation so that you can count them.

In the direct preparation, you take the filter as it is as you collected the sample and simply go through the preparation procedures from there, so you get pretty much the way they were collected on the

surface.

So there are two different procedures.

We were able to use the direct procedures. In our studies, the filters were not overloaded with fibers.

Q In your opinion, Doctor, do you believe both procedures are scientifically valid?

A I think so. They are not directly comparable to each other, but they both produce information about the numbers of fibers that that person would be breathing.

Q Did you also perform any hand surface testing?

A Yes, I did. We were interested in -- because in some of the articles and so on they talk about the fact that you shouldn't be eating or smoking, while or after you are doing the asbestos work, because you still have asbestos on your hands.

So what we did was take a Post-it note, one of your Post-it notes, and we added an extra carbon piece to it and laid it on the person's hand before he

did the activity. And then afterward we did the same thing.

Then we put that under the electron microscope, the scanning electron microscope, and looked at the surface, and we were effectively getting an idea of what the particles were on the surface.

If we show the pictures later, we will be able to see what those were.

Q You took some pictures during the course of your testing?

A That is right.

Q How long did the testing take?

A Well, it was done over two days. Each individual activity was fairly short term. Taking either -- I guess the lowest was two minutes, and the longest was 10 minutes.

Q The photos you mentioned, do you believe that those will help the jury and us understand the various test procedure and what you saw?

A I think so, yes.

Q All right.

MR. SMITH: Your Honor, if Dr. Millette could come down off the stand, we have some slides to present.

THE COURT: He may.

(Whereupon, the witness left the witness stand.)

THE COURT: Dr. Millette, would you like to take the position right next to Ms. Gahagan here, please?

Right there, sir.

(Whereupon, slides were presented to the jury via the view box.)

BY MR. SMITH:

Q Dr. Millette, can you tell us what this slide shows?

A This shows the surface of one of the brake shoes.

Obviously it is a Ford brake shoe, and the whole piece is probably about 10 inches long. It is a curved surface, as we will see in the next picture.

One of the things to look at here is we will

show higher magnification of this area where one of the holes has been drilled into the brake shoe.

All or much of the white material you see here are really asbestos fibers on the surface of and in the matrix of the material.

THE COURT: Is that in focus?

MR. SMITH: I am not an authority, Judge.

THE COURT: Nor am I, that is why I ask.

A I think that is in focus there. It is a curved surface, so some of the edges will be out of focus with the center.

Q You have taken a number of pictures closer up.

A This shows a brake shoe in that one area that was indicated before.

Q Excuse me, this is the same brake shoe we looked at a moment ago?

A Same brake shoe at higher magnification, and we can look at the individual hole, the fibers protruding and also see them on the surface of the brake shoe as well.

These are asbestos fibers here.

Q You have that at higher magnification?

A This, again, shows the same hole, and now we can see the asbestos fibers sticking out.

Q And these were new brakes?

They had not been worn?

A That is correct. That is my understanding.

If you took your finger and rubbed across this area or some of the other areas, you would get the dust to come off.

Q Okay. Let's see the next slide.

A This is the edge of the brake shoe.

We are now looking at it from the side view, and you can see that on the edge there are a number of asbestos fibers and other particles that are protruding, sticking up.

Q Am I correct, Doctor, you had not performed any tests on these brake shoes prior to these pictures?

A That is correct. These are brake shoes as we received them.

Q Did you also take pictures of Ford disc brake pads?

A Yes, we did. This is a brake pad here. It is similar in the structure on the surface and has holes in it as well.

It is a little bit different shape. It is actually a flat piece, and it would have metal on the back.

Q All right. Is this a higher -- excuse me, higher magnification of what we just saw?

A That is correct. We are now looking at the edge of the hole.

Again we see fibers sticking out, and we also see the asbestos fibers in the matrix of the material.

Q All right.

A This is a higher magnification yet, showing the individual particles sticking out, some of which would be chrysotile asbestos fibers.

Q And I think the next series of slides demonstrates the sanding that you performed on the

brake linings?

A Yes. This is inside the containment. We have -- this is the brake shoe here, and these are some of the other brake shoes.

There were four brake shoes in the study, and we have a piece of sandpaper here, and we are sanding the edge of the brake shoe.

We also sanded down these taped ends, and then ran the sandpaper over the surface to take off any high spots, as they indicated in the deposition.

Q Why isn't the operator there wearing any gloves?

A It was my understanding that the work was generally done without gloves. And we are interested, too, in getting an idea of what fibers or particles would be adhering to the surface of the hand.

This is sweeping up of the sanding debris and dust. You can't see it real well here with the lights on, but there is a pile of some debris and dust found here.

He essentially swept this 8 foot by 8 foot

area with a broom.

You can see the pump on his waist here.

You can see the respirator that he is wearing here. And then on the side right around in the sampling or in the breathing zone, there is one of the air samples.

Q I think there might be another picture coming up.

What activity is being performed here?

A Now we have the brake pad, and we are using the file to cut grooves in the brake pad.

Here you can see the air sampler, again near the breathing zone, and the respirator that the gentleman is wearing.

Q Okay.

A This is a scanning electron image magnified 350 times.

Q What does this depict?

A This shows the surface of the hand after filing. Well, actually, excuse me, before filing.

This is a sample that we collected by

putting it on the gentleman's hand before we did any of the filing, peel it off and put it directly in the electron microscope to look at the surface.

We do see a few particles that he had on his hands. Some of these are skin cells.

The next picture, which is of the same magnification, again, 350 times, shows the surface of the hand after we did the filing.

Again, we are laying it directly on there, peeling it off, putting it in the microscope, and what you see are a variety of particles that come from the brake pad.

They are individual asbestos fibers that you can see here in various forms and shapes on the surface of the gentleman's hand.

Q Excuse me. You said peeling off.

What did you peel off his hand?

A We just put the Post-it note on his hand and peeled it back off, so we could collect what was on the surface.

Q Those long skinny things, they are

chrysotile fibers?

A That is correct. I have a higher magnification image.

Q For a lack of a better description.

A Yes. Here is a large asbestos fiber you can see here, and there is another one laying underneath that is a more tight bundle.

You can see how the asbestos is formed with individual fibrils, and they are all bundled together forming a fiber, and then there are other smaller fibers and areas and components down here.

THE COURT: Excuse me, Doctor, is the light working or not?

THE WITNESS: Yes.

MR. WILLIAMS: Intermittently.

BY MR. SMITH:

Q Again, the picture depicted here is higher magnification of what we saw earlier, on the previous slide, of the fibers on the worker's hand?

A That is correct. Yes, this would be magnified 1,000 times, actually 1,100 times.

Q How many fibers are depicted in that picture?

A Well, there would be, I would guess, hundreds of fibers. It is impossible to count because you can't see all of the different layers or pieces of fibers underneath other particles that are there. So it is -- it would be akin to the problem of trying to analyze an air filter collected, if you had an overloaded air filter.

This would be why you would have to go to an indirect procedure to disperse the particles to get an idea of how many were there.

Q Okay. Let's move on to the next slide.

A This shows the grinding wheel, that I think you picked up before, being used on the brake pad.

We held the brake pad down with some clamps and, again, it is a matter of -- there is the grinder and the disk, the grinding disk on the end, the brake pad here, and we are going to be cutting grooves in the brake pad.

This is just another image showing the same

thing, and more clearly shows in this case the air samplers collected on both sides of the breathing zone.

This is the respirator the gentleman has and there is one of the pumps, little tubes that go up his back, that are pulling the air from this area through the filter, and then down and exhausted through the pump.

Q This is a fiber as you would see it under the transmission electron microscope. It is magnified probably up on the screen here, probably 100,000 times.

Generally when we are looking at it in a microscope, it would be the 20,000 times that I referred to before.

A couple of interesting things -- I didn't get the micron marker, but approximately this distance from here to here is about five micrometers. So we have here a fiber longer than five micrometers, but it is quite thin, and this fiber would not be seen by the light microscope technique.

You could see it under the electron microscope because you can see finer and thinner particles.

This would be collected from the air while the sanding was going on in the breathing zone of the person who is breathing it.

This would be a respirable fiber, something he would breathe in and go into his lungs.

You also notice, in addition to the long fiber here, there are some smaller pieces as well, and these are the asbestos fibers. Here, this piece here may not be an asbestos fiber.

It may either be part of the -- most likely it is part of the brake pad. It could be part of the sandpaper, I suppose, and it could have arrived on the filter either in conjunction with the fiber, could be attached to it slightly at this point, or it could have arrived independently at another time and just ends up laying on the filter.

We can't really tell at this point.

Q How long is that fiber approximately?

A I believe it is about 10 micrometers long.

Q Do you recall what product manipulations you did that generated that fiber?

A This was the sanding of the brake shoe with the sandpaper.

Q And did the testing result in fibers longer than five microns with the other product manipulations that you performed?

A Yes, it did.

Q Thank you.

(Whereupon, the slides were removed from the view box.)

(Whereupon, the witness resumed the witness stand.)

MR. SMITH: Your Honor, at this time we would like to offer for evidence the slides that Dr. Millette just presented as Millette Exhibits 1 through 16, I believe.

MR. WILLIAMS: No objection, Your Honor.

THE COURT: They will be admitted into evidence.

(Whereupon, Plaintiffs' Exhibit Numbers Millette 1 through Millette 16 were received into evidence.)

MR. SMITH: Thank you.

BY MR. SMITH:

Q Now, with respect to the sanding procedure, do you recall what the fiber release results were, or would you like to take a look at your report?

I take it you prepared a report at our request?

A That is correct. Yes, I would like to read from the report, if I may.

MR. SMITH: Your Honor, may I approach?

THE COURT: Please.

BY MR. SMITH:

Q If you could explain to us briefly how you categorized the results?

A We had results from the sanding of the brake shoes. We did sanding on all four brake shoes, and we found 2.2 fibers per cc by the light microscope technique. And then by the electron microscope we

found 54 asbestos structures per cc.

TEM, electron microscope are obviously counting the smaller, thinner fibers as well as the larger ones.

MR. SMITH: Your Honor, if we may write that up on the easel.

THE COURT: Please.

BY MR. SMITH:

Q First there was sanding?

A That is correct.

Q And can you repeat for me, it was 2.2 fibers per cc?

A That is correct.

Q Okay.

A And 54 structures per cc by PEM.

Q PEM is phase contrast?

A That is correct.

Q And 54 was --

A Structures per cc.

Q Again, what are the structures?

A They are individual fibers or they could be

clusters of fibers counted as a structure, and they could be a matrix piece that has a nonasbestos part attached to the asbestos fibers.

Q What were the results you found for filing?

A For filing we found PCM 0.3 fibers per cc. The TEM was 6.7 structures per cc.

Q Okay, and the other operations that you performed?

A The grinding of the brake pad was 8.5 fibers per cc by PCM, and 231 asbestos structures per cc by TEM.

Q Okay.

A The sweeping of dust and debris after the sanding we found 1.7 fibers per cc by PCM.

Q I am sorry?

A 1.7 fibers for sweeping and 12 asbestos fibers per cc.

Q Now, of these fiber levels that you found, how do these compare generally with background levels?

A Well, the background levels in a building

such as you would find normally for phase contrast microscopy would be very low.

It would be .30 -- well, it would be around four zeros, .00001 fibers per cc for ambient level.

For PEM structures in a building, one of the EPA documents talks about .005 asbestos structures per cc or structures per cc as being the ambient TEM level.

Of course, they were looking at smaller fibers.

Q This is the background level that may be in the ambient air in an urban environment?

A That is correct.

Q How did the figures, or the results that you found, compare with the permissible exposure level that is in the regulations today?

A Well, the OSHA level was .01 fiber per cc. That would be over an eight-hour time-weighted average.

Q Can you describe for us what you mean by the time-weighted average, and how it differs from what

you found here?

A The eight-hour time-weighted average would be collecting the samples over a whole day's work and taking an average of what the concentration would be.

And the -- what we did were short-term projects interested in what was released during that activity. So that a person did the brake -- let's say they did the brake grinding over a long period of time, maybe that was their primary job, and then the number in the eight-hour time-weighted average would be similar to what we got.

Otherwise if they did other kinds of things, you would average in what the other levels would be.

Q And as part of your study, were you looking for time-weighted averages?

A No. We were interested in determining what the exposures would be for that particular activity.

There are some other studies in the literature that talk about general time-weighted averages for exposures during other, I guess, longer periods.

We were interested really in what kind of fibers or numbers were released during these activities.

For one thing, we didn't have, you know, a whole day's worth of brake shoes to work on or something like that, so what we did was one particular specific activity.

Q And I noticed the highest levels were with the grinding.

Did that surprise you?

A No. Generally any kind of power tool will cause an abrasion or disruption of the fiber release much higher than the hand tools will do.

Q And would you expect similar results if a brake lining was used on a bench grinder, for example?

A I would think so. Any kind of power activity would cause, I think, pretty high levels.

Q And those fiber release results, those were all measured in the personal breathing zone of the operator?

A That is correct.

Q And, I take it, you performed each of those functions for a different amount of time for each one?

A Well, the grinding only takes a couple of minutes. Obviously that is a very quick thing.

The sanding we did for about 10 minutes, I guess, I am not sure, but that is about the time we used.

I was looking at all four of the brake shoes, sanding each one.

Q To your understanding, it would be four brake shoes would need to be sanded during a typical brake repair job?

A That is my understanding, yes.

Q Two linings for each wheel?

A That is right.

Q So if there was a brake job for all four wheels, then you would need eight brake linings?

A Well, there were four that we had.

Q Right, I agree.

MR. SMITH: Your Honor, we would offer Dr. Millette's report for evidence in this case.

MR. WILLIAMS: Your Honor, I object.

THE COURT: Sustained.

MR. SMITH: We would like to mark that, then, for identification only.

THE COURT: It will be marked as Millette Exhibit Number 17 for identification.

MR. SMITH: Thank you, Your Honor.

(Whereupon, Plaintiffs' Exhibit Number Millette 17 was marked for identification.)

BY MR. SMITH:

Q Did you have any problems, Dr. Millette, with the testing procedure?

A No, I didn't.

We had one pump that failed during the test, which is one of the reasons we take two personal samples whenever we do this kind of testing, so in one case one of the pumps failed. There were fibers on the filter, but we don't know how long the pump actually ran.

Q Is it your opinion, though, that the tests were scientifically valid?

A Yes, I believe so.

Q And these tests were performed on new brake shoes, so we are clear, not on the brake wear dusts that would occur when brakes were used and worn down?

A That is correct.

Q Now, based on your experience and training and knowledge, Doctor, do you have an opinion, with a reasonable degree of scientific certainty, whether the sanding, sweeping, filing and grinding operations that you performed on the Ford brakes released significant levels of asbestos fibers into the ambient air?

MR. WILLIAMS: Objection.

THE COURT: Overruled.

A Yes, I do.

Q And do you consider those levels high enough that precautions are necessary?

A Yes, I would think so.

Q And, again, Doctor, based on your experience, training and knowledge, do you have an

opinion, based on a reasonable degree of scientific certainty, that Mr. Grewe would have inhaled airborne asbestos fibers during the various operations of Ford brakes, in levels that were high enough that precautions were necessary to avoid exposure?

MR. WILLIAMS: Objection, Your Honor.

THE COURT: Overruled.

A Yes, I do.

MR. SMITH: Your Honor, we don't want to move the boxes into evidence, but we would like to later move into evidence the precaution statements.

I don't have a photo of it right now.

THE COURT: All right.

MR. WILLIAMS: No objection.

THE COURT: No objection.

BY MR. SMITH:

Q Finally, Doctor, I take it you charge for your services.

How much have you charged for the various testing procedures that you have described this morning?

A Altogether, the various testing procedures that we did probably are about $10,000.

Q And you also charge, do you not, your time for testimony in the case?

A Yes, I do.

Q That is how much?

A $250 an hour.

Q Doctor, thank you very much for your time this morning.

THE COURT: Thank you, Mr. Smith.

Cross-examine, Mr. Williams?

MR. WILLIAMS: Yes, Your Honor, thank you.

If I might, Your Honor.

THE COURT: You might.

MR. WILLIAMS: I need to -- I don't know that this has an exhibit number on it.

CROSS-EXAMINATION

BY MR. WILLIAMS:

Q This is a box that contained some of the parts that you tested; is that correct?

A That is correct.

Q I don't know if you can read it; it says, Authorized Remanufactured, and then, Ford Engines Parts.

Did I read that right?

A That is correct.

Q What does remanufactured mean, do you know?

A My understanding is that these may have been parts that were worn and sent to a factory and then refurbished.

Q Which factory, do you know, Doctor?

A I think there may be some information on the box.

Q Is it your understanding, Doctor, or do you have an understanding that they were remanufactured by some company other than Ford?

A I don't know the relationship between the companies.

Q Okay. Just so we are clear, you have been referring to these parts that you tested as Ford brakes, right?

A Well, that is what they say on them, yes.

Q Okay. But you have no knowledge as to who actually manufactured them, do you?

A Well, as I said, I think there is a company name on one of the boxes.

Q Okay. Which box, do you recall?

A I don't remember. I thought it was the brake shoe box.

Q I will bring them both over.

MR. WILLIAMS: May I approach, Your Honor?

THE COURT: You may.

BY MR. WILLIAMS:

Q Will you go ahead and see if you can find that information?

A This box which is the brake shoe box says remanufactured by RMP and gives an address as being in New Jersey.

Q All right.

A It says Authorized Remanufactured Ford Engines Parts.

Q Do you have any information as to who RMP might be, Your Honor, or Doctor, I am sorry?

A No, I do not.

The other box just comes -- it says Ford Motor Company and that is all. There is no other company listed.

Q Thank you. I will take this back and get these out of your way.

Doctor, my understanding is that you came up with the protocol for this test; is that right?

A That is correct.

Q Have you ever changed brakes?

A Not that I recall.

Q Okay.

A I have inspected brakes, but I don't remember changing them.

Q Do you have any knowledge about how the brake parts that you tested might be manufactured?

A Other than the obvious components, and knowing something about how the components are put together, I am not sure what your question is.

I have never been to a brake factory and seen them made, but it is pretty clear looking at the

materials, I would know how you mix up a batch and form it and attach it to the metal plate and so on.

Q Okay. You testified about how you did some bulk sampling of the parts to determine what the asbestos content was, correct?

A That is correct.

Q And what was the asbestos content?

A It was about 50 percent by volume.

Q Okay. So am I correct, then, that 50 percent, the remaining 50 percent of the brakes is something else; is that right?

A That is correct.

Q Do you know what that material is?

A At least part of it was carbonate.

We didn't do an extensive analysis of the other material.

Q Were you asked to do some?

A No, we were not.

Q Okay. So you know part of it was carbonate.

Do you know how much was carbonate?

A No.

Q Okay. Doctor, we have heard a couple of terms used by a lot of witnesses in this case.

The terms of chamfering and beveling.

Do you have an understanding as to what those terms mean?

A That would be smoothing out the edges and, in this case, when you are chamfering the shoes you are smoothing out the sharp edge of the material.

Q So that is chamfering.

What is beveling then?

A Well, beveling would be more cutting or grooving the material. It is a little more extensive than chamfering would be.

Q By grooving, do you mean the thing that you did to the brake pads?

A No, this would be -- my understanding, beveling would be in terms of straightening it out, in terms of making sure it was all the same height.

Q Prior to writing the protocol, or at any other time during the time you conducted this test,

did you look at any Ford manuals or conduct any brake service operations?

A No, I did not.

Q Did you look at any other brake manual, brake service manuals by other suppliers and manufacturers?

A No, I don't believe so. Other than the EPA documents which discuss some of the activities.

Q Okay. Are you aware that various manuals are put out by companies, including Ford, to tell people how to conduct brake service operations?

A I would assume so.

Q All right. Can you tell me what a semi-metallic brake pad is, Doctor?

A Well, that would be a brake pad that has some metal in it.

Q Do you have an understanding as to whether that would be an asbestos-free part?

Or do you know?

A I don't know.

Q Okay. Now, as I understand it, you

developed the protocol after you were provided some information by Mr. Smith and his firm; is that right?

A That is correct.

Q And some of the information that you received was a deposition from -- given by Mr. Grewe; is that right, or there might have been a couple of depositions?

A That is right.

Q Did you get the entire depositions?

A No, I did not.

Q Okay. So you got portions selected by, presumably, Mr. Smith or somebody from his office?

A I got portions.

Q Okay. And based upon your review of those portions, you decided which activities to test; is that right?

A That is correct.

Q And I think you said that you conducted tests on sanding the brake shoes, and that was using the coarse sandpaper, correct?

A That is correct.

Q All right. Now, did your information concerning the sanding and the proper procedure for sanding come from Mr. Grewe's deposition?

A Well, the idea to use a coarse sandpaper and sand the edges and the high spots was from Mr. Grewe's deposition, and then the general understanding of what you would do to smooth the brake pads.

Q Some of that came from some of the other materials that you reviewed?

A That is correct.

Q Another activity that you did was you filed the disc pads, correct?

A That is correct.

Q All right. Could you explain to the jury exactly what you mean by filing?

What effect were you attempting to get?

A According to the deposition, when the brakes would squeal or squeak, they would sometimes be asked to take the disc pad and cut grooves in it so that it would alleviate the squeaking sound. So you would file a little groove, usually two grooves or more in

the pad to get rid of the sound.

Q Two grooves or more?

A I remember it talking about making an X, I think, on the pad.

Q So that would be two grooves?

A Right.

Q Okay. When you conducted your filing operation of the pads, which I think, according to the chart, resulted in .3 fibers per cc, how many grooves did you cut into the pad, Doctor?

A We were representing the use of four pads, although we did it all on one pad, and I think we did, it was like eight to ten grooves, as I recall.

Q So you used the file and cut eight to ten grooves in the pad, correct?

A That is correct.

Q Another activity that you tested was using this muffler grinder to cut grooves into the pad; is that right?

A That is correct.

Q Now, Mr. Grewe didn't talk about that in his

deposition, did he?

A He mentions grinding, but he doesn't talk about muffler grinding?

Q Where did you get the information about using the muffler grinder that resulted, I think, in the higher numbers?

A That was by -- Mr. Smith indicated other co-workers used that type of equipment.

Q Did you review any other co-worker testimony?

A No, I did not.

Q Based upon the information that you received, you drafted a protocol.

What is the purpose of the protocol, Doctor?

A Well, it described what we were going to do so that we would look it over ahead of time and make sure that we covered all of the areas of interest, and then it would provide a basis of the report that we wrote.

Q I believe from your deposition that took

place last week, you indicated that you drafted that approximately May 10th; is that right?

A I believe so.

Q Sometime around that time period?

A Yes.

Q And then you sent your draft protocol to Mr. Smith for review by his firm; is that right?

A Well, he had indicated to me at that time that there was a court requirement for some of the defendants who were interested at looking at the protocol.

And we originally talked about the fact that some of the defendants might be interested in doing similar testing, or having someone attend while we did the testing. And they were interested in looking at the protocol, so I sent them a copy of what we put together.

Q Some of the defendants were interested in the protocol; is that what you just testified?

A That is correct.

Q Okay. Now, you sent it to Mr. Smith who, in

turn, forwarded it on.

Prior to the completion of the protocol, did you get any input from an auto mechanic?

A No.

Q Did you get any input from anybody, to your knowledge, who had done brake work?

A Only in going to the parts place and getting the equipment. I don't think there were any other people.

Q Just so I am clear, you didn't show a copy of the protocol to the guy at the parts place, did you?

A No.

Q Okay. The input that the guy at the parts place would have had would have been giving you the sandpaper and the file?

A That is correct.

Q All right.

A I had sent it, as I think I testified in the deposition, to industrial hygienist Todd Dawson and a guy that works with him, Bill Ewing, who has done

brake work projects.

Q Now, I think you testified that after you drafted the protocol and after the test was done, you then talked to somebody who had done brake work, correct?

A That is correct.

Q Who was that person again?

A He was a high school student who is taking a technical course, in the technical section. And we were talking about brakes, and I had mentioned that we had done this test.

And I asked him, do you get involved in sanding or grooving brakes?

And he said, oh, yes, we do that. And he said, now, when you are dealing with asbestos brakes, we have special equipment that we have to put around the brakes and so on. But new brakes they do -- he said sometimes we are even asked to drill holes in the brakes for squealing or various other reasons.

Q Let me ask you this.

You were deposed on last Friday, correct?

A That is correct.

Q Did you talk to this person after your deposition?

A That is correct.

Q That was after I asked you whether you had any input from an auto mechanic; is that correct?

A That is correct.

Q Then you went to talk to this high school student to confirm that what you had done is what is done?

A Well, he, as I said, it was something that they are doing in their training, yes.

Q Did you show him a copy of the report?

A No, I did not.

Q Okay. Did you show him any of your pictures?

A Not that I remember, no.

Q Basically you described in general terms the activities that you did and he said, oh, yeah, we do that?

A That is correct.

Q I believe on direct examination you said that he indicated that he did file grooves in the asbestos brake pads in the manner that you did during your test; is that correct?

A That is correct.

Q Do you have an understanding as to whether or not he followed that procedure for semimetallic brake parts?

A That may be -- if that is the more common occurrence type of brakes, then I would think so.

Q Were you provided a copy of the deposition of Mr. Grewe's son in this case?

A No, I was not.

Q Okay. So when you designed your protocol and conducted your test, then, you were not aware that he testified that the groove procedure that you conducted was only used on semimetallic brakes?

MR. SMITH: Objection.

THE COURT: He can answer.

A I haven't seen the deposition, so I don't know what he said.

Q So that is yes, you were not aware?
A That is correct.
Q Okay.
THE COURT: How much longer do you anticipate your cross-examination?
MR. WILLIAMS: It will go after the break, Your Honor.
THE COURT: All right, we will go to the break, and we will have Dr. Millette return at 3:00.
BY MR. WILLIAMS:
Q Dr. Millette, I believe you testified about the site that you testified in this case and you called it a double containment area; is that right?
A That is correct.
Q The point of that is to make sure that none of the fibers get passed through the two layers of containment, correct?
A And also to prevent fibers from the outside from getting in.
We wanted to be able to say the activity caused the fibers.

Q Would it be fair to say that your 8 by 8 by 7 area is much smaller than the dimensions in garages that you have been in?

A I guess it depends. Some areas it would probably be larger, the tool or machine area.

A general open bay garage would probably be small.

Q Let me ask you a different way.

Did you attempt in any way to ascertain what the dimensions of the garage at Foreign Motors were, where Mr. Grewe was?

A No, I did not.

Q Did any of the materials that were forwarded to you by the plaintiffs talk about the dimensions, or give you a physical description of the garage where Mr. Grewe worked?

A I don't believe so.

Q My understanding as to the area where you actually conducted the tests is that there were plastic sheets on the walls, the ceilings and the floor; is that right?

A That is correct.

Q Now, Dr. Fowler, who testified yesterday, told us that the presence of grease and oil on garage floors affects the ability of asbestos fibers to become airborne once they have settled.

Did you have any grease or oil on the floor in your test facility?

A No, we did not.

Q Okay. And I think you testified on direct that there was no ventilation during the conducting of the test, correct?

A That is correct.

Q Okay. Now, Dr. Fowler also testified yesterday about something called air flow.

Do you have an understanding as to what air flow is?

A Yes.

Q Could you tell the jury what air flow is?

A Well, the air currents in the area of interest. Sometimes air currents go up, sometimes they go down. Just depends on what activities are

going on.

Q Okay. Did you take any steps to learn what the air flow might have been at the Foreign Motors garage where Mr. Grewe worked?

A I think as I indicated -- well, the answer is no.

As I indicated in my direct testimony, the air flow can cause fibers to be re-entrained and put in the air.

We were interested really in what was going on with a particular activity.

Q Okay. So it would be fair to say, then, that there was no air flow in your test facility, correct?

A Other than what happened when the person was moving around, that is right.

THE COURT: On that note, let's suspend and we will continue the cross-examination at 3:00.

Ladies and gentlemen, we will take our recess at this time.

Please return and be back in the jury room

about 10 minutes to 3 and we will start again at 3:00.

Have a good lunch, everyone.

Dr. Millette, you may relax and be back in the chair about 5 of 3 and we will start again at 3.

We will take a recess until 3:00.

MS. HINES: Your Honor --

(Whereupon, jury dismissed -- 11:55 a.m.)

THE COURT: You may be excused, Doctor.

(Whereupon, witness excused.)

Ms. Hines.

MS. HINES: Your Honor, I just have a message from Mr. Hoffman who went and checked on Dr. Hill's availability for Monday afternoon, and I just want to let the Court know he is not available for Monday all day, but he is available for Tuesday afternoon.

He was originally supposed to come today.

MR. WILLIAMS: We have out-of-town witnesses that day, like the whole day.

THE COURT: Well, we are moving with dispatch, and with a minimum of wasting of time.

Let's see how we develop, and we will make sure that he has an opportunity to testify.

I will see everybody at 3:00.

(Whereupon, a luncheon recess was taken -- 11:57 a.m.)

(Whereupon, afternoon session -- 3:04 p.m.)

(Whereupon, in open court.)

(Whereupon, witness present.)

THE COURT: Be seated. Good afternoon.

Let's bring the jury in.

MR. WILLIAMS: Your Honor, if I may, I know the doctor is on the stand, but if we could take care of something before the jury comes in.

THE COURT: We will try.

MR. WILLIAMS: The next witness will be Dr. DeLuca who, as I understand, is going to testify about Mr. Grewe's pain and suffering; and I object to that testimony based on the fact that his testimony is cumulative because both Dr. Hammar and the other doctor who testified yesterday, Dr. Rubin testified about that at pretty great length.

THE COURT: Mr. Shellenberger, good morning, sir.

MR. SHELLENBERGER: Good afternoon, Your Honor.

Dr. DeLuca is in the hallway. He is the actual treating physician. I will have him on the stand on direct 10 minutes only.

It will be like a laser, to the point; and, in fact, he will clear up a couple of issues that came up on cross-examination concerning when first exposures were discussed, and I do not believe his testimony will be cumulative in any fashion.

He was the man who was there.

THE COURT: If it is, I will sustain any objections you may make to it.

MR. WILLIAMS: Very well, Your Honor.

THE COURT: 10 minutes. You haven't taken lessons from Flerlage on time estimates, have you?

MR. SHELLENBERGER: No, sir.

MR. IGNATOWSKI: We all have.

MR. SHELLENBERGER: Mr. Flerlage uses the

hourglass method.

THE COURT: The hourglass is very, very big at the top and no opening at the bottom.

MR. SHELLENBERGER: I think when you turn your head, Judge, he turns it over again.

THE COURT: Is that what his trick is?

MR. McGOWAN: When he was asking questions, Judge, I saw the clock go backwards.

(Whereupon, laughter ensued.)

(Whereupon, discussion off the record.)

THE COURT: How much longer do you anticipate with Dr. Millette?

MR. WILLIAMS: Probably 20 or 30 minutes.

THE COURT: Okay. Closer to 15, right?

MR. WILLIAMS: I will do my best.

MR. IGNATOWSKI: Your Honor, while we are on the record, I discussed this with Mr. McGowan and Ms. Tostanoski.

Yesterday I referred to two X-rays of Mr. Vandergucht, VA 29-D and 29-E, as being in September of 1980. They should be September of 1981, and we

have all agreed of that.

THE COURT: 9 of '81. I had them for 9 of '80.

MR. IGNATOWSKI: Yes. That was my mistake, and I apologize.

THE COURT: No need to apologize.

Everybody apologizes. What does Shakespeare say, me thinks the lady protests too much.

(Whereupon, jury present -- 3:05 p.m.)

THE COURT: Good afternoon. Thank you for your patience, and we are now ready to proceed with Dr. Millette's cross-examination by Mr. Williams.

MR. WILLIAMS: Thank you, Your Honor.

CROSS-EXAMINATION (CONTINUED)

BY MR. WILLIAMS:

Q Good afternoon, Doctor.

A Good afternoon.

Q I think where we left off is that we were talking about the test site, and I think we have gone through that in pretty much detail, and I would like to move on and that is your bulk test sampling that

you did as part of your work in this case.

I believe you testified in response to a question from Mr. Smith that you tested the bulk samples to determine asbestos content; is that correct?

A That is correct.

Q Okay. He asked you whether or not you found any tremolite and you indicated that you did not, correct?

A That is correct.

Q Okay. Just so we are all clear, did you find any crocidolite or amosite either?

A No, I don't believe so.

Q So there was no amphibole content present?

A Not that we could detect.

Q Okay. I would like to move on, then, to the actual activities that you tested, and I think they are kind of summarized up there on the chart.

As I understand it, the first activity that you tested was sanding a couple of brake shoes; is that right?

A That is right, sanding four brake shoes.

Q Sanding four brake shoes.

Based upon your deposition last week, I understand that the activity actually took approximately 10 minutes; is that right?

A That is correct.

Q Is that 10 minutes from the start of the sanding until the end then?

A It was approximately like that.

Q Were you the person who determined how long the sanding would actually take place?

A That is correct.

Q Okay. How did you choose 10 minutes?

A It was what was listed in the deposition by Mr. Grewe.

Q I believe I had an opportunity to look at that transcript over lunch, and I believe that he said it would take approximately five to ten minutes; is that right?

A I believe so, yes.

Q Okay. If you had tested for only five

minutes, would that have done anything to your numbers?

A It may have changed the sweeping data because there would be less material, but I don't think it would have changed the other number.

Q Okay. Are you aware that in his deposition for this case Mr. Grewe's son indicated that the same activity would take a couple of seconds?

A No, I did not read Mr. Grewe's son's deposition.

Q I would like you just to assume for a minute that that is his testimony.

If you had tested the activity for only a couple of seconds, would that have affected your numbers?

A I don't think you can do the activity in a couple of seconds.

I mean, sanding the four brake shoes takes longer than a couple of seconds.

Q Again, your experience as a brake mechanic is what?

MR. SMITH: Objection.

THE COURT: Sustained.

BY MR. WILLIAMS:

Q Regardless of whether you could do the activity in a couple of seconds, if you had sanded for a couple of seconds, would that have affected your numbers?

A Possibly. It would have been difficult to collect the sample for that short a period of time, but it possibly would have had some difference in the result.

Q You indicated, I think, that you used a coarse sandpaper to sand the brake shoes; is that right?

A That is correct.

Q Okay. And you sanded four of them.

Was that in order to determine what kind of fiber release you would have gotten if you replaced all of the brake shoes on a car?

A Well, if you were to replace four of the brake shoes, that is correct.

Q By using the sanding method?

A Yes.

Q So that would have been all of the sanding that would have been done in a complete brake job, right?

A Quite possibly.

Q Okay. Can you tell the jury the amount of pressure or force used during the sanding?

A Only that it was light enough that we didn't sand off the markings that you saw in the pictures.

Q Okay. Now, I believe in your protocol which you drafted for this test, you indicated that you were going to take area samples; is that right?

A That is correct.

Q Okay. Now, just so we are clear, those numbers are -- represent what?

A These are personal samples collected in the breathing zone of the individual doing the activity.

Q And those are from the monitors that we actually saw on the individual in the pictures that you showed the jury earlier, correct?

A That is correct.

Q Now, did you have area monitors that you used during this test?

A Yes, we did.

Q Okay. And where were those located?

A As I think I indicated, they were about five or six feet away on the walls of the containment, about five feet off the ground.

Q Okay. So when the activity was taking place, was the person who was conducting the activity in the center of the room?

A Close to the center, yes.

Q So that would put him approximately four or five feet away from the area sampler?

A Well, it would be a diagonal. It is about five feet away.

Q Okay. About five feet away.

Can you turn to your report and read for the jury what the area sample results were in the report?

A I did not put the area samples in the report.

Q Why not?

A We did not finish all of the area samples. Although we do have some data, it was also, I guess, not as important for the individual exposure that we were determining.

Q Would it be fair to say, Doctor, that your area sample results which were taken approximately five feet away from the individual doing the activity were lower than the personal results?

A Yes, it is fairly common. That is what you would expect, the bystander exposure would be less than the individual doing the activity.

Q Now, I believe at your deposition you gave me some copies of your raw data, and I think for the sanding activity you took an area sampling that resulted in about .77 fibers.

Do you recall that, or would you need to look at the raw data?

A I would need to look at the raw data.

Q Okay.

MR. WILLIAMS: May I approach, Your Honor?

THE COURT: You may.

BY MR. WILLIAMS:

Q If you could just take a look at that and tell me if I got it right, .77.

A That is correct. This is the PCM data, phase contrast data. I think you want it under the PCM data there.

Q It really goes to the 2.2?

A That is right.

Q If I could leave that there for a minute, and we will talk about that.

I think you testified that the next activity that you tested or one of the activities that you tested was sweeping, and actually I will go in order of the chart.

You tested filing, right?

A That is correct.

Q As I understand it, you obtained a file from an auto supply store; is that right?

A That is correct.

Q How did you know what kind or size file to

buy?

A I asked the person at the auto supply store. I explained what I was doing and said was there a particular file that they had an idea about, and they suggested that I buy this particular file.

Q Okay. And if I recall correctly from your deposition, the filing took about five minutes; is that right?

A That is correct.

Q Okay. Again, how did you determine how long the filing would take?

A Well, I was interested in doing between eight and ten movements or grooves on the disc pad to replicate what you would do if you are doing four disc pads, so we did eight to ten grooves and took about five minutes.

Q Okay. Now, you did that on one disc pad; is that correct?

A That is correct.

Q And that is because you had a limited supply, right?

A Well, we needed another disc pad for the grinding test, and we wanted to keep one disc pad in case we wanted to do some other tests.

Q All right. Now, do you have an understanding from your preparation to do your test as to how many disc pads there would have been on the average car that Mr. Grewe would have worked on?

A Well, I think the set that came in the box were four.

Q Okay. Would it be fair to say that you went ahead and had eight to ten grooves cut in with the file on the one pad because you were trying to duplicate the amount of fiber release that you would expect from an entire brake job?

A For doing the same thing, cutting the grooves in four pads, that is right.

Q Right. For one vehicle?

A Yes.

Q Okay. Did you also take area samples for filing?

A Yes.

Q Do you recall what those might have been?
A I am not sure. I don't remember what the results were.
Q Okay. Are they reflected in your raw data?
A I don't see any for the filing.
Q Okay. Would it be fair to say, though, that they would have been something lower than your personal samples?
A I think so.
Q Okay. So something lower than .3 fibers per cc?
A I believe so, yes.
Q All right. The next activity that is listed on the chart is grinding, and as I recall your testimony during direct examination, that activity was with the hand grinder that we were showing earlier; is that right?
A That is correct.
Q Okay. And I believe that that activity lasted approximately two minutes?
A Yes.

Q Okay. How did you decide the two minutes?
A Again, it was the amount of time to cut eight or ten grooves in the disc pad.
Q Okay. And, again, you cut eight or ten grooves in the disc pad because you were trying to duplicate the amount of fiber release that would occur during an entire brake job on the vehicle; is that correct?
A Working on one brake pad.
Q It would be one brake pad per wheel, correct?
A I would think so.
Q If we had a four-wheel car, it would be four pads?
A Yes.
Q Did you take area samples for that activity?
A Yes, we did.
Q Okay. I believe that is reflected in your raw data. If you could go ahead and take a look at that and tell me what that is?

A Yes. Here is one of the area samples. We found 1. -- well, one fiber per cc.

Q One fiber per cc. Again, that would have been taken approximately five feet away from the activity?

A That is correct.

Q Somewhere in that ball park.

Okay. The final activity that you did, I think, was sweeping.

I think at your deposition and here today you testified that the sweeping took about five minutes; is that correct?

A That is correct.

Q How did you decide five minutes?

I don't think that was reflected in any of the materials that was provided to you, was it?

A No. That is about the time it takes to sweep the entire area in the containment.

Q So that would have been the 8 by 8 area?

A That is correct.

Q Okay. What kind of broom did you use?

A Straw broom.

Q How did you decide to use a straw broom?

A I guess it is the type that we have used in other types of studies. It is the common type of broom that you might have almost anyplace that you would be working.

Q Okay. And did you take area samplings during that activity?

A Yes.

Q Okay. Are those reflected in the raw data?

A No, they are not.

Q Okay. If I could just get that back from you.

Now, all of these numbers that you have gotten for all of the activities that you tested, those would really be peak exposure numbers, wouldn't they?

A Yes, they would.

Q Okay. You are familiar with the concept of the time-weighted average, right?

A That is correct.

Q Okay. Are you able to convert the fiber per cc numbers into a time-weighted average for the jury?

A Well, it would depend on what the person did during the other time they were doing it.

If they did pretty much all day the same kind of work, then this number would pretty much be the same.

Q Okay. Well, I would like to go ahead and give you some facts and maybe you can go ahead and make the conversion for us.

Assume for a minute that the person did one brake job a day over the course of an eight-hour day.

Are you able to convert the numbers for us?

A Well, we need to know what other exposures he had. Did he sweep up the place? Did somebody use compressed air? Was somebody else working on another job by him.

Those are the factors you would have to have in order to determine what the eight-hour time-weighted average exposure would be.

Q Okay. Right now, as it stands, you wouldn't

have enough facts to do that?

A That is correct.

Q Okay. Would it be fair to say that if the individual did one brake job a day, though, even absent any additional facts over a time-weighted average the number would be substantially lower?

A It depends on what his other activities are and how much exposure there might be. I don't know that.

Q Let me give you some facts then.

Assume Mr. Grewe did one brake job a day and that was his only exposure to asbestos-containing products during that time, and assume -- let's just assume for the purposes of this exercise that there were three other brake jobs done somewhere in the garage, but not in his bay at the same time.

Are you able to give us a rough ballpark figure, for example, as to what the time-weighted average would be for the activities that you tested?

MR. SMITH: Objection.

THE COURT: Overruled. The answer is really

yes or no.

A No.

THE COURT: Next question.

Q Why not?

A Well, because there are other activities that go on besides the brake jobs. There would be the cleaning, as I indicated.

Did these other people sweep up their areas? Did Mr. Grewe clean up his area, or did he go home and just go back for those particular times when somebody else was working?

All of these things you need to know if you are going to try to calculate a time-weighted average.

Q Let me ask you a very simple question then.

I understand you are not able to convert it into a time-weighted average, but are you able to say whatever the time-weighted average would be, it would be lower than the peak numbers that you got during the test?

A No, I can't tell you that.

Q Now, the jury has heard that Mr. Grewe started working in the '50s, and we heard a little bit this morning about what the permissible exposure level was currently.

Was there a threshold limit value or permissible exposure level back in the '50s?

A I am afraid I don't remember when the first recommended guidance was. The first data was in terms of asbestos particles per cubic foot.

Q Okay.

A I don't remember the date when that began.

Q That would have been the five million particles per cubic foot standard that the jury has heard something about?

A I would think so.

Q Are you able to roughly approximate how many fibers per cc five million particles would be?

A That is something -- I have got information back at the office, but I didn't bring that, so I can't make the calculation.

Q Okay. We have talked about the fibers per

cc counts.

In addition, with Mr. Smith you went through your asbestos structure counts, and that is from your electron microscope review, correct?

A That is correct.

Q Okay. But just so we are all clear, let me ask you a preliminary question.

What is OSHA and NIOSH?

What is NIOSH's purpose?

A NIOSH is the National Institute of Occupational Safety and Health, and they put together the methodologies and technical background for OSHA. And OSHA is the regulatory part of the agency, and they generally don't get involved in the research end.

Q Okay. But would it be fair to say that OSHA is the governmental agency or regulatory body that is charged with ensuring safe workplaces?

A Well, there is some overlap because obviously this is an EPA document here for automobile mechanics.

Q Right.

A So OSHA and EPA share some regulatory and guidance support for auto mechanics.

Q Does OSHA have primary responsibility, or are you able to say?

A I am not sure.

Q Okay. Now, the jury has heard something about something that has been referred to as OSHA fibers, and as I understand that term, those are fibers greater than five microns in length and that have an aspect ratio of three to one.

Is that your understanding of what an OSHA fiber is?

A Well, it would be those fibers that are counted by the light microscope, so the numbers listed by PCM here would be OSHA fibers.

Q Okay. In addition to counting the fibers that way, OSHA regulates them that way, doesn't it?

A That is correct.

Q Okay. So we have got these numbers that you have referred to as asbestos structures, but when OSHA

issues its regulations that you talked about this morning, they really concentrate on the fibers per cc number; isn't that right?

A For OSHA that is correct.

Q Okay. So with respect to OSHA then, they are concerned about the 2.2 fibers per cc; and I guess the .77 under area sampling; the .3 fibers per cc; the 8.5 fibers per cc; and the 1.7 fibers per cc?

A Generally, unless there has been some TEM data done, sometimes they consider that as well.

Q I think you indicated this morning that they did not have a lot of TEM data upon which to draw experience, and that was one reason that they continued to use the fibers per cc?

A They use the light data to make most determinations, although there are some situations where they have used the TEM data as well.

In their Salt Lake City office where they have the laboratory, they sometimes get involved in projects where in order to make a determination in certain industry, they will look at the TEM data as

well.

Q Doctor, am I correct that you have had occasion at least at some point to review the NIOSH studies that pertain to automobile garages?

A I have reviewed some studies, yes.

Q Okay. Now, they calculate those numbers in fibers per cc, don't they?

A As far as I remember, most of the work is in light microscopy, but there were -- I know there was some TEM part to their studies. I don't remember if it is in the reports, no.

Q Okay. While we are on the subject of chrysotile asbestos structures, I think you indicated earlier that there were several components to that, and, for example, I think you talked about bundles; is that right?

A That is correct.

Q Okay. And you talked about clusters?

A Yes.

Q And I think for bundles and clusters you used the analogy of straws and for a bundle the straws

would all be together; is that right?

A That is correct.

Q And for clusters they would be apart?

A Well, they would be on top of each other and intertwined.

Q Okay. And you talked about something called a matrix or matrices, that is another type of chrysotile asbestos structure, right?

A That is correct.

Q And I think you indicated that what a matrix was was it was a fiber or fibers that had a nonasbestos part attached to it in some fashion; is that right?

A That is correct.

Q Now, when we are talking about brake linings, would that be the binder matrix or the resin in your best estimate?

A Quite possibly.

Q Okay. Now, it is quite possible, isn't it, that the fact that the resin is attached to those fibers would affect respirability?

A It is possible. It may affect toxicology, too. I don't know.

Q Okay. It may affect toxicology. And by that you mean it may affect the way the fibers interact with the human body?

A That is correct.

Q Okay. In addition to taking the personal samples and the area samples, you also measured the amount of asbestos fibers on the individual's hands who was doing the work, correct?

A Well, we didn't actually measure the number of fibers, I couldn't do that, but we did determine that there were a number of fibers present.

Q And you did that by using the Post-it note?

A That is correct.

Q Something that looks like this?

A Yes.

Q Okay. I have seen from your CV that you have written a number of articles relating to asbestos that are published in the literature.

Have you written anything about the Post-it

note method and published it?

A Yes.

Q Okay. And is that reflected on your CV?

A Yes, it is.

Q Okay. Great. I think you also indicated this morning that this is not the first test that you have done of asbestos-containing products, right?

A That is correct.

Q So is it fair to say that it is not the first test that you have done for -- at the request of a plaintiff's firm?

A That is correct.

Q All right. How many other tests have you done at the request of plaintiffs' firms, can you approximate?

A I think we talked about maybe five or six other materials that we tested this morning, and I imagine we probably have done ten or so different projects.

Q And did the ten projects relate to the five or six materials or are there additional materials?

A They would relate to the five or six materials.

Q Okay. And how many plaintiffs' firms have you worked with?

A Probably a dozen, perhaps.

Q Okay. Does that include your testing work as well as your testifying work?

A They are usually the same.

Q Okay.

A Usually the work that I do for, say, the Attorney General's Office or a plaintiff's firm results in at least deposition testimony.

Q So you do the test and then you go and you testify about the test, right?

A If I am requested to, yes.

Q Okay. So then you have either done tests and/or testified for about a dozen plaintiffs' firms?

A I think so, yes.

Q Okay. Are those across the country?

A Yes.

Q Okay. Can you tell the jury how many times

you have testified at trial on behalf of plaintiffs in personal injury actions?

A I think it is probably about maybe ten times.

Q Ten times. Were all of those times at $250 an hour?

A Probably.

Q Okay. How many depositions have you given on behalf of plaintiffs' firms?

A Probably 40 or 50.

Q And your rate for testifying at deposition is also $250 an hour; is that correct?

A That is correct.

Q Okay. For your testimony here today, does the $250 an hour include your travel time from Atlanta to here and back?

A That is billed at $100.

Q Okay. So your travel time is $100 an hour.

And I think you told the jury earlier that you billed Mr. Smith and his firm $10,000 or approximately $10,000 for the tests; is that correct?

A That is correct.

Q Do you think that will be the total bill, or do you still have some work to do that may make the bill go up a little bit before you are all done?

A Well, it would be whatever we do today.

Q Okay. Just one final question, Doctor.

You billed Mr. Smith $10,000 for the test.

Do you think that given the fact that you billed that much that you could have afforded a mechanic to help you out in designing and executing the test?

MR. SMITH: Objection, Your Honor.

THE COURT: Sustained.

MR. WILLIAMS: Nothing further, Your Honor.

THE COURT: Thank you, Mr. Williams.

Mr. Smith, any redirect?

MR. SMITH: Just a couple of minutes, Your Honor.

REDIRECT EXAMINATION

BY MR. SMITH:

Q Dr. Millette, Mr. Williams asked you several

questions about the protocol that you utilized in this test.

Have protocols similar to this one by you been published in the literature?

A Yes, some of the studies we have done have been published following similar protocols.

Q And have those been reviewed and accepted by your peers in the literature?

A Yes, they have.

Q And is this -- these types of protocols, similar protocols that you have done with similar studies, are they available to anyone such as Ford to use in performing brake fiber release tests?

A Once the publications are out, they are available to anyone in the scientific community.

Q In fact, Ford could have conducted their own tests if they wanted to?

A Certainly.

Q And do you have any intention at present, sir, to publish the results of these tests that you have performed for us?

A I would like to, yes.

Q And fiber release results that you have found here, they don't represent the total lifetime exposure of a person who would have been subject to those exposures, do they?

A No. They would represent various activities to determine what those activities might contribute, and as I think I have alluded to, there are a variety of other possible exposures based on other people doing the work nearby or cleaning up or using air hoses to blow out brakes and things like that.

Q And the last question, Doctor, is the asbestos fibers that are released that are not bound with other materials that Mr. Williams talked about, those would still be respirable and potentially carcinogenic?

A Yes. All of the fibers that we would pick up on the filter, I think, would be respirable.

MR. SMITH: Thank you. That is all I have, Your Honor.

THE COURT: Thank you, Mr. Smith.

Anything else, Mr. Williams?

MR. WILLIAMS: Just a couple of questions, Your Honor. Thank you.

THE COURT: Two? Okay.

MR. WILLIAMS: Maybe one.

THE COURT: All right.

RECROSS-EXAMINATION

BY MR. WILLIAMS:

Q Dr. Millette, you testified that a company like Ford could take your protocol and conduct its own tests.

If I sent that protocol to Ford, would they be able to go ahead and do the sampling, the hand sampling like you did?

A Well, if they read the deposition, they certainly would.

Q Right. But it is not in your protocol, is it?

A I don't think it is listed in the protocol.

MR. WILLIAMS: Thank you, Your Honor.

THE COURT: You are welcome.

Dr. Millette, thank you very much. You may be excused, sir.

(Whereupon, witness excused.)

THE COURT: Next witness, please.

MR. SMITH: Your Honor, I would just like to move into evidence the pictures of the emblems on the boxes and the caution statement as Plaintiff's Ford Exhibit 197 and 198, and I don't believe Mr. Williams has an objection.

MR. WILLIAMS: No objection.

THE COURT: They will be admitted.

(Whereupon, Plaintiffs' Exhibit Numbers Ford 197 and 198 were received into evidence.)

MR. SMITH: Thank you, Your Honor.

And Dr. Millette's CV, we would also move in as Millette Exhibit -- whatever the next number is.

THE COURT: That would be Millette 18.

MR. SMITH: Thank you.

THE COURT: 18 would be the CV of Dr. Millette.

(Whereupon, Plaintiffs' Exhibit Number

Millette 18 was received into evidence.)

MR. SMITH: Next, Your Honor, we would like to read some discovery responses by Ford Motor Company.

THE COURT: Go ahead, Mr. Smith, please.

MR. SMITH: Thank you, Your Honor.

Interrogatory number 14. Answer by Ford in this case where we asked them when they first determined that another material could be used in place of asbestos, and their response was the first Ford application of nonasbestos brakes was on light trucks in approximately 1976.

Other Ford makes presently utilize fiberglass, steel wool and semimetallic materials.

The response to interrogatory number 39 in this case where we asked Ford what trade organizations they belong to, and Ford stated that they had a membership from January of 1947 through December 1974 in the Industrial Health Foundation, formerly known as the Industrial Hygiene Foundation.

In response to interrogatory number 123 in

this case, it asked that Ford contends if they recommended safety procedures regarding the use of and exposure to asbestos products to the plaintiff and their response was Ford has no way of knowing this information at this time.

In response to interrogatory number 124, it asked if they contend that the plaintiff was exposed to a safe amount of asbestos or to an amount less than the threshold limit of exposure to asbestos, and they said -- or their response was unknown.

Response to interrogatory number 134, we asked them to state whether they contend that the plaintiff's claims are by Mr. Grewe's alleged misuse of asbestos products with which he worked, and Ford's response was unknown at this time.

Their admission responses in this case, response to number 256, we asked them to admit that Ford never performed any dust studies which measured the amount of airborne asbestos fibers at any of Mr. Grewe's places of employment, Ford admitted that.

They also admitted in response number 257

that Ford did not have any dust study results which measured the amount of airborne asbestos fibers at any of Mr. Grewe's places of employment.

In response to admission number 248, Ford admitted that inhalation of cigarette smoke does not cause or contribute to mesothelioma.

In response to admission number 240, Ford admitted that Mr. Grewe's mesothelioma was more than likely asbestos related.

In response to number 141, Ford admitted that it never performed or contributed funds to any studies or research to determine the effectiveness of any dust masks or respirators to prevent asbestos inhalation.

And in our Ford Exhibits Number 86 which are interrogatory answers by Ford in the Corsino case, United States District Court for the Eastern District of Pennsylvania in 1984, Ford was asked to state whether it is aware of the practice of using compressed air to remove accumulated dust and debris from brake drums and friction mechanisms during brake

and/or clutch maintenance and repair, and Ford responded yes.

And in interrogatory number 96 from the same set of interrogatories in Pennsylvania, Ford was asked to state whether it is aware of the practice of grinding or beveling asbestos friction materials, and Ford responded yes.

Thank you.

THE COURT: You are welcome. Next live witness?

MR. IGNATOWSKI: Your Honor, I was going to move the medical records in.

THE COURT: What number?

MR. IGNATOWSKI: Good afternoon, ladies and gentlemen.

THE JURY: Good afternoon.

MR. IGNATOWSKI: The medical records for Mr. Keith Grewe, premarked as Grewe Numbers 1 through 13, and they are contained in this file, the medical records of Mr. Keith Grewe.

THE COURT: They will be admitted as

Plaintiff's Exhibits 1 through 13.

(Whereupon, Plaintiff's Grewe Exhibit Numbers 1 through 13 were marked for identification and received into evidence.)

MR. IGNATOWSKI: There is a stipulation between plaintiff's counsel in the Grewe case -- between plaintiff in the Grewe case and counsel for Ford that the medical expenses in Mr. Grewe's case were $34,239 and that they are fair and reasonable.

I would now, if I may, Your Honor, continue?

THE COURT: Please.

MR. IGNATOWSKI: I apologize for going so quickly, ladies and gentlemen.

I want to read some responses to admissions as to Owens-Illinois and Owens-Corning Fiberglas and some answers to interrogatories.

Owens-Illinois has admitted --

THE COURT: Excuse me. Before you do that, do you have a live witness?

MR. IGNATOWSKI: Yes, we do.