IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS
COUNTY DEPARTMENT, LAW DIVISION

BOARD OF EDUCATION OF THE CITY OF CHICAGO, Plaintiffs, vs. A, C AND S, INC., et al., Defendants.	NO. 92 L 9934	DEPOSITION OF: DR. ARTHUR M. LANGER
EVANSTON COMMUNITY CONSOLIDATED SCHOOL DISTRICT NO. 65, et al., Plaintiffs, vs. A, C AND S, INC., et al., Defendants.	NO. 92 L 9933	
BOARD OF EDUCATION OF HIGH SCHOOL DISTRICT NO. 221, et al., Plaintiffs, vs. A, C AND S, INC., et al., Defendants.	NO. 92 L 9932	
BOARD OF EDUCATION OF TOWNSHIP HIGH SCHOOLS, et al., Plaintiffs, vs. A, C AND S, INC., et al., Defendants.	NO. 92 L 9927	

TRANSCRIPT of the Examination Under Oath of the witness called, in the above-captioned matter, said deposition being taken pursuant to Federal Rules of Civil Procedure by and before BERNADETTE H. MASTRANGELO, a Certified Shorthand Reporter and Notary Public of the State of New York, at the law offices of WILSON, ELSER, MOSKOWITZ, EDELMAN & DICKER, ESQS., 150 East 42nd Street, New York, New York, on Wednesday, May 31, 1995, commencing at 10:00 a.m.

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I N D E X

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DR. ARTHUR M. LANGER, doing business at Bedford Avenue and Avenue H, Brooklyn, New York, having been duly sworn, testified as follows:

DIRECT EXAMINATION BY MR. MILLER:

Q. Dr. Langer, good morning. My name is Jonathan Miller. I'm an attorney with the firm of Greitzer & Locks in Philadelphia. It's important that you hear and understand everything that I say today. If you do not hear me or do not understand me, please stop me and I will be happy to repeat my question.

Do you understand that, sir?

A. Yes.

Q. I represent two of the three plaintiffs, and they've consolidated the asbestos case pending in Chicago. I represent the Board of Education of the City of Chicago and a number of suburban district captions, generally under the title of Evanston.

Do you understand that, sir?

A. Yes.

Q. I understand that you have been retained, you are an expert consultant for Asbestospray in

this case, is that correct?

A. Yes.

Q. You are also an expert consultant for another defendant named Conwed in this case, is that correct?

A. Yes.

Q. It's my understanding that your testimony today will focus on your being consulted by Asbestospray, and so it will include Asbestospray-specific questions, as well as general questions about your view, but I will not go into any Conwed specific questions.

MR. MILLER: Is that your understanding, also?

MR. BROWNSON: Jon, so we're clear, Dr. Langer was obtained by Conwed. As you know, Conwed is a defendant in District 2007, 211 cases which are being handled by Elaine Siegel.

MR. MILLER: That is another reason why I am not going to ask anything about Conwed. Conwed is not a defendant in whom I have interest. I understand there's a future date for your deposition with Ms. Siegel that will focus on Conwed.

MR. BROWNSON: Specifically, we made those arrangements with her.

BY MR. MILLER:

Q. Doctor, how many times have you testified in an asbestos property damage deposition?

A. I don't know, maybe a half dozen or so.

Q. Have you ever testified in a trial in an asbestos property damage case?

A. Yes.

Q. How many times?

A. I testified in the West Virginia property damage case, I may have testified in one other case, but I'm not sure, maybe several other cases.

Q. At least one of the asbestos property damage depositions you gave was in a case for Robert Sweeney on behalf of the plaintiff, is that correct, sir?

A. Yes, that's correct.

Q. Aside from that, have all your other asbestos property damage depositions and trial testimonies been as an expert consultant by a defendant?

A. That could be true, yes.

Q. Approximately, how many times have you testified in depositions involving asbestos personal injury cases?

A. Several dozen, probably.

Q. How many times have you testified at trials involving asbestos personal injury cases?

A. Maybe one dozen, maybe more.

Q. How would you divide those testimonies between an expert consultant by the plaintiff and expert consultant by the defendant, sir?

A. These are only testimony, correct?

Q. Both deposition and trials.

A. Just testimony, you're talking testimony, not consultant?

Q. Exactly, just testimony, precisely right.

A. That's an evolution. At the very beginning, I represented plaintiffs only. Then an equal number of plaintiffs and defendants; and as of late, it's mostly defendants.

Q. Have you ever testified before the EPA?

A. Yes. Well, I'm just trying to think if EPA's ever held hearings, which one would

testify. Have I? Indirectly.

Q. I'm not talking here about the times that you were a reviewer.

A. No, no, I understand the question.

Q. Have you ever done such direct testimony with regard to asbestos?

A. Yes, that would be before a committee hearing on the advisability of passing the Toxic Substances Control Act. It would be Senator Tunney's (phonetic) committee.

Q. What year was that, sir, that you testified?

A. Could be 1973 or thereabouts.

Q. What was the general subject of your testimony?

A. Well, the sources of fiber which may enter into the environment.

Q. You were still --

A. I'm sorry, that's all right. Ask your question.

Q. You were still at Mount Sinai at that time?

A. Yes.

Q. Were you testifying on behalf of any particular group?

A. No.

Q. That's the only time you've testified directly or indirectly regarding the EPA, is that correct, sir?

A. Well, this is my recall, but there may have been other instances in which testimony was then used by the Environmental Protection Agency, such as testimony before OSHA.

Q. How many times have you testified before OSHA with regard to asbestos?

A. I think three times, two or three times, something like that.

Q. Please tell me the years and the subject matter of each one.

A. Well, the foremost that is easy to recall is the last piece of testimony which focused on -- well, what was the year? The years 19 -- 1991 or thereabouts, '90, '91.

Q. It concerned what, sir?

A. It concerned the subject of whether or not OSHA should remove cleavage fragments from the asbestos standard.

Q. Your position was, in summary, what?

A. Cleavage fragments were different from asbestos fibers. Experimental data indicated

that they had a much, much reduced carcinogenicity, and they should be removed from the asbestos standard.

Q. Did OSHA so remove them?

A. Yes.

Q. Was that in the 1994 regulations?

A. Which?

Q. The asbestos regulations that came out in August of 1994?

A. Well, the -- yeah. I mean, all of these are published in the Federal Register. These are all public documents. You can read them yourself and find out what the outcome was, but they did effectively remove cleavage fragments from the standard.

Q. 1990 testimony, were you testifying on behalf of any organization?

A. I was testifying on behalf of my own laboratory. We had provided data which were collected during the support from the Vanderbilt Tagging Company, but we represented ourselves.

When I say "we," that's Langer, Nolan who testified. He's the associate director of my crew, and John Addison from the Institute of Occupational Medicine in Edinburgh.

Q. Is this the second time you testified before OSHA?

A. Yes, that would be the hearings held in 19, I think, 84.

Q. Have those hearings led up to the 1986 OSHA asbestos regulations?

A. Yes.

Q. What was the general subject of your testimony in those hearings?

A. Well, I wrote a document which was submitted as supporting a documentation concerning the nature of asbestos fibers and whether or not certain materials should be included in the standards.

Q. Was that testimony on behalf of any organization?

A. No. Actually, it was on behalf of the Department of Labor. We were asked to -- we, my colleagues and I at Mount Sinai, were asked to generate a number of documents which were to be used as the underpinning support for OSHA asbestos regulations.

Q. Is there a possibility of a third time you testified before OSHA?

A. I seem to recollect that in the late '70s

I appeared before one of the hearing committees with Irving Selikoff.

Q. Do you remember the general subject of that testimony?

A. No, I think it was general mineralogy. That was my expertise, and that was why I was present. I appeared with Irving Selikoff. That was my expertise, mineralogy.

Q. Okay. Are there any other Federal government organizations that you have appeared before in giving testimony before, sir?

A. Here in the United States?

Q. Yes, sir.

A. Yes, I appeared before the Consumer Products Safety Commission.

Q. What year was that?

A. 1989, perhaps, 1990, something like that.

Q. What was the general subject of your testimony then?

A. I appeared as an expert for the Consumer Product Safety Commission. The issue at that time was a carbonate place, and in whether or not this material was contaminated with asbestos fiber.

Q. So, that's the only time you

appeared before them?
A. Yes.
Q. Any other Federal government testimony appearances in this country that you can recall at this time?
A. I can't recall.
Q. Have you ever testified before any State or local legislature or municipal or governing bodies in Illinois?
A. In Illinois?
Q. Yes, sir.
A. No.
MR. MILLER: Okay. Exhibit 1, please.
(P-1, Curriculum Vitae, received and marked for Identification.)
Q. Dr. Langer, marked as Exhibit 1 is a copy of your CV. This copy of your CV has materials going up through 1994, has numbered pages through page 43, and then additional pages called funding source.
Is this the most up-to-date copy of your CV, sir?
A. Well, it's reasonably up-to-date, yes.
Q. Please tell me if there are any

items that should be added to it in any of the categories.

A. As an example, I attended a conference at Pennsylvania State University last week and presented a paper on modification of chrysotile fiber and biological activity. It was called a Goldschmidt Conference. It was held under the auspices of the Mineralogical Society of the American -- the Mineralogical Society of America, and the Geochemical Society, among others.

Q. Anything else which should be added to Exhibit 1?

A. I don't know. I would have to examine it in detail.

Q. How about in terms of peer-reviewed articles, are there any that have appeared more recently than your last one, which is on Page 16, and it's your New York City article with Dr. Wilson, et al.?

A. No. I don't think so.

Q. Okay. Are there any more recent publications under symposium proceedings?

A. I think that is current. It looks current.

Q. Are there other publications and published abstracts?

A. No, we have two abstracts that were published in proceedings of the Goldschmidt Conference, and we have a paper which has been submitted to -- as soon-to-be-published text on Occupational Environmental Medicine, a chapter in the book.

Q. What is your chapter on, sir?

A. It's on mineralogy, the nature, the materials to which workers are exposed in the workplace.

Q. Who's the editor on that book?

A. Phillip Harber, from Los Angeles.

Q. Do you know which publishing company will be publishing the book?

A. Not offhand.

Q. Do you know how soon it will be published?

A. I think publication is about as imminent, as they say.

Q. Good.

Do you have any other peer-reviewed articles or other types of publications in which publication is imminent, namely, before

October?

A. No.

Q. On Page 30, you have a list of manuscripts and preparation.

Are they still in preparation or --

A. Preparation changes with time because there is the famous item, crocidolite paper, that's on the back burner because I don't have time to do it. The tremolite dust is exactly the same. It's just the data there. The fibers in human lungs of an exposed worker, that is all done, and that has to be written up. The surface mechanisms and the anion transport paper, that is up to Nolan to write up. He has pretty much a draft worked out.

Basically these papers are in preparation, meaning the data are in the laboratory and they are in the process of being written up.

Yes, they're all pretty much manuscripts and preparation -- work in preparation.

Q. The last two manuscripts in preparation are on the top of Page 31, and they both concern asbestos bodies.

A. Correct.

Q. If I were to ask you your general opinions about asbestos bodies, particularly as indices in the disease risk, would you be able to tell me even though the manuscripts are not published?

MR. BROWNSON: That's a yes or no question.

A. Would I be willing?

Q. Would you tell me your opinions?

A. Only if you're decent to me today; yes, of course.

Q. What are your opinions, Doctor, about asbestos bodies as indices of disease risk?

MR. BROWNSON: Well, this is a vague and general question, and I object to it on that basis, but to the extent you can answer, go ahead.

A. The asbestos body has been used as a marker of exposure, as an early marker of exposure. It has -- the asbestos body has evolved in time in terms of nomenclature and specificity. The asbestos body, depending on occupation, is an index of exposure to fibers, generally, and on the basis of my work,

following various groups of individuals, there is a quantitative and proportional trend which indicates that among workers that are intimately involved with asbestos-containing products, their asbestos body concentration tends to be high, and the prevalence among that population tends to be universal. Meaning, an insulation worker who works in cramped spaces exposed to aerosols of asbestos-containing products, all asbestos workers have what we call asbestos bodies in pulmonary tissues, and concentrations tend to be very high.

My data showed that the shipyard worker population tends to be lower in prevalence, meaning, only 75 or 80 percent of shipyard workers have what appear to be asbestos bodies in their pulmonary tissues, and that the concentrations of these are very much less than present -- are present if the insulation worker that is followed by a group that we call construction workers, that I called construction workers, in which the prevalence, again, decreases, and numerically, the quantities decrease.

This is followed by a number of

other occupations which deal with automotive trades, mechanics, brake maintenance and repair workers, and this is followed by white-collar workers, in general, and then followed by white-collar housewives who have never been engaged in work outside of their own home, followed by neonatal deaths.

So, there is discontinuum, and the asbestos body is, according to our technique, and the technique, of course, was light microscopy and the certain volume of tissue waves analyzed according to a certain technique. So, the asbestos body is a rough index of "exposure," and, of course, there's all these other embellishments, meaning that there are variables and confounders and so on and so forth.

Q. Did you find asbestos bodies in the cases of neonatal deaths?

A. No.

Q. Did you find asbestos bodies in the case of the white-collar housewife who never worked outside the home?

A. Approximately 30 percent of these women had what appeared to be asbestos bodies in their

tissues. They tended to occur numerically, according to our protocol, maybe one or two asbestos bodies per unit volume of tissue.

Q. Did you find asbestos bodies in white-collar workers?

A. Approximately 40, 45 percent. Again, there were very few, maybe one or two or three.

Q. Have you reached any conclusions from this body data that you just summarized?

MR. BROWNSON: Again, I'll object to the form of the question as vague, but go ahead.

A. What have I concluded? I have concluded that the asbestos body is a gross index of exposure to mineral fiber, that shipyard workers and construction workers appear to be exposed to higher levels of fiber than others in the working populations in the United States. Whether or not risk can be determined on the basis of asbestos bodies is more problematic and I'm not sure it's possible.

Q. If you do not find asbestos bodies in the lungs of the person who has died, can you then conclude that that person did not have an asbestos-related disease?

A. You're talking to me as a mineralogist, not as a pathologist?

Q. Based on your experience, either in mineralogy or if you wish to opine on pathology, let me know.

MR. BROWNSON: I'll state for the record that we're not going to opine about pathology because he's not a pathologist.

Q. Well, limited to mineralogy, if you're comfortable to, then?

A. Sure.

Q. Do you know the question, sir?

A. Not only do I know the question, I know the answer.

Q. May I have the answer, please?

A. As you know, there is a spectrum of "asbestos diseases." The mesotheliomas, meaning the sites, the multiple sites in which mesothelioma occurs, lung cancer, and cancer of other sites, and, of course, asbestosis.

Now, there are some who believe that the asbestos body is a necessary marker for each and every one of those diseases. I, personally, believe that one should look for uncoated fibers rather than asbestos bodies. In that sense, the

asbestos body is a more -- I guess the right word is a more coarse index of exposure.

Q. Are you aware of any person who had mesothelioma, who, upon appropriate examination, was not found to have had uncoated fibers in their body?

MR. BROWNSON: I'll object to the form of the question.

Are you talking about his examination or --

Q. I'll start with your examination.

A. My experience?

Q. Yes, sir, your experience.

A. Have I ever found a mesothelioma without asbestos fiber in the pulmonary tissues?

Q. Yes.

A. Yes.

Q. How many times did that happen?

A. We're talking about asbestos. This means even below what I would anticipate as background?

Q. Yes, sir.

A. Perhaps twice.

Q. Okay. Did you reach any conclusion regarding the cause of the mesothelioma in those

two cases?

A. Other than unrelated to asbestos, no.

Q. Going back to your CV, on Page 3 you state that you were a fellow with the Collegium Ramazzini, and elected a fellow in 1983?

A. Correct.

Q. What is the Collegium Ramazzini, sir?

A. Collegium Ramazzini was an organization which came into being through the efforts of Irving Selikoff and a number of other individuals, and came about because of the perceived time lag between research in areas affecting occupational health, "the publication of seminal papers," put that in quotes, in the peer-reviewed literature and the implementation of those data to ameliorate conditions which might have been dangerous in the workplace.

There was a perceived need to bring together scientists from around the world working on these peculiar problems and to use these new findings to better understand problems of the workplace and to bring about change in perceived hazards.

Q. When was the Collegium formed?

A. You mean, when was it incorporated?
Q. Yes, sir.
A. I don't really know. I'm thinking out loud. That's a good question to ask Shelly Samuels. Perhaps 1981, '82, something like that. It's about that time.
Q. Have you been a member since it was incorporated?
A. Yes.
Q. After you left Mount Sinai, which was in 1988, is that correct, Doctor?
A. Correct.
Q. Have you kept up with Collegium Ramazzini in terms of doing anything with regard to it?
A. No.
Q. Did you attend the conference known as the Third Wave, here in New York City?
A. No.
Q. Why not?
A. I don't know.
Q. Were you invited?
A. No.
Q. Did you ask somebody if you could go?

A. No.

Q. Did you know that you could attend simply by paying an admission fee?

A. That, I'm certain of.

Oh, that tickles me.

Q. The general subjects discussed at that conference appear to me, as a mere layman, to have had some relevance to work that you have done for many years, and I wondered, given that, why you didn't attend.

A. I can't for the life of me think why. I could have been out of town that week.

When was it, anyway?

It was sometime in 1991. I really do believe I had commitments elsewhere, as a matter of fact.

MR. FISHER: June 1991.

Q. Doctor, I've handed you a book which is titled: "The Third Wave Of Asbestos Disease: Exposure To Asbestos In Place Public Health Control," published by the New York Academy of Sciences in 1991.

Have you ever had an occasion to review this book?

A. To review it?

Q. To read any of the papers in it?

MR. BROWNSON: You mean, as a peer reviewer?

Q. No, to read it.

A. Oh, have I read some papers in it?

Q. Yes, sir.

A. Yes, of course.

Q. Okay. Do you have any opinions about the usefulness in your work of any of the papers that were represented in here?

MR. BROWNSON: Well, again, that's a general and vague question. I'll object to the form of the question on that basis, but it's a thick book.

Are those papers useful in your work, is that the question?

MR. MILLER: I think so.

A. Well, I have to translate what you mean by "useful."

Do I occasionally cite papers that are in that volume? Yes.

Q. Okay. Which papers, if you recall, have you cited in this volume?

A. Do you want to go through the volume with me?

Q. Yes, sir, just the table of contents would be sufficient, I think.

A. You want to know what I've read in here or what I cited, what I've quoted?

MR. BROWNSON: Well, let's get the question in mind.

THE WITNESS: Well, let's start with --

MR. BROWNSON: Whoa, let's hear the question.

Are you asking him papers he has cited in his publications?

MR. MILLER: Yes.

MR. BROWNSON: That seems to be the question.

Q. That's correct.

A. Which of the papers that I, myself, have read that I've cited and found of interest?

Well, the very first paper, the one by Selikoff and Seidman on "Asbestos-associated deaths among insulation workers in the United States and Canada," that has the most recent data on the national survey. Very interesting.

I've read the paper on the "Carcinogenicity of chrysotile asbestos:

evidence from cohort studies." A paper by Dement. That has some interesting chrysotile commentary in it and other interesting features.

The third paper I have quoted, this is the paper by Kohyama and Suzuki, "The analysis of asbestos fibers in lung parenchyma." That's also of interest.

I've also read the fourth paper, which is Ron Dodson's paper, and colleagues, "A comparison of asbestos burden in lung parenchyma."

I've read this paper, the fifth paper, as well, which is Baker's paper, on the "Limitations in drawing etiologic inferences based on measurement of asbestos fibers from lung tissue." I've read that, too.

MR. BROWNSON: Wait a minute. Now, you're asking as to papers you read. I think the question was papers you cited.

MR. MILLER: I appreciate the way the doctor is doing it. It's making time shorter. I wish he'd continue that way.

MR. BROWNSON: The only thing I was going to say is let's continue with the answer to the question of papers you've cited in your publications, and if you want

to note whether you've read it from something or not, I think you can do that, that's fine. I don't want to get the answer confused with the question.

MR. MILLER: I appreciate that the doctor is being very clear, as he always is in his answers, about which he has read, and in addition to which of those he has read, he has also cited, and I wish he would continue that same way. I think that's good.

MR. BROWNSON: Okay, fine. I want to make clear as to what we're doing here.

A. I will state which papers I've read and, for example, the Kohyama paper, the Dodson paper, the Baker paper are referenced in the manuscript that I'm generating now on asbestos fibers in 83 cases in the United States.

The Dose-Response papers, Nicholson's papers on "Comparative dose-response relationships with asbestos fiber types," I've read that. I haven't quoted anywhere as yet.

I've read Murray Finkelstein's paper on exposure response relationship with

mesothelioma among the cement workers in Canada.

I've read the paper on the radiographic abnormalities by Christine Oliver and colleagues. I've read that but I haven't quoted it anywhere.

I've read the paper by Sluis-Cremer, "Asbestos disease at low exposure after long residence times." I haven't quoted that anywhere, either.

I've read Friedrich Potts' paper, "The neoplastic findings in experimental asbestos studies," which is very interesting, but I haven't used that as yet.

I've read Suzuki's paper of "Comparability of mesothelioma in humans and in experimental animal studies." I have not quoted that, as well.

The experimental studies, I've read the study of Raymond Begin, "The asbestosis in sheep."

I've read Marie-Claude Jaurand's papers, "The observations of carcinogenicity of asbestos fibers."

I have read Landrigan's paper on the

children at risk. I haven't quoted that anywhere as yet.

I've read Mancuso's paper on "Mesotheliomas among railroad workers."

I've read Jacques Ruttner's paper, "Mesothelioma in Swiss railroad workers."

I've read this paper by Seidman and Selikoff. Lou Joubert as a single part, I don't know why.

"Mortality experience and family contacts of asbestos factory workers," I've read that, as well.

I read "Asbestos in lungs of children." This, again, comes out of Ron Dodson's group. It's an interesting paper. I don't know what it means, though.

I've read the paper, "Pleural plaques in the general population," Hillerdal's paper. I haven't used that in any paper.

I've read the paper by Boutin, and "Pleural effects of environmental asbestos pollution in Corsica."

I've read David Lilienfeld's paper, "Asbestos-associated pleural mesothelioma in school teachers." I haven't used that in

anything.

I've read Jack Harington's paper on "The carcinogenicity of chrysotile asbestos."

I've read John Davis' paper on "Variations in the carcinogenicity of tremolite."

I've read Bruce Case's paper on "Health effects of tremolite: Now and in the future." I haven't used that, as well.

I have read "Asbestos exposure from activities in buildings with asbestos-containing materials," by Keyes and Jim Millette.

I read the "Mineral fiber contents of lung tissue in patients with environmental exposures." That's the paper by Roggli and Longo. I haven't used those.

I read the paper by Christine Oliver on maintenance workers.

I've read the paper by Levin and Selikoff on radiological abnormalities.

I think I reviewed John Balmes' paper. The original paper was submitted to the Peer Review Journal, so I did not review it here.

I read Henry Anderson's paper on

"Mesothelioma among employees with likely contact with in-place asbestos-containing building materials."

I have just about looked at every paper in here. I mean, whether I've read them all in detail or not, is more problematic, but those are the ones that I've read or looked over.

Q. Thank you, Doctor.

Do you have a general opinion about the breadth or scope of the people who submitted papers that are in the Third Wave?

MR. BROWNSON: I'll object to the form of the question.

What do you mean, "the breadth or scope of the people"?

Q. Do you believe that the people who submitted papers are all plaintiff-oriented experts in asbestos-oriented litigation?

A. I have no idea.

Q. Do you respect the scientific work of some, at least, of the people who submitted papers in the Third Wave?

A. Sure.

Q. Is it fair to say that you respect

the scientific work of those people whose papers you have just said you cited in your own work?

A. That doesn't necessarily follow.

Q. Who are the people whom you just mentioned as having read, and in some cases cited whose work you respect?

If you would like the book back to look at the index again.

MR. BROWNSON: I'm going to object to the form of the question. If you're asking him does he -- first of all, I object to the form of the use of the term "respect."

Secondly, when you say "respect the work," you're not limiting it to the work which comprises those papers. So I think the form of the question is objectionable.

That being said, you can attempt to answer the question.

A. Well, one of my concerns is that it's -- when you say "respect," there are words written on Page 1, accepts or rejects. It's one on Page 1 that reads the data, how old the data derived are, these data, robust data, are these data weak data, are there conclusions in keeping with

the data presented, is this a contribution to the field, is it just a rehash of old materials, and so on and so forth. I mean, you could read papers and read them different ways.

Do I respect the people? I mean, some people I respect, some I don't respect, but you have to take each individual contribution and read it with a fresh eye.

Selikoff -- I cannot think of any group in the world that has reproduced the work that Selikoff, Hammond, Seidman, et al., produced in terms of the insulation workers. They stand on -- without peer, or peers, sure, wonderful work, great work.

Q. Are there any other papers in this Third Wave that you would say are contributions to the field?

A. Well, I happen to like the paper by Kohyama and Suzuki, because it is the first work to come out of Mount Sinai that shows that insulation workers were exposed to crocidolite. I thought that was first-rate.

There are others like that. I've considered John Harington -- Jack Harington as one of the more brilliant and insightful

investigators in the field. I mean, there are lots of people out there.

Q. Doctor, are you familiar with a book called the "The Identification and Control of Environmental & Occupation Diseases, Asbestos and Cancer," edited by Ira Mehlman and Arthur Upton. I'm showing you the book now.

A. No.

Q. Do you know anything at all about this book?

A. No. Can I look at it?

Q. Certainly.

A. Oh, my goodness, this has finally come out. Isn't that something. This was in the works for about 10 years.

Q. Are you familiar with some of the papers in that on a pre-publication basis? You're looking at a picture of Dr. Selikoff. I don't mean to interrupt you.

A. Quite a guy.

I'm sorry, what was that question pending?

Q. Are you familiar with any of the papers that appeared in this book on a pre-publication basis?

A. No.

MR. MILLER: Off the record.

(Whereupon a discussion is held off the record.)

Q. Dr. Langer, moving on with your CV, reference Page 5, that you worked with the EPA in the Orange, Purple and Blue Books.

Did you have any connection with the Green Book?

A. No. Neither Green Book -- either Green Book.

Q. I am speaking about what I believe you had called the second Green Book.

A. 1990?

Q. Yes, sir.

A. No.

Q. Okay. Why not?

A. Why not what?

Q. Why didn't you have a connection with the Green Book, given that you had a connection with three prior rainbow books that in some ways led up to it?

A. No one asked me.

Q. How would you describe your contribution or your status with the three prior

books as the peer-reviewing consultants or what would you use for either one of them?

A. Both, basically.

Q. Each of the three books?

A. Each of the three books.

The Orange Book, I wrote a section in one of the appendices with Arthur Rohl and Ann Weill (phonetic). Arthur Rohl and I were at Mount Sinai at the time, Ann Weill at the University of Maryland. And we wrote on the identification and characterization of asbestos in bulk asbestos-containing products found in buildings. We wrote that section.

I also reviewed part of the document which meant read over certain sections, and I was asked in the Purple Book, in the Blue Book, I was one of the committee members when we put these documents together.

Q. On Page 9 of your CV, under the heading "Consultants," it refers to you being a consultant for Safe Building Alliance, asbestos in buildings, 1987.

Was that the symposium held at Harvard University, sir?

A. No.

Q. What was that consulting about, please?

A. I met with John Welch, in Washington. John Welch, he was the president of the Safe Building Alliance, and we discussed certain problems that they perceived with asbestos-containing materials in buildings.

Q. Did you write any document for the SBA?

A. No.

Q. Do you know if your views were reflected in any SBA publication?

A. There probably are, but when you say my views, they are not so unique as to be easily recognizable as having my imprimatur; many people think the way I do, concerning asbestos products in buildings.

Q. Okay. Who were some of those people whom you would say think the way you do concerning asbestos products in buildings?

MR. BROWNSON: Now, there's a vague and general question, but I'm assuming it will lead to --

MR. MILLER: Assuming I'm responding exactly to what he said.

MR. BROWNSON: I'm sure you are. I'm objecting to the form of the question, and we'll proceed from there.

THE WITNESS: I'm sorry?

MR. BROWNSON: Go ahead, proceed, and tell us who the people are who think as you do.

A. As an example, the generic paper which appeared in Science; Mossman, Gee, Corn, Bignon, others like that.

Q. Can you think of the names of any others at this time?

A. Who, what, who think the way I do?

Q. Yes, sir.

MR. BROWNSON: I assume you're limiting the question to researchers in the field and not men on the street?

MR. MILLER: I'm limiting it to any way that Dr. Langer meant it, though I assume he meant the researchers in the field as opposed to the average dumb lawyer on the street.

A. Not so dumb.

Those in the field, if we were to approach this problem as it should be

approached, the Mossman article, or articles, because there was another article which appeared in, I guess, the New England Journal of Medicine, Mossman & Gee, they are responsible for bringing to the United States that which already existed elsewhere in other countries.

Q. That is what, sir?

A. That is that low-level exposure to mineral fiber, such as fibers in buildings, represents a very small risk of developing the asbestos diseases.

Now, when we talk about the individuals who would support this, I would think that the following individuals in, let's say Europe, Richard Doll, Julian Peto, Chris Whamel, Allan Gibbs, Jean Bignon, Molly Newhouse, Lorenzo Simonato.

I served on a committee with John Gillson, and of course, Gillson passed away, for the regenerated document in Hanover, Germany, for the international program for chemical safety on asbestos fibers in the ambient environment, and presented really a European view of the importance, or lack of importance of fibers in the ambient

environment.

There are a number of others in Europe. The general consensus among the scientists working in the field was that the focus on asbestos in buildings in North America was misplaced. The others who also feel this way presented their views for the Ontario Royal Commission. That is part of the Dupres report on fibers and buildings in Ontario.

Q. I'm familiar with a report that was done at the Ontario Royal Commission. I am not used to the Dupres report.

Is there only one Ontario report?

A. Yes. Stefan Dupres is the senior committee member.

Q. Okay.

A. Stefan.

MR. BROWNSON: Be careful, try not to talk when Jonathan's talking because our reporter here does not like that.

MR. MILLER: I was equally at fault.

Q. Doctor, who in the United States feels this way, the way you just described the certain Europeans, and now certain people who took part in the Ontario Commission field in the

asbestos in buildings?

MR. BROWNSON: Again, I'm posing an objection. I assume you're referring to researchers in the field?

MR. MILLER: Of course.

A. Brook Mossman, Morton Corn, Bernard Gee, certainly the people who work with me, Robert Nolan, Marvin Kuschner, Richard Wilson, Jack Spengler. A number of others have been at the Harvard School of Public Health.

Robert Sawyer, I'm thinking Jerry Kliaman as a pathologist. I believe he also supports this view. There are others, and I don't know why I'm blocking them, but there are many others who support this.

Q. Doctor, we started this particular part of the discussion by starting with your reference to people who think the way you do about asbestos in buildings.

Will you please tell us, summarize for me how you feel or believe, how you think about asbestos in buildings?

A. I don't think about it. One of my opinions concerning asbestos in buildings is -- you want to know all of my opinions or just

general, just a little brush stroke?

Q. If you could summarize your opinions in asbestos in buildings, that would be good, sir.

A. Asbestos in presence in buildings are in a number of forms. Each of these forms serve some function and purpose. Some of these functions and purposes are very important. The presence of asbestos-containing products in buildings need not indicate the presence of asbestos fiber in the air.

The levels of fibers found in buildings, now many hundreds of buildings and thousands of air samples, have demonstrated that in the very large majority of these buildings, the fiber levels in air, if found in air, the fiber levels, even using the most pessimistic risk model, represents de minimis risks to building occupants. I think that's a reasonable, short summary.

Q. What is that de minimus risk using a pessimistic risk model?

MR. BROWNSON: Before you answer the question, I'm going to object, but I just -- since we're about to take our

break, I'll incur the wrath of Judge Ito and make a speaking objection, but what I wanted to say, Jonathan --

MR. MILLER: -- Thank you. I'll accept that.

MR. BROWNSON: -- Jonathan, is that you know we've identified Richard Wilson as our expert on risk assessments in this case and generally with respect to Chicago buildings, so he's going to testify about that area and I have no objection to you getting into that a little bit with Dr. Langer, but in terms of moving his deposition with what he's going to testify about, that's not the area that he's talking about in this case.

Q. I appreciate it, Doctor.

Very briefly, what is the de minimis risk to building occupants using the most pessimistic risk model?

A. Using the fiber levels found in the air, it would range from one in a million plus or minus in order of magnitude, one in 100,000, one in 10 million.

Q. By "building occupants," you mean

passive building occupants, is that correct?

A. Yes, correctomundo.

MR. MILLER: Thank you.

Break?

MR. BROWNSON: Sure.

(Whereupon a brief recess was taken at 11:00 a.m.)

(Whereupon the proceedings resumed at 11:10 a.m.)

BY MR. MILLER:

Q. Doctor, on Page 36 of your CV, you state at the very bottom that you gave an invited seminar and lecture to the Armstrong Defense Group in Memphis, Tennessee. That it was called the "Asbestos Saga and the Star Wars Trilogy: The Empire Strikes Back." It was given in 1991.

Which, if any, asbestos tests were part of the Armstrong Defense Group?

A. I have no idea.

Q. Okay. Did it concern vinyl asbestos tile as opposed to other types of asbestos in buildings, if you recall?

A. I believe so, yes.

Q. Why did you choose such a catchy

name, aside from the fact that it's obviously a catchy name, for your talk?

A. I thought people might come. It's hard speaking in an empty room, the reverberations are deafening.

Q. What did you mean when you said, "The Empire Strikes Back"?

A. 1991, what was the date of that presentation?

Q. Thursday, April 25th, 1991.

A. The asbestos in buildings passion play was being played out in North American courtrooms, and the only group, "recognizable group," put that in quotes, which could not embrace any of the concepts and principles of low-level exposures, was the group at Mount Sinai which was then under the leadership of Phil Landrigan. The more North Americans brought the issue of low-level exposure and its low-level risk to the attention of administrators in certain government agencies, the more the Mount Sinai group resisted.

In fact, there was some speculation that the Mount Sinai group had not acted in the best interests of the community by actions and

by words.

Q. What do you mean by that, sir?

A. Just that I've spoken sentences, and it means just that.

Q. How have they not acted in the best interest of the community?

A. I believe that if one reads a data set, that is how delicately I phrase this, a data set which runs contrary to your beliefs and one attacks ad hominem, rather than the data, that, to me, is not serving the best interests of the scientific community.

So if a young woman publishes a paper which someone at Mount Sinai finds offensive because they don't like the conclusions, one should present data and the data will speak for themselves. One should not proceed to attack this person as an individual, it serves no purpose.

Q. Are you referring specifically to the paper by Mossman, et al., and Science?

A. You can use that as an illustration.

Q. Do you believe she was attacked ad hominem?

A. Yes.

Q. There were certain letters that were published in, I think Science, and maybe elsewhere, as follow-ups to the Science article, and I believe one of them was by Dr. Nicholson, at least. Are these the documents to which you were referring that she was attacked ad hominem, or something outside that?

A. Outside that.

Q. What is there outside those published letters that you're referring to, sir?

A. This is hearsay of people present at meetings at Mount Sinai.

Q. Who was it? Who did this attack, according to your source of interest?

MR. BROWNSON: To the extent if you know.

A. To the extent that I know, this is all hearsay, and it's unfair because some of the principals are no longer living.

Q. By that, you're referring to Dr. Selikoff?

A. He was one, yes.

Q. Do you believe he was one who unfairly attacked directly Ms. Mossman?

A. Yes.

Q. Excuse me, Dr. Mossman.

Who else?

A. Who else what?

Q. Who else attacked her, do you believe?

A. You would have to depose Jack Harington to find out details, since he was present at some of these meetings.

Q. Now, when you were referring to the empire striking back, who, in your mind, in 1991, was the empire?

A. Who constituted membership in the empire?

Q. Yes, sir.

A. Well, the center of the empire was at Mount Sinai, of course.

Q. Do you remember anything you said at that particular discussion in 1991 before the Armstrong Defense Group, other than what you have already referred to here today?

A. I don't think I mentioned this -- well, what I've spoken about today.

Q. What did you tell the Armstrong Defense Group in 1991?

A. Actually, I outlined what was known in the field, I outlined what was known in Europe, I

outlined what was brought over to the United States, and I outlined what the perceived response was from Mount Sinai.

Q. Anything further than that that you recall?

A. About what?

Q. What you told the Armstrong Defense Group?

A. Well, I don't remember everything, of course not.

Q. Okay.

A. Since it was more spontaneity than pre-thought.

Q. I'd like to ask you a couple questions about the projects for which you have provided a very nice graph at the back of your CV under "funding sources."

Starting with the most recent one first, sir, on the last page, there's a project at the Ecaterinburg workshop, project chrysotile. You're co-investigator for The Asbestos Institute and the W.R. Grace Company.

What was that all about, sir?

A. About five years ago, Favel Kogan wrote a paper which was published -- actually a

commentary which was published in the American Journal of Industrial Medicine on the occurrence of mesotheliomas in chrysotile-exposed workers in Katerinsburg. It used to be Verdslosk, and I'll spell Katerinsburg later.

The commentary was of interest to me because its wording suggested there were more mesotheliomas there than reported among the miners and millers from Canada. I wrote to Kogan and we communicated, and through a mutual colleague, we were able to obtain tissue blocks from Kogan, obtained from individuals who died with asbestosis, and we began a joint -- and we arranged with certain individuals in the Russian federation, we arranged to participate jointly in a study of tissues obtained from certain kinds of workmen.

We are presently obtaining tissues from individuals who succumb with mesothelioma, which interestingly, more mesotheliomas occur outside this region than inside the region, occur from other areas in the Russian federation.

Q. Will this someday be a published article?

A. It certainly will.

Q. Do you have any tentative conclusion you have reached based on your research thus far?

MR. BROWNSON: Well, I'll object to the form of the question. Again, it's broad and it's vague and requires speculation, but go ahead.

A. You just want to hear two basic conclusions, let's say?

Q. If you reached them, sir, yes.

A. The first conclusion is that they have a lot of the dust in their lungs, high concentrations of chrysotile, no tremolite.

Q. You're referring to dust in the lungs of these people that died from asbestosis or --

A. Yes.

Q. Are there any who died from mesothelioma?

A. Not yet.

Q. Okay. Is the Katerinsburg a chrysotile mine?

A. Katerinsburg is the major city which is east of the Ural Mountains. It is the jumping-off point to a small town of approximately 60

kilometers to the northeast called Asbestos, like asbestos, Quebec. Basically, this is asbestos and this is where the largest pits are located.

Q. Have you concluded that the chrysotile mine in Asbestos does not have tremolite as a contaminant or that, whatever word you would like to use in it?

A. No.

Q. Do you know if it does have tremolite in it?

A. No.

Q. Turning to the prior page that I guess is Page 48, there's another project funded by the W.R. Grace Company, titled "Asbestos in the lungs of exposed workers," starting March of '93, going to the present.

What is that project all about?

A. That's part of the Katerinsburg project.

MR. MILLER: Exhibit 2, please.

(P-2, Expert witness disclosure, received and marked for Identification.)

BY MR. MILLER:

Q. Doctor, I've had marked as Exhibit 2, an expert witness disclosure in this case

given by the defendant Asbestospray. I believe this is similar to some expert witness disclosures I have seen in the past, and I hope I will not have to spend too much time on it.

Have you seen this before, sir?

A. Yes.

Q. Can you tell me if, in the last five years, you can think of any particular area of your testimony where your views have been significantly changed?

MR. BROWNSON: I'm going to object to the form of the question, but are you speaking here to see if we can at least -- so I understand, your testimony expressed in this disclosure?

MR. MILLER: Exactly.

MR. BROWNSON: If you look at the areas in that disclosure, the question is: Have your views changed in any of those areas in the last five years, as I understand it?

MR. MILLER: Yes.

MR. BROWNSON: I still object to the question, but go ahead.

A. You want to do this line by line or just

topic by topic?

Let's do it topic by topic. I see you are shaking your head to the topic by topic.

The testimony in the first paragraph, he will testify there's been a great deal of confusion in the medical and scientific literature concerning the term "asbestos" and that it is often improperly defined.

Well, there seems to be a little less confusion now since OSHA has taken cleavage fragments out of the asbestos standard. Okay.

Q. What is the nature of fiber release from asbestos fireproofing?

A. That's rather broad and generic.

Q. Well, that's something that you're going to testify to in exactly those words. I'm interested in what you're going to say about it.

A. It depends on whether Mr. Brownson asks me.

Q. Tell the jury, in your opinion, whether or not fibers are released in asbestos-containing fireproofing, and if so, under what circumstances?

A. I have not examined all asbestos-containing

fireproofing. Asbestos-containing fireproofings have a range of compositions, asbestos-containing fireproofings have a range of agents that are called binders.

I, personally, have examined many structures which were sprayed with a cementitious material. For example, Asbestospray formulation T, which is an amosite-containing material. These applications have existed in construction for the past 30 years or more. The buildings that have vibrated with mechanical stresses have been subject to large noises, have had bombs go off in their basements -- no, that's not asbestos, I'm thinking of the World Trade Center.

Materials are in place. The fiber levels found in the area of these structures are either not detectable below a certain volume, or when fibers are detected, they suggest, given various risk models available to us, the risks vary between one in 100,000 and one in a million, that these fireproofings function according to their specifications, and that they present a little or no risk to occupants of buildings.

Q. When you say "occupants of buildings," you were referring, again, to what you call passive occupants?

A. Or C1 occupants, as we referred to them in the AGI report.

Q. Do you have any opinion about risk to other categories of building occupants other than the C1 categories as referred to in the HEIAR report?

MR. BROWNSON: Well, again, I'll object to the question in that Dr. Langer is not going to testify for Asbestospray in this case about risk, as he previously stated, but go ahead and answer.

A. Again, it's a broad question because there are any number of activities that could be performed inside of a building or by maintenance workers. If a material is sprayed on a surface, on a decking, on cementitious material that's behind a suspended ceiling, would people who sweep the floors be at any greater risk than people sitting in a room? The fiber levels would be identical and the risks would be identical, as well. The risks would approach zero. Others might change lightbulbs. If the

lightbulb is below the suspending tile ceilings, they constitute zero risk. If there's someone who pulls cables above a suspended tile ceiling, it depends on the integrity of the material whether or not there are any activities that have dislodged the spraying application.

So there are any number of scenarios. I mean, I'm not saying it approaches an infinite number, but N is a very large number, and one has to specify a kind of worker and an activity and the circumstances under which this person performs these activities and the nature of the installation of which these are carried out. I mean, there's no way to really do it other than with some specificity associated with them.

Q. One of the suggestions or recommendations of the HEIAR was that research should be accomplished on these other than C1 building occupants.

Do you believe that that research or any has been done, sir?

A. Yes, a great deal of it's been done. Not all of it, but a great deal.

Q. Would you please cite for me certain articles or other reports on which you rely,

particularly for the conclusions you just gave about people who sweep floors are not at different levels, people who change lightbulbs may not be at different levels, et cetera?

A. The HEI had a meeting in Boston, the proceedings of which was published in Applied Occupational Environmental Hygiene in November of 1994. There's a number of interesting papers in here which I am now reading.

Q. That means you have not read them yet, sir?

A. No, I haven't finished.

Q. Okay.

A. I know this is hard to believe, but it's true.

Q. Okay.

A. The title of the conference was called "Proceedings of Operations and Maintenance Programs in buildings containing asbestos," subtitled "Workshop organized by the Health Effects Institute in asbestos research." Editors are Morton Lippmann, John Samet, and Rashi Shaikh.

There's a number of papers that were presented, interesting papers, with data

touching on the issues of maintenance workers in buildings, and whether or not they are exposed to fiber and various settings.

Q. Are those your own handwritten notes in that volume of the journal, sir?

A. Yes.

Q. Can you tell me which articles, I'm sorry?

A. Yes.

Q. I mean, can you tell me which articles you have read, thus far, that you found to be a particular interest or value to you and your opinions?

A. You mean, the articles pertaining to asbestos? There are some very interesting ones in here on mortality among construction laborers, if you're interested.

Q. I mean only asbestos?

A. Only asbestos, thus far, Millette's paper on TEM, transmission electron microscopy, "Analysis of asbestos structures," and his microvac technique and so on.

An interesting paper by Rashi Shaikh and colleagues on fiber levels found in buildings with maintenance activities.

There are a number of others that I started to read but put down because I haven't had time to really focus on these things.

Q. What is your opinion about the value of surface dust sampling for asbestos?

A. Not much.

Q. Why is that, sir?

A. Well, it doesn't tell you anything, basically. It tells you that you have asbestos in some settled dust. It doesn't tell you the nature of the original size distribution. It doesn't tell you anything about the respirability of the fibers. It doesn't tell you about the nature of the fibers in the air. It tells you that it used to be in place A, it's now in place B, and we find it there, and people generate these very large numbers which are generally misleading, and they have very little biological relevance.

Q. When you speak about people generating these large numbers, they are generally in terms of structures per cubic something?

A. Area.

Q. Some area?

A. Correct.

Q. Do you know, if the information were analyzed in terms of weight, if that would have more relevance for the issues you're concerned with?

A. Worse.

Q. Why?

A. Weight doesn't tell you anything except weight.

Let's say that -- let's use an example. A fiber has just fallen off the ceiling. The fiber dimension is 10 microns in diameter, and it is a millimeter in length, and the weight is 100 micrograms. Let's say it falls to this table, someone comes in and does a dust assay, and say there's 100 micrograms of dust on this table. My question is 100 micrograms of what? What are the dimensions of the fibers?

Now, I just told you it was a single fiber, but let's say we were to calculate on the basis of a preparation technique which alters the size distribution. We grind it up. We sonicate it. We do a lot -- we manipulate this, so instead of that one particle, we now have 100,000, and that 100 micrograms now represents

100,000 fibers.

Now, that carries a different meaning to you in terms of hazard and risk than that single fiber. So you have to know something about size distribution in order to come to some understanding of risk.

So mass is awful, don't bother using that because then mass may be, in part, the matrix materials, it could be mixed with vitreous fiber, could be mixed with a cementing agent, Portland Cement, it could be mixed with bentonite clay, whatever.

So mass means nothing. Well, it means something, but it doesn't tell you very much, and when one looks at the microvac techniques and sonication and the alteration of size distribution, it is misleading. So it's worse than telling you very little, it's actually misleading.

Q. Would your opinion regarding the utility or usefulness of surface dust sampling vary depending upon the method by which the dust is taken off the surface?

A. Taken off of the surface?

Q. Yes, sir, microvac as opposed to

scraping as opposed to any of the different techniques?

A. No, no, no, the artifact is not in removing from the surface so much as in the preparation of the material for examination by electron microscopy, that's the problem.

Q. The way it is removed from the surface is not something which would enter into your judgment or surface dust sampling in general?

A. I don't think -- in general, that's too much of a problem.

MR. BROWNSON: Try to wait until the question is done.

THE WITNESS: I know, I'm getting antsy. I have to apologize.

Q. Would your opinion about utility of dust sampling change if the preparation were done by direct preparation as opposed to indirect preparation?

A. Better.

Q. Okay. How is it better?

A. A direct preparation would be a preparation in which the material in its state on the surface is not altered when examined by

transmission electron microscopy; that would be better, yes.

Q. Do you think it still has some limits?

A. It depends on the nature of the matrix.

Q. Explain.

A. Well, do the fibers stick out? Can you see a whole fiber? Is this particle respirable? If a fiber is sticking out, is it coated with some of the matrix materials?

It's more meaningful, but there are always interesting questions that come up. I'm not dismissing it, of course. Merely, I'm saying if you remove it from the surface and you prepare it so that there's no artifact introduced in terms of size distribution, that's better.

Q. Is one of the disadvantages of direct preparation that it could hide the asbestos fibers in other material?

A. That's possible.

Q. Are there any other disadvantages to direct preparation that you can think of?

A. The major disadvantage is that these clumps are so large that you can't see anything. So this material is broken down so

you can see what's there. That's one of the reasons people went into the indirect method; that the direct method, that was just so much junk there, you couldn't see through it.

Q. Any other disadvantages you can think of at this time, sir?

A. Well, no. There are probably others I just can't think of.

Q. Have you, by any chance, read the book by Millette called "Settled Asbestos Dust Sampling & Analysis"?

A. No, I have not.

Jim Millette is such a handsome devil.

Q. Well, I've seen pictures of you, Doctor, that flatter you.

A. Aren't you nice to say that.

Q. Doctor, you said that at one point recently in your testimony that you had examined various types of cementitious fireproofing.

What other types of fireproofing, cementitious or not, have you, personally, examined?

MR. BROWNSON: I'm going to not interpose an objection to the question,

per se, but just state that Dr. Langer is here to talk about his examination of various asbestos fireproofings. While other examinations he may have done will be of interest, and you're certainly welcome to question him, we're not going to ask him at trial.

MR. MILLER: Thank you.

A. I don't know whether I'm going to give this back to you. It's very interesting. I'm only kidding.

Q. Doctor, it only costs about $70 and some of the money goes --

A. Only $70, well...

Q. What is your current -- while we're speaking, what is your fee for expert consultation?

A. Well, it depends. $225 an hour, general background work; $275 an hour for a deposition; and usually $325 an hour for trial testimony.

Q. It has not gone up in a number of years?

A. Indeed, it is the same.

Q. Very good. I'm going to be --

A. How good that is, I don't know.

Q. What other asbestos-containing fireproofings have you, personally, examined?

MR. BROWNSON: Other than asbestos?

A. You mean, over my career?

Q. Yes, sir.

A. Holy mackerel, I think about all of them. I've looked at specimens of Kafco blaze shield, I've looked at a number of products from W.R. Grace, I've looked at material -- this is just fireproofing, correct?

Q. Yes, sir.

A. I would say on the average at Mount Sinai we would examine a half a dozen to a dozen specimens submitted to the laboratory weekly over a period of several years.

Q. Using the EPA definition of friability, do you believe that all the fireproofings which you've examined, including those specifically which you named here, are friable?

A. You mean, the definition, crumbled or easily crumbled?

Q. By hand pressure.

A. By hand pressure?

Q. Yes, sir.

A. When you say all of the products, you mean blaze shield?

Q. Let's start there.

Is that friable?

A. I have to have the specimen in front of me.

Q. How about the Asbestospray type T?

A. That's fairly cementitious, especially when tamped.

Q. Would you say that is not friable?

A. I said generally not friable.

Q. How about Grace Monokote-3?

A. I would have to see it in front of me, and I just don't recall. I've looked at them, but when you talk about friability, that requires a specimen in front of you.

Q. Are there any others you can recall now without having a specimen in front of you?

A. Actually --

MR. BROWNSON: The question is: Can you recall if any others are friable or can you recall seeing any others?

Q. If any others are friable?

A. I'm sorry, now I'm confused.

Q. Can you recall if any other

fireproofings that you have had personal experience in, are, in your opinion, friable? You understand the EPA definition?

A. Well, there were some that I examined at Mount Sinai that under the definitions would be considered friable.

Q. Do you recall the names?

A. I can't recall.

Q. Okay.

A. These are just fireproofings, we're not talking about decorative?

Q. Just fireproofings, sir.

A. Okay.

Q. You gave a definition or your opinion of risk a little while ago, and that definition or your opinion of risk was based upon air levels, is that correct, sir?

A. In part.

Q. Was it based on anything other than air levels?

A. Well, of course.

Q. What?

A. Well, the air level is only one aspect of risk assessment, the other involves the response. There's a dose and there's a

response, and the response models, which are used by various agencies.

Q. Was your opinion regarding risk based at all upon the actual condition of any of the asbestos-containing materials in any of the plaintiff's buildings?

A. I don't understand the question, I'm sorry.

Q. Do you know the actual condition today of any of the asbestos-containing materials in any of the plaintiff's buildings?

MR. BROWNSON: We're speaking of the Chicago buildings?

Q. Yes, this case.

A. I've seen photographs of the application of Asbestospray in some of these buildings' photographs.

Q. Aside from the photographs, do you have any additional information regarding the actual condition of any of the asbestos-containing materials in these buildings?

A. Yes.

Q. What is that?

A. Some of the documents that I've read of

the individuals who inspected these facilities.

Q. Aside from the inspection reports and the photographs, do you have any further information regarding the actual condition of the materials in the buildings today?

A. You mean, like a videotape or something?

Q. For example, fireproofing?

A. Fireproofing, no, I don't believe so.

Q. Do you have some knowledge about the types of asbestos-containing materials in the Chicago and Evanston plaintiffs' buildings other than fireproofing?

A. Yes.

Q. What is that, what type?

A. As you know, I'm also representing Conwed, a manufacturer of a ceiling tile. Those materials are present in some of the buildings.

Q. I will not be asking you questions specifically about Conwed.

Other than the Conwed specific information, do you have any additional information?

A. Other than that which I read, meaning that other experts examine materials and carry out what is commonly referred to as product ID;

other than that, I have no firsthand information, correct.

Q. Did the information you received through photographs you mentioned and the inspection reports that you mentioned form some part of the basis for your opinion about risk in the buildings?

A. In part.

Q. Was the information that you saw and you've described, thus far, namely, the photographs and the inspection reports, aside from the Conwed, which I'm not going to ask you about, but other stuff you saw regarding our building, was that Asbestospray-specific, to the best of your knowledge; in other words, it was in buildings where Asbestospray products were alleged to have been?

A. Yes, that's right. There are three buildings there we're talking about, correct.

Q. In what document could I find the most up-to-date statement that the EPA's published on asbestos in buildings, if there is such one document?

A. Yes, there is. What is that document called? You say asbestos in buildings or

asbestos in schools?

Q. I said in buildings.

A. Asbestos, I have two recent EPA documents, one published in June of '91, which is called "Asbestos in schools, evaluation of asbestos hazard emergency response act, a summary report; and in January of '92, a U.S. EPA document called "Communicating about risk, EPA, and asbestos in schools."

Q. Is there anything more recent than those two documents, more generally referring to buildings?

A. You know, there is one and I've been trying to get it and I can't get it.

Q. What is that, sir?

A. There is a most recent document, it postdates the second Green book, and it postdates many of the statements that you hear about it's safer to leave it in place than to take it out, so on and so forth.

There is another document which I have not been able to get as yet, but it's my understanding that it's floating around at the Environmental Protection Agency. It might be a draft of a document rather than a final report.

Q. Can you give any further or a more clear description of what the document might be?
A. I wish I could.
Q. Does it concern generally asbestos in buildings, as you understand it?
A. That's my understanding, yes.
Q. It has not been published yet in any form, to the best of your knowledge?
A. Apparently so, correct.
Q. Doctor, do you have any AHERA certifications?
A. No.
Q. Do you have any certification from any Illinois Department of Public Health or other governing bodies concerning asbestos?
A. No.
Q. You are not a certified industrial hygienist, is that correct?
A. Correct.
Q. Would you call yourself an industrial hygienist?
A. No.
Q. Okay. Given that, would you please, in some summary form, tell me why you believe you have the expertise to testify as stated in

Exhibit 2 concerning proper responses to asbestos in buildings including, but not limited to, the necessity of removal, the advisability of removal, and operations and maintenance of asbestos in buildings?

MR. BROWNSON: Well, I object to the form of the question, but go ahead, you can answer.

A. I object to the form of that question, myself.

Do you want to ask part of it, what makes me think I can advise people about anything, is what you're asking me?

Q. Advise people specifically, and what, if anything, should they do about asbestos in buildings?

A. I'm one of those people who believes that advice of an expert is best when from an expert who knows a lot about a subject area. I'm not saying that an industrial hygienist -- a hygienist tells you one part of the problem, but expertise requires some understanding of what is asbestos; what are the fiber types; what are the risks associated with the different fiber types; what is known about those responses; what is

known about fiber levels in the industry; what are the implications of cigarette smoking in asbestos risk; how much fiber is in the air; how do we ever get these models that the EPA uses. And in their hazard analysis, what do these models mean; what is it based on; what is epidemiological studies; what are the fiber levels; how do you measure the fiber levels; what do you use in electron microscopy; why do you use an electron microscope rather than a light microscope; what are the fiber levels; what are your interpretations and meaning of these data.

Now, if you find me an industrial hygienist in the United States who can answer all of those questions and give you a reasonable dissertation on each of these, then I will back out of the litigation, meaning, that there's someone out there who really knows something.

On the other hand, one doesn't have to be an industrial hygienist to gauge situations where there may or may not be a risk. In fact, one doesn't need all the tickets in certain instances, but you have to have some broad-based knowledge.

Q. Do you believe that a medical doctor would be more qualified than you with your qualifications to give advice to a building owner about what, if anything, they should do about asbestos in buildings?

MR. BROWNSON: I'll object.

A. It depends on the doctor.

Q. Are there some doctors whose names come to mind who you think would be at least as well qualified as you to give advice to building owners regarding asbestos in buildings?

MR. VALENZA: Objection.

MR. BROWNSON: I'm going to object to the form of the question, and I'll tell you specifically why, which may help you understand the objection.

Dr. Langer will be asked in this case to give testimony as to what response, perhaps, will be asked, what response would be appropriate in the three Chicago buildings which are at issue with respect to Asbestospray, and I don't know what doctors may or may not have reviewed the data he's reviewed with respect to those buildings, and therefore, I think

the question is objectionable on that ground.

MR. MILLER: I appreciate that. Let me change my question slightly.

Q. If a medical doctor were to review the same data that you reviewed regarding the three Chicago buildings, is there any particular medical doctor whose name comes to mind who you think would be at least as well qualified as you to give advice to building owners regarding what, if anything, to do about the asbestos in those buildings?

A. Very, very complex and compound question.

First, you're asking: Is there a medical doctor who's as qualified as I am in my field? Nay, not so.

Are there medical doctors who know a great deal more in pulmonology than I do? Sure.

Are there doctors who are certified to be readers who can read chest x-rays? Sure. Sure, there are many physicians who are better qualified in the medical field.

Now, talking overall asbestos field, that's more problematic now.

Are there physicians who could read

the data and come to the same conclusion as I would come to, qualifications aside? Yes, there are physicians who would come to the same general conclusion as I.

Q. When you refer to your field, were you referring to what you subsequently call the overall asbestos field?

A. I think so, yes.

Q. Who, in your field, namely, the overall asbestos field, do you believe is as qualified or perhaps even more qualified than you to give advice to a building owner if they were to review the same information you were to review? And this is advice concerning what, if anything, to do about asbestos in buildings.

A. Well, I don't normally give advice to people on what you do in buildings. All I could do is present the problem to them and they make their own decisions.

That's not the question. The question is: Are there individuals who -- well, there are people who do it to a greater or lesser extent.

Q. Who, among the people who do it in

your field, do you believe, if any, are as qualified as you or more so to give either the advice or the information that you give to people?

A. Well, there are a number of people who give the information to building owners. I think Roger Morris, as an architect, is very well qualified to render advice and opinions to building owners and operators. I think that Morton Corn, who is an industrial hygienist or engineer, is qualified to render advice to various people. I think Richard Lee, who's a physicist, is qualified to render opinions and advice to people.

The people have slightly different areas of focus in slightly different percentages in areas of expertise. I mean, there are lots of people who are not physicians, like myself, who you can categorize as basic scientists, who give advice, and the advice comes from a slightly different perspective.

Are they as qualified in my field? I don't think so. In their field, yes, they're as qualified as one could be qualified, yeah.

Q. It's fair to call your field, then,

that of a basic scientist, is that right?
A. That's fair enough.
Q. Who else, specifically in your field, would you believe is a basic scientist who is as qualified as you, or perhaps more so, to give advice to a building owner regarding what should be done, if anything, about asbestos in buildings?
MR. BROWNSON: I'll interpose the same objection, but again, the original question was based upon the data he's reviewed here?
MR. MILLER: Right, and I will amend it.
Q. To me, if they were able to look at the same data you looked at, who do you think, as a basic scientist, would be as qualified as you?
A. Well, Richard Wilson.
Q. Anyone else whose name comes to mind, sir?
A. I'm thinking.
Q. I'm sorry.
A. Maybe Richard Lee, Robert Nolan.
You're talking just about basic

scientists now?

Q. Yes.

A. Who are in the field, who have a feeling for all these data and what they mean?

Q. Yes.

A. Malcolm Ross.

Q. Where is Malcolm Ross, sir?

A. He is just retired from the United States Geological Survey. He's in Virginia.

Q. To your knowledge, is he now in the business or expertise of giving advice to building owners about asbestos?

A. No.

Q. I interrupted you, I'm sorry.

Were there any other names that you had in mind?

A. I'm thinking. Well, there are others who are epidemiologists who are interested in risk analysis. There's Janet Hugh and Philip Enterline of Pittsburgh. I'm sure there are many others, but I just can't recall.

MR. MILLER: Off the record.

(Whereupon a discussion is held off the record.)

(Whereupon a luncheon recess was taken

at 12:00 p.m.)

(Whereupon the proceedings resumed at 12:55 p.m.)

* * *

A F T E R N O O N S E S S I O N

DIRECT EXAMINATION BY MR. MILLER CONTINUED:

Q. Doctor, before lunch, you referred to the physicist Richard Lee.

Is that the same Dr. Lee who does product identification in this case, he's in Pittsburgh, at ETC, or are you referring to somebody else?

A. I'm referring to the Richard Lee who is the president of the Lee, I guess, and Associates in Monroeville, Pennsylvania.

Q. That's the same person?

A. Oh, yes.

Q. That's exactly?

A. Oh, yes, yes.

Q. Thank you.

You have been consulted by Asbestospray in this case.

Is it your understanding that they are alleged to have an asbestos-containing product in three schools in Chicago in this case?

A. There are three buildings.

Q. Three buildings, that you think?

A. There are three buildings, one is the South Shore High School, one is the Leif Ericson School, and the other is the District 2 Offices.

Q. What is your advice to the building owners as to what, if anything, she should do about the asbestos-containing Asbestospray, allegedly Asbestospray material in those buildings?

A. No one's asked me for my advice.

Q. I'm asking you.

A. What would I advise them to do?

Q. Yes, sir, this is a hypothetical question.

A. This is a hypothetical. Well, based on the surveys which have been completed, based upon the description of the utilization of the spaces, based on a description of where this material occurs in relation and regard to the spaces in which people work and are educated,

given the purpose which it serves and given the experiences, and given the air data which have been obtained in other circumstances, in other structures, my advice would be to leave the material in place.

Q. Do you know what type of asbestos is alleged to be in the fireproofing in those three buildings?

A. Yes, the formulation approximates Asbestospray T, which is an amosite-containing formulation.

Q. Have you seen the formula for Asbestospray T?

A. Pardon?

Q. Have you seen the formula for Asbestospray T?

A. I have. It's been reported to me. I have notes and it is my understanding that it is a formulation consisting of approximately 25 percent amosite fiber, approximately 60 percent vitreous fiber, a wool of some kind, approximately seven and a half percent Portland cement, and approximately seven and a half percent bentonite clay.

Q. Do you have any reason to believe

that any of the information that you have that the material in any of those three buildings is not Asbestospray T?

A. Do I have information that it is not?

Q. Yes, sir.

A. You mean, do I have an understanding that it is not, or do I have some impression that the assays performed are limited or provide me with some reason to be skeptical that this is Asbestospray, is that what you're asking me?

Q. Yes.

A. Yes.

Q. What is that?

A. I have looked at some of the assays from, I guess, Dr. Longo's group, MVA -- no, excuse me, that's not MVA -- Longo's group, and it is the assays, as presented, are similar to the Asbestospray formulation, but the assays have limited -- the assays described certain materials as being present in amounts which are similar to Asbestospray products, and I'm not at all certain that the interchanging of bentonite and montmorillonite.

So, there are certain characteristics of the assay which are not -- haven't fulfilled

my own requirements for a proper product ID. I would have preferred to have seen a bulk x-ray diffraction tracing. I would have preferred to have seen other kinds of data presented in order to come to the conclusion this is Asbestospray T.

Q. Thank you, Doctor.

MR. BROWNSON: For the record, as you know, Dr. Langer is not being presented as a witness on this question, although you might find his comments interesting.

MR. MILLER: I always find the doctor's comments interesting.

MR. BROWNSON: Off the record for one moment.

(Whereupon a discussion was held off the record.)

BY MR. MILLER:

Q. Doctor, one of the bases for your advice to the building, I understand the three buildings, was where the material occurs?

A. Correct.

Q. Does the material occur above some type of suspended ceiling in these buildings?

A. Yes, it is my understanding from the description in one of the schools in which there is a suspended ceiling in a pool area, maybe the pool area wasn't opened and the pool area wasn't used, but there are areas described in which the spray product is present above a suspended tile ceiling. I would have to check the details.

Q. Do you believe that the owner should, even though the owner is keeping material in place, have some sort of operations and maintenance program with regard to that material?

A. Well, if they're not using the room, no. If it's above a suspended tile ceiling, other than you might do some air sampling once in a while under the ceiling, no, I wouldn't recommend any extensive kind of O and M program, no.

Q. Is any of the air sampling that you have seen thus far, air sampling, taken above the suspended ceiling in these buildings?

A. No.

Q. Do you have any information as to how often maintenance or custodial persons in the course of their normal duties must gain

access above the suspended ceilings in these buildings?

A. The inference drawn from the description of what exists above the ceiling with the existing services indicates that they would have very little, if any, need to go above these tiles.

Q. If they should have any need to go above tiles, would you recommend any form of protective clothing or other practices that they should follow in there above the ceiling?

MR. BROWNSON: Just so we're clear on the question, you're speaking of buildings that he's examined and talking about, you're not making this a more general question?

MR. MILLER: I'm speaking about the buildings in this case that you are referring to that have the alleged Asbestospray type T above some form of suspended ceiling.

A. If it makes the workers feel better, then they should wear some kind of respirator, an approved respirator, dust respirator for fibrous dust.

Q. Do you believe there's any health-related reason as to why they should have any type of precaution, whether it's a respirator or anything else when they go above ceilings in these particular buildings or buildings where there is alleged Asbestospray type T above ceilings?

A. A health reason, specifically?

Q. Yes.

A. Are they at risk, is what you're asking me?

Q. Yes.

A. Or are you asking me are they at risk?

Q. Yes.

A. If there's a risk, it is a very small risk. If the risk exists, it is a very small risk.

Q. Could you quantify that risk?

A. Well, I've stated for the record that I know of no air data taken above those tile ceilings, so I don't know that.

You can give me another hypothetical.

Q. Given the present state of your knowledge, which includes no air data, would you

recommend that any type of precautionary measures be taken by custodians or maintenance personnel if they must access above the ceiling in the same building or buildings that we're talking about?

A. The absence of data invites extrapolation. The extrapolation would include a worst-case scenario. I would recommend the use of a respirator.

Q. Okay. Would you recommend that the maintenance or custodial personnel who are going above the ceiling in the same buildings we've been talking about take care not to in any way contact the fireproofing itself?

A. Of course.

Q. Okay. Do you have any knowledge as to whether there is any debris or dust or other portions of the fireproofing that has fallen from the fireproofing and is currently on the top side of the suspended ceiling in the same buildings we've been talking about?

A. According to my recollection and an inspection carried out by Don Hunter, there was some debris on top of the tile ceilings, and I'm thinking that there was debris, also, in a power

plant, which came about for other reasons.

Q. Assuming that that debris, in fact, did come from the asbestos-containing material, do you have any recommendation as to what, if anything, should be done with that debris?

A. You mean, other than place it in some kind of a bag and take it away?

Q. Well, that's the first thing.

Should you leave it there, put it in a bag, take it out, or what?

A. That would depend on the situation. I mean, you might leave it there.

Why would you want to move it?

Q. If a maintenance personnel or custodian has to go above the ceiling to do some work above the ceiling, sticking his or her head above of the ceiling, and all around there's some debris, do you think in that situation the debris from the fireproofing should be cleaned up?

MR. VALENZA: Objection.

A. I still don't know. One needs an air measurement of the fibers in the air. The fact of the matter is we can have a box of asbestos on this table, the question is: Does it produce

any hazard or associated or attendant risk by its presence? Are there other factors that come into play here?

So, its mere existence is no prima facie evidence that it hasn't existed and recommendations thus follow.

Q. Do you believe that asbestos-containing dust or debris on a surface can be re-entrained into the air?

A. Could be, sure.

Q. Do you have opinions as to what types of activity would re-entrain asbestos-containing dust surfaces into the air?

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

Are we speaking again of these three buildings or --

Q. More generally, but if you care to limit it, I don't care, Doctor. My question was more general.

A. The only data I have seen are data involved or generated on clean-up activities, such as sweeping, specifically dry sweeping, and fibers can be re-entrained for short periods of time.

Q. Therefore, would you recommend, going back to the three Asbestospray buildings, that if a custodian were going above the suspended ceiling, that that custodian not dry-sweep, or in any other way, similar way, push around the debris from the fireproofing?

MR. BROWNSON: I'll object to the form of the question.

A. Pushing around is different, of course. Should he sweep the top of that tile? No, I wouldn't recommend it. I wouldn't recommend anyone going up there and sweeping the debris on top of the tiles.

Q. Would you recommend that it would be a prudent health measure for a custodian going above the ceiling in the same buildings we've been talking about to use some sort of water spray to spray down the debris to help stop any possible re-entrainment?

A. I'm not so sure.

Q. Why not?

A. Once you get water above the tiles and the limited amount of air circulation above those tiles, you might begin to harbor certain organisms in dangerous environment molds, for

example; so I'm not certain that would be an efficacious method.

Now, you've begged the question, is there a health risk? You have to measure fibers in the air.

MR. MILLER: Mark this 3, please.

(P-3, one-page document, received and marked for Identification.)

Q. Doctor, I've had marked as Exhibit 3, a single page document which is headed the following words: "Dr. Langer will rely on the following materials in this case." This came from a pleading filed by Asbestospray.

Does this document, in fact, summarize the specific materials in which you expect to rely for your testimony in this case?

A. May I read them?

Q. Of course. I assumed you had seen them before, I apologize.

A. No, that's all right.

I think that I have seen this report before, yes. I have read reports of Longo, Millette and Hatfield. I have read the deposition transcript in this matter. I have looked at the product ID reports, and we've

already discussed some of my reservations.

Air sampling data, yes, I've seen those. Most of these instances, dust samples, I've seen those.

Photographs in buildings, yes, air sampling data. We are in the process of completing those.

As a matter of fact, documents pertaining to Sprayed Mineral Fibers, yes, I've read those.

Air consultants and other parties, yes, I have those.

Proceedings of Harvard, yes, I've read those.

Spengler and colleagues on the "Summary of Symposium," yes. I've read that.

The Health Effects Institute, yes, I've read that.

Wilson, Langer, yes, I've even seen that paper, too, yes. I've seen all of these.

Q. Thank you.

Are there any building-specific documents that are not on this list on which -- or which you have seen -- let's start with that, relating to our building, the three buildings at

issue.

A. I have. I am now completing review of documents from Conwed, so there may be other buildings.

Q. Putting aside Conwed, again --

A. Oh, you mean this particular or three little litigations grouped into big ones?

Q. Fairly big.

A. No.

Q. I'd like to go quickly through as many of these references as we can.

Number 1: Reports of William Longo, Jim Millette, and William Hatfield, are they product identification reports?

A. Well, generally so. I mean, you're asking me the questions. Let me see if I can give you something more specific.

Q. Do you have with you the actual reports that you looked at?

A. No, no, no.

Okay. Go ahead and ask me the question. I can give you the specifics.

I've seen a report in a letter of November 9th, 1992, MAS to Mr. Tucker, Counsel, concerning samples analyzed in the District 2

Office. Material is identified as Asbestospray T.

I've looked at the TEM reports.

I have looked at the report from law engineering. This is Hatfield's report of November 16th, 1994, concerning settled dust.

I have looked at Hunter's Environmental Survey, 10 to 11 November, 1994.

Air sampling data. Those are the data I have looked at for the District 2 Offices in Kenwood.

I have also looked at a report in a letter of July 6th, 1993, Dr. Longo to Mr. Tucker, concerning identification of the specimens, some of his TEM reports. Interesting.

I have the Hunter, Incorporated Environmental Assay, 9 through 10, November of '94.

MR. BROWNSON: Which building is this that we're speaking of?

A. This is the Leif Ericson building -- I'm sorry, this is Leif Ericson, also known as Leif the Lucky.

Then it's Glenbrook South High School, Glenbrook. We're not interested in them.

How about South Shore High School?

Q. Let's stop right there.

We said earlier, and Mr. Brownson said that there were three buildings in Chicago. You also mentioned Glenbrook South and Hawthorne.

Are they under the Evanston, Heading?

MR. BROWNSON: Yes, you can question all you want about that. We have not had to look for those specifically because those are the ones that -- where there have been removal already, so air sampling has not been analyzed there.

Q. Very simple: Have you looked at Glenbrook South or Hawthorne, Doctor?

A. I have looked at some documents.

Q. You have?

A. Yes. Many of these reports contain data from different buildings, so if you read Report A, it may have some on Hawthorne and South Shore for reasons which escape me; but nonetheless, this is the reality.

Q. The air sampling you see relates to South Shore, Leif Ericson and District 2 Offices?

A. Yes.

Q. Air sampling from Glenbrook or Hawthorne, is that correct?

A. May not be correct at all, no.

I have some data that I've looked at.

MR. BROWNSON: Just to help you out, we did not have him analyze air sampling from those two schools because, as you know, its materials have been removed. So, whether he has seen some in one of these Longo reports, I don't know.

Q. I apologize, Doctor, I interrupted you. You were telling us the documents you've seen, and I wish you would finish the recitation.

A. I've seen documents from the South Shore High School. This is a Longo report to Mr. Tucker. It's dated January 1st, 1993. It consists of a bulk assay of what these materials are, its formulation. It consists of a TEM assay of different components.

There is also a report from Hunter Environmental, a survey done on the 14th and 15th of November, 1994.

There is also, for some reason -- oh, as I said, sometimes there are reports with

different schools. Here is a report that had Webster Elementary and South Shore High School as part of the same report.

The South Shore High School, there is an assay by polarized light microscopy what the bulk material is. There are a number of settled dust assays.

There are South Shore air samples analyzed by the NIOSH, OSHA technique using phase contrast microscopy. These were undertaken by McCrone and air data from South Shore.

Q. You earlier talked about your general opinions about dust sampling results.

Is there anything in addition about the specific dust sampling that you looked at here that you feel is worthy of comments or do all your prior comments fairly cover what you say about the dust sampling that you see here?

A. Well, that's an awfully broad question.

What is it that you would like me to do? You want me to take a single specimen or single report and just "sally forth," as we say?

Q. Please, I would appreciate it.

A. Okay. Let's take a look at the Leif Ericson report here, a report from Longo's group to Mr. Tucker, five samples analyzed as a bulk material.

What is this stuff, basically, is the question?

MR. BROWNSON: Wait a minute.

MR. MILLER: Dust sampling is what I'm talking about.

MR. BROWNSON: The question is settled dust?

MR. MILLER: Surface dust or settled dust.

Thank you.

A. Okay. Let's stay with the District 2 -- let's do District 2, and let's look at a report dated November 16th, 1994, which consists of a dust sample log from Hatfield which is sent to materials analysis, whatever, Longo's group, and Longo produces an assay and sends this assay to someone on -- well, that doesn't matter.

The material is collected by Hatfield and sent to Longo. Longo receives it November 21st, which is five days later.

There are three dust samples. There's

a certain area which has been microvaced, and these materials are processed and a number of objects are counted and given in asbestos structures per square centimeter.

Of the 102 objects which are described as amosite, only one of these 102 objects have any diffraction data available, which is not included in that assay.

Now, of the 1.6 million, only 770,000, approximately one half are greater than five microns in length, which I'm interested in because this relates to risk analysis and the OSHA data sheets that we use.

Now, the values given, concerning the distance between the ceiling and the top of the tile, from the data given, I have recalculated, based on 30 years, 365 days a year, 24 hours a day, 60 minutes as a continuum that the fibers falling, if these were individual fibers, those greater than five microns in length, that a concentration per cubic centimeter of air should have been approximately 0.3 fibers per CC, 3/10 of a fiber per CC. It was a continuum over that 30-year period. Failure began day one, and it has never

changed.

Now, if you look at the air data, this is too high by three orders of magnitude, so obviously, one cannot reconcile the settled dust data with the fiber levels found in the air of buildings.

So, the fact of the matter is you can find "stuff" on the top of a surface, but it begs the question: How did it get there? Was it ever in the air to begin with? Other than traversing point A to point B, were there ever any fibers in the air? The fact you find fibers on the settled surface, what does it mean in terms of risk to building occupants, that begs the question.

So just based on raw data, based on the fact that there are a certain number of fibers found, and given the circumstances that it's landed on top of this surface, you cannot reconcile fiber numbers with fiber levels found in buildings, that is the bottom line.

Q. Is it your conclusion that the figures found by Dr. Longo mean nothing in terms of risk to building occupants?

MR. BROWNSON: With respect to

settled dust?

MR. MILLER: I'm asking the question.

A. No, of course not. I didn't say nothing. Every piece of data has some meaning. The fact of the matter is: I'm interested in risk calculation and I'm interested in fiber levels in the air.

Now, tell me whether this pertains to fiber levels in the air. Based on what this technique involves, and based on what is presented to us, I don't think that you can rely on these data to form any conclusion regarding risk to building occupants.

Do they have meaning? Yeah, I suppose they have meaning. It means that it went from there to here. I'm pointing up and I'm pointing down. It went from there to here, but it carries no other significance without other data. One has to measure fiber levels in the air.

Q. You indicated that your calculations include the distance between, I guess, the fireproofing above and the sample below.

How far was that distance, sir?

A. The distance that I used in this calculation was 10 centimeters.

Q. Okay. Are you willing to conclude that the amosite found in the dust sample, 10 centimeters below the amosite containing fireproofing, came from the fireproofing?

A. Might have.

Q. Is there any place else that you can realistically think that it came from?

A. Well, let's say you have a maintenance guy who's going to go up into the ceiling and he's just come from the boiler room and he did a repair job in the boiler room.

Is it possible that the jacket he's wearing will be contaminated with stuff from the boiler room? That's a possibility, but let's be reasonable here. You look at the material on top of the ceiling tile and you look at the material in the ceiling, and you should characterize it on the basis of fiber type, fiber chemistry, size distribution. You come to a better understanding as to whether this stuff on top of a ceiling tile really came from the ceiling.

Let's say it did. Is there any

other way of getting it -- people talk so much about maintenance workers knocking this stuff around, it could have come from any number of sources.

Do I believe that that's it?

No, I think if you can find something on top of the ceiling tile, it probably came from whatever is sprayed on top. That's just sensible.

Q. You indicated that the diffraction information was not written down on a report that you saw.

A. It was not provided.

Q. Not provided.

Do you believe that a light microscope report should always have optical diffraction information written down?

MR. VALENZA: Objection.

A. You mean, TEM report, a transmission? You mean light microscopy?

Q. I did say light.

A. You did say light.

Well, what is diffraction?

Q. That's only for -- I'll rephrase my question.

Do you believe that a light microscopic report should always have written down on it optical qualities of the asbestos-containing material, such as indices and refraction?

MR. VALENZA: Objection.

A. It depends.

Q. On what?

A. See, if someone gave me a sample and I said there was amosite there, I think there's a pretty good chance there was amosite there. If there's someone that's just been trained in the laboratory, let's say, a big laboratory, as in a laboratory, and someone got three weeks training how to identify asbestos, then I'd like to see most of the characteristics written out, yes.

Is it necessary to do that? Generally so.

In many of the reports there's an index of refraction given parallel to the fiber bundle and right angles to the fiber bundle and some optical characteristics which indicate and support the otherwise visual observation that this stuff is an amosite, crocidolite or chrysotile. So, generally so, you'd like a

little bit of quantitative information.

Q. You did some calculations to come up with a .3 fibers per CC level on a piece of paper in front of you, is that correct?

A. Yes.

MR. SENFTLEBEN: Objection. I thought he said .03, but I stand corrected.

Q. I thought it was 0.33.

A. Let's say it's .03, what does it matter?

Q. What does it matter?

A. It doesn't matter. Calculations could be off.

MR. BROWNSON: Wait for a second.

Q. Now, would you have any objection if I made that piece of paper an exhibit, Doctor?

A. Would I object to it?

Q. Yes.

You can certainly have a copy of it or we can take a copy.

MR. MILLER: I'd like that to be Exhibit 4.

MR. BROWNSON: Let's mark it as an exhibit.

MR. MILLER: We'll do it after a

break. Good.

Q. Then this will be the next exhibit.

A. I assumed a ceiling height of 10 feet -- I misspoke. Ten feet would yield a fiber level of 0.01. Ten centimeters, it would be 0.3, but this is written down and so you may copy it.

MR. BROWNSON: We'll make that as Exhibit 4.

Q. If you assume the ceiling height of 10 feet, does that mean that the dust sample was not taken above a suspended ceiling; rather, it had to be taken below a suspended ceiling?

A. Correct. Let's say you found it on a floor, in a carpet, whatever.

Q. Given that circumstance, Doctor, namely, you have the asbestos amosite-containing fireproofing separated by a suspended ceiling from the normal occupancy area, and somewhere down on the floor of the occupancy area the sample is taken. So you have about a 10-foot distance and you find the 107 or 102 amosite fibers in that dust sample.

Do you still believe that the amosite in that sample probably came from the fireproofing 10 feet above it?

MR. BROWNSON: I'm just interposing an objection to the form of the question because it really is hypothetical, it's not fact, but you can answer it.

A. May I answer it as a hypothetical?

Q. You can answer as a hypothetical. It's how you are looking at it, but hypothetical is fine.

A. The more, as the physicians would say, the more proximal this sample is to the source, the more you are secure in your conclusion.

The more distal this is, like if you find it on a floor under some surface embedded in the carpet, there the issue of tracking dust in a building is raised, and it could come from any number of sources. So, the closer you are to that source, the more likely it came from that source.

Q. Given the hypothetical I gave you, to what degree of certainty would you say that the amosite on the floor came from the fireproofing 10 feet above?

A. I have no idea, I've never been in the building.

Q. Okay. If you had a dust sample

taken on a ledge that's about two feet below the surface of a ceiling, and the ceiling, itself, was asbestos-containing, and the ceiling has chrysotile and you have chrysotile dust samples taken a couple feet below that level, this is all in a normal occupying area of a building, like a hallway, say --

A. Right.

Q. -- would you be willing to make any conclusion regarding the source of the chrysotile in the dust sample being the material two feet above it?

MR. VALENZA: Objection.

MR. BROWNSON: I will object to the form of the question as an improper hypothetical, but go ahead. Improper in the sense that I don't think it fits any of the facts that we're dealing with here.

Q. Okay. You may answer.

A. Chrysotile is more problematic. Obviously it comes from a greater number of sources, and there are those who believe that it is -- there are many other sources of chrysotile fiber. Amosite is more restricted in consumer products, meaning products found outside of a boiler room

or power plants. So there's only a limited number of sources, whereas chrysotile, you enter into a "where did it come from" kind of thing.

MR. MILLER: The next exhibit number, please.

(P-4, diagram sheet, received and marked for Identification.)

(P-5, cover letter, dated May 26, 1995, received and marked for Identification.)

Q. Doctor, I've handed you Exhibit 5, which is a cover letter from Lynnae Waskosky, dated May 26, 1995, to Dan Albers. There are attached reports that are, I believe, reports prepared by you.

Are all the attached reports prepared by you?

A. No.

Q. Did you prepare any of them?

A. These reports were prepared by Dr. Nolan of my laboratory.

Q. Do you have any idea why Ms. Waskosky would say in the letter that the reports were prepared by Dr. Arthur Langer?

A. Well, she's a paralegal at Mr. Brownson's

law firm, and I suppose she assumed that.

Q. Okay. Now, did Dr. Nolan do his work under your direction and supervision and control?

A. I received the samples. The samples were prepared by my laboratory, by our laboratory technician, and I asked Bob Nolan, who has 15 years' experience in this field, to scan the grids.

Q. Okay. Now, it appears to me that the work is not completed, is that correct?

A. As we sit here today, no, we're still working on this.

Q. Well, this provides a bit of a problem, since I'm supposed to ask you opinions; since your work isn't completed, it may be hard to ask you about opinions.

MR. MILLER: Mr. Brownson, what do you think we should do about this problem?

MR. BROWNSON: Work not completed largely because of the fact, as you know, our second round of sampling was just done less than a month ago.

My solution is, and has been, that you can ask him all you want about the

work that's been completed. As soon as the additional analysis from the recent sampling is completed, you'll get it. If you want to ask him about that, you're welcome to do it.

MR. MILLER: Okay.

MR. BROWNSON: I suspect that you can ask him enough questions today concerning the technique and such that when you see the additional data, it probably will not involve a lot of additional questions, but maybe it will, that's up to you.

Q. Let's look at the first page, HES identification number refers to Hunter Environmental Services, sir.

A. Which school are you in?

Q. The first page, as I have, table one, it should be the same that you have.

A. Description of sites and types of second air monitoring in South Shore High School.

Q. Right.

A. HES, Hunter Environmental -- yes.

Q. Do you have back-up data from them detailing the dates, the times, the exact

location, that type of information?

A. Yes, of course.

MR. MILLER: Has that information been provided to us, Mr. Brownson?

MR. BROWNSON: Yes, if you look at this previous exhibit, which I think was 3.

MR. MILLER: It was provided. I'll take your word for it.

MR. BROWNSON: I'm trying to look here very quickly, which I don't see it on that exhibit. It was provided. It was the Hunter report.

MR. MILLER: Okay. Fair enough.

Q. Doctor, I'll ask you a few more general questions to see if you can give me that information.

Were these samples all taken during normal school hours, according to your understanding, Dr. Langer?

A. I don't recall. I would have to reread Hunter's report. I think so, but I'm not certain.

Q. For the samples taken into the specific building, were they all taken on the

same day except, of course, for the reference to second-day air monitoring, which I assume would be taken on a different day?

A. I think they were taken over two days, if I'm correct.

Q. Okay. Getting down to the bottom line of these, let's see, the sixth page of the report, as I count them, is: "Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in Leif Ericson Elementary School."

Do you have that page, sir?

A. Yes.

Q. The columns that are towards the right center are headed "Chrysotile asbestos fibers detected."

Do you see that?

A. Yes.

Q. Some columns simply have asbestos fibers detected.

Was there a distinction or reason why some columns on some pages use the word "chrysotile," and others do not?

A. No, I don't know.

Q. If the amphibole fibers were

detected in this specific school we are looking at, which has a heading of only chrysotile asbestos fibers, would there be some indication of amphiboles or should there be?

A. Normally, we indicate asbestos fibers detected, and if an asbestos fiber is detected, then we note which asbestos fiber type.

So we made reports before in which we indicated it was either chrysotile or amosite. We never found any crocidolite in the air, nor have we found any other fiber by either amosite or chrysotile. Why that says chrysotile, I'm not certain, other than the fact that this was awfully rushed when we made this report. Everything that takes time is the actual scanning, of course.

Q. As I look through these reports and I look at the columns where it's either chrysotile or just asbestos fibers detected, where there is a numerical result, it is always zero.

Is that how you read it, also?

A. No.

Q. Where do you see fibers detected, sir?

A. Well --

Q. Asbestos fibers detected?

A. Well, asbestos fibers detected, there were no asbestos fibers detected. I think you were referring to the airborne concentration. It's never referred to as zero, of course, less than a certain limit of detection based on the amount of air actually scanned on the filter, the amount of particulates deposited from air scanned.

Q. Thus far, Dr. Nolan has found no asbestos fibers whatsoever in those that he has reported results on, is that correct?

A. These are as reported, correct.

Q. Do you have any back-up data of any typewritten data regarding these air samples that have not been presented?

A. What do you mean, the scientific data?

Q. Any type of spectra charts, any -- you broadly included Dr. Nolan when you did these air samples, were there documents prepared that we don't have?

A. Well, I don't know what you can prepare if you don't see the asbestos fibers. That's what you're counting. You don't just count the

particulates or photograph particulates, what you do is look for fibers.

Q. You don't have, for example, electron micrograph data sets of some sort?

A. You mean, an actual printout of the grid shown in the various areas scanned?

Q. Among other things, yes.

A. I don't have those with me.

Q. Okay.

A. Since the project is not finished as yet, normally those are a part of a file and they're kept in one place.

Q. Would they normally be turned over to your clients when the project is done?

A. Sure.

MR. MILLER: Okay. I would appreciate, of course, receiving everything.

MR. BROWNSON: Right, you'll get all that.

MR. MILLER: Okay.

Q. Let's move on a little bit, sir.

Do you have with you the photographs that you looked at of the three buildings?

A. No.

Q. Category 8 says that you will rely on documents pertaining to Asbestospray and/or Spray Mineral Fibers Manufacturing Association.

Is it all right with you if I call it SMFMA for short?

A. No, I would say it's most certainly not correct.

Q. Not correct?

A. No. I want you to call them anything else but that. As a matter of fact, you mean the sprayed mineral fiber, whatever?

Q. Manufacturing Association, SMFMA?

A. Can't we agree on some other term?

Q. What would you prefer?

You're serious?

A. Sprayed Fiber Association.

Q. Okay. Sprayed Fiber Association, Doctor.

I'm looking at what's been given to me. I believe it's supposed to be Exhibit A. It's a fairly thick pile of papers, generically, about Asbestospray or Sprayed Mineral Manufacturers. I don't see anything in here dealing specifically with this case.

Tell me how this is going to support

your opinions, this Exhibit A information.

A. What opinions are there? Those that are going to be objected to are going to be supported? Are we talking the Sprayed Mineral Fiber Association? Then they will help me. If you're going to ask me about Mr. Herbert Levine, who is president of the company, these will help me. If we are interested in whether this organization participated in asbestos research at Mount Sinai, these documents will help me. If you're going to suggest to me that this organization was a nefarious organization with suppressed data and injured workers, then these data will support me in my opinions.

Q. Doctor, it's obvious that the large number of documents in there could be relevant for many different issues.

A. Exactly correct.

Q. The point is, though, that it has been presented to me by Mr. Brownson as material on which you will specifically rely, so I think it's fair to ask you: What is this type of information which in some way is generically different than everything else we've talked about today?

A. Correct.

Q. How do you expect this to be relevant to what you expect your direct testimony to be? I don't mean relevant in a legal sense, where does it fit in so I get a fair shot to ask you a question without looking through hours -- to go through page by page?

MR. BROWNSON: I can probably move that along.

MR. MILLER: Appreciate it.

MR. BROWNSON: Dr. Nolan had certain contact with Herbert Levine, who is president of Sprayed Mineral Fibers Manufacturing Association. Dr. Nolan worked at Mount Sinai and --

THE WITNESS: You misspoke.

MR. BROWNSON: I meant Dr. Langer.

MR. MILLER: That's right, you did say that.

MR. BROWNSON: To some extent you can appreciate that we don't know what the evidence may be on various theories with respect to liabilities against Asbestospray, but to the extent that any of the claims involved analyzing conducting Asbestospray

during the years the material was applied in these buildings, we may ask Dr. Langer to respond to that in terms of what he knows about the activities in Asbestospray during those years, and that's why he's reviewed this.

MR. MILLER: Thank you.

BY MR. MILLER:

Q. Can you, in summary, tell me what you would tell the jury if you were asked: What do you know about Dr. Levine --

A. Mr. Levine.

Q. -- Mr. Levine, and his activity about asbestos during the years covered by these documents?

A. That's a fair question.

Mr. Levine frequently came to Mount Sinai to discuss issues of asbestos and its health effects. He frequently met with Irving Selikoff. Mr. Levine, through his organization, Sprayed Mineral Fiber Manufacturer's Association, contributed to some of the ongoing projects at Mount Sinai. Mr. Levine generously gave of his time, he generously gave of his knowledge in the field, he provided investigators

in our laboratory with information concerning ongoing spray activities, and allowed members of our research group to visit sites and to perform air sampling exercises.

He was forthcoming. He participated in several of our early courses on asbestosis at Mount Sinai. I found him to be reliable and honest and open, generous with his resources, and a refreshing individual in terms of a representative of asbestos concerning the late 1960's, early 1970's.

Q. Doctor, before we broke, you made a comment that Dr. -- excuse me -- Mr. Levine was refreshing, I think, in terms of people in this issue at that time.

Whom did you contrast Mr. Levine to? You said he was refreshing. Refreshing in terms of comparison to X?

A. Well, let's invoke one of the great demons of modern industry. A lawyer, by training, called Vandiver Brown, who is quoted or is reported to have said, "The less said about this, the better, in terms of diseases," so on and so forth, that would be one side of the fulcrum; and on the other side is Herb Levine,

who is willing, able, open and generous with resources, as I have said.

Q. Okay. When did you first get this pile of documents which is supposed to be No. 8 as listed on this Exhibit 3?

A. I don't remember. Several months ago, I'm sure.

Q. You agree with me that these documents are not in chronological order? Do you agree with that?

A. I don't remember, but I put mine in chronological order.

Q. Did you notice whether or not there were documents which appeared to be missing because Bates stamp numbers would jump from one document to another?

A. Well, there are some documents that didn't belong in there, actually, which I pulled out, so that might account for it. This enterprise is carried out by someone who is going to take the 5 o'clock train home or something. Hopefully, the documents are put into some order that make them useful, but it doesn't always happen that way. So you have to look at a box of documents, see what's there, and do your own

kind of recategorizing, if that's a word, and this has to be done.

Are there documents missing? I don't know. I haven't thought about looking. I mean, are there jumps from 1967 through 1971? I didn't notice any, but there may be.

Q. How do you know that you're getting the complete story about what happened with the Sprayed Mineral Fibers Association, Mr. Levine, in those years regarding your concerning interest and testing for asbestos?

How do you know those documents are complete?

A. I'm glad you asked me that question because this is something I volunteered with Mr. Brownson not too long ago.

That is, I was there at Mount Sinai at that particular time, and I was involved in most of those activities, and I had an impression as to what Mr. Levine's contribution was, and these documents reinforced my previously-held opinions and high regard for him.

Q. Was there any other asbestos manufacturer at that time whose representatives

or general policies struck you as favorably as Mr. Levine obviously has?

MR. VALENZA: Objection.

MR. BROWNSON: I'll object to the characterization of "asbestos manufacturer." He didn't manufacture asbestos, he manufactured products. Subject to that objection, go ahead.

A. My interaction with manufacturers? Let's say Johns-Manville was considerable at that time and we were involved in certain joint studies with the Johns-Manville Corporation, and I found them to be generally helpful and open, generally so.

Q. Did you have any contact during that time with representatives of U.S. Gypsum?

A. I don't think so, no.

Q. Did you have any contact with representatives of W.R. Grace during that time?

A. I don't think so. You mean, in the late '60s, early '70s?

Q. Yes.

A. I don't think so. I mean, I may have. I may have misspoke. Is there someone who contacted me, who wrote me a letter or called me on the

telephone? It's possible, but I don't think so. I cannot recall; that's a better response, I cannot recall.

Q. Remember the documents in here that showed a report by Davershaw Cooper on air sampling, taken in the building in California, sir?

A. Yes.

Q. That was in the Wells Fargo building, was it not?

A. Yes.

Q. That product was Kafco, is that correct?

A. I believe so.

Q. What's your opinion about the results of that air sampling?

I have the document tabbed, if you would like to look at it.

A. May I?

Q. Yes. There's certainly more than one document, and I will try to give you the two key ones.

For the record, the two documents I'm showing you, I believe, are the two main reports. There are other documents that are in

the transmittal letters, one dated September 23rd.

A. This is 1970 and '71, isn't it?

MR. BROWNSON: Let him finish.

Q. There's a subsequent one dated November 5th, 1970, and there are other letters, but these are the two key ones.

A. Here on my notes which I consider important, and whether I get out of this, so to speak.

Q. Please read your notes. I appreciate it.

A. There's a letter of 23 September, 1970. This is Fowler of Davershaw Cooper of Mr. Levine, a preliminary report. This is Montgomery Ward.

Q. I think it was Wells Fargo.

A. Well, hold it a second. Let's go down to Wells Fargo, Fowler to Cooper to the Sprayed Mineral Fiber Manufacturer's Association. That's 5 November, '70.

Q. Those are the two I put in front of you now?

A. Yeah. The values are 00085, 0011, 0019, rounds it out to 001, 001, 002.

Now, they --

Q. Can we stop right there for a second?

A. Sure.

Q. Are those the values of the report or values that you have recalculated yourself from other data?

A. The values in the report are as follows: 0.00085, 0.0011 and 0.0019, and I just rounded them out.

They're all pretty much -- but say that they are the same, for argument's sake. Now, this was couched in 1970, according to the TLV, to prevent asbestosis.

Again, the threshold limit values at that time, 1970, this predates OSHA two years. We are relying on the American Conference of Governmental Industrial Hygienists, ACGIH, in which the TLV, to prevent asbestosis, what they call 5,000 fibers per liter, five fibers per CC, no firm guidelines on levels, and they say that these fiber levels, 001 or 01, probably such amounts constitutes no risk.

So, given asbestosis, given the TLV's at the time, given the fiber levels they

found, it's not such an outrageous conclusion. In fact, it's pretty good.

Q. Do you agree with the other conclusion reached in both of those reports regarding the same study, that air passing along the airplane line with Kafco has more asbestos in it after passing through an air plenum, before it passes through it, is in a statistical increase in asbestos?

A. That is their conclusion.

Q. Do you have any reason to doubt that?

A. No. Why should I?

Q. Do you have any further comments about that?

You're looking at your notes, sir.

A. No, I think that --

Q. The next, category 9, "Air sampling data obtained by Asbestospray consultants in other property damage litigation."

I have another quick question before you do that.

A. Shoot.

Q. Some of the other information concerns a Maryland project.

What type of building or buildings was that, do you know?

A. My understanding is that this was from the State office building, Preston Street.

Q. The next set of information I see concerns samples taken in the Trans World Airline terminal in Kennedy Airport in New York.

Is that the same TWA terminal which had some samples taken in these documents that we saw in Exhibit A, early samples, if you know?

A. I don't know.

Q. Okay. The next samples come from Columbia, South Carolina, USC Business Administration Building.

Is that a university, if you know?

A. Yes.

Q. The next samples come from a convention center in Wichita, Kansas, is that correct, sir?

A. Yes.

Q. Next samples come from a West Virginia University coliseum in Bordentown, West Virginia, is that correct?

A. Correct.

Q. The last samples refer to a drop

test in the coliseum in West Virginia University.

What was that test all about?

THE WITNESS: Do you have an objection that you want to get on the record?

MR. BROWNSON: No, I have no objection to that question.

A. The contention at that time that concerned plaintiff's data was that when and if this material failed, it would drop to the ground and generate dust, that there could be a catastrophic failure if this material was on the coliseum ceiling. So, they constructed an isolated chamber and they dropped some stuff at a certain height, whether it was three meters or four meters or 10 meters, whatever it was, and they dropped the stuff into this glove box, which is, for many human beings, it's 20 feet high and 10 feet by 10 feet, whatever the dimensions were, and they dropped the stuff down and they measured the amount of fiber liberated in this drop test.

Q. Is the information that you have here as part of this category 9, the

plaintiffs's generated information on the drop test, or is this information that you or somebody in your office have prepared?

A. I think I took the information from the plaintiff's data and I may have recalculated a couple of things, but that's it.

Q. Was the plaintiff's data published, if you know?

A. I don't think so.

Q. This was part of the West Virginia?

A. Wait a minute. I think it may be published in part in the Collegium Ramazzini, but I'm not sure.

Q. Was this drop test originally part of the West Virginia litigation, asbestos property damage litigation?

A. You mean, was it carried out for that purpose?

Q. Yes, sir, if you know.

A. I think so.

Q. Now, I've gone through this category 9, and to the best of your recollection, have I listed all the different types of buildings and locations of air sampling that you have under this category 9?

A. Well, actually, there's two other work sites which use the Asbestospray T formulation. One is the Wallbrook High School, and the other is the one that's in Maryland, and the other is the Erasmus Hall; I mean, it's arguably Asbestospray product, Erasmus Hall in Brooklyn, so there's two other data sets.

MR. MILLER: Mr. Brownson, I guess there's no objection to provide the other data sets?

MR. BROWNSON: I don't -- oh, we just didn't have the written reports?

THE WITNESS: I may have them in our computer.

MR. BROWNSON: To the extent that they can be found and generated, we will provide them.

THE WITNESS: Of course.

Q. Can you tell me, in summary, what the air sampling data shows for each of those?

A. I think Erasmus Hall was 0008. That was an average. The outside air was a little higher. The Wallbrook High School also was triple digits, some numeral.

MR. MILLER: Let's break.

(Whereupon a brief recess was taken at 2:00 p.m.)

(Whereupon the proceedings resumed at 2:15 p.m.)

BY MR. MILLER:

Q. Doctor, back to Exhibit 3, which is the listing of materials in which you will rely in this case, subsections 10 and 11 both refer to the symposium held at Harvard in 1988, published in 1989.

I have questioned you about this before. I would appreciate it if you can, very briefly, summarize for me, if I were Mr. Brownson, asking you to explain to the jury the lessons from that symposium, including, of course, your article which was part of it.

MR. BROWNSON: Well, the question is broad and I'll object to it, but go ahead.

A. Very broad. However, I shall attempt to answer it.

The papers presented at Harvard, actually in the Kennedy School of Government, reported on current epidemiological findings, current experimental findings, current fiber levels found in buildings. A synthesis of those

data sets was attempted, and the conclusion was that "the asbestos in the buildings problem," put that in quotes, was overblown in the United States, to use a phrase, and that it was not as serious a problem as envisioned by various groups, including groups within the Federal government, agencies within the Federal government.

Q. With regard to the asbestos problem, reference specifically was to the asbestos problem for passive building occupants, is that correct, sir?

A. No. As a matter of fact, we touched on asbestos exposure in a range of settings, not merely building occupants but, of course, the nature of the symposium was the health effects to building occupants, which included passive occupants.

Q. If you can summarize briefly to the jury your paper that was presented there and published there.

A. That paper focused on fiber type and the asbestos diseases. It reviewed much epidemiological data, at least those studies which delineated among the fiber types. It

touched upon environmental mesothelioma in certain settings. It touched upon the papers upon which risk is calculated, and clearly showed that there is a significant difference in the mortality experience of workers exposed to chrysotile asbestos as compared to those workers exposed to one of the amphibole asbestos types.

The paper also included some data pertaining to fibers in the lungs of workers in the United States.

The paper also included some interesting data on fiber types found in certain kinds of products in the United States, and basically concluded that there is a very significant difference in fiber type potency to reduce asbestos diseases, and that because chrysotile was one of the prominent types that we deal with in buildings, the risks associated with such exposures were much less than previously perceived.

Q. Category 12 of Exhibit 3 refers to the "Health Effects Institute - Asbestos Research," a 1991 document. Again, I've asked you about this before.

Would you be kind enough to

summarize briefly, as if I were Mr. Brownson asking you to summarize for the jury, the main lessons for that document?

MR. BROWNSON: Again, I'll object to the form of the question, but go ahead.

A. Well, you have the document here.

Q. I do?

A. There's an executive summary and --

Q. Would you simply refer to the lessons of the executive summary?

A. You're not going to give me that nice volume that you have all marked up?

Oh, okay.

The executive summary includes a general background to this problem with asbestos in schools, some brief description of what asbestos is and how it was used in the United States, the methods by which the panel reviewed and either accepted or rejected data sets, the methodology of the review committee, the presence of asbestos in public and commercial buildings, the general categories of exposed groups within these buildings, how asbestos is measured in various environments, what the exposure to asbestos in buildings is based on

the available data, some measurement of what the asbestos levels are in the ambient air, a focus on the levels found inside of buildings with asbestos-containing products, exposure categories and distinctions made on the basis of different categories of occupants, from passive occupants to emergency workers who come in and fight fires, the control of the asbestos exposure in buildings through operations and maintenance, the potential health effects associated with exposure to fiber in buildings, and the various physical chemical properties which are thought to govern these risks, the risks to building occupants based on the fiber levels, and the various models used to calculate risks, the presence of man-made mineral fibers, the so-called vitreous fibers in buildings, whether or not these are of concern, and finally, research needs.

Q. Were the risks, as calculated in the Summary to the Harvard Symposium, one in 100,000; that is, the risks of asbestos related to the death for somebody in a school?

A. I don't recall. Why don't you give me the paper and let me look at it.

Okay. I think this is it, sir, and this is the summary, also. Oh, that's what I want, the summary of it.

Q. I think that may be it.

A. Yes, Spengler and colleague's summary.

MR. BROWNSON: I'm going to object to the form of the question. I think the risk calculated was in buildings, not schools.

A. Buildings, yes.

Now, the question is: What is the risk in?

Q. The Summary of the Harvard Symposium to persons in buildings?

A. In conclusion, number seven in the executive summary, the following statements are present:

Recent data indicate the average concentration of asbestos in schools and other buildings is that asbestos-containing materials is generally well below the 0.001 fibers per ML used in risk calculations performed for school children. Of course that's mixed fibers of different types T.

Using these conservative risk models

of exposures higher than typically measured are the projected lifetime risk from exposure to mixed asbestos fibers is one death among the cohort of one in a thousand children.

Q. Now, to the HEI executive summary table, 1-1, Page 1-11, also has some lifetime cancer risks, is that correct?

A. Yes, it does.

Q. Do you consider those risks to be substantially the same as the Harvard University risks you just read for exposure in a building?

A. Are they the same, you said?

Q. Yes, sir.

A. Okay. Reading this table, we're talking about school-aged children, 5 to 18 years, 180 days per year, five hours per day. Given two different averages which are different by an order of magnitude, one is five times higher than the value that we just read .001, and the other is one half that value.

So, therefore, we're dealing with an order of magnitude difference in dose, and then given these various conditions, the premature cancer deaths, the lifetime deaths per million. So six per million would be .6 per 100,000.

Let's say it's one per 100,000, at half the dose given in the Harvard school, and the 60 per million or six per 100,000 is the risk which is five times higher.

So, are these values the same? Yes, they're pretty much the same.

Q. Do you think that in making risk predictions that a difference of five times something you can say is basically the same?

A. No, no, no, I didn't say that.

Q. Okay. I misunderstood you, then.

A. The Harvard, Spengler, et al., executive summary says, given the fiber level of .001, it's approximately one in a 100,000. This table says given a level .005, which is five times the value of 001, is approximately 60 per million, or six per 100,000. So, you have five times the level, linear five times one is five, so they have six instead of five. So, they're given the numbers five and six. They are statistically identical. So this is the same model and the same people crunching the numbers.

Q. Thank you, Doctor.

On Page 1-6 on the AGI executive summary, there is a figure 1-1.

Can you turn to that, please?

A. Sure, yes.

Q. Can you explain, if you have an answer, to why the mean value for average air board concentrations in non-litigation data by building type is at least twice as high in schools as in all buildings, residences and public and commercial buildings?

MR. BROWNSON: Can you just read that back for me, please? I'm not sure I caught the question.

(Whereupon the pending question was read back.)

MR. VALENZA: Objection.

MR. BROWNSON: I'll object to the form. Go ahead.

Q. Did you understand my question, Doctor?

A. I understand the question that I'm looking the data and that which you've stated is correct, the schools are twice as high as these other structures. So, if the schools are at 0005 and these are about 00025, they're about half, that is correct.

Why is it higher in the school

buildings? There have been a lot of interesting hypotheses generated, it may be the activity in the building, it may be any number of reasons, but can I answer it definitively? No, no, I can't do it.

Q. Do you have an answer that you believe is more likely than others?

A. I'm sorry?

Q. Do you have an answer that you believe is more likely than others?

MR. VALENZA: Objection. Speculation.

A. No.

Q. Okay. Doctor, the last category of documents on which you will specifically rely in this case as listed in Exhibit 3 is the article you wrote with Drs. Wilson, Nolan, Gee and Ross, titled: "Asbestos in New York City Public School Buildings - Public Policy: Is There a Scientific Basis?"

I have just a couple of questions to ask you about that, and if you would like, I'd put a copy of the article in front of you and if you want to refer to it, you may now.

First of all, sir, did you receive any type of grant or sponsorship, financial

sponsorship from any asbestos litigation defendant for writing this paper?

A. No.

Q. Do you know if anyone did?

A. No, I'm quite sure no one did.

Q. Okay. There is a specific reference to an analysis of a sample in one of the New York City schools. It's on Page 165.

Was that sample analyzed as part of the litigation?

A. Yes. Pending litigation, correct.

Q. There are, of course -- I take it that some asbestos defendant paid for the analysis of that sample, is that correct?

A. Yes.

Q. Which defendant was it?

A. Asbestospray.

Q. Page 162 is the following statement, the first full paragraph: "NYC's Board of Education was not required by law to measure the asbestos fiber concentrations in air, or the type of asbestos present before any asbestos abatements was to take place."

Do you believe that it should be so required by law?

A. Should it be required by law?

Well, I think before any abatement activity, number one, you want to make sure you have asbestos in the product that you are abating, ripping out. You may think that this is trivial and kind of stupid, but let's carry on from there.

Do I believe that it should be required to measure fibers in the air? I think that if someone gives advice, they should base this on some perceived, or some not perceived so much, base this on some estimate of risk associated with each of these instances.

Q. Therefore, do you believe that, by law, they should be required to consider: Number one, concentrations in the air; and number two, the type of asbestos present before any asbestos abatement?

MR. BROWNSON: Well, I guess I'll object to the form of the question, and I'm not sure what the exact legal objection is other than the fact that you're asking for a hypothetical legal conclusion.

A. Yeah, it is a legal conclusion.

MR. BROWNSON: Go ahead.

A. I'm one of those people that believes you ought to do what's right without having it mandated.

Q. You believe certainly --

A. What do I believe? Let me just interrupt you. Let me finish this.

If, let's say, you are a school district, like Chicago, New York or Los Angeles, and you're going to expend $125 million in an asbestos abatement activity, I think that you should know something about the risks that you are addressing. I think the way to do that is to measure that which is the hazardous elements of environment, which means measure fiber in the air and come to some understanding as to, at least prioritize various buildings and places and so on and so forth. Some might have a measurable risk, others not, but you ought to do something in terms of establishing a data base upon which you will base your decisions.

Q. Do you believe that another thing a school district should do in terms of prioritizing is to establish the type of asbestos present?

A. Yes, I do. I certainly believe that.

Q. Would you, in general, all other things being equal, recommend the removal of an amosite-containing, asbestos-containing material before the removal of a chrysotile asbestos-containing material?

A. You mean, all of the factors equal?

Q. Sure.

A. Probably.

Q. On Page 163 of your article is a list of EPA guidance documents.

Did you have any connection with the Yellow Book?

A. No.

Q. Did you have any connection with the first Green Book of 1983?

A. I don't think so. I may have reviewed it, but I'm not sure.

Q. Did you have any connection with the Silver Book of 1984?

A. No, I don't think so.

Q. Do you still agree with this sentence which is written on Page 166, "The acceptance of risk is a social and moral issue, and scientists are no better qualified than anyone else to decide whether a risk is

acceptable or not"?

A. Absolutely.

Q. You also still believe that scientists will provide the best available data for decision makers and that scientists should be consulted?

A. Sure.

Q. Okay. On Page 166, at the very bottom, just before the heading "Other approaches to address asbestos in schools," is the statement: "If such removals have taken place, the lifetime risk of school children and teachers increase," citing the US EPA 1990, which in the back, you indicate, I believe was the Green Book, is there a specific statement in the Green Book, this being the second Green Book that says, "If there's a poorly executed removal program, that will increase the lifetime risk of school children and teachers"?

A. I think that's listed directly from the Green Book, or is the citing of a study in Great Britain, and I'm thinking of Bridet and Rude (phonetic), their study which showed elevated levels in buildings after abatement, school buildings, that followed the six months after

abatement.

So, we're talking about the actual fiber levels where they talk about that in that particular reference. If you calculate the fiber levels found before, during and after, the lifetime risk of those individuals increased.

Q. This was done in the Green Book, you believe?

A. I think so. As I sit here and recall it.

Q. I'm now going to ask you a couple questions, Doctor, about your article titled "chrysotile, its occurrence and properties as variables controlling biological effects," and I have a copy of it in front of you, in case you would like to look at it.

A. Sure.

Q. Do you know, first of all, which industry sources gave funds to support this conference?

A. No.

Q. Do you know any of them?

A. No. This conference was to be supported by an international program for chemical safety, but I think NIOSH withdrew some support, so they generated funds from other places.

Q. Do you believe that the mechanical manipulation required for the industrial application of chrysotile can increase the carcinogenic effects of chrysotile?

A. Yes.

Q. Specifically, what is there about that mechanical manipulation which leads to an increased carcinogenic effect?

A. We're talking in the generic sense now?

Q. Yes, sir.

A. We're not talking about the degradation, the grinding of stuff -- "stuff", that's such a bad word -- the grinding of fiber which alters surface properties decreases crystallinity or thermal shock brought about by friction product usage, things like that, that decreases it.

It is the opening of the fiber bundle, for example, in the textile industry, in which you get a lot of long, thin fibers generated in the willowing and spinning processes in asbestos textiles, which increases the carcinogenic textile of this mineral fiber, yes.

Q. Do you believe that that manipulation is responsible for the results found in the

Charleston textile mill study?

A. It's one of the possible explanations, yes.

Q. Do you know of any other possible explanations?

A. You mean, for lung cancer in Charleston, South Carolina?

Q. Yes.

A. As you know, Charleston, South Carolina is the northernmost extent of the cancer belt in the United States, which begins around the Gulf Coast and goes up the coast of North America. It's a paper written in 1976 by Bill, Blott and Fraumin (phonetic). They talked about cancer belts in the United States, and Charleston happens to be one of the last of the high cancer areas for lung cancer in which the SMR's, standardized mortality ratios, for lung cancer are elevated above national background. No one knows quite why. That's one explanation, that the referent population used by Dement was the wrong one.

There's another one given by Corbit McDonald. He seems to favor the use of oils in the dust suppression as being another factor in

this.

There is the third additional factor, Charleston's a big port; city people are exposed to amphiboles, that's another factor.

Then there's a factor that the actual machinery, itself, broke apart the fiber bundles and produced an aerosol with characteristics unlike fibers found in other environments.

Then there's another factor which is not stated by Dr. Dement, that the tissue burden study was done by Fred Pooley in Great Britain. Fred Pooley found crocidolite, and those tissues showed that those working in this plant also spun crocidolite for a short time, so there's many of these confounders and variables which haven't been embellished or brought out in the ideology of this peculiarly high incident of lung cancer by physical chemical properties.

One of these -- and I'm one of the people who believes that we were dealing with a very interesting dust, meaning, it was -- I don't understand the resolution of the light microscope, it was very thin, but certainly sufficiently high in long, thin fibers to be

produced in the thesis.

Q. How do you know that Pooley found crocidolite fibers?

A. He told me, and from -- the records also report these, I think they're reported in the -- I think they are reported in the General Motors biological effects of chrysotile, the meeting which was held by Chris Vogna, in Cardiff, in 1986 or '85, something like that.

Q. Why hasn't that information, which is now almost a decade old, in terms of going to the public, become generally accepted as the explanation for the excess lung cancer at Charleston?

MR. VALENZA: Objection.

MR. BROWNSON: Object to the form of the question. I think he said it was one factor to be considered.

Q. Do you think that that could explain all of the excess lung cancers?

A. No.

Q. Okay. That's fine.

Let me ask you --

A. The next time you're speaking with John Dement, ask him a perfectly good question.

Q. Did you read his article on the subject in The Third Wave Book?

A. I've looked at it, I have not formed an opinion as yet.

Q. You referred to the harsh form of chrysotile as opposed to the -- what's the word you used?

A. Soft.

Q. Do you believe that the harsh form of chrysotile, which you say on Page 438, tends to behave after amphibole asbestos fibers were aerosolized?

A. Correct.

Q. Could be one of the reasons why chrysotile can have a carcinogenic effect?

A. In part, yes. I think that was what I was trying to do in that paper. I was trying to explain the differences seen among different cohorts around the world and explain the different experiences on the basis of the physical chemical properties in the materials, themselves. There are a number of factors which have not been properly addressed, and this is just another one of them, yes.

I'm just so tickled pink someone's

read that paper.

(Whereupon a discussion was held off the record.)

BY MR. MILLER:

Q. There's a statement on Page 448 that "Tremolite and amphibole material is important in this regard since tremolite asbestos in appropriate concentration is considered to be the agent responsible for pleural mesothelioma found amongst chrysotile exposed workers."

Do you believe that?

A. Sure.

Q. By "chrysotile exposed workers," are you talking about workers in the mines and mills in Canada?

A. It's possible.

Q. Your last paragraph states, "Mineral nature of chrysotile controls biological behavior. These factors must be considered in developing any health criteria document in resolving health effects following exposure to dust."

If you were able to legislate or not legislate, at least to give advice to someone, what types of factors would you ask them to take

into effect based upon your research in this paper?

MR. BROWNSON: Excuse me, I'll object to the form of the question. Go ahead.

Q. You really what, Doctor?

A. I'm not sure I would.

Why do I say this? I know that there are all of these interesting observations, experimental observations, epidemiological observations, and they point to many, many interesting aspects of this, but if I was a regulator and I was given the fact that I'm going to have an industrial hygienist, certified industrial hygienist, a certified industrial hygienist using a phase contrast microscope going out to the field and doing dust counts, I would not do that. I would have a bulk sample read that generates fiber type and regulates across the board.

If we're dealing with -- the best of all possible worlds would be other techniques and other instruments, but in dealing with the pragmatics of everyday life, and the challenges that face us all, I would probably not regulate

them differently, I'd probably just use one standard for chrysotile.

MR. MILLER: This is 6.

(P-6, report by Dr. Langer, received and marked for Identification.)

Q. Dr. Langer, this picture I was referring to when I said some of your pictures come out pretty well, do you like the picture?

A. No, let's go on.

Q. Do you like the title?

A. Voice of reason, I think that that underestimates my true value and worth.

Q. Tell me how you got involved with U.S. News and World Report, in this article? Somebody called you up, you called them or what?

A. Do you want to hear the whole story, for the record?

Q. I do.

A. It's fascinating.

Q. I'd like to.

A. Well, normally when I tell the story, I have a single malt Scotch in one hand.

Q. I wish I could.

A. It all started out with New York City's asbestos episode in the fall of '93, and I wrote

a letter to the editor of The New York Times. I was joined with several colleagues, specifically those who are on the paper in the Journal of Regulatory, so on and so forth.

The New York Times did not publish this letter, and we basically said, "Wait a minute. Before you start to invest a lot of money and time and it's evident that these people really are at risk, why don't you do some air measurements of data from other schools, indicate that there's very small risks." We just completed a small study in one New York City school and we don't see very much, so on and so forth.

The New York Times chose not to publish that paper. To add insult to injury, they published a letter to the editor by an asbestos abatement contractor, the president of the company, who said something grotesquely stupid. It was ghastly.

The other was an Op-Ed piece by a well-known ideologist, whose name I seem to have forgotten, so I decided --

Q. Somebody who's at Mount Sinai?

A. Well, I've forgotten that, but I've

decided that if this is the case, then we ought to get a paper out somewhere, and I did the first draft of a major paper which was then circulated among our colleagues. We sent it down to the Journal of Regulatory Toxicology and Pharmacology. We sent it out. When they reviewed it, they said, "Hey, this is a hot topic. Why don't you guys publish this with a few minor changes," and so on. Minor changes, there was too much data description, but we did. We cited a lot of chapters and verses and all of the documents that are outlined, so we had to reduce that significantly. They said, "Yes, we're going to publish this."

Now, this paper was then picked up by someone in the Office of Technological Assessments in Congress. They were doing a study of problems in U.S. schools, and I was contacted by this person. Of course, the problems in U.S. schools focus on the physical problems of radon, lead asbestos. They also had several other interesting areas, like violence, and so on.

This was picked up by the OTA. Then, the preliminary report was circulated in

Washington and someone picked it up from U.S. News and World Report. They contacted me saying, "We've seen this particular paper. We're interested in the New York City experience and that particular episode. What did the EPA do, and what didn't they do?"

Of course, they interviewed me for two hours and took what they wanted to take and misquoted me there, but nonetheless, they contacted me and this was an evolutionary process because The New York Times didn't publish our letter to the editor.

Q. Is it fair to say that you gave the reporter for U.S. News much or most of the information published here about the history of the EPA?

A. I don't think so. I think the EPA's history is eloquent and speaks for itself.

Q. I'm trying to figure out how the reporter heard it.

A. The reporter spoke to many, many people, and my selection is mysterious, to me, anyway.

Q. Did you have any contact with John Welch during this process of giving an interview to U.S. World Report?

A. No. As a matter of fact, John Welch, I think, has left the Safe Building Alliance, as far as I believe.

Q. I believe he's quoted here as being with the Safe Building Alliance, at least president of a former manufacturer of asbestos products.

So at the time of this interview, he's thought to be there, but you had no contact during the course of this?

A. I don't think so.

Q. Is the U.S. News and World Report a journal on which you would customarily rely in the medical or scientific field, that you would call authoritative?

A. Would I call it authoritative? Is this a real question?

Q. Yes.

A. I don't consider lay press as authoritative, any more than I would consider a book by Paul Gradore (phonetic) to be authoritative in the sense of an unimpeachable source of scientific source.

Q. Let me ask you a few questions about the article. I believe you have a copy in front

of you. Here it is. Sorry, it never quite got over to you.

The first paragraph of the article talks about a number of precautions that are taken by a man named Bill Lee before he can replace an offending valve.

Do you believe those cautions are wise and appropriate from a health point of view?

A. I don't know.

MR. BROWNSON: Well, I'll object to the form of the question.

A. I don't know. Is the pipe wrapped with fiberglass or is it wrapped with crocidolite?

Q. Assume that it has some form of asbestos around it.

A. Well, then, what is the percentage of that asbestos; 90 percent or one percent?

Q. If it were 90 percent, you might agree that the cautions were wise. If it was one percent, you might say it's not wise, is that how I should interpret that response?

A. No. What we're dealing with is some kind of product on a pipe, and this product has been in service for a number of years, but this

product may have been in service for two months, this product may have been in service for 50 years. One product may have an integral physical condition, another may be more, to use your word, EPA's word, "friable," some of these materials may contain a crocidolite, others may contain goat hair, so there are different materials, there are different conditions, there are different scenarios, so to speak.

Now, let's assume that this is a worst-case scenario. Let's say this is the stuff that's a very high temperature pipe and it's a combination of chrysotile and amosite.

Do I think these precautions are warranted, sure.

Q. In the middle column on the first page there's a sentence about six or seven lines down, starts "Across the nation."

Do you see the sentence, Doctor?

A. Yes.

Q. "Across the nation, school districts that can't buy new library books are spending hundreds of thousands of dollars to deal with asbestos because they mistakenly believe their children are in great danger."

Do you agree with that?

A. It's possible that there are some school districts that possibly cannot buy new library books that are possibly spending hundreds of thousands of dollars to deal with a problem in which there's asbestos in the basement or asbestos above suspended tile ceilings in which the levels in the buildings are 0001 and kids can't buy new math books.

I think that that would be a mistake of the administration. These are your risks, these are your quantitative risks. Here are your children, they're out there scoring 50 points less than the school there on their math SAT's.

What do I think?

I think you ought to reconsider removal, yeah, I think that it depends.

Q. In your third column under the middle sentence, right next to the blurb, U.S. News Investigative Report, it starts with, "there is now broad consensus among scientists and physicians that asbestos in public buildings is not much of a threat to health."

Do you agree with that?

A. Consensus, what does that mean to you,

Counsel?

Q. I'm asking you, Doctor. I don't know what it means.

A. Well, I don't know what it means, either, if there's a consensus.

MR. BROWNSON: I'm sorry, so we're clear, you're asking if he disagrees with the consensus, or if he agrees with the statement that there's that much of a risk?

Q. The first statement: Do you believe that asbestos in public buildings is not much of a threat in health?

A. From the data that I've seen, I think it's pretty close to the truth.

Q. Now, the next sentence: Do you believe there's no broad consensus among scientists and physicians that asbestos in public buildings is not much of a threat in health?

A. I haven't the foggiest.

Q. The last paragraph refers to a study soon to be released by the federal Office of Technology Assessment.

Is that the same study which you

were referring to?

A. What is its technology, yes.

Q. Have you seen any conclusions from that study?

A. Not yet, no, I haven't, but they're quoting Richard Wilson, isn't that right?

Q. Not for that purpose, no.

A. I see. Okay.

Q. Do you have any idea what that study will say regarding asbestos in schools?

A. No.

Q. On the next page, sir, there's a sentence beginning at the top, "Less understandable is the role of government agencies, especially the federal Environmental Protection Agency, which created a public panic on the basis of paper-thin scientific information."

Do you agree with that, sir?

A. What part of the statement?

Q. Any part. I'll divide it up as you wish.

A. Less understandable is the role of the government, yeah, that's probably true, especially the EPA, that's less understandable,

more or less understandable. You have to have been there and to know the players in the game as to who advised what, which created a public panic. Well, it's not so much a public panic. People didn't know what to do, so they did what they thought the EPA was telling them to do, which was to take out asbestos from buildings on the basis of paper-thin scientific information.

Paper-thin scientific information, well, what did we know?

We knew asbestos in the workplace was dangerous, but it was a function of dose based on the risk calculations and fiber levels to which people were exposed. They had less of a risk than we certainly knew, so it's kind of overwritten, yeah.

Q. They say -- they're quoting you in the sentence, "When everybody's shouting 'Fire!' in a theater, the man who quietly stands in the corner and says, 'There's no fire,' is rarely heeded."

Is that a correct quotation of what you told the interviewer?

A. Not bad. Yeah.

Q. In fact, is that what you believe

you told the EPA during the years when you were there consulting as a peer-reviewer on those three rainbow books we talked about?

A. Three rainbow books, 1979, I thought that friable asbestos was a problem in school buildings. I participated in that. As time went on and more data became available, I was less convinced that there was a problem, and probably by the Health Effects Update.

As a matter of fact, I wanted to put in a section on fiber type and risk associated with the fiber types because I believe that an inspection should focus on and prioritize problems in buildings. So, I was much in favor of a fiber-type kind of approach to this problem.

Of course, as time went on and the Health Effects Update was published in 1986 and those documents were made available and people were measuring fibers in buildings, that I no longer believed that there was much of a problem in buildings.

Q. You talked about your wanting a section on fiber type.

Where, in regard to what paper did

you want a section on fiber type?

A. This was in the, I think it's the Purple Book. When we talked about algorithms and such, I was interested in a fiber type section.

Q. What happened to your request for fiber type?

A. It was never put in, they dismissed me, like I was a shoe salesman. That's the phrase that's used, I was dismissed; in more ways than one.

Q. Were there other specific advices that you gave during your work at any of the three rainbow books that were not followed that you can recall at this time?

A. Well, yes, I think that at these very same meetings, when a hearing was being formulated, the Asbestos Hazard Emergency Response Act, I objected to the language and I objected to the use of emotive words, and thought that the data pointed the other way and that people should be calm and not pushed into any action without some data base; but that was never done, neither.

Q. Under the picture of you is the statement, "Professor Arthur Langer kept trying to warn policy makers they were overreacting."

Is one of the places where you tried to warn policy makers they were overreacting was in AHERA conversations you just described?

A. I would say that every year I attended a number of meetings, both nationally and internationally, in which there were members of various federal agencies, and many discussions, public and private, followed.

As time went on, I continued to voice the opinion based on observations and analysis and analysis of data, that the risks posed by asbestos products in buildings were overblown, and the very first time that I participated in such an exercise with a colleague, we evaluated documents brought forward in the Service Employees International Union lawsuit against the Environmental Protection Agency, in which we evaluated the risk analysis which was being proposed at that time by a Bill Nicholson, and had lots of concerns. I mean, there were official concerns, there were unofficial concerns, but this was a continuing kind of dialogue for various members of government.

Q. When was the first time that you

believe you tried to warn policy makers they were overreacting, what year?

A. Probably 1983, maybe earlier, but certainly by '83.

Q. The Blue Book came out in 1983.

During the course of those discussions and that review in the Blue Book, did you try to warn anybody at that time that you thought they were overreacting?

A. You keep using this word "warn." What's "warn"? Don't walk on 42nd Street against the light, that's a warning; open and broad and frank discussions as to the contents of certain documents, I think that's more appropriate.

Q. Okay.

A. Did I raise concern? Did I bring forward any objections? Did I critique the contents? Did I recommend alterations of text? Did I carry forward the normal kind of operations of an outside reviewer and contribute to a federal document? Yes; did I try to warn someone, that's kind of, you know...

Q. Take out the word "warn."

What I'm interested in is the idea that you believe the federal policy makers were

overreacting.

Can you tell me when you first, in some way, indicated to federal --

A. Well, the federal policy, did they overreact? They didn't do anything other than write these documents. Everyone else reacted, some more than others, and therefore, you might say they overreacted.

What did the feds do? The feds put forward a position that generated position documents, and they said, "This is our position: We think you ought to have an inspector come in. We think if you follow this algorithm of conditions of materials and places in buildings where they exist in proximity to air supply," so on and so forth, "air supply units, and whether or not these materials are easily accessible and whether or not they are," and there's a whole strategy for coming to some conclusion.

Each of these factors are then multiplied by some normalizing weighted factor, and there's a number that's generated. On the basis of that number, one proceeds in certain ways to ameliorate. This is the algorithm technique, without using microscopy to measure

fibers in the air. This is a whole evolutionary process that I did warn people, you discuss it; "this algorithm may work, it may not."

It turns turned out the algorithm didn't work. It turns -- out the material was, as to prognosis data, the fibers in the air neither is fiber content nor fiber percentage or this or that.

What is it that you have to do? You have to measure fibers in the air, that's what's necessary to calculate risk. This is the bottom line, and did I warn people? That's such an unfortunate word in this instance; you discuss.

Q. On the second page in the third column on the right-hand side there's a heading in bold, "On second thought," and then there's a sentence, "But by 1985, some notable environmental health scientists were backing off."

Were you one of those?

A. I wouldn't characterize myself as a notable, that's rather self-aggrandizing, don't you think?

Q. Were environmental scientists backing off in 1985?

A. You mean in asbestos school buildings?

Q. Just as discussed here, and you can feel free to look at the exact context.

A. Let me read that. Where is that?

Q. Second page, right-hand side underneath the picture. Under the picture it says, "On second thought," in bold heading.

Would you say you were one of those there they're describing?

A. By 1985, yeah, maybe I would consider by 1985, '86 for sure, by the time the models were more available and characterized by.

Q. Turning to the next page, the last page, it's Page 63, at the top in the first column, bold headline, "Powerful convert: Perhaps most important, Selikoff himself had drifted from the position of being a neutral research scientist to that of an antiasbestos activist. He told a congressional panel in 1984 that risk posed by asbestos in schools was intolerable."

Do you agree that by 1984, Dr. Selikoff had drifted from the position of being a neutral research scientist to that of an antiasbestos activist?

A. Do I think that's accurate?

Q. Yes, sir.

A. An antiasbestos activist, no.

Q. How would you characterize?

A. Who, Irv?

Q. Irv's position, changes, modification, if there was any in the 1980's?

MR. BROWNSON: With respect to asbestos in buildings?

Q. Yes.

MR. BROWNSON: Okay.

A. I don't know.

Q. Do you believe he did change in any way?

A. No. I think Irving was always himself. I don't think he changed very much, no. He was right on one side and I think he was wrong on another issue.

Q. What side was he right on and what side was he wrong?

A. I think that his work on exposure to asbestos in, for example, the insulation work, was the best work ever done in that field, without question, that Selikoff, Hammond, Cherring, Canastein (phonetic), and others.

Q. You were part of that too, weren't you?

A. I was involved in some of it.

Irving was brilliant and articulate and charismatic and carried the day in that area.

Q. Where was he wrong?

A. He was wrong in not considering dose response. If his insulation worker were exposed, on average, to somewhere between 10 and 20 fibers per cc of air, it begged that question: What will exposure to .001 fiber -- and based on the models generated by one of his own people, Nicholson, the risk was very much less, and the question begged was: Can we provide an environment which is absolutely safe? I think that it is a question which is decided by society. That's not an answer that anybody else can reach a resolution on, those issues; nevertheless, I think his contributions are many in a brilliant and occupational sphere, but diminished in the environmental setting. I think that his position was extreme, and it's unfortunate.

Q. While you were still at Mount Sinai,

did you ever bring up with either Dr. Selikoff or Dr. Nicholson or anyone else the points you just made: What about .001 in the Nicholson risk model?

A. As you know, Dr. Nicholson served on the AGI committee and we had many, many, many open discussions at a table just like this one, where we discussed all of this. Everyone brought forward their data, and Nicholson was on one side, Peter was down there, and I was here, and we argued this loudly. Nicholson also would not be moved nor persuaded by our arguments, and I was entitled to have a different discussion with Irving Selikoff. No.

Q. My question wasn't clear. I wondered if before you left Mount Sinai --

A. Did I have a discussion with Irving Selikoff concerning this subject?

Q. Or anyone else there at that time before 19 --

A. No. Nicholson, I'm sure we banged heads on this once or twice.

Q. Before you left?

A. Before 1988?

Q. Yes, sir, that was my question.

A. Before 1988, yes, I think we discussed this.

Q. Okay.

MR. MILLER: Off the record.

(Whereupon a brief recess was taken at 3:15 p.m.)

(Whereupon the proceedings resumed at 3:20 p.m.)

BY MR. MILLER:

Q. Doctor, do you agree that chrysotile can cause pleural mesothelioma?

MR. SENFTLEBEN: Objection to the form.

A. If present in high enough concentration, possibly, yes.

Q. Do you believe that chrysotile can be an initiator of lung cancer?

A. It's possible.

Q. Do you believe that amphiboles can be initiators of lung cancer?

A. It's possible.

Q. Do you believe that asbestosis progresses after exposure to asbestos --

A. What grade asbestosis?

Q. That would make a difference to your

results, sir?

A. Yes.

Q. Explain the different grades of asbestosis and how your answer would differ.

A. I believe it is like a silicosis, the more the pulmonary burden, the greater the chance of it progressing after cessation of exposure, but if the dose is low enough, I believe the process stops.

Q. On what evidence do you base that conclusion?

A. On the basis of some animal studies which showed very minimum scarring or no scarring present after very low exposures to animals, but with higher exposures, the lungs are progressively scarred. As a matter of fact, I'm sitting here thinking, maybe some of Chris Vogner's early work showed that, but its outcome was malignancy among scarring, but it's just reported.

Q. Can you state to a reasonable degree of scientific certainty that no one will ever contract an asbestos-related disease in any of the schools in the plaintiff's case in which Asbestospray T is allegedly present?

MR. BROWNSON: I'll object to the

form of the question. Go ahead, to a reasonable degree of scientific certainty.

A. Well, to a reasonably degree of scientific certainty, if you use the risk models, eventually, maybe not this century or millennium, but in the next, there may be someone who might develop mesothelioma on the basis of exposure.

Q. Can you state to a reasonable degree of scientific certainty that no one ever has, in the past, contracted an asbestos-related disease in those same schools?

MR. VALENZA: Objection.

MR. BROWNSON: I'll object to the form of the question.

A. No.

MR. BROWNSON: Calling for speculation.

A. Which of the individuals are you talking about; occupants; maintenance workers?

Q. Any persons.

A. Any person?

Q. Any persons.

A. No, I would think that someone engaged in maintenance activities which are carried out

without the proper precaution may have developed some asbestos disease, it's possible.

Q. Would you ever refer to the presence of asbestos in a surface in a school where it's not an ingredient in surface material, for example, asbestos in surface dust, would you refer to that asbestos as a contamination?

MR. VALENZA: Objection. Calls for legal conclusion.

Q. Using your scientific work?

MR. VALENZA: I object to the term because it is susceptible of many different reasons, one, which has a legal scenario, and I object to the use of the word, but the doctor may answer.

A. You mean, if I find fiber in a settled dust, and settled dust in an interior environment normally does not contain that particular kind of material, would I call it a contaminant?

Q. Yes.

A. Yes, I probably would, or adventitious particle.

Q. Is there any particular numerical connotation of asbestos in the dust that would

be required before you would call it a contaminate?

MR. VALENZA: Objection. Same objection.

A. I wouldn't, but there may be some nomenclature which I'm not familiar with.

Q. Have any of your published articles ever been supported by a grant from a defendant in asbestos litigation?

A. Sure.

Q. Every time that's happened, has there been an acknowledgment made in the publication that it was supported, at least in part, by a grant from a defendant?

A. Well, most certainly, of course.

Q. In those cases where an asbestos defendant has the support by some form of grant, an article you eventually published -- strike that.

Would you believe that it would be proper for you to give a draft or advance copy of that article to the defendant or its counsel for their review prior to submission of the document for publication?

A. I think it's improper.

Q. I take it you've never done that, is that correct?
A. No.
Q. No, you have done it? It's a double negative, that's why I want to be very clear.
A. No, I have not.
Q. In the OSHA regulations that were published Wednesday, August 10th, 1994, there are a couple of statements I want to ask you about. I have the regulations here, if you want to see them.
A. Just read them to me.
Q. Do you believe that a significant level of risk exists at 0.1 fibers per?
MR. VALENZA: Objection.
MR. SENFTLEBEN: Jon, this is a hell of time to bring it up, but I assume you're operating that an objection by one is an objection by all?
MR. MILLER: Yes.
A. 0.1, is that the level?
Q. Yes, sir.
A. The term used is significant, which is OSHA's term.

Q. Yes, sir.
A. 0.1, that would be 1/100 of insulation work. All factors being equal, the risk of mesothelioma would be one in a thousand, and, of course, per thousand, let's just calculate this, let's say there's a 17 percent -- 16 percent excess lung cancer, it would be 160 and a hundredth of that would be 1.6, so it would be roughly three excess cancer deaths per thousand workers.
Now, you say there's still a significant risk. It's okay. Three in a thousand, yeah, I would say that's still a significant risk.
Q. At approximately Page 40979, they give their reasons for not separating the fiber types.
A. Oh, this is good.
Q. Do you agree with their decision not to separate fiber types?
A. What are their reasons?
Q. Well, there are lots of pages. We'll start with at least three reasons.
A. Start, please.
Q. I have to show it to you, and you can tell me if you agree with the reasons. I'm

pointing to where they start with the three reasons they made mention of.

A. "As OSHA explained in the Preamble to 1986 standards ... to summarize."

MR. BROWNSON: Just for the record, you're reading aloud here.

(Whereupon a discussion was held off the record.)

MR. BROWNSON: Let's start over and pose a question here.

A. You better ask me a question.

Q. Dr. Langer, as we have noted, OSHA says that there are at least three reasons why they have decided not to separate fiber types.

Would you please read into the record each one of the reasons, and whether or not you agree with them and the reasons for your agreement or disagreement.

A. "To summarize the data on risk differential by asbestos fiber type, human epidemiological studies have suggested that occupational exposure to amphiboles is associated with greater risk of mesothelioma than is exposure to asbestos."

I agree with that, so they're saying

basically you're exposed to amphibole asbestos fiber. It's worse for mesothelioma induction. That certainly is true.

However, they go on to say, "No clear risk differential for lung cancer or other asbestos-related disease has been demonstrated by epidemiological studies." Not true.

The increased risk of gastrointestinal cancer is found among amphibole exposed cohorts. No clear risk differential for lung cancer is true, and that is why I have written papers on the properties of chrysotile, as related to the disease risk.

So, for lung cancer, that's probably true. So what OSHA had said is: Yes, there are more mesotheliomas with amphiboles. They have a mistaken notion that GI cancer is the same as amphibole cohorts and chrysotile cohorts. Nay, not so.

That there is no clear differential for lung cancer, that is true.

Animal experiments. All of a sudden they're drawing on animals. "However, have indicated that chrysotile is a more potent carcinogen than amphiboles when administered by

inhalation or intrapleural injection."

This is generally true. This is generally true, that when one uses route of administration, such as intracavitaries, as they call it, you do induce more tumors with chrysotile, this is so; by inhalation, is it true?

That's the Vogner experiment, and also John Davis. It's probably true. So the animal studies support this, as well, but why they have it with epidemiology, I don't understand.

It says OSHA agreed with the testimony of Dr. Davis, who stated that, "the evidence cannot answer with certainty if one fiber of amphibole is more dangerous than one fiber of chrysotile."

That begs the question: Are the amphiboles more dangerous? I think so, yeah.

Do I think that chrysotile exposure in the textile industry is very dangerous? Yeah, I certainly believe that.

Do I think the stuff in products in buildings is more dangerous? No. I think the properties differ significantly.

So, this first part of this OSHA,

that first part of it is an embellishment of all of these kinds of facts.

"Second, as stated in the 1986 asbestos standard, even if OSHA were to accept the premise, which it does not, that chrysotile may present a lower cancer risk than other type of fiber types, occupational exposure to chrysotile asbestos still presents a significant risk of disease at the revised PEL." Yeah, it's probably so. I think so, significant risk.

The revised permissible exposure level is -- let's say that they are interested in 0.1, it's 100th of insulation worker. I mean, all the factors equal, insulation workers are exposed to amphiboles. Most of their -- much of their risk is enmeshed in mesothelioma, which is an amphibole component exposure.

It's fascinating, this exercise is.

"In particular, asbestos, the disabling and often fatal fibrosis" -- I don't believe that. It's not often fatal. Many asbestosis cases live out their lives.

-- "of the deep portions of the lung is caused by exposure to all types of asbestos."

Yes, the evidence on this is strong,

okay. All right. Let's say it's true.

Okay. "Lung cancer risks associated with chrysotile exposures are also high - 6.7 lung cancer deaths per thousand workers exposed to 0.2 fibers." Let's see whether that's true.

6.7 per thousand at 0.2, that would be at, let's say 25 is for the insulation workers would be a tenth. That would be eight percent -- no, there's something wrong with this figure, by the way. I think this lung cancer risk is wrong.

Now, it may be that this is a Xeroxed copy, and that fiber, 6.7 lung cancer deaths, is not correct.

Well, hold it a second.

Let's say you have 1,000 people and you have a 16 percent among insulation workers -- they're looking at all these other data. Let's use insulation workers. There's a 16 percent excess, of course, 10 times greater in current cigarette smokers than people who never smoke. Nevertheless, let's say at 16 percent, would be 16 per hundred or 160 per thousand. That's 20 fibers. You go down to two fibers, it would be 16. If you go down to .2,

it would be 1.6.

I think that their figure for lung cancer risk includes the expected as well as the observed. Meaning, the observed as expected, plus observed. Observe over expected is your standardized mortality ratio. I think it's a little high.

Q. You're going through all three reasons now?

A. No.

Q. Then let's do it, please.

A. Lung cancer risks associated, Dr. Crump acknowledged -- that's Kenny Crump, isn't it?

Q. Yes.

MR. BROWNSON: Let me take that.

(Whereupon a brief recess was taken.)

MR. BROWNSON: I think we'll continue.

A. I think that the risk of lung cancer is a little bit high. Okay. Here we go.

I stated about OSHA estimated asbestosis risks at 0.25 per cc's exposure, as an unacceptably high five cases per thousand. This is asbestosis on five cases per thousand.

That would be 50 at .2 or 500 per thousand.

Now, isn't that goofy? The highest levels reported in Selikoff's cohort is 10 percent mesothelioma mortality, and they have 50 percent mesothelioma. I don't know where they got that from, I really don't.

Okay. Let's say that they're concerned, okay, "lung cancer risk associated" -- we've gone through that.

"Third, the record shows that employees are likely to be exposed to mixed fiber types at most construction and shipyard industry work sites most of the time.

Assuming a higher PEL to chrysotile with presenting agencies and analytical difficulties, they should all be the same.

Okay. All right. What do I think?

Well, that's a real interesting agglomeration of comments, but let's say that you people aren't exposed to all of this stuff. Let's say people are exposed to a defined fiber type in a defined setting. Then you can use the data specifically for that particular fiber type. Why not?

If I were doing OSHA, I would also

probably do it this way, and say let's not distinguish the fiber types. In fact, I recommended that in the HEI report. I was the one that recommended it.

Q. You mean, OSHA, would you also agree with 1. fibers per cc as a level that shows --

A. That's as good as any level. Okay. .1 is all right.

Q. Look at the standard hypothesis.

There's a short chrysotile fiber which had been mechanically manipulated because it went through the industrial process, and it was harsh. By short, I mean less than five microns.

A. How short? Three microns.

Q. Okay. Three microns.

Do you believe that that fiber has some carcinogenic potential?

A. It might, but you need a lot of it.

Q. If the fiber were not harsh, would you require more of them?

A. Probably not. Doesn't matter if it's soft to harsh in that case. I was thinking of long fibers, actually, rather than the curlicue in which the effective diameter is the diameter of

the spiral. The harsh fiber tends to be more splintery and is more effective in getting to the distal tissues.

Q. Doctor, is there a length or a ratio of length to diameter or to width of a fiber, either chrysotile or amphibole, let's say with chrysotile, below which you believe that it has no carcinogenic potential?

A. I generally do not count fibers less than one micron in length when I do a tissue burden assay.

Q. Does that mean that you effectively did not believe that fibers less than one micron in length can have any potential for causing cancer?

A. No, it means that I have examined the cases in the general population, and those fibers, chrysotile, tend to be extremely short. In fact, most of them lie below one micron in length.

Q. Do you then have a limit below which you believe a chrysotile fiber has no cancer-producing potentiality?

A. I'm shaking my head. You mean, none, zero, it has no potential?

Q. Right.
A. No, I think that it may be significantly reduced, but is there some residual risk?
Well, it's probable. Probably so.
Q. Is there a point at which you make a distinction in the cancer-causing potentiality in a fiber based upon its life? For example --
A. Sure.
Q. -- what is that point or what is the distinction?
A. Well, I am concerned mostly with fibers greater than five microns in length, in that this is the standard index against which we measure risk or hazard, and everything else is just embellishment.
What does it mean?
Q. Doctor, do you have an opinion about the scientific value of the work done by the Canadian Tumor Registry Panel?
A. The value of the work?
Well, it's like every registry, it has value, of course.
Q. How can you describe that value?
MR. BROWNSON: Well, I'll object to the form of that question.

A. It gives us a better idea of what people are dying with or from.

MR. MILLER: Thank you.

I have no more questions today. However, I do want to leave open the possibility of the return visit in this case after receiving further documentation from Mr. Brownson, which I understand will be the full air sampling results and back-up documents.

Given that, though, aside from that, we're done in this case.

Thank you, Doctor.

(Whereupon the witness was excused at 3:50 p.m.)

* * *

C E R T I F I C A T E

I, BERNADETTE H. MASTRANGELO, a Certified Shorthand Reporter, License No. XI01860, and Notary Public of the State of New York do hereby certify that prior to the commencement of the examination

DR. ARTHUR M. LANGER

was sworn by me to testify to the truth, the whole truth, and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a true and accurate computer-aided transcript of the testimony as taken stenographically by and before me at the time, place, and on the date hereinbefore set forth.

I DO FURTHER CERTIFY that I am neither a relative of nor employee nor counsel nor attorney for any party in this action, and that I am not interested in the event nor outcome of this litigation.

Bernadette Mastrangelo

Notary Public of the State of New York

C E R T I F I C A T I O N O F W I T N E S S

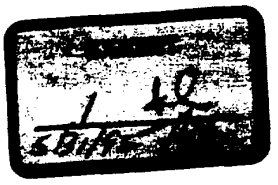
I have read the foregoing transcript of my deposition and find it to be true and accurate to the best of my knowledge and belief.

DR. ARTHUR M. LANGER

Sworn and subscribed to before me on this_____day of_____, 1995

Notary_____

My Commission Expires_____



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Associate Professor, Mineralogy, Department of Community Medicine, Mount Sinai School of Medicine, New York, NY, 1968-1986, 1987-1988.
Science Administrator, Environmental Sciences Laboratory, Mount Sinai School of Medicine, New York, NY, 1983-1984.
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Field Assistant, Geology, Beartooth Mountains, MT, Columbia University, 6/57-8/57; 6/58-8/58.
Exploration Geologist, Rosario Exploration Chibougamau Mining and Smelting, 6/56-8/56.
Consulting Mineralogist, Columbia University, New York, NY:
-Texas Gulf Sulphur Company, 1965 (with Professor Kerr).
-Tidewater Oil Company, 1962 (with Professor Kerr).
-Consulting Mineralogist, Creole Oil Company, 1962 (with Professor Kerr).
-Consulting Mineralogist, American Metals Climax, 1961 (with Professor Kerr).
-TAMS Dam site, East Pakistan, WHO, 1960 (with Professor Fairbridge).

FELLOWSHIPS:

Research Mineralogist, Department of Geology, Columbia University, New York, NY. Sponsored by the U.S. Air Force Cambridge Research Laboratories under the direction of Prof. P.F. Kerr, 3/61-9/63.

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Fellow, Geological Society of America.
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Fellow, New York Academy of Sciences.
Fellow, Collegium Ramazzini.
Geochemical Society.
American Association for the Advancement of Science.
Electron Microprobe Society of America.
Sigma Xi, Kappa Chapter (Honorary Scientific).
International Association of Bioinorganic Scientists.

HONORS AND AWARDS:

Honors, Department of Geology, Hunter College, New York, NY, 6/56.
Sigma Xi, Kappa Chapter, Columbia University, New York, NY, 9/64.
Dust Research, Polachek Foundation Award, 9/65-6/67.
Career Scientist Award, National Institute of Environmental Health Sciences, 6/69-5/74.
Phi Beta Kappa, Nu Chapter, Hunter College, New York, NY, 6/77.
Hunter College Hall of Fame HC-CUNY, 6/78.
Biography in: American Men of Science; Who's Who in the East; Who's Who in America (September, 1992).
Elected Fellow, Collegium Ramazzini, 1983.

EXPERT CONSULTANT:

Atlantic Legal Foundation. Amici Curiae in support of respondents to the Supreme Court of the United States. October Term, 1992. Daubert et.al. Petitioners v. Merrell Dow Pharmarceuticals,Inc., Respondent.
Environmental Protection Agency, Superfund Cases, 3/85-Present.
National Institute for Occupational Safety and Health, 6/75-Present.
National Institute for Environmental Health Sciences, 4/75-Present.
Environmental Protection Agency, 6/75-Present.
National Heart, Lung and Blood Institute, 6/75-Present.
National Institutes of Health, Section of Grants, 6/74-Present.
World Health Organization, Geneva, Biomedical Expert, 6/75-Present.

GRADUATE THESES:

Geology of the Manhattan Formation. Submitted in partial fulfillment for the degree of Master of Arts, in the faculty of Pure Science, Columbia University, NY, p. 132, 1962.

Mineralogy and Physical Properties of Mojave Desert Playa Crusts. Submitted in partial fulfillment for the degree of Doctor of Philosophy, in the faculty of Pure Science, Columbia University, NY, p. 155, 1965.

EDITORIAL BOARD SERVICE:

Assistant Editor, Environmental Research, 1978-1985.
Advisory Editor, Environmental Research, 1985-1987.
Assistant Editor, American Journal of Industrial Medicine, 1980-1985.
Associate Editor, American Journal of Industrial Medicine, 1985-1986.
Editorial Review Board, Journal of Environmental Pathology and Toxicology, 1978-1982.
Editorial Advisory Board, Advances in Modern Environmental Toxicology, 1981-1982.
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Consultant, South African Ministry of Mines, Asbestos Symposium, Johannesburg, South Africa, 1977.
Consultant, Institute of Public Health, Norway, Microscopy Facility, Oslo, Norway, 1977. Seminars on vitreous fibers as asbestos substitutes.
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VIIth International Pneumoconiosis Conference. International Organizing Committee; Organizer of Session: Hazard Recognition of Mineral Dust. Pittsburgh, PA, August, 1988. Chaired Two Sessions at Meeting: Mineral Recognition by Membranes and Mineral Toxicity; Mineral Fiber and Diseases of the Pleura.

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New York City Board of Education: Asbestos in Schools, 1981-1983.
New York City Department of Sanitation; Fire Department: Insulation Products, 1979-1983.
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ACADEMIC COMMITTEES:

Academic Council, Department Representative, MSSM, 1977-1979.
Medical Center Safety Committee, MSSM, 1979-1988.
Chemical Hazards Committee, MSSM, 1979-1988.
Alternate Medical Safety Officer (in absence of Dr. S. Kochwa), MSSM, 1980-1983.
Space Committee (Department and Institution), MSSM, 1982-1985.

ACADEMIC COMMITTEES (cont):

New York Academy of Sciences, Conference Organizing Committee, 1976-1980.
Visiting Professor Program. Mt. Sinai School of Medicine. 1971-1973.
Educational Policy Committee. Mt. Sinai School of Medicine. 1972-1974.
Ad Hoc Reviewer, National Institutes of Health, Minneapolis Medical Center, 1977.
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Workshop Organizer and Chairman, Significance of Aspect Ratio in Asbestos Diseases, New York Academy of Sciences, 1977.
Workshop Organizer, Third International Workshop on In Vitro Testing of Mineral Dusts, 1984.
Executive Committee, Ph.D. Program, Earth and Environmental Sciences, City University of New York, 1985-1993.
Curriculum and Examination Committee, Ph.D. Program, Earth and Environmental Sciences, City University of New York, 1987-1990.
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PARTICIPATION IN POSTGRADUATE EDUCATION COURSES (1976-PRESENT):

6/70 - Page and Black Postgraduate, Mount Sinai School of Medicine: Asbestosis.

4/71 - NY Academy of Sciences, Seminars for Trade Union Representatives: Occupational Health Hazards.

4/71 - American College of Chest Physicians, Mount Sinai School of Medicine, NY: Interstitial Pneumonias--Acute and Chronic.

5/75 - United States-USSR Environmental Protection Agreement: Workshop on Basic Practical Approaches to Environmental Carcinogenesis, Mount Sinai.

6/76 - Page and Black Postgraduate, Mount Sinai School of Medicine: Environmental Lung Disease.

2/77 - Office of Continuing Education, Baylor Medical College, Houston, TX: Pulmonary Diseases and Carcinoma of the Lungs, Baylor Medical School, Houston, TX.

11/77 - New York Lung Club, Cornell University Medical College: Silicosis revisited. New York City Tunnel and Caisson Workers: 1928-1977.

1/78 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Asbestos Carcinogenesis.

3/78 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Occupational and Environmental Pulmonary Diseases.

6/78 - Page and Black Postgraduate, Mount Sinai School of Medicine, NY: Health Effects of Asbestos Exposure. Course Director.

11/78 - Page and Black Postgraduate, Mount Sinai School of Medicine, NY: Asbestos Associate Diseases: With Particular Reference to United States Shipyards.

PARTICIPATION IN POSTGRADUATE EDUCATION COURSES (1976-PRESENT) (cont):

1/79 - Page and Black Postgraduate, Mount Sinai School of Medicine, NY: Scientific Basis for Evaluation of Occupational and Environmental Asbestos Disease.

10/79 - Office of Continuing Education, Baylor Medical College, Houston, TX: Asbestos-Associated Diseases, Houston, TX.

1/80 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Asbestos in Shipyards.

3/80 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Management and Control of Asbestos in Public Buildings.

6/80 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Health Effects of Asbestos in Public Buildings.

9/80 - College of Medicine and Dentistry of New Jersey: Rutgers Medical School, Recent Advances in Occupational Toxicology, Graduate Center, NY.

11/81 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Recent Advances in Occupational Medicine.

12/82 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Scientific Basis for Evaluation of Asbestos-Associated Diseases.

3/85 - Page and Black Postgraduate, Mount Sinai School of Medicine, New York, NY: Asbestos in Schools and Public Buildings, Hasbrook Heights, NJ.

9/91 - Environmental Lung Disease. American College of Chest Physicians. Mineralogy Techniques. Montreal, Canada.

INVITED SEMINARS AND LECTURES:

Union College, Schenectady, NY, Department of Geology and Civil Engineering. "Asbestos and Lung Disease." April, 1967.

Barnard College, NY, Department of Geology. "Asbestos Fiber in the Ambient Air and Disease Potential." December, 1968.

The Rockefeller University, Air Pollution Working Group, Health Research Council. "Analysis of Air Samples for Inorganic Constituents." June 9, 1969.

INVITED SEMINARS AND LECTURES (cont):

New York University Medical Center, New York Lung Club. "Sublight Microscopic Mineral Particles in Talc Pneumoconiosis. Physiology and Mineralogical Studies." November, 1970.

Leheigh College, Department of Material Sciences and Metallurgy. "Electron Probe Characterization of Particles in Tissues." April, 1971.

Oberlin College, OH, Department of Geology. "Asbestos Dust in the Workplace and Human Disease." May, 1971.

State University of New York at Buffalo, Department of Biophysical Sciences. "The Asbestos Problem. An Interdisciplinary Approach." April, 1972.

Queens College of the City University of New York, Department of Earth and Environmental Sciences. "Asbestos and Disease. How Wide is the Spectrum?" November, 1972.

Columbia University, NY, Department of Geology and Biological Sciences. "Contamination of the Environment with Mineral Particles." December, 1972.

College of South Hampton, Long Island University, Division of Chemical Sciences and Oceanography. " The Contamination of Lake Superior with Fibrous Silicates." January, 1973.

National Institutes of Health. Review of Asbestos Problem. "Mechanism of Fiber Action." National Institutes of Health, Bethesda, MD, February, 1973.

City College of the City University of New York, Department of Earth and Planetary Sciences. "Mineral Particles and Human Disease." May, 1973.

Queens College of the City University of New York, Department of Health Sciences. "Occupational Hazards as Harbingers of Environmental Hazards." September, 1973.

Rutgers University, Colonial Conference Tri-State Environmentalists. "Recognition of Environmental Hazards: Use of Academic Facilities for Monitoring and Control of Hazards." November, 1973.

Johns Hopkins University, School of Public Health. "Asbestos Minerals and Disease." Seminar. April, 1974.

Rutgers University, Department of Environmental Sciences. "Mineral Particles in the Air." June, 1974.

INVITED SEMINARS AND LECTURES (cont):

Temple University, Department of Geology. "Amphibole Contamination of Lake Superior Water from Taconite Processing." September, 1974.

American Museum of Natural History, Department of Mineral Sciences. "Minerals and Disease." September, 1978.

Rutgers University, Department of Chemistry. "Minerals and Their Biological Activity." October, 1978.

University of North Carolina, Department of Medicine. 1) "Analytical Methods of Tissue Analysis, Asbestos Bodies and Asbestos Fibers"; 2) "Inorganic Particles in Cigarettes and Cigarette Smoke." November, 1978.

University of Maine, Farmington, Department of Geology. 1)"The Asbestos Problem"; 2) "Evolution of an Environmental Scientist, A Personal View." March, 1979.

School of Public Health, Columbia University. "Epidemiology of Asbestos Diseases." April, 1979.

New York Medical Examiner's Conference. "Analysis of Tissues for Asbestos Fiber and Asbestos Bodies." June, 1979.

Seton Hall University, Department of Chemistry. "Minerals and Disease: Interaction Mechanisms." October 2, 1979.

American Institute of Mining Engineers, Tucson. "The Biological Effects of Inorganic Fibers: The Case Against Asbestos" (invited speaker). October, 1979.

American Chemical Society, Staten Island Section. "Minerals and Diseases: Physical and Chemical Factors." February 19, 1980.

Society of Sigma Xi Lecture. "Man in Conflict with His Physical Environment." Invited Speaker for initiation ceremony, City University, New York, May 13, 1980.

National Institutes of Health, Bethesda, Department of Health and Human Services CCERP-26. "Serpentine-Containing Host Rocks: Amphibole-Containing Host Rocks." November, 1980.

NIEHS-EPA-NIOSH Joint Committee at Bethesda. "Mount St. Helen's Volcanic Ash: Mineral Nature and Biological Activity." July 23, 1981.

The Rockefeller University. "Minerals and Toxic Agents, Parameters and Mechanisms." Invited speaker in series on Comparative Toxicology, February 12, 1981.

INVITED SEMINARS AND LECTURES (cont):

Kettering Laboratory, University of Cincinnati Medical Center. "Silica and Silicosis: Mechanisms." April 8, 1981.

University of California, Irvine, Occupational and Environmental Health Center. "Physicochemical Properties of Inorganic Dusts and Biological Consequences of Exposure." Occupational Medicine Series, December 2, 1981.

Barlow Hospital, Los Angeles, University of Southern California Medical School. "Tissue Analysis for Asbestos, Comparative Techniques." Chest Service, Department of Medicine, December 3, 1981.

Appalachian Laboratory for Occupational Safety and Health NIOSH-CDC, Morgantown, West Virginia. "Surface Properties of Silica and Its Biological Activity." February 24, 1982.

National Institute for Occupational Safety and Health. "Silica and Silicosis." Cincinnati, March 24, 1982.

Society of Sigma Xi Lecture, Queens College of the City University of New York. "The Case Against Chrysotile Asbestos." December 2, 1982.

National Institute of Environmental Health Sciences, Pathobiology of Mesothelioma, Research Triangle Park, NC. "Physicochemical Character of Dust and its Role in Inducing Human Mesothelioma." January, 1983.

Geology Seminar, Long Island University, College at South Hampton. "The Biological Effects of Asbestos." March 18, 1983.

Graduate Seminar, Rutgers University, Department of Geology. "Physical-Chemical Properties of Minerals and Their Biological Activities." April 13, 1983.

Symposium on Fibrous Minerals, American Lung Association Annual Meeting, Kansas City, MO. "Mineralogy of Mineral Fibers." May 8, 1983.

Faculty Research Collegium, Ph.D. Program Earth and Environmental Studies, CUNY, Graduate Center, NY. "Physicochemical Properties of Minerals Controlling Biological Activity." March 6, 1984.

Graduate Seminar, Department of Geology, Princeton University. "Minerals and Disease." Princeton, NJ, March 8, 1984.

Graduate Seminar, Department of Biology, New York University, New York, NY. "Asbestos: Biological Considerations." April 16, 1984.

INVITED SEMINARS AND LECTURES (cont):

Medical Geology Conference on Health Threatening Toxins in Water. "Asbestos Fiber in Water." May 3, 1984.

Asbestos Information Association of North America, Annual Meeting, Alexandria, VA. "Asbestos Substitutes. How Safe are They?" September 18, 1985.

American Society for Testing Materials, Annual Meeting, Bal Harbour, FL. "Method for Testing Indoor Air for Asbestos. Analytical Electron Microscopy." November 4, 1985.

University of Southern California Medical School. "Membranolytic Properties of Quartz and Phosphorylated Chrysotile Fiber." January 29, 1985. Main Campus. "Asbestos Fiber in Lung Tissue - Analysis by Analytical Electron Microscopy." January 30, 1986.

Milton Kannerstein Lecture. "Mineral Dust and Pulmonary Lesions." Annual Meeting of the Klemperer-Otani Society. Mount Sinai, June 5, 1986.

Northeast Regional Environmental Public Health Center, University of Massachusetts. Symposium: Asbestos in Play Sand. "Tremolite Analysis, Morphology, and Health Significance." February 11, 1987.

The Defense Research and Trial Lawyers Association, Reno, NV. "Analytical Protocol for the Study of Sublight Microscopic Particles in Human Tissues"; "Types and Amounts of Asbestos Fibers in the Pulmonary Tissues of Asbestos-Exposed Workers in the United States." October 30, 1987.

The Manville Settlement Trust Asbestos Disease Seminar, Washington, DC. "Asbestos Fibers: The Physico-Chemical Properties and Health Effects." March 16, 1988.

Asbestos Fiber Type and Risk of Disease, Conference: New York - New Jersey Environmental Expo: The Source for Environmental Solutions. Seminar 7E, The Management of Asbestos in the 1990's. Thursday, October 18, 1990.

American Industrial Hygiene Association, Georgia Section, Atlanta Georgia. Conference: The Asbestos Controversy. Has the Public Been Properly Informed? "Understanding the Asbestos Risk." November 30, 1990.

Armstrong Defense Group. Memphis, Tennessee. The Asbestos Saga and the Star Wars Trilogy: The Empire Strikes Back! Thursday, April 25, 1991.

INVITED SEMINARS AND LECTURES (cont):

Department of Medicine - Pulmonary, New York University Medical Center. Pulmonary Grand Rounds. Particle Characteristics Responsible for Pneumoconiosis and Cancer. Tuesday, September 3, 1991.

Nelson Institute of Environmental Medicine, New York University School of Medicine. Surface Properties of Minerals as Determinants of Biological Activity. Tuxedo, New York. Wednesday, October 23, 1991.

Defense Research Institute. Current Issues in Asbestos in Buildings Seminar. Report From the Health Effects Institute. Orlando, Florida. Friday, January 24, 1992.

Characteristics of Mineral Fibers - Critical Research Needs. Invited to Workshop on Chemical and Biological Interactions of Glass. Bethesda, Maryland, March 5-6, 1992.

Mealey's National Lead Litigation Conference. Presented: Bioavailability of Lead. April 22-23, 1993. Philadelphia, Pennsylvania.

McGrath Fund Lectures. Current Topics in Environmental Science. Division of Natural Sciences, South Hampton Campus of Long Island University. Update on Asbestos. An Asbestos Risk Assessment. May 3, 1994.

United States Environmental Protection Agency. Environmental Asbestos Workshop: Chrysotile Asbestos. Comparative carcinogenicity with the amphibole asbestos varieties. Monterey, California. October 7, 1994.

Defense Research Institute Symposium. Asbestos Medicine Seminar. Health risks associated with low-level asbestos exposures. (with Dr. B. Gee). New York. October 26-28, 1994.

INVITED INTERNATIONAL MEETINGS AND CONFERENCES:

Physics and Chemistry of Asbestos Minerals. Oxford, July, 1967. Presented: The Nature of Soft and Harsh Chrysotile (with Kerr PF.).

Second International Conference on the Biological Effects of Asbestos. Dresden, DDR, April, 1968 (two papers with Berkley C, Sastre A, Arneson A and Schwartz J).

International Conference on Pneumoconiosis. Johannesburg, April 23-May 2, 1969. Presented: Electron Microprobe Analysis of Asbestos Bodies (with Rubin IB and Selikoff IJ).

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

Working Group: Asbestos and the Asbestos Diseases. Cardiff, April 6-9, 1970. Presented: Identification of Asbestos Fiber in Tissue.

British Occupational Hygiene Society: Inhaled Particles and Vapors. Imperial College, London, June, 1970. Presented: Inorganic Fibers, Including Chrysotile, in Lungs at Autopsy (with Baden V, Selikoff IJ, and Hammond EC).

Fifth National Conference on Electron Microprobe Analysis. New York, July 21-24, 1970. Invited paper: Electron Microprobe Analysis of Particles in Tissues (with Berkley C and Rubin IB).

Second International Clean Air Congress. Washington, DC, May 1971. Paper with Selikoff IJ.

International Agency for Research on Cancer. WHO, Lyon, September, 1972. Presented: Identification of Single Asbestos Fibers in Human Tissues with (Pooley FD).

6th International Meeting of Forensic Sciences. Edinburgh, September, 1972. Presented paper Asbestos Fiber in Human Lungs: Forensic Significance in Environmental Disease (with Ehrenreich T).

Dialogues in Microscopy, 1973, NY. Microscopical Society. Chaired Session: Identification of Asbestos, May, 1973.

International Conference on the Biological Effects of Ingested Asbestos. NIEHS sponsored. Pinehurst, NC, November, 1973.

International Conference on Environmental Sensing and Assessment. Las Vegas, NV, September, 1975 (paper with Rubin IB and Wolff M). Chaired 2 Sessions: Fine Particles-7; Fine Particles-2. United States Environmental Protection Agency.

Conference on Health Problems of Energy Technologies. Held by NIEHS, January, 1976.

Mineralogical Society of London. London, April, 1976. Presented paper Nature and Range of Mineral Dust in the Environment.

International Agency for Research on Cancer. The World Health Organization, Lyon. Invited member of working group, December, 1976. Chemical Carcinogenesis Monograph Series. Evaluation of Carcinogenic Risk of Asbestos, Vol. 14.

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

Royal Society of Medicine. Meeting Focusing on Occupational Diseases. London, April, 1977. Presented paper Asbestos Content of Dust Encountered During Brake Maintenance and Repair (with Rohl AN, Weisman I, and Klimentidis R).

Invited Consultant to Institute of Public Health. Oslo, Norway, May, 1977. Presented three papers: Contamination of the Biosphere by Submicroscopic Particles; Asbestos Minerals and Their Carcinogenic Effects; Are There Safe Substitutes for Asbestos Materials?

Invited Consultant to the Ministry of Mines. Biological Effects of Asbestos. Johannesburg, October, 1977. Monograph, Ministry of Mines.

Health Hazards of Asbestos Exposure. New York, June 24-27, 1978. Presented paper on Contamination of Lake Superior with Amphibole Gangue Minerals and organized and chaired workshop on Significance of Aspect Ratio in Regulation of Asbestos Fiber Exposure.

International Conference on Critical Current Issues in Environmental Health Hazards. Tel Aviv, March 4-7, 1979. Presented paper Defining New Asbestos High Risk Groups. Chairman Workshop: Laboratory Approaches in Environmental Medicine.

International Agency for Research on Cancer. WHO, Lyon, October, 1979. International Conference on the Biological Effects of Inorganic Fibers. Invited Rappateur. Physics and Chemistry of Asbestos Minerals.

Expert Consultant, International Metal Workers Federation. Geneva, September, 1980. Focus on problem: Asbestos Fiber Contamination of Metal Ore Deposits.

International Conference on Crystalline Deposits in Human Tissues. August 13-14, 1981. Mount Sinai Hospital, Toronto. Presented paper The Role of Analytical Electron Microscopy in Diagnosis of the Pneumoconiosis (with Weisman I, Adams A, and Pooley F).

Annual Symposium Scanning Electron Microscopy. Anaheim, CA, April, 1982. Presented paper Identification Characterization and Quantitation of Asbestos Fibers in Human Lung Tissue by Analytical Electron Microscopy.

Fourth Annual Rocky Mountain Center for Occupational and Environmental Health Center. Salt Lake City, April, 1982. Invited to present two papers: Fibrous Minerals: Properties and Biological Activity; Relationship Between Surface Properties and Biological Activity in Health Issues Related to Metal and Non-Metallic Mining.

World Symposium on Asbestos. Montreal, May 24-27, 1982. Presented paper Mineral Fibers: Properties Imparting Biological Activity.

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

6th International Pneumoconiosis Conference. Bochum, Federal Republic of Germany, September, 1983. Presented two papers: Recognition of Quartz by the Erythrocyte Membrane; Physicochemical Factors Effecting Membrolytic Properties of Quartz (with Nolan RP, Foster KW, and Simenski R). Chaired Session: Etiopathogenesis of Silicosis.

Program of Research on Asbestos. University of Sherbrooke, December 5-6, 1983. Presented lecture Physicochemical Properties of Minerals as Related to Biological Activities.

2nd International Congress on Applied Mineralogy. February 22-25, 1984. Presented two papers: Asbestos, Fibrous Minerals, Acicular Cleavage Fragments and the Minerals Industries; Minerals and Disease: The Association Between Exposure to Minerals and Rock Dusts and the Occurrence of Human Disease.

Workshop on the Assessment of Mineral Fibers from Human Lungs. Oxford, England, September 17-19, 1984. Keynote speaker Problems of Tissue Analysis with the Analytical Electron Microscope.

3rd International Workshop on the In Vitro Effects of Mineral Dusts. Schluchsee, Hochschwarzwald, FRG, October, 1984. Physicochemical Properties of Minerals Relevant to Biological Activities. State of the Art, (paper with Nolan RP); Alteration of surface of quartz and altered biological activity.

Workshop on Biological Effects of Chrysotile. General Motors Cancer Research Foundation. Cardiff, Wales, May 7-9, 1986. The Mineralogy of Chrysotile Asbestos: Physicochemical Properties as Determinants of Disease Potential (with Nolan RP).

International Programme on Chemical Safety (IPCS). WHO Environmental Health Criteria 53. Asbestos and other Natural Mineral Fibres. Hannover, Germany. Session chairman, co-author. 194 p., 1986.

International Agency for Research on Cancer. The World Health Organization. Invited member of working group. Lyon, France, July, 1986. Chemical Carcinogenesis Monograph Series. Evaluation of Carcinogenic Risk of Fibrous Talc, Wollastonite, Palygorskite, Sepiolite, Erionite and Crystalline Silica. Vols. 34-42.

Symposium: Mineral Fibers in the Non-Occupational Environment. IARC-WHO. Lyon, France, September 8-10, 1987. Summary of five presented papers; Round-table discussant on Environmental Risk. Presented paper: Fiber Type and Parenchymal Burden Found in Workers Occupationally Exposed to Asbestos Fiber in the United States (with Nolan RP).

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

Symposium: Fibers in Friction Materials. Society Automotive Engineers and the Asbestos Institute. Symposium organizer and Co-Chairman. Fibers and Health Issues. Atlantic City, NJ, October, 1987. Presented summary paper; co-authored Physicochemical Properties of Fibers and Biological Potential (with Nolan RP).

Symposium: Safe Use of Asbestos Cement. Peruvian Ministry of Health and the Environment. The Asbestos Information Association of South America. Lima, Peru, March, 1988.

International Symposium/Workshop: Biological Interaction of Inhaled Mineral Fibers and Cigarette Smoke. Session Chairman. Presented paper: Inorganic Particles Found in Cigarette Tobacco, Cigarette Ash, and Cigarette Smoke; co-authored Physico-Chemical Properties and Membranolytic Activities of the Titanium Dioxide Polymorphs Compared to Quartz. April 10-14, 1988.

Electron Microscopy Society of America; the Microscopical Society of Canada: Presented paper: Electron Diffraction of Mineral Fibers Vs. Acicular Cleavage Fragments. Milwaukee, WI, August 7-12, 1988.

National Organizing Committee, Workshop Chairman: Hazard Recognition of Mineral Dusts. Presented: Mineral Fibers in the Lung Tissues of Persons Exposed to Asbestos in the United States; Distinguishing Between Tremolite Asbestos and Tremolite Cleavage Fragments. VIIth International Pneumoconiosis Conference, Scientific Organization Committee. Pittsburgh, PA, August, 1988.

Session Chairman: Asbestos, Pleural Pathology, and Lung Fiber Burden. VIIth International Pneumoconiosis Conference, Pittsburgh, PA, August, 1988.

Workshop on Asbestos Research. Health Effects Institute, American Academy of Arts and Sciences, Cambridge, MA, October 31-November 1, 1988.

Symposium on the Health Aspects of Exposures to Asbestos in Public Buildings. Presented: Fiber Type and Risk of Mesothelioma to Building Occupants. John F. Kennedy School of Government, Harvard University, Cambridge, MA, December 14-16, 1988.

First International Conference on Health Related Effects of Phyllosilicates. International Scientific Organizing Committee. Session Chairman: Health Related Effects After Non-Occupational Exposure. Presented: Fibrous Minerals as Natural Contaminants of Phyllosilicates (with Pooley F). Paris, France, March 16-18, 1989.

International Federation of Building and Woodworkers. Health Hazards in Painting and Allied Trades. Presented: Hazards in the Painting Trade. Panelist. Geneva, Switzerland, May 8-12, 1989.

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

NATO Advanced Research Workshop on Mechanisms in Fibre Carcinogenesis. Presented: The Importance of Mineral Subpopulations in Biological Assays. Alburquerque, NM, October 22-25, 1990. Co-authored paper: Association of tremolite habit with biological potential, co-authored with Nolan RP, Oechsle G, Addison J, Colflesh D.

American Lung Association - American Thoracic Society. 1991 International Conference. Presented: Mechanisms of Asbestos-Induced Pulmonary Disease: Importance of Surface Properties of Asbestos and Non-asbestos minerals in cell interaction. Anaheim, California, May 12-15, 1991.

American College of Chest Physicians. Fourth International Conference - Environmental Lung Disease. Presented: Diagnostic Methods in Occupational Lung Disease: Mineralogic Techniques. Co-Chair session: Diagnostic Methods in Occupational Lung Disease. Montreal, Canada. September 25-28, 1991.

Chemical Industry Institute of Toxicology. Workshop on Approaches to Evaluating the Toxicity and Carcinogenicity of Man-made Fibers. Durham, North Carolina. November 11-13, 1991.

Institute for Glass Science and Engineering. Workshop on Chemical and Biological Interactions of Glass. Discussant on Biologically Important Properties. Bethesda, Maryland. March 5-6, 1992.

International Geological Congress. Environmental Mineralogy in relation to human health and activities. Session I-3-49. Co-chair with N. Kohyama, J. Addison, Kyoto, Japan. 24 August-3 September, 1992. Introduction. Importance of environmental mineralogy. Summing up. 1 September, 1992.

Biopersistence of Respirable Synthetic Fibres and Minerals. Presented: Comparison of lung tissue mineral fibre retention of exposed workers and the general population. With RP Nolan, co-authored: Health hazard evaluation of the lung tremolite fibre content among Canadian chrysotile workers. With RP Nolan and J Addison. Round-Table discussant on: Role of Biopersistence in Pathogenicity. IARC, Lyon. September 7-9, 1992.

Symposium on Chemicals and the Environment. Chemical Specialities, '92. Invited presentation: Zeolite catalysts. Is there a health risk? Philadelphia, 3-4 November, 1992.

International Life Sciences Institute. 4th International Inhalation Symposium, Hannover. Invited Faculty Presentation: Factors Controlling the Biological Potential of Inorganic Dusts. Surface Chemistry and Character. With R.P. Nolan. Hannover, 1-5 March, 1993.

INVITED INTERNATIONAL MEETINGS AND CONFERENCES (cont):

Hoffmann-LaRoche Pharmaceuticals. Analysis of Medicines for Asbestos. Microscopy Protocol. Edinburgh, U.K. Institute of Occupational Medicine. April 25-26, 1993.

Cellular and Molecular Effects of Mineral and Synthetic Dusts and Fibres. NATO Advanced Workshop. Invited paper: Phosphorylated Canadian chrysotile. With RP Nolan and G Herson. Chaired session: Physico-chemical properties of minerals in relation to their biologic effects. Paris, 11-13 October, 1993.

Workshop on the Health Risks Associated with Chrysotile Asbestos. Intl. Commission on Occupational Health - Intl. Program on Chemical Safety (WHO) Presented paper: Chrysotile: The Mineral and Its Properties. Jersey, Channel Islands. 14-17, November, 1993.

Hoffmann-LaRoche Pharmaceuticals. Protocol for Analysis of Injectable Medicines for Asbestos. Workshop. Basel, Switzerland. March 2-4, 1994.

Verband der Chemischen Industries. Protocol for the Analysis of Chemicals for Asbestos. Workshop. Frankfurt, Germany. May 30-31, 1994.

Eurometaux (European Association of Metals) and the European Commission, Directorate General V. Scientific Organizing Committee InH. Seminar on Assessment of Respiratory Carcinogenic Risk from Occupational Exposure to Inorganic Substances. Meeting of the Scientific Committee. Brussels, 17-18 October, 1994.

FUNDING SOURCES

PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Asbestos disease in New York City workers	Co-Principal Investigator/Mineralogist	07/01/66-06/30/67	Health Research Council, NYC	$ 39,703
Silica and Silicosis	Principal Investigator Mineralogist	09/01/66-08/31/68	Polacheck Foundation	10,000
Microprobe analysis of asbestos-pseudo asbestos bodies	Co-Principal Investigator	06/01/67-05/31/69	NIH	133,245
Asbestos exposure risk in defined human populations	Co-Principal Investigator/Mineralogist	05/01/68-04/30/73	NIH	1,306,281
Biological effects of modified inorganic fibrous particles	Co-Principal Investigator/Mineralogist	07/01/68-06/30/69	Johns-Mansville Corporation	61,930
Insulation industry hygiene reports	Co-Principal Investigator	09/15/68-09/14/73	Johns-Mansville Corporation	500,000
Asbestos air pollution in New York City	Co-Principal Investigator	12/01/68-11/30/70	HRC-NY DAR-NY	110,455
Inorganic particles biological systems interactions	Principal Investigator Career Development Award	06/01/69-05/31/74	NIH-NIEHS	125,000
Asbestos exposure and cancer in the general population	Co-Principal Investigator	12/01/69-11/30/71	NIH	105,539

FUNDING SOURCES

PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Inorganic particles in cigarettes and cigarettes smoke	Principal Investigator	07/01/71-06/30/73	NIH	65,730
Environmental cancer in US industries	Co-Principal Investigator	09/01/71-08/31/74	ACS	289,321
Asbestos exposure and cancer in the general population	Co-Principal Investigator/Mineralogist	12/01/71-11/30/73	NIH	254,569
Asbestos air pollution; extent persistence, effects	Co-Principal Investigator/Mineralogist	01/01/72-12/31/74	NIH	348,858
Asbestos in therapeutic drugs for human use	Co-Principal Investigator/Mineralogist	04/01/72-03/31/73	NIH	49,230
Effects of asbestos in water (Duluth)	Co-Principal Investigator/Mineralogist	06/01/73-10/30/73	EPA	47,970
Environmental agents, relation to human health effects	Co-Principal Investigator	06/01/73-08/31/78	NIH	2,823,220
Asbestos in brake drum dusts	Principal Investigator	07/01/73-06/30/75	Ford Motor Company	10,000
Population at high risk of lung cancer: establishment of cohort and development of serial surveillance	Co-Principal Investigator	08/01/73-07/31/75	NIH	78,572

FUNDING SOURCES

PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Asbestos exposure of workers and public from brake linings	Co-Principal Investigator	07/01/75-06/30/76	HRC-NY	12,980
Asbestos exposure with brake lining service and repair	Co-Principal Investigator	07/01/75-06/30/77	HRC-NY	51,142
Residency training in occupational medicine	Co-Principal Investigator	07/01/76-06/30/78	NIOSH	105,491
Asbestos in brake workers' lungs	Principal Investigator	09/01/77-08/31/79	NIOSH	95,223
Environmental Health Sciences Center Grant	Co-Principal Investigator	09/01/78-08/31/83	NIEHS	4,841,529
Environmental dusts and macrophage activation	Co-Principal Investigator/Mineralogist	03/01/79-02/29/81	NCI via Sloan-Kettering Institute	168,589
Surface properties of chrysotile asbestos and its role in biological potential	Principal Investigator	07/01/79-continued yearly	Mobil Foundation	8,000 12,000
Environmental cancer research project	Co-Principal Investigator	09/01/80-08/31/81	ACS	284,540
Particle analysis St. Regis Health Study	Co-Principal Investigator	07/01/81-06/30/82	Canadian	1,016,581
Activity of amosite asbestos and grunerite fiber	Co-Principal Investigator/Mineralogist	09/01/82-08/31/84	NIOSH	143,396

FUNDING SOURCES

PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Environmental Health Services Center Grant	Co-Principal Investigator/Mineralogy Group Leader	07/01/84-06/30/86	NIEHS	300,000
Biological activity of modified chrysotile asbestos fiber	Principal Investigator	09/01/84-12/31/86	SNA, Canada	300,000
Biological activity of asbestos substitutes	Principal Investigator	01/01/87-03/31/87	SNA, Canada	15,000
Analysis of play sand for asbestos content	Principal Investigator	11/01/87-02/01/88	Consumer Products Safety Commission	4,000
Analysis of talcs for mineral character	Principal Investigator	04/01/88-12/01/88	Vanderbilt Talc Company	32,000
Surface properties of asbestos and substitutes	Principal Investigator	04/01/87-03/31/88	Asbestos Institute	10,000
Evaluation Microscopy Laboratories	Co-Principal Investigator	03/01/88-06/30/90	Battelle, Columbus	130,500
Wollastonite in animal lungs	Principal Investigator	12/01/88-06/01/89 08/01/88-12/01/88	NSI - National Toxicology Program	38,000
Modified asbestos; asbestos substitutes; surface properties	Principal Investigator	04/01/88-09/01/90	SNA, Canada	50,000
Fibers in vermiculite	Principal Investigator	08/01/88-09/01/88	State of Montana	900

FUNDING SOURCES

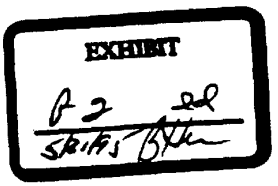
PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Characterization and biological potential of asbestiform and non-asbestiform amphiboles	Principal Investigator	06/01/89-current	Vanderbilt Talc Company	162,000
Talc and its associated mineral impurities	Principal Investigator	08/01/89-02/29/91	Georgia Pacific Company	32,000
Study of asbestos contamination of building air	Principal Investigator	06/30/88-present	CNA Insurance Company	50,000
Asbestos-emissions during gasket replacement	Co-Investigator	01/30/91-present	Durabla Company	40,000
Release of Rockwool fibres from gaskets	Principal Investigator	01/01/93-present	Lapinus Fibres, B.V.	7,000
Asbestos-release from plumbing supply products	Co-Investigator	10/01/92-present	Sexauer Manufacturing Company	10,000
Asbestos in the lungs of exposed workers	Principal Investigator	03/01/93-present	W.R. Grace & Company	90,000
Applied Technology - Equipment Assistance Grant	Co-Investigator	09/93-09/96	New York State Higher Education Assisting Technology	710,000
Mineral Analysis of Quarry Samples	Co-Investigator	12/10/93-present	Readymix Group & the A	10,000

FUNDING SOURCES

PROJECT	ROLE IN PROJECT	PROJECT PERIOD	SOURCE OF FUNDS	TOTAL DIRECT SUPPORT
Ecaterinburg Worshop Project - Chrysotile	Co-Investigator	6/94-7/94	The Asbestos Institute & the W.R. Grace Co.	30,000
Risk Identification and Management of Fibers in Iron Ore	Co-Investigator	4/1/94-present	Cleveland Cliffs, Inc., Cleveland, Ohio.	40,000

IN THE CIRCUIT COURT OF COOK COUNTY, ILLINOIS #9021
COUNTY DEPARTMENT, LAW DIVISION

BOARD OF EDUCATION OF THE CITY OF CHICAGO,	)	Nos. 92 L 9934
	)	92 L 9933
Plaintiff,	)	92 L 9932
	)	92 L 9927
v.	)	
	)	Honorable Michael Gallagher
A, C AND S, INC., et al.,	)	
	)	
Defendants.	)	



DEFENDANT ASBESTOSPRAY CORPORATION'S EXPERT WITNESS DISCLOSURES

Defendant Asbestospray Corporation ("Asbestospray") hereby gives notice that, pursuant to Rule 220 of the Illinois Supreme Court Rules and this Court's Scheduling Order dated November 1, 1994, Asbestospray has served upon Daniel P. Albers, Esq., Liaison Counsel for plaintiffs, and all defense counsel of record, Asbestospray's Expert Witness Disclosures for the expert witnesses it intends to call to testify at trial. All of the witnesses disclosed will serve as primary expert witnesses, although Dr. Cooper will also serve as a backup medical, state-of-the-art witness in the event Dr. Murray is unavailable to testify at trial. The curriculum vitae for each witness is attached hereto.

In addition to the witnesses listed below, Asbestospray hereby incorporates by reference the Expert Witness Disclosures served by or on behalf of each and every other defendant in these consolidated cases and reserves the right to call any witness listed by the plaintiffs or any other defendant (including, but not

Arthur M. Langer, Ph.D.

Environmental Sciences Laboratory
Ingersoll Hall
Brooklyn College of the City
University of New York
Brooklyn, NY 11210

A. QUALIFICATIONS

Dr. Arthur M. Langer is director of the Environmental Sciences Laboratory of the Institute of Applied Sciences, Brooklyn College of the City University of New York, Brooklyn College, City University of New York, Brooklyn, New York. He received a Bachelor of Arts degree in geology from Hunter College, City University of New York in 1956, M.A. in petrology from Columbia University in 1962, and a Ph.D. in mineralogy from Columbia University in 1965. From 1965 to 1988, Dr. Langer held various positions at the Mount Sinai School of Medicine in the Department of Medicine, Department of Community Medicine, Environmental Sciences Laboratory, and Center for Polypeptide and Membrane Research.

Dr. Langer has published extensively in the area of asbestos, asbestos fiber type, asbestos mineralogy, asbestos-related disease, and asbestos disease mechanism. He has peer reviewed numerous manuscripts, served on numerous editorial boards, and authored and reviewed numerous documents for NIOSH, ALOSH, MSHA, and EPA. He has served on numerous international committees and has spoken at numerous meetings.

B. TESTIMONY

Dr. Langer will testify that asbestos is a term for a number of minerals from around the world, some of which had been used commercially and some of which have not. He will testify that there has been a great deal of confusion in the medical and scientific literature concerning the term asbestos and that it is often improperly defined. He will testify concerning historical and current scientific knowledge concerning how asbestos fiber enters the human body, the disease mechanism within the human body, and disease processes. He will testify that different asbestos fiber types are not equally biologically active. He will testify concerning medical, scientific, and

epidemiological literature with respect to persons occupationally exposed to asbestos. He will testify concerning low-level exposure to asbestos. He will testify concerning asbestos fiber, how it is used in asbestos products, the concept of "friability", the aerodynamics of asbestos fibers, the dispersion of asbestos fibers in the air both inside and outside of buildings, and the nature of "fiber release" from asbestos fireproofing.

Dr. Langer will testify that air testing and monitoring is an appropriate method of determining whether an asbestos hazard exists within a building. He will testify concerning his own inspection of asbestos-containing materials in buildings, air monitoring in buildings, and asbestos levels both inside and outside of buildings.

Dr. Langer will testify concerning microscopic techniques, proper analysis of air and bulk asbestos samples, and the appropriate measurements of asbestos fiber levels.

Dr. Langer will testify concerning threshold limit values, both currently and historically, the EPA position on asbestos in buildings and threshold limit values, and the relation of low level asbestos exposure to various diseases including asbestosis, lung cancer, peritoneal mesothelioma, and pleural mesothelioma.

Dr. Langer will testify concerning proper responses to asbestos in buildings including, but not limited to, the necessity of removal, the advisability of removal, and operations and maintenance of asbestos in buildings.

Dr. Langer will testify concerning the risks to building occupants from asbestos, the lack of epidemiological studies with respect to such risks, and the nature and extent of such risks based upon fiber levels.

Dr. Langer will testify concerning the state of the art with respect to low-level exposure to asbestos and risks of different asbestos fiber types.

Dr. Langer will rely on the following materials in this case:

1. The reports of William Longo, Jim Millette, and Richard Hatfield;

2. Deposition transcripts of William Longo, Jim Millette, and Richard Hatfield;

3. Plaintiffs' product identification reports for South Shore High School, Leif Ericson Elementary, District 2 Offices, Glenbrook South High School, and Hawthorne Elementary;

4. Plaintiffs' air sampling results for South Shore High School, Leif Ericson Elementary, District 2 Offices, Glenbrook South High School, and Hawthorne Elementary;

5. Plaintiffs' dust sampling results for South Shore High School, Leif Ericson Elementary, District 2 Offices, Glenbrook South High School, and Hawthorne Elementary;

6. Photographs in building survey and inspection reports taken by Asbestospray's consultants in South Shore High School, Leif Ericson Elementary, and District 2 Offices;

7. Air sampling data obtained by Asbestospray's consultants with respect to South Shore High School, Leif Ericson Elementary, and District 2 Offices;

8. Documents pertaining to Asbestospray and/or the Sprayed Mineral Fibers Manufacturing Association (SMFMA);

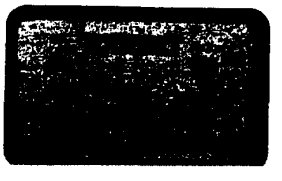
9. Air sampling data obtained by Asbestospray's consultants in other property damage litigation;

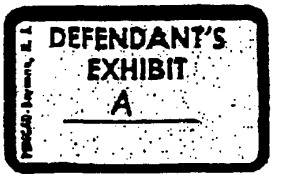
10. "Proceedings of the Symposium on Health Aspects of Exposure to Asbestos in Buildings" (Harvard University, December 14-16, 1988);

11. Spengler, Özkaynak, McCarthy, and Lee, "Summary of Symposium on Health Aspects of Asbestos in Buildings" (Harvard University, August 1989);

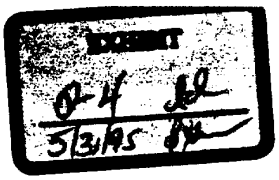
12. Health Effects Institute - Asbestos Research, "Asbestos in Public and Commercial Buildings: A Literature Review and Synthesis of Current Knowledge" (1991); and

13. Wilson, Langer, Nolan, Gee, and Ross, "Asbestos in New York City Public School Buildings - Public Policy: Is There a Scientific Basis?" *Reg. Toxicol. Pharmacol.* 20:161-169 (1994).





Report (Report) Law Engineering District No. 2 — Dust sample log 11/16/94 Hatfield → to MAS (Longo) 11/21/94



3 dust samples; 12x10 cm, 10x10 cm, n=2 · TEM in Asb Struct/cm²

	1	–		lite fixture	0 >5um	
SAED X/46	2	1.6 x10⁶	n=48	ceiling tile	23 >5um	all amosite
SAED 0/54	3	1.8 x10⁶	n=54	lite fixture	26 >5um	

obtain M* 33179 SAED (only plate available)

1/102 objects have diffraction data available

AML
nalpio: Asbestos 1.6 x 0.479% = 0.77x10⁶ f. >5um cm²

[15.77 x10⁶]
30 yrs · 365 dys · 24 hrs · 60 min · fiber every 25 min/cm * time; air

AML:

{15,768,000 Sec / 1440 min/dy}

770,000 fib >5 µm
25,667 f/yr (30)
70 f/dy (365) (24 hrs)
23 f/8 hrs pettle
through 1cm
~3f/in/cm²

assume ceiling height 10ft = ~305cm

3f/305 cm³ = ~0.01 f/cc

[on top of ceiling tile not floor] ≈ 3f/10 cm³ = 0.3f/cc !!

see air data

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*ALSO ADMITTED TO PRACTICE IN WISCONSIN

ROBERT H. YAEGER
THOMAS J. LINNIHAN
SCOTT P. DRAWE*
JAMES D. KNUDSEN*
SUSAN M. HANSEN
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GREGORY L. WRIGHT
MICHAEL W. GAUGHAN, JR.
LEO I. BRISBOIS
LOUISE A. BEHRENDT
JEFFREY A. MAGNUS

May 26, 1995

Daniel P. Albers, Esq.
COFIELD, UNGARETTI & HARRIS **VIA FAX**
3500 Three First National Plaza
Chicago, IL 60602

Re: *Chicago Board of Education, et al. v. Asbestospray, et al.*
Our File No.: 12801/15230

Dear Mr. Albers:

Enclosed are copies of the reports prepared by Dr. Arthur Langer.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

Lynnae I. Waskosky
Legal Assistant

Enclosures

cc: Jonathan Miller, Esq. (w/ enclosures)
Jeff Johnston, Esq. (w/ enclosures)

Table 1: Description of the sites and types of second air monitoring in South Shore High School.

HEB IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED (IN LITERS)	LOCATION OF SAMPLING
50282	0.45µm MCE	Area	674	2.5	1,702	East Mechanical Room
50284	0.45µm MCE	Area	746	2.6	1,900	Lobby
50286	0.45µm MCE	Area	753	2.5	1,885	Auditorium Rear
50288	0.45µm MCE	Area	758	2.5	1,904	Auditorium Front
50290	0.45µm MCE	Area	736	2.5	1,828	Stage
50292	0.45µm MCE	Personal	817	2.5	2,070	Personal
50294	0.45µm MCE	OPEN BLANK				
50296	0.45µm MCE	CLOSED BLANK				
50298	0.45µm MCE	Area	616	2.5	1,561	East Pair
50300	0.45µm MCE	Area	648	2.6	1,661	West Pair
50304	0.45µm MCE	Area	719	2.6	1,862	Southeast Single
50305	0.45µm MCE	Area	509	2.5	1,268	North Single
50306	0.45µm MCE	Area	707	2.5	1,792	Southwest Single

Table 2: Results of the analysis of the second set of membrane filters by transmission electron microscopy for asbestos in South Shore High School.

HES IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)*	ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
50282	1,702						
50284	1,900						
50286	1,885						
50288	1,904						
50290	1,828						
50292	2,070						
50294	OPEN BLANK						
50296	CLOSED BLANK						
50298	1,561						
50300	1,861						
50304	1,862						
50305	1,268						
50306	1,792						

* Total area of grid 385mm^2

Table 1: Description of the sites and types of air monitoring in District 2 office.

HES IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED IN LITERS)	LOCATION OF SAMPLING
50252	0.45µm MCE	Area	808	2.5	2,036	1st Floor, Room 18
50254	0.45µm MCE	Area	823	2.6	2,123	1st Floor, West Hallway
50256	0.45µm MCE	Area	849	2.5	2,130	1st Floor, Auditorium/ Band Room 15
50258	0.45µm MCE	Area	782	2.5	1,926	1st Floor, Main Office
50260	0.45µm MCE	Area	846	2.5	2,092	2nd Floor, Room 256
50262	0.45µm MCE	Personal	830	2.5	2,067	Personal
50264	0.45µm MCE	OPEN BLANK				
50266	0.45µm MCE	CLOSED BLANK				
50268	0.45µm MCE	Area	742	2.6	1,953	West Pair
50270	0.45µm MCE	Area	808	2.5	1,986	East Pair
50274	0.45µm MCE	Area	760	2.5	1,889	2nd Floor, Room 256

Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in District 2 office.

HES IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)*	ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
50252	2,036						
50254	2,123						
50256	2,130						
50258	1,928						
50260	2,092						
50262	2,067						
50264	OPEN BLANK						
50266	CLOSED BLANK						
50268	1,953						
50270	1,986						
50274	1,889						

* Total area of grid 385mm^2

Table 1: Description of the sites and types of air monitoring in the Leif Ericksen Elementary School.

HES IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED (IN LITERS)	LOCATION OF SAMPLING
50732	0.45µm MCE	Area	747	2.0	1,504	Front Office
50734	0.45µm MCE	Area	787	2.1	1,629	Lobby
50736	0.45µm MCE	Area	717	2.1	1,529	Cafeteria
50738	0.45µm MCE	Area	678	2.2	1,426	Teacher's Lounge
50740	0.45µm MCE	Area	761	2.1	1,607	Hallway
50742	0.45µm MCE	Personal	897	1.8	1,691	Personal
50744	0.45µm MCE	OPEN BLANK				
50746	0.45µm MCE	CLOSED BLANK				
50748	0.45µm MCE	Area	869	2.1	1,825	West Side Pair
50750	0.45µm MCE	Area	876	2.1	1,862	East Side Pair

Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in Leif Erickson Elementary School (Second).

HEB IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)*	CHRYSOTILE ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
50732	1,504	20	0.242	0	0	945	0.0011
50734	1,629						
50736	1,529						
50738	1,428						
50740	1,607						
50742	1,691						
50744	OPEN BLANK						
50746	CLOSED BLANK						
50748	1,825						
50750	1,862						

* Total area of grid 385mm^2

Table 1: Description of the sites and types of air monitoring in the Leif Erickson Elementary School

HES IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED (IN LITERS)	LOCATION OF SAMPLING
50222	0.45µm MCE*	Area	808	2.4	1,916	Front Office
50224	0.45µm MCE	Area	794	2.4	1,894	Lobby
50226	0.45µm MCE	Area	830	2.4	1,986	Cafeteria
50228	0.45µm MCE	Area	811	2.4	1,910	Teacher's Lounge
50230	0.45µm MCE	Area	812	2.3	1,876	Hallway (near room 219)
50232	0.45µm MCE	Personal	823	2.4	1,975	Personal
50234	0.45µm MCE	OPEN BLANK				
50236	0.45µm MCE	CLOSED BLANK				
50238	0.45µm MCE	Area	794	2.4	1,994	East Double
50240	0.45µm MCE	Area	798	2.5	1,962	West Double

* Methyl Cellulose Ester

Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in Leif Ericksen Elementary School (Second).

HES IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)*	CHRYSOTILE ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
50222	1,916						
50224	1,894						
50226	1,998						
50228	1,910						
50230	1,876						
50232	1,978						
50234	OPEN						
50236	CLOSED						
50238	1,994						
50240	1,962						

* Total area of grid 385mm^2

Table 1: Description of the sites and types of air monitoring in the District Office.

HES IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED (IN LITERS)	LOCATION OF SAMPLING
50942	0.45µm MCE	Area	761	2.37	1,805	Gifted Children Room 18
50944	0.45µm MCE	Area	770	2.51	1,932	West 1st Floor Hall
50946	0.45µm MCE	Area	832	2.32	1,928	Auditorium Room 15
50948	0.45µm MCE	Area	725	2.45	1,774	Main Office
50950	0.45µm MCE	Area	425	2.64	1,122	Room 256
50952	0.45µm MCE	Personal	844	2.57	2,168	Personal
50954	0.45µm MCE	OPEN BLANK				
50956	0.45µm MCE	CLOSED BLANK				
50958	0.45µm MCE	Area	787	2.42	1,904	East Pair
50960	0.45µm MCE	Area	789	2.70	2,133	West Pair
50966	0.45µm MCE	Area	362	2.35	851	Room 256

Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in District Office.

HES IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)	CHRYSOTILE ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
50942	1,805	20	0.242	0	0	1,135	< 0.0009
50944	1,932	30	0.363	0	0	1,822	< 0.0005
50946	1,926	20	0.242	0	0	1,212	< 0.0008
50948	1,774	20	0.242	0	0	1,115	< 0.0009
50950	1,122	29	0.351	0	0	1,023	< 0.0010
50952	2,168	20	0.242	0	0	1,363	< 0.0007
50954	OPEN	20	0.242	0	0		
50956	CLOSED	30	0.363	0	0		
50958	1,904	20	0.242	0	0	1,192	< 0.0008
50960	2,133	20	0.242	0	0	1,341	< 0.0007
50966	851	20	0.242	0	0	535	< 0.0019

* Total area of grid 385mm^2

Table 1: Description of the sites and types of air monitoring in South Shore.

HES IDENTIFICATION N°	FILTER SIZE AND TYPE OF MEMBRANE	TYPE OF SAMPLE	DURATION OF SAMPLING (MINUTES)	FLOW RATE (LPM)	VOLUME OF AIR SAMPLED (IN LITERS)	LOCATION OF SAMPLING
53462	0.45µm MCE	Area	858	2.50	2,148	Stage
53464	0.45µm MCE	Area	849	2.37	2,011	Auditorium Front
53466	0.45µm MCE	Area	793	2.40	1,902	Auditorium Rear
53468	0.45µm MCE	Area	824	2.43	2,001	East Mechanical Room
53470	0.45µm MCE	Area	830	2.43	2,019	Lobby
53472	0.45µm MCE	Personal	853	2.41	2,055	Personal
53474	0.45µm MCE	OPEN BLANK				
53476	0.45µm MCE	CLOSED BLANK				
53478	0.45µm MCE	Area	791	2.40	1,897	East Pair
53480	0.45µm MCE	Area	800	2.47	1,975	West Pair

Table 2: Results of the analysis of the membrane filters by transmission electron microscopy for asbestos in South Shore.

HES IDENTIFICATION N°	TOTAL VOLUME OF AIR SAMPLED (IN LITERS)	N° OF FIELDS EXAMINED	GRID AREA EXAMINED (IN MM^2)*	ASBESTOS FIBERS DETECTED		VOLUME OF AIR SCANNED (IN ML)	AIRBORNE CONCENTRATION (F/ML)
				≥ 5µm	< 5µm		
53462	2,148	20	0.242	0	0	1,350	< 0.0007
53464	2,011	20	0.242	0	0	1,264	< 0.0008
53466	1,902	20	0.242	0	0	1,196	< 0.0008
53468	2,001	20	0.242	0	0	1,278	< 0.0008
53470	2,019	20	0.242	0	0	1,269	< 0.0008
53472	2,055	20	0.242	0	0	1,292	< 0.0008
53474	OPEN BLANK	20	0.242	0	0		
53476	CLOSED BLANK	20	0.242	0	0		
53478	1,897	20	0.242	0	0	1,192	< 0.0008
53480	1,975	11	0.133	0	0	682	< 0.0015

SCIENCE & SOCIETY

The asbestos panic attack

How the feds got schools to spend billions on a problem that really didn't amount to much

When school custodians in Oakland County, Mich., want to fix a leaky water valve, they don head-to-toe spacesuits. "They make you sweat like a pig," says facilities consultant Bill Lee. Then, they test the air near the leaky valve. Next, they wet the insulation surrounding the pipe, chip it off, seal it in a bag, seal that in another bag, then check the air again. Only after that can they strip off their spacesuits and actually replace the offending valve.

The reason for all the elaborate precautions: asbestos. A tough, heat-resistant mineral fiber associated with lung disease, asbestos has long had the reputation of a workplace hit man. The reputation has cost plenty. Across the nation, school districts that can't buy new library books are spending hundreds of thousands of dollars to deal with asbestos because they mistakenly believe their children are in great danger. In the fall of 1993, for instance, New York City closed its public schools for two weeks and spent $83 million on asbestos reinspection and removal because earlier asbestos inspections were shoddy. Total spending nationwide has been $10 billion, the National School Boards Association told Congress earlier this month. Experts say it could reach $30 billion.

Much of the money, though, is probably being spent in vain. There is no telling how much of the cleanup might have been necessary. No one has ever determined how much asbestos in the air is unsafe, and there is now broad consensus among scientists and physicians that asbestos in public buildings is not much of a threat to health. "A phantom risk" is what Richard Wilson, a physics professor at Harvard University, calls it. A study soon to be released by the federal Office of Technology Assessment will say much the same thing.

U.S. NEWS INVESTIGATIVE REPORT

Paper-thin evidence. How America's money-strapped schools could have so overreacted to the perceived threat from asbestos is an illuminating tale. One part, at least, is understandable: Parents and teachers pressed for drastic remedies for something they were told was a

JOHN CHIASSON—GAMMA LIAISON

Cleanup. *Many school districts like the one in New York City had costly asbestos-removal drives. No one is sure now if it was worth it.*

real danger. Less understandable is the role of government agencies, especially the federal Environmental Protection Agency, which created a public panic on the basis of paper-thin scientific information.

It's also a story about how the instinct to act overwhelms common sense. "When everybody's shouting 'Fire!' in a theater, the man who quietly stands in the corner and says, 'There's no fire,' is rarely heeded," observes Arthur Langer, director of the Environmental Sciences Laboratory at Brooklyn College in New York, who has served on numerous asbestos-study panels. Langer recalls sitting with other experts in the mid-1980s to draft EPA asbestos rules. The documents used terms like "hazard" and "emergency." "I said, 'Let's change the language of this; we are using emotive words,'" Langer said. "They just blew me out." John Welch, president of an association of former manufacturers of asbestos products, told an EPA panel in 1984 that since asbestos was present in the air everywhere, the EPA should set standards for levels deemed permissible. "They didn't want to hear it," he says. "'No safe level' was the foundation of their arguments."

Voice of reason. *Prof. Arthur Langer kept trying to warn policy makers they were overreacting.*

First warning. The saga began in the 1950s when a brilliant, energetic physician named Irving Selikoff documented that workers in mines, shipbuilding and other asbestos-using industries had contracted lung cancer, asbestosis—a disease marked by stiffening of the lung tissues—and a rare lung cancer called mesothelioma. By the 1970s, Selikoff's research was the foundation for lawsuits against asbestos manufacturers. Many were driven out of business. (Others continue to pay. Last October 31, for instance, 10 large asbestos manufacturers settled with 15,000 school districts for $200 million in damages.)

Selikoff's findings scared school leaders because many walls, floor and ceiling tiles, roofs and insulation materials contained asbestos fibers. If the surfaces were abraded, asbestos could float into the air and be inhaled. Parents feared their kids could get asbestosis.

That fear was misguided: Early studies concluded that asbestosis came only after long-term inhalation of large volumes of asbestos dust, as in dirty factories. A more likely risk to children was lung cancer. But again, early studies had seen a high coincidence between smoking and asbestos-linked lung cancer. More important, the risk of all these diseases seemed to be tied to the exposure level. How much was too much?

To help local officials, EPA published a "guidance" book in 1979. It had a bright-orange cover and was known thereafter as the Orange Book. But instead of declaring what levels of airborne asbestos were safe or unsafe for children, it issued directions on how to search for asbestos-containing materials. The only "permanent" solution, it said, was to take it out. Four years later, the EPA issued its Blue Book, which said much the same thing: Removal was "always appropriate, never inappropriate."

Joseph Breen, an EPA official who worked on the Orange Book, recalls, "There was a cry to get something out, and the best available information was what had been done to date." Unfortunately, at the time, little work had been done on the health effects of low levels of asbestos in schoolroom air.

While the Orange and Blue books did not command that asbestos be torn out, their dire admonitions—plus the availability of federal funds for asbestos removal only—pushed schools into many needless removals. An asbestos-remediation industry sprang up overnight; it would gross $4 billion to $5 billion annually. Schools would pay up to $1 billion a year; other building owners paid the rest.

On second thought. But by 1985, some notable environmental health scientists were backing off. New data were showing that levels of airborne asbestos in buildings with even flaking insulation could be as low, or nearly as low, as the air outdoors. Asbestos was everywhere: It came from auto-brake pads and building and roofing materials. People breathe in a million fibers a year, and nearly everyone has asbestos in his lungs, scientists would say.

The new thinking was that most asbestos in schools should be left alone; in most cases, painting, spray-coating or covering it up was the best and cheapest

RISKY BUSINESS

Many things expose people to a greater threat than exposure to asbestos

Lifetime probability of premature death (per 100,000)	
Being a pedestrian hit by car	200
Tobacco smoke	200
Diagnostic X-ray	75
Bicycling	75
Miami/New Orleans drinking water	7
Lightning	3
Hurricanes	3
Asbestos in school buildings	1

USN&WR – Basic data: Energy and Environmental Policy Center of Harvard University

solution. In a nod to the new thinking, the EPA's 1985 Purple Book placed "managing asbestos" ahead of "removal" on some lists of options. But the shift was subtle, and it was hardly noticed. Opposing interests now had a stake in asbestos removal: They included labor unions who wanted it out of workplaces, parent-teacher groups fearful for children and a mushrooming asbestos-removal industry.

Powerful convert. Perhaps most important, Selikoff himself had drifted from the position of being a neutral research scientist to that of an antiasbestos activist. He told a congressional panel in 1984 that the risk posed by asbestos in schools was intolerable. The subcommittee chairman, then Rep. Jim Florio of New Jersey, shepherded passage of a law called the Asbestos Hazard Emergency Response Act in 1986. Florio says he wanted to end the confusing stream of "guidances," put an end to the sloppy and corrupt asbestos-removal firms and make the EPA write clear rules for schools to follow. The EPA did some of that: It put asbestos inspectors, planners and even haulers under strict regulations. It ordered schools to do inspections and create asbestos-management plans. All that, of course, added millions of dollars to schools' costs. The EPA, however, later argued that Florio had fueled the asbestos alarm. Florio counters that the EPA dragged its feet and never set safety standards.

By 1990, however, a mass of new data showed the true levels of asbestos in schoolroom air around the nation were extremely low. Articles in the *New England Journal of Medicine* and *Science* magazine argued that the asbestos threat had been exaggerated. These caught the attention of John "Joe" Schwarz, a physician and Michigan state senator, who feared the reasons to fear asbestos had been overstated from the beginning. It took three years for him to win passage of a law requiring school districts to keep asbestos-laden materials in place unless unique conditions made removal wiser. Opposition came from the state's trial lawyers, who represented plaintiffs in asbestos cases, parental groups, labor unions and even, surprisingly, schools themselves. "What was particularly pernicious, a bureaucracy had grown up," Schwarz now says. "The schools all had asbestos-maintenance officers, and they had all submitted their [EPA required] plans and were hellbent to rip it out."

Some now regret it. Rick Simonson, the assistant superintendent for Oakland County schools north of Detroit, estimates his district spent nearly $100 million tearing out 70 percent to 80 percent of the schools' asbestos. He now says they should have done just the reverse—taken out 20 to 30 percent and sealed up the rest. "We spent a ton of money removing that stuff when we didn't need to," he says.

In its 1990 Green Book, the EPA acknowledged that low levels of asbestos in school and office buildings meant low overall risk. It pointed out that the dust created by improper asbestos removal could actually increase the danger. Still, some schools were not getting the message. In May 1990, for instance, the Downers Grove school district near Chicago prepared to spend the last $850,000 of a $5 million asbestos-management project. But this time, it said, the work would be much harder because the asbestos was on pipes sealed *inside the walls*. That got the attention of then EPA Administrator William Reilly, who ordered the EPA to study how well it had advised the public on asbestos. The result, published in 1992, was a remarkable—and embarrassing—document. It found that the EPA had made matters worse by publishing confusing and shifting guidances.

In the absence of certainty at the federal level, six other states have debated proposals like Michigan's. None has been enacted because of trial lawyers' protests and because of state attorneys general who argue that such a law could affect their own litigation against manufacturers. Eleven states have set permissible asbestos-in-air standards for public buildings; up to nine states include schools. The level is about 10 times more stringent than the one just set by the federal Occupational Safety and Health Administration for industry.

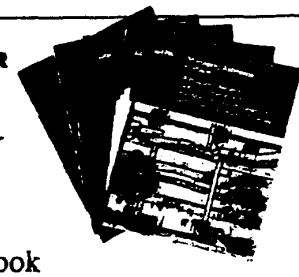
But the EPA still refuses to say what levels are safe for schoolchildren to breathe. The reason? Robert Jordan, an environmental protection specialist at the EPA, says his agency fears that "people could be lulled into complacency" by taking infrequent air samples. If asbestos levels suddenly turned worse, school officials wouldn't know it, he argues.

So asbestos madness continues. For fear of asbestos, in 1993 New York City ripped out tons of plaster from its schools, only to find that just 25 percent of it contained asbestos. How much of that found its way into the air no one knows. With Congress and the EPA now considering regulations for lead and radon exposure, the 1992 EPA report on how it messed up its message on asbestos should be required reading. But that report is virtually impossible to find inside the EPA. Says one in-house expert, "I think it's been buried." ■

BY PETER CARY

DON'T TAKE OUR WORD ON IT

The EPA gave confusing advice over the years about the best way to handle asbestos:



1979 Orange Book

"No safe level of exposure has been established. . . . Removal completely eliminates the source of exposure to asbestos and is, therefore, a permanent solution."

1990 Green Book

"Based on available data, the average airborne levels in buildings seem to be very low. . . . Removal is often NOT a building owner's best course of action to reduce asbestos exposure."

DARRYL HEIKES—USN&WR

Florio. *He wrote tough asbestos legislation.*

JEFFREY MACMILLAN—USN&WR