IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, :
Plaintiff, :
vs. : No. RG08426405
ASBESTOS CORPORATION LIMITED, :
et al., :
Defendants. :

VIDEOTAPED DEPOSITION OF ANN WYLIE, Ph.D.

Hyattsville, Maryland
Friday, September 18, 2009
1:41 p.m.

Job No. 1-164409
Pages: 1 - 177
Reported by: Janet A. Hamilton, RDR

VIDEOTAPED DEPOSITION OF ANN WYLIE, Ph.D., held at the office of:

University of Maryland University College
Inn and Conference Center
3501 University Boulevard East
Hyattsville, Maryland 20783

Pursuant to Notice, before Janet A. Hamilton, Registered Diplomate Reporter and Notary Public in and for the State of Maryland.

A P P E A R A N C E S

ON BEHALF OF THE PLAINTIFF:

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ON BEHALF OF THE DEFENDANT:

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ALSO PRESENT:

AKIM GRAHAM,
Video Specialist

I N D E X

E X H I B I T S

(Attached to the transcript)

E X H I B I T S (continued)

E X H I B I T S (continued)

P R O C E E D I N G S

THE VIDEOGRAPHER: Here begins video tape number one in the deposition of Dr. Ann Wylie in the matter of Eric Weston versus Asbestos Corporation, Limited, et al., in the Superior Court of the State of California, in and for the County of Alameda, case number RG08426405. Today's date is September 18th, 2009. The time on the video monitor is 1:41 p.m., and the video operator today is Akim Graham. This video deposition is taking place at 3501 University Boulevard in Hyattsville, Maryland.

Counsel, please voice identify yourselves and state whom you represent.

MS. ABRAMS: Denise Abrams for the plaintiff.

MR. RADCLIFFE: My name is Tom Radcliffe. I represent R. T. Vanderbilt. I'd like to make a statement on the record that this is a deposition taking place pursuant to a subpoena issued by a Maryland court in Maryland and that Ms. Abrams is here, she is not admitted in Maryland as far as I know, and as far as I know she's not been admitted pro hac vice, and there is no Maryland counsel for plaintiffs.

MS. ABRAMS: And for the record this is subject to an out-of-state commission which was granted, and we have a California -- it's pursuant to California rules and the, the order from the Maryland court allowing for the deposition of a, pursuant to a California subpoena taking place, and I would like to attach for the record as Exhibit 1 our, a number of documents together including the Notice of Taking Deposition, Notice of Video Tape Deposition, Requests to file Foreign Subpoena For Production of Documents, Amended Notice of Taking Deposition and Notice of Video Tape Deposition, the commissions for these depositions, the return of service and the court's order granting the deposition, and I will attach all of this as Exhibit 1.

MR. RADCLIFFE: I do not agree that we're here pursuant to the California rules. We are here pursuant to the Maryland rules. It says so on the face of the subpoena.

MS. ABRAMS: Well, with that I think we'll go forward.

THE VIDEOGRAPHER: The court reporter today is Jan Hamilton of LAD Reporting Company. Would the reporter please swear in the witness.

ANN WYLIE, Ph.D.

a witness herein, being duly sworn, testified as follows:

EXAMINATION

BY MS. ABRAMS:

Q. Good afternoon, Dr. Wylie. We're here to take your

deposition in a matter that's pending in California. My name is Denise Abrams. I represent a plaintiff Eric Weston who is -- his case is about to start trial. I would like to note for the record that you were noticed to us in this case as an expert witness, and that notice was withdrawn. So you understand that you are not here to give expert testimony, but you are here pursuant to a Notice of Deposition for your percipient knowledge and information about matters that occurred some years ago, and that's what we'll be asking you questions about. Okay?
A. Okay.
Q. Could you please state your name for the record?
A. Ann Wylie.
Q. Is that Dr. Wylie?
A. It is.
Q. And are you a medical doctor or doctor of philosophy?
A. Doctor of philosophy.
Q. And briefly did you get -- where did you get your Ph.D.?
A. Columbia University, New York.
Q. What is your current address?
A. My home address or my business address?
Q. Whatever you prefer.
A. My business address is 1132 Main Administration

Building, University of Maryland, College Park, Maryland.
Q. Now, I know that you have in the past been in the Geology Department at Maryland, but what is your current occupation or title at Maryland?
A. I am professor of geology, but I'm Vice President For Administrative Affairs.
Q. How long have you been Vice President of Administrative Affairs?
A. I was appointed as interim in November of 2009 and, 2008, and permanently in April 2009.
Q. Did you have any administrative positions for the University prior to that?
A. Yes.
Q. What were those positions?
A. Before that I was assistant president, chief of staff. Before that I was associate provost. Before that I was interim associate dean, and I've been interim department chair, director of graduate studies, director of undergraduate studies in the Department of Geology.
Q. What year was the appointment to, as associate provost, if you recall?
A. About ten years ago.
Q. Do you -- at that point when you were appointed associate provost did you still teach in the Geology Department?

A. Yes.
Q. At any point from then until now did you stop teaching in the Geology Department?
A. I haven't been giving courses for a while.
Q. What do you mean by a while?
A. Well, past five or ten years, past five years, past eight years probably.
Q. Do you still have graduate students?
A. Not at the moment.
Q. And when was the last time you had a grad student?
A. Probably the last student graduated in 2006. I'm not very good on dates, but, so I'll give you my best estimate.
Q. When was the last time you actually -- well, strike that. You've done your own research projects as a geologist for the, in the Geology Department; correct?
A. Yes.
Q. Do you have ongoing research at the moment?
A. No.
Q. When was the last time you had ongoing research?
A. It ended in about 2006.
Q. And I know that in the past -- well, strike that. R. T. Vanderbilt has produced to us records of correspondence with you, reports that you have done in the past for them with respect to various products and minerals that are of interest

to them or a part of their product line. When was the last time you did any kind of work for them in that capacity?

MR. RADCLIFFE: I object to the form, to the predicate, vague, ambiguous. Go ahead.

THE WITNESS: I don't remember.

BY MS. ABRAMS:

Q. Was it more than five years ago?

A. Yes.

Q. And I know you did testify for them as an expert witness in 2007, but aside from that have you done any expert testifying for them?

A. I didn't testify for them in 2007.

Q. I understood that you gave a deposition in the Franklin case?

A. I did, but I wasn't there representing R. T. Vanderbilt.

Q. So you weren't there as their expert witness?

A. I don't really -- you know, technicalities. I was asked to give a deposition about some samples that I had received, and I had previously put an affidavit out about that, and they -- I agreed to go and give that, and I think both sides were interested in hearing that. So that's why I went.

Q. So you didn't understand at that point that you had been listed by R. T. Vanderbilt as an expert, their expert in

the case?
A. I don't really remember.
Q. Do you know if you were paid for your --
A. I was not --
Q. -- for testifying?
A. -- no.
Q. Other than that testimony have you testified in court regarding any matters with respect to R. T. Vanderbilt?
A. Define court.
Q. Either a -- well, let's start with civil court.
A. About 30 years ago I appeared in some administrative court to talk about, not about any product from Vanderbilt, not, nothing from their materials, but just in general about asbestos and some work I had done with the Bureau of Mines.
Q. Were you working for the Bureau of Mines at the time?
A. I -- no. I was at the, employed by the University of Maryland.
Q. So was that about your understanding of the definition of asbestos?
A. Yeah.
Q. Do you have any idea where that was?
A. Florida somewhere.
Q. Other than that do you recall any other administrative or civil testimony?

A. I was never in a court otherwise.
Q. Thankfully, right? We had requested and served a subpoena on you to bring any, a number of materials relevant to our case, and I'm going to show you the exhibit which is part of Exhibit 1 which is -- let me just take it out of Exhibit 1. That will be better.
In the document requests to file foreign subpoena for production of documents there's an attachment A, and I'd like to ask you to look at attachment A and ask you if you had reviewed that having been served with this --
A. I have, yes.
Q. -- subpoena? And did you, in fact, look for any and all materials listed on this document?
A. I did.
Q. So I'd like to just go through this with you one by one and -- well, strike that. You didn't bring anything with you today; correct?
A. I brought everything.
Q. Okay. Well, I was not handed any materials. Let's see what this is. There's an invoice for 222 pages at a dollar a page. Does that -- does the University charge a dollar a page for copying?
A. Mm-hmm. My office does.
MR. RADCLIFFE: There's actually I believe 222 pages there since two pages were added after the invoice was

generated.

MR. ABRAMS: Okay. Why don't we go off the record for a minute, and I'll take a look at this material. Thank you.

THE VIDEOGRAPHER: Going off the record. The time is 1:52 p.m.

(Discussion off the record.)

(Wylie Deposition Exhibit No. 1 was marked for identification.)

THE VIDEOGRAPHER: Back on the record. The time is 2:01 p.m.

BY MS. ABRAMS:

Q. Dr. Wylie, you handed me, which I unfortunately put a little bit out of order, 222 pages of records, and is it correct that these are all of the documents that you believe are responsive to the attachment A request?

A. Everything I could find.

Q. And is it your testimony that you have looked in every place that you could think of?

A. I looked in all of my files.

Q. I would -- we'll mark this entire set of records -- find a Post-It -- for, to the deposition, but I think I'll go through them one by one at some point, and we'll remark specific items, but we'll mark this whole set as Exhibit 2.

Where exactly did you look for these materials?

A. In my geology office.
Q. So you still maintain an office in the Geology Department?
A. I do.
Q. With respect to item 1 on the attachment, all documents relating to all tests and analysis performed on talc mined or supplied by Vanderbilt and/or International Talc. Would you, could you look through these documents and tell me which of these you believe relate to tests and analysis performed on talc mined or supplied by Vanderbilt or International Talc?
A. All of them, but there's -- there's all of them except the bills and the correspondence, everything that's there.
Q. Do you -- did you ever perform to your knowledge analyses for a company called International Talc?
A. No.
Q. So all of the materials in here are analyses you did with respect to R. T. Vanderbilt; correct?
A. That's correct.
Q. Do you recall when the first time you ever did any work for R. T. Vanderbilt was?
A. 1980.
Q. Do you know when you first -- so it wasn't in the 1970s so far as you know?

A. Well, I joined the faculty in '72. I, you know I don't really truthfully remember. I didn't -- I'm just guessing. '80 plus or minus two years.
Q. Had you ever heard of International Talc?
A. Had I ever heard of it when?
Q. Had you ever heard of International Talc?
A. Oh, yes, uh-huh.
Q. And did you know of International Talc in the 1970s when you joined the faculty?
A. No.
Q. So that's something you learned from work with R. T. Vanderbilt?
MR. RADCLIFFE: Objection. Assumes facts not in evidence.
Q. Or how did you learn about International Talc?
A. I was working with the Bureau of Mines, and I learned about it through the Bureau of Mines.
Q. What was it -- why did you learn about International Talc through the Bureau of Mines?
A. The Bureau of Mines was interested in asbestos, definitions of asbestos and mined products that had been confused with asbestos, and they had a, they had an interest in that, and they supported research on those topics.
Q. When you first joined the Bureau of Mines in 1972, do you know whether the Bureau of Mines was researching in

those, in the early '70s whether or not International Talc had asbestos in its talc?

A. I didn't join the Bureau of Mines in 1972. The rest of the string of your questions, could we go through that bit by bit?

Q. When did you join the Bureau of Mines?

A. I didn't join the Bureau of Mines. I never -- I worked for the Bureau of Mines during a one semester sabbatical or as a faculty member, whatever, whatever on loan, but I never worked for them. I worked, I have been employed continuously for the University of Maryland since 1972 full time position. I had one semester that I took off and I worked intermittently with the Bureau of Mines for that semester.

Q. Is that the time that you learned about International Talc?

A. You know, I really don't remember. I mean the Bureau of Mines, I probably became involved in the, with the Bureau of Mines in 1974 and began work with them which continued for 10 or 15 years. So sometime during that period.

Q. International Talc was bought by R.T. Vanderbilt in 1974. Do you recall whether you knew about International Talc prior to the, their purchase?

A. I -- no -- no, I had no idea. I didn't even know that they bought them. I wasn't -- no.

MR. RADCLIFFE: Let me assert an objection to that question that it misstates the evidence, and it assumes facts not in evidence.

Dr. Wylie, sometimes you're answering immediately. If you would just wait a heartbeat --

THE WITNESS: Okay. Well, then --

MR. RADCLIFFE: -- in case I have an objection.

BY MS. ABRAMS:

Q. So what do you recall in the 1970s about asbestos and International Talc?

A. Nothing.

Q. Well, you mentioned I believe in your answer that you learned about International Talc from the Bureau of Mines and it had something to do with asbestos.

A. No. I'm sorry. That's not correct. International Talc is a company, and Vanderbilt is a company, and what I was interested in were the talc deposits in the Gouverneur nor talc district in New York.

Q. Can you -- so at some point you were interested in whether or not the talc deposits in Gouverneur contained asbestos?

A. We -- the Bureau of Mines was interested in the definition of asbestos, and its application to the non-asbestiform varieties of the minerals that had been listed by the federal government in the asbestos regulations.

Q. Did they hire you as a consultant on that issue?
A. The bureau of mines?
Q. Correct.
A. They supported my work through grants.
Q. And what work did you do on grants from the Bureau of Mines in that capacity specific to Gouverneur?
A. I had a research project that was funded by the National Institute of Environmental Health Sciences that that agency was interested in obtaining reference samples of a variety of minerals, let's see, maybe five, one of which was non-asbestiform variety of the mineral tremolite and the other ones were commercial asbestos. The non-asbestiform variety of tremolite was a sample donated to the Bureau of Mines from the Gouverneur talc district.
Q. Was that donated by someone at R. T. Vanderbilt?
A. I really don't know.
Q. Where did you see that sample?
A. At the Bureau of Mines.
Q. Was that when it was at the University of Maryland --
A. It was.
Q. -- temporarily?
A. Mm-hmm.
Q. Did you do something with that sample?
A. We characterized it.

Q. Did you have to crush it or do something like that to --
A. It came crushed.
Q. Do you know who crushed it?
A. The Bureau of Mines.
Q. Do you know who worked on that at the Bureau of Mines?
A. No.
Q. Do you have a record of your findings?
A. It's published.
Q. And what's the paper?
A. It's Campbell, et al., Characterization -- it's in my -- well, I don't remember the name exactly -- Characterization of -- for the NIEHS Animal Feed Study. It's an information circular I think, or report of investigation, sorry. It's a US Bureau of Mines report of investigation.
Q. You had a research grant. Do you remember how much that was for?
A. No.
Q. So what it was at that point you had seen one piece of ore from the Gouverneur that you analyzed in that, in that study?
A. I had seen this crushed samples of tremolite.
Q. Was that the first time that you had any information about the particular ore in Gouverneur?

A. I think yes, mm-hmm.
Q. And do you know where that specifically was from, what mine that was from?
A. No.
Q. Do you have any -- in the papers that you brought today in Exhibit 2 did you bring any analyses of that material?
A. No.
Q. Do you know if those exist?
A. I don't know. Probably.
Q. Where would they be?
A. They're the property of the University of Maryland, and they'd be in our files somewhere.
Q. Would they be in your personal files or somewhere in the Geology Department or --
A. Somewhere in the Geology Department.
Q. So that's -- outside of your own files you didn't do a search; correct?
A. No.
Q. That's correct?
A. That's correct. I did not do a search. Yes.
Q. Would the sample that you looked at also exist at somewhere in the Geology Department at the University of Maryland?
A. I think so.

Q. Do you retain samples that you look at for the most part?
A. Yes.
Q. Where do they keep samples?
A. I keep them in my lab.
Q. You still have a lab?
MR. RADCLIFFE: The question was at the University of Maryland.
THE WITNESS: At the University of Maryland. They are in my laboratory at the University of Maryland.
BY MS. ABRAMS:
Q. I understood. Do you still maintain a lab in the Geology Department at Maryland?
A. Yes.
Q. Is that your own lab or do you share the lab?
A. I share the lab.
Q. How many professors share the lab? Strike that. Does the Geology Department only have one lab or are there multiple labs?
A. Multiple labs.
Q. How many professors share your lab?
A. I have a graduate student working in the lab who's advised by another faculty, but I'm on his dissertation committee.
Q. Would, would all of the materials that you have

examined in the past since you joined the faculty be housed in your lab?
A. I can't attest to every sample being there.
Q. What -- well, for the most part do you retain the samples in your lab?
A. Generally speaking, yes.
Q. After you finish examining a sample what do you do with it generally?
A. I put it in a drawer.
Q. What -- if it's a crushed material, is there some kind of packaging that it usually goes into?
A. It's contained in something when it's arrived if it's crushed or I put it in a bottle.
Q. So do you, if it comes in a baggie, do you keep it in a baggie? Do you put it --
A. Usually.
Q. Okay. And do you have a form, a format for -- well, strike that. Do you maintain asbestos in your lab of any kind?
A. Yes.
Q. Do you -- how do you package asbestos material?
A. It's in my, it's in my lab. It's in drawers. It's in containers. It's in, you know, as samples.
Q. Do you also keep asbestos material in baggies or in bottles depending on what they come in?

A. Usually yes, mm-hmm.
Q. So if you have -- strike that. And with respect to your deposition today, did you bring any physical samples?
A. I did.
Q. And where are those?
Thank you for sharing.
MR. RADCLIFFE: Whoops.
BY MS. ABRAMS:
Q. Is there anything else that you brought today other than the documents and the bottles that we have in front of us?
A. No.
Q. Okay. And when did you first show that material to Mr. Radcliffe?
A. About an hour before I came in here.
Q. Did you make him aware that you had upwards of 30 samples with you. That you were bringing with you?
A. I showed him the bag. We didn't discuss the quantity.
Q. Prior to today did anyone at the Dehay law firm know that you were going to produce physical samples today?
A. I don't know.
Q. Did you tell them?
A. They didn't ask. Well, other than I told them, I think I told you, that I had fulfilled the terms of the court

order.
Q. So with respect to category 1, and Dr. Wylie, I will just tell you that I was told that this 1:30 today was the only time that you were available within the next three weeks. Is that a correct statement?
A. That's a correct statement.
Q. Okay.
MR. RADCLIFFE: I think it was 1:00. I think I pushed it back to 1:30. That was my delay from 1:00 to 1:30.
MS. ABRAMS: I was never told that either.
BY MS. ABRAMS:
Q. The second category is -- strike that. Can you tell me what is in this bag that is responsive to the subpoena?
A. All physical samples of talc mined or supplied by Vanderbilt and/or International Talc in my possession or control, all physical samples of Mouldene talc in my position (sic) or control, all physical samples of talc identified by you as Mouldene in my July 28th, 1989, letter to Dr. C. S. Thompson.
Q. So I'm going to show you a bottle which is, which says talc fiber No. 3 mine ore pure fiber portion CPS 183-3, ask you to look at that.
A. Mm-hmm.
Q. And can you tell me, do you have any idea when you received that?

A. No.
Q. Is there any -- do you have any information in your lab about when you received that?
MR. RADCLIFFE: You mean other than the documents we've produced?
MS. ABRAMS: Can you read the question back?
(The reporter read back the previous question.)
THE WITNESS: All the information that I had on all of the samples and all the information that I was asked to bring are in the documents that I provided to you.
BY MS. ABRAMS:
Q. Do you have in the documents an identifying document for every one of the samples that you produced, to your knowledge?
A. I'm not -- I would say most of them, most of them.
Q. Now, could you look at the material inside that little bottle, please, and tell me if that is a, is that what you examined to your knowledge when you examine that sample or is that what's left over from the --
A. This is a --
(The reporter requested clarification.)
THE REPORTER: "Left over from" --
MS. ABRAMS: The examination.
THE WITNESS: This is a sample of the material that I have that I'm giving to you. I didn't give you the entire

sample.
BY MS. ABRAMS:
Q. And why is that?
A. Because I could see no reason to do that, that I retain them. They're part of my scientific record. I'm not going to give you the entire thing.
Q. How much of that particular material do you have?
A. I don't remember.
Q. When you analyzed that particular material in that bottle, how much material did you need to analyze?
A. About one one-thousandth of what's in this little bottle.
Q. So you looked at a very minute portion of what is in that bottle in order to derive your findings for the material in that bottle?
A. That's correct.
Q. Correct? And is, would that be the case for all the samples that you looked at?
A. Not necessarily. In some of the analyses that were more comprehensive, were done with electron microscopy I may have made multiple preparations. When I'm trying to quantify abundances, then I needed to have multiple preparations, so I would make multiple one one-thousandths of those.
Q. Well, for example, would the material in that bottle that you produced for us be sufficient for any kind of testing

that you might do to do these multiple preparations?
A. Yes.
Q. So is it fair to say that for all of the testing that you've done on any of these samples that you have produced today you looked at an amount less than what's in the bottle in front of you?
A. I would say that's generally correct.
Q. Well, when wouldn't that be a correct statement?
A. You know, I -- it's just generally correct. I can't, you know, if you would define one place where I did a whole bunch of analyses and I put, and I had a small amount less -- left and I gave you a smaller amount I can't, but generally correct, generally correct.
Q. You -- is it correct that you don't keep with each one of these samples that you have in your lab a chain of custody declaration or some information on the chain of custody?
A. No, I don't.
Q. So you, for these, for every bottle that you have in the bag, other than you opened a drawer and took the material out and put it in a bottle and labeled it, you have no other information on where it came from other than what's in the documents?
A. Other than what's in these documents, no, I don't.
Q. And you have no information, for example, if any of

these samples through reading the documents came from R. T. Vanderbilt, you have no idea how they got the samples; correct?
A. No, I have no idea.
Q. Do you know, have you personally examined any of the material in these bottles in the last ten years?
A. I don't think so.
Q. Do you know if your students, any of your students have examined any of these materials in the last ten years?
A. Let me, let me go back. Ten years. I have a, had a student whose name is William Greenwood, and I'm not exactly sure what year he graduated. It could have been 2001. I can't remember. He would have been the last person to have looked at that.
Q. Did he ever publish any peer reviewed publications regarding any of the materials in the samples?
A. He has a Master's thesis in the -- that's not peer reviewed.
Q. Was it ever published anywhere?
A. It's in our library.
Q. So it's a University of Maryland --
A. Publication, yes.
Q. Is every graduate student's Master's thesis --
A. Yes.
Q. -- considered published?

A. It is, yes.
Q. Does -- he did not write a Ph.D.?
A. No.
Q. Do you know where Mr. Greenwood is now?
A. The last time I heard from him he was working for the Defense Mapping Agency.
Q. Did you also have a student named Watson?
A. Mark Watson, yes.
Q. Do you know when he was your student?
A. No. I can't remember. Sorry.
Q. Was it prior to Mr. Greenwood?
A. I think it was after, after.
Q. Do you know if he examined any of the material in the --
A. No.
Q. -- bags?
A. He didn't.
Q. Do you know if he ever -- did he write a Master's thesis?
A. He did.
Q. And other than at the University of Maryland was that ever published?
A. No.
Q. Do you know where he is currently?
A. He lives in this area.

Q. Do you know if he's working in geology?
A. He's -- the last I heard of him he's an electron microscopist for a titanium company somewhere in the Baltimore area.
Q. Was Mr. Veerta your student also?
A. Yes.
Q. Do you know when he was your student?
A. The late '80s? I don't really remember. Maybe early -- I don't really remember, early '90s.
Q. Mr. Greenwood had a fellowship in the department?
A. He, yes, he did.
Q. And that was a fellowship paid for by the R. T. Vanderbilt Company?
A. Yes, it was.
Q. Did Mr. Watson also have a fellowship that was paid for by R. T. Vanderbilt?
A. No.
Q. Were there other fellowships --
A. No.
Q. -- paid for by R. T. Vanderbilt? In the materials that R. T. Vanderbilt gave us and I brought them with me there appear to be two fellowships. You don't recall another one?
A. No. It was there -- it was the same fellowship. It was only one person and it --
Q. Mr. Greenwood?

A. Yes.
Q. You were asked to bring all the tests and analysis performed on talc mined or supplied by R. T. Vanderbilt for International Talc. Is it your testimony that the samples in the bag are all from R. T. Vanderbilt or International Talc so far as you know?
MR. RADCLIFFE: Objection; vague, ambiguous, assumes facts not in evidence.
BY MS. ABRAMS:
Q. Is that correct?
A. Well, ask me again.
Q. She'll read it to you.
MR. RADCLIFFE: I change my objection to an objection to the form.
(The reporter read back the previous question.)
THE WITNESS: They are all the samples that were supplied to me for analysis by R. T. Vanderbilt. They do not include samples that were supplied for the work performed by William Greenwood.
BY MS. ABRAMS:
Q. And is there a reason you didn't bring his samples?
A. They belong to the University of Maryland.
Q. Do the samples in the bag belong to the University of Maryland?
A. No.

Q. Were those samples that you, that belong to you in a consulting capacity?
A. They were.
Q. Where would Mr. -- where would Mr. Greenwood's samples be kept?
A. In, in my laboratory.
Q. How many samples to your knowledge did Mr. Greenwood use?
A. Ten.
Q. Do you know how much material remains from his --
A. No.
Q. -- samples? And those came from R. T. Vanderbilt?
A. Not all of them, no.
Q. Do you know where else they came from?
A. They were other samples of talc that had been given to the University of Maryland.
Q. Mr. Thompson has testified that the particular ore out of Mine 3 is a very unique ore and that he's discussed that with you. Did he ever give you a sample of that ore?
MR. RADCLIFFE: Object to the form.
THE WITNESS: There -- he didn't give me a sample of the ore, no. He gave me a sample that says No. 3 mine on it.
BY MS. ABRAMS:
Q. Is it -- did you analyze that and is the analysis in this stack of papers?

A. Um, this says No. 3 mine right on it.
Q. Okay. Do you recall what you found?
A. I mean just generally speaking. It's the material that is characteristic of the Gouverneur talc deposit.
Q. Did -- so you don't, you don't have an understanding there was anything unique about the ore in the number 3 mine?
A. I know nothing --
MR. RADCLIFFE: Object to the form.
THE WITNESS: I know nothing about the mine or the number 3 mine or any other number mine. I only know I have a sample that says No. 3 mine on it, and it's labeled talc fiber, and this, as my recollection is, now that I think about this, is that this material is primarily fibrous talc. It doesn't have the other components of the ordinary product of the mine that's like put in paint and ceramics and things like that. So it's a kind of a special sample.
BY MS. ABRAMS:
Q. And you don't recall ever actually seeing the ore, the physical ore; correct?
A. From the No. 3 mine?
Q. Yes.
A. I have to tell you that I was at the location, and I was in an open pit. I have no idea whether that was the No. 3 mine or whatever other mine it was.
Q. You were at the open pit?

A. It was at an open pit.
Q. Were you ever at an underground mine?
A. No, no.
Q. When did you go to the open pit?
A. Well, it was six or so years ago I guess.
Q. Why did you do that?
A. I was going to a conference in Vermont and another geologist, accompanied by other geologists, one in particular, and she wanted to visit the mine and I wanted to visit the mine. I'd never seen it, so we stopped by.
Q. Was there someone there to actually show you around?
A. There were people there, yes.
Q. Was Mr. Thompson there?
A. I don't think so, no.
Q. Mr. Putman?
A. I, I don't know who that is.
Q. The -- so getting back to the discussion we were having about the test results.
A. Yes.
Q. Do you know whether in that 222 pages there are test results for every one of these samples?
A. There are not.
Q. Do you have test results for every one of those samples?
A. I provided you every analysis that I have.

Q. Do you keep the test results in the regular course of your --
A. I do.
Q. -- work?
A. Usually.
Q. Do you believe that you have tested every sample that's in every bottle that you produced?
A. No, I don't.
Q. Do you know why you have samples that were never tested?
A. I just didn't test them I think.
Q. Now, you mention that these do not belong to the University of Maryland. Do you have a consulting company?
A. No.
Q. Did you have a consulting company?
A. No.
Q. Did you receive them in the regular course of your work as a professor at the University?
A. Yes.
Q. And why is it that you do not identify those as belonging to the University of Maryland?
A. Because I was paid as a, for the analysis privately.
Q. Did you do them on the, on your own time?
A. Yes.
Q. Did you do them in your lab at Maryland?

A. Most of them I did at home.
Q. What type of equipment do you have at home?
A. I have a microscope, polarizing light microscope.
Q. Can you do TEM or SEM at home?
A. No.
Q. Is that -- do you have that equipment at Maryland?
A. Yes.
Q. Have you examined any of these samples under, with TEM OR SEM?
A. Not as part of any consulting, no.
Q. So it's -- did you do x-ray --
A. Wait a minute. Let me just take that back. There might be -- there might be -- there might be samples in there of a project that I did do some TEM for -- some SEM at the University of Maryland.
Q. And do you recall which sample that would have been?
A. I think they're western talc samples from the western talc deposits.
Q. Why did you do TEM?
A. SEM.
Q. I'm sorry. Why did you do SEM on the western talc and not on the other samples?
A. I, I don't remember. It was some type of study they were interested in. I, I can't remember; just happened to be the protocol that met the need.

Q. You were asked to bring all correspondence with Vanderbilt and International Talc or any employee, agents or attorneys. Have you done that?
A. I have.
Q. Where did you look for the correspondence?
A. In my files.
Q. Do you have correspondence files?
A. No.
Q. How did you know -- do you have an R. T. Vanderbilt file?
A. I do.
Q. Did you produce your whole file?
A. I produced all of the documents that were in that file that related to this, that relate to this deposition.
Q. What types of documents were in there that you didn't produce?
A. I don't remember.
Q. Can you give me an example?
MR. RADCLIFFE: Objection; asked and answered. She just said she didn't remember.
BY MS. ABRAMS:
Q. Can you give me an example?
MR. RADCLIFFE: Same objection.
THE WITNESS: I don't remember.
BY MS. ABRAMS:

Q. When did you go through your files?
A. Monday, Tuesday.
Q. Of last week?
A. Of this week.
Q. How, how many, approximately how many pages are in your R. T. Vanderbilt file?
A. I have no idea.
Q. Is it a few more than what's brought here or is it hundreds more or what?
A. I have no idea.
Q. You can't say approximately whether it's bigger than the pile on the table?
A. I have no idea.
Q. Did you bring all the tests you have with respect to Mouldene talc?
A. I did.
Q. We have a letter from you to Slim Thompson regarding Mouldene. Is there anything else in that stack with respect to Mouldene other than the letter with your findings?
A. I went through my lab notebooks. If there was anything in there on, with respect to Mouldene I copied it.
Q. Would you take a look at these documents and tell us if there's anything else in there with re, specifically with respect to Mouldene, and, and including the S-158 sample that you examined?

A. It's going to take me a while. I guess that doesn't matter, huh?

Q. Why don't you go to your test results, if you would. I know there are a lot of test results in there.

MS. ABRAMS: Bless you.

THE WITNESS: That's the same document. I think that's all.

BY MS. ABRAMS:

Q. Thank you. So we'll mark this four page, four pages as Exhibit 3. We'll come back to that.

Moving down to number 5, tests performed on Nytal, and if you would just look at the actual testing material and not your correspondence, but the rough data, could you tell us which of the material was Nytal, which was Asbestine and which 3X, if you can differentiate any of that?

A. That doesn't pertain. That doesn't belong.

MR. RADCLIFFE: Okay.

THE WITNESS: It's not -- again, what are the ones I'm looking for?

BY MS. ABRAMS:

Q. Why don't we -- why don't you pull out all your test material and then I'll ask you questions. These are the tests?

A. Mm-hmm.

MS. ABRAMS: So would you mind marking this because we're going to mark some more exhibits.

MR. RADCLIFFE: It should be 3 I think.

(Wylie Deposition Exhibit No. 3 was marked for identification.)

BY MS. ABRAMS:

Q. I'm just going to have you hold that for a minute. We're going to go through the rest of this, and then we're going to go off the record and then we'll organize this a little better so we can mark it.

Did you bring with you all financial documents relating to any work that you performed for Vanderbilt or International Talc including billing records, purchase orders and financial statement?

A. I brought you everything I had, mm-hmm.

Q. Other than what is in those records, would you have received any money from Vanderbilt for any work that you've done?

A. Not to my recollection.

Q. You were asked to bring the physical samples from the Stanton studies. Did you bring those?

A. No.

Q. Do you have those?

A. Yes.

Q. And why didn't you bring those?

MR. RADCLIFFE: Object to form.

THE WITNESS: They belong to the University of Maryland.
BY MS. ABRAMS:
Q. How large are the samples from the Stanton studies?
A. Tiny.
Q. Where are they kept?
A. In my lab.
Q. What material do you have? Do you have every single sample that --
A. No.
Q. If you don't mind, could you wait until I get my whole question before you give an answer. Okay? What samples -- I understand that Dr. Stanton had something around a hundred samples; is that right?
A. I don't know.
Q. How many do you have?
A. I don't know.
Q. Is it more than 50?
A. I would guess. I'm guessing it's at that order.
Q. Are they all kept in the same place?
A. Yes.
Q. And where are samples kept in your lab? Is there a sample room?
A. No.
Q. How are they kept?

A. In drawers, on shelves.
Q. So is there a drawer marked Stanton samples?
A. No.
Q. How do you know where the Stanton samples are?
A. I have to look for them if, every time I want them.
Q. Did you look for them this time?
A. No.
Q. So do you know where they are?
A. No. In my lab. They're in my lab.
Q. When was the last time you looked for them?
A. Many years.
Q. You signed a dec-, several declarations regarding the Stanton samples. Did you look for them before signing the declarations?
A. No.
Q. How do you know you still have them?
A. Well, I, you know, I don't, I mean unless someone came in and took them out, but that would be highly unlikely I would think.
Q. The last time that you looked for them where were they?
A. In my lab.
Q. Do you know any more specifically where?
A. In a box.
Q. Is there anything else in the box other than bottles

with samples?
A. No.
Q. Is there any chain of custody information?
A. No.
Q. You've stated in a declaration that you have reviewed Dr. Stanton's files.
A. That's correct.
Q. Did you copy any of those files?
A. Yes.
Q. Where are those materials?
A. They're probably in my files.
Q. Did you look for those?
A. No.
Q. Why not?
A. Because they belong to the University.
Q. So it's your testimony that you are -- well, strike that. My understanding is that they belong to Mrs. Stanton and she gave them to you; is that correct?
A. Not necessarily.
Q. Well, did you testify in a declaration that you went to Mrs. Stanton and looked in her attic and reviewed Dr. Stanton's papers?
A. I also went to the National Cancer Institute and reviewed his papers and his materials there.
Q. Where did you -- are the NCI papers the ones that

are in, at the University of Maryland?
A. The -- all of the papers are at the University -- anything I, anything I found is at the University of Maryland.
Q. Did you copy the files that, from Mrs. Stanton's attic and bring them to the University of Maryland?
A. I did.
Q. And it's your testimony here today that you could not bring those with you because those are the property of the University of Maryland?
A. That's correct.
Q. And you could not make copies of them because those are the property of the University of Maryland?
A. That's correct.
Q. And why is that, that you believe that you could not bring copies of Mrs., of Dr. Stanton's papers because they are property of the University of Maryland?
A. Because I acted as a professor when I received them. I was an employee of the University of Maryland.
Q. Is the University of Maryland a public institution?
A. It is.
Q. Are the papers that the University of Maryland has open to the public?
A. Not necessarily, no.
Q. Under what circumstances would they not be available to the public?

A. I -- look, this is a test, an area outside my area of expertise. You can take it up with the University lawyer.
Q. Did the University lawyer advise you not to bring Mrs. Stanton's papers?
A. No, he did not.
Q. Did you get any legal advice that you could not bring Mrs. Stanton's papers here?
A. I did not.
Q. You just decided that for yourself?
A. I don't see that, Mrs. Stanton's papers listed in this -- I see no Mrs. Stanton's papers in this subpoena.
Q. I think No. 14 says all documents identifying the source of the talc samples identified as R. T. Vanderbilt talcs from the Stanton study you refer to in your deposition testimony of August 8, 2007, in the Franklin case.
A. I would not bring anything that I acquired as a professor to a deposition that I came to by subpoena. I -- the -- I'm acting as a -- when I'm an employee of the University of Maryland, if you want University of Maryland papers, you can't ask me for them; you need to ask the University of Maryland.
Q. Did you bring copies of all the written statements you've signed?
A. I brought you everything that was on this request that I had found in my files.

Q. Did you bring financial documents relating to your work performed for Ford, Chrysler and General Motors?
A. No, I did not.
Q. And why is that?
A. I have none. All of -- I have none.
Q. It's correct that you received a half million dollar grant from Ford, Chrysler and General Motors?
A. The grant is to the University of Maryland.
Q. But that was for your work, wasn't it?
A. Yes, but the grant is to the University of Maryland.
Q. And have you received any other grants or has the University of Maryland received any other grants from Ford, Chrysler or General Motors --
A. I have no idea.
Q. -- on your behalf?
A. Any other than what?
Q. Than the $500,000 grant you received?
A. I have received -- no. I think the answer to that is no.
Q. Has the University of Maryland received any grants from R. T. Vanderbilt?
A. University of Maryland received a grant that supported the fellowship of William Greenwood.
Q. Have they received any other grants to your knowledge?

A. I, I don't remember any others.

MS. ABRAMS: Let's go off the record and take a break.

THE VIDEOGRAPHER: Going off the record. The time is 2:53 p.m.

(Discussion off the record.)

(A recess was taken.)

THE VIDEOGRAPHER: Back on the record. The time is 3 p.m.

BY MS. ABRAMS:

Q. Dr. Wylie, I want to go through some of these records that you produced. The first stack of records apparently are invoices for services. Were these kept in a separate file together?

A. No.

Q. So you actually put them in this order --

A. I did.

Q. -- when you produced them? Was there a reason for that?

A. Well, they're just willy-nilly, so I tried to make a little sense out of it.

Q. Okay. And I guess we can mark these if we have some paper clips. Can we get paper clips?

Do you have paper clips? We'll mark this as Exhibit 4.

MR. RADCLIFFE: It already has a label on it.

MR. ABRAMS: I know. It's going to have to be the beginning of 2. We're going to have -- this set is also going to be part of Exhibit 2.

MR. RADCLIFFE: So we have a set of documents that have two exhibit labels on them?

MS. ABRAMS: All, all the exhibits are going to be part of Exhibit 2, and then they're going to be separately marked. You don't like that. I'm open to suggestions.

MR. RADCLIFFE: How about if we put a label on top of Exhibit 2 and we'll name it 4, and then whatever stack of documents you have left over at the end of the day that you did not label individually we'll label those as Exhibit 2.

THE VIDEOGRAPHER: Don't forget your microphone.

MS. ABRAMS: Okay. So I'm not averse to that.

MR. RADCLIFFE: Okay.

MS. ABRAMS: We will leave open Exhibit 2. The stack of invoices will be marked as Exhibit 4, and we'll move on from there.

(Wylie Deposition Exhibit No. 4 was marked for identification.)

THE VIDEOGRAPHER: I'm actually getting some noise from your microphone there.

MR. RADCLIFFE: Are you? I'm afraid you'll get more noise if I put it on, which is why I'm trying to keep away

from it.
MS. ABRAMS: Are we ready?
BY MS. ABRAMS:
Q. This one invoice dated July 8, 1988, is to John Kelse, and it has STEMicro Corporation at the top.
A. Yes.
Q. What was STEMicro Corporation?
A. It was a company that existed for, in Rockville, Maryland, and I worked in their facility on a few occasions, and the bill was sent from them.
Q. You use their lab to do some work?
A. Mm-hmm. I did.
Q. Did they have particular equipment that you didn't have at the University that you used?
A. They had a polarizing light microscope.
Q. Is there any particular reason you used their lab as opposed to your own microscope?
A. It was close to my house.
Q. And are all these documents in Exhibit 2 true and correct copies of billing statements that we, pertain to your work for analyzing samples for the R. T. Vanderbilt Company so far as you know?
A. Yes.
Q. And they all came out of your files?
A. Yes.

Q. I'm going to skip some of the correspondence and test material. I just want to move to your sample, I mean your -- strike that. I'm going to skip over some of the written materials and move on to some of the lab entries. Let me just -- do you know what those --
A. I actually don't.
Q. Okay. It's not just me. Okay.
A. Oh, I know what it is, but I don't know what --
Q. What is it?
A. -- what samples it pertains to.
Q. I'm showing you two pages that say white, white sample chrysotile on the bottom of the first page and University of Maryland at the top. Can you tell us --
A. These, these don't, are not relevant. They, they don't belong. They're not Vanderbilt materials.
Q. How do you know that?
A. Because it -- they have chrysotile on them.
Q. Where did you find them? Can I have them back, please? Thank you.
A. In a -- my files are scattered.
Q. There's several pages after that, and it says A. Wylie paint sample on the top of the fourth page. I'm just going to hand you --
A. Oh, I know what they are. There, there was a, a material that was involved, put in some apartment somewhere,

and it had chrysotile in it as well as materials from the Gouverneur talc district.

Q. And you analyzed that material?

A. I did.

Q. That material you believe to have talc and chrysotile in it?

A. Yes.

Q. So I'm going to show you what I'm going to mark as Exhibit 4? 5, and ask you if all of these documents pertain to that analysis?

A. Yes, but none of these are my analyses.

Q. Whose analyses are they?

A. They were done by a laboratory at the University of Maryland, Baltimore.

Q. Do you know who did them?

A. Jeff Furman.

Q. Do you know why you have them?

A. They were incorporated into a report that I did on some of the materials, and there's a subreport. It's incorporated by reference. That's why I included it. It's from the, this laboratory at the University of Maryland, Baltimore, and they -- he did the TEM work on the samples, and so it was incorporated by reference in my report. So I included it.

Q. Did he do the TEM work for you or at someone else's request?

A. I, I don't remember. Probably for me, but I, I don't remember exactly how that worked.

Q. Is there --

A. May have been was for, directly for the person that requested it; can't remember.

Q. If you would check through those documents and see if there's something in there that refers to that analysis. These are the pages that were following. Perhaps they have something regarding --

A. No.

Q. Okay.

(Wylie Deposition Exhibit No. 5 was marked for identification.)

THE WITNESS: Well, I don't see it, so you must not have given it to me. It must be in the rest of those papers. Here. I thought there was another one that I incorporated by reference. There must be another, another something. Okay. I think I'm getting them confused. This goes with that. This is a different, a different analysis that I incorporated by reference.

BY MS. ABRAMS:

Q. Okay.

A. Okay. So --

Q. Now --

A. -- that's a different problem.

Q. So I'm going to mark this -- we have Exhibit 5, so I'm going to remark Exhibit 5 with the report of investigations on the top of the exhibit. This says you received these materials from Dr. Langer; is that correct?

A. That's correct.

Q. Do you know Dr. Langer?

A. I do.

Q. Have you worked with Dr. Langer?

A. Yes.

Q. In what capacity?

A. We've co-authored papers together.

Q. Have you done consulting work on litigation for asbestos cases together?

A. No.

Q. Have you consulted regarding whether there's asbestos in materials with Dr. Langer?

MR. RADCLIFFE: Object to form.

THE WITNESS: That's, that's too broad.

BY MS. ABRAMS:

Q. Do you know why Dr. Langer sent you these samples?

A. I think he was interested in my opinion.

Q. Do you know what, why he needed your opinion on these particular samples?

A. It's my recollection that there was a case involving

an apartment building in New Jersey.
Q. Can you tell me in your handwritten notes which say A. Wylie at the top -- strike that. Are these your handwritten notes, the two pages of notes?
A. No.
Q. Do you know why they say A. Wylie at the top?
A. Maybe they're not related to this. Sorry.
Q. Okay. Are those -- is that your handwriting?
A. No.
Q. Okay. So by "this" we mean a doc --
A. JCF, this is Furman.
Q. Uh-huh.
A. And he may have worked on this, too. To tell you the truth, I really don't remember this. It's like 25 years ago. I really -- I just don't, sorry.
Q. So these --
A. Just as confused as my mind.
Q. -- these materials could all relate to each other?
A. Maybe. They might not.
Q. Other than what is -- why don't you just look through these again, and that's all of Exhibit 5. Other than what is written on those documents do you have any independent recollection of any matters related to any of the materials there?
A. Nothing that I haven't already told you related to

the occupancy of an apartment. That's all I can remember.
Q. And with respect to the handwritten notes that at the top that say A. Wylie, do you know whether or not any of the samples referred to in these two handwritten pages are included in the samples that you produced for us?
A. I found no tex -- no paint, no textured paint, no, nothing like that. I found no building materials among my samples.
Q. So is --
A. So I don't believe that they are.
Q. And it's your understanding that what is referred to on these two pages is paint?
A. No, not necessarily. I think there's textured, a textured ceiling, sprayed-on ceiling material and there's paint. So I think both of those things were involved in this topic.
Q. And is it your understanding that they had talc in them?
A. Well, I can read what I wrote.
Q. Okay.
A. Yes, they contain talc.
Q. And you believe they independently contained chrysotile?
A. What do you mean by that?
Q. That -- strike that. Based on your notes was there

chrysotile in the material?
A. According to my conclusions the cementaceous undercoating contains chrysotile.
Q. And with respect to the handwritten notes, can you decipher anything in those notes about, to tell us what they're about?
A. The numerical entries relate to focal length, magnification. They look like electron microscopy type of analysis was going on.
Q. Do those notes state that there's chrysotile in the material?
A. There's a statement that says sample 10, chrysotile, at the top of the page.
Q. This says DAP on it. Does that refresh your recollection about this?
A. That's a different situation. That's this report. So they're not related.
Q. All right. So these handwritten notes go with the other report?
A. They must, yes.
Q. Which says very small chrysotile?
A. Yes.
Q. And this also says DAP on it. So these don't belong together?
A. Right.

Q. Do you know, do these go with the handwritten notes?
A. I don't know.
Q. Okay. So let's have the DAP report. And I believe you -- what is AIP Environmental Laboratory?
A. It's at the University of Maryland, Baltimore, or was.
Q. Okay. So now we are going to remark -- strike that. And these two pages, do they --
A. I think that's a different topic.
Q. From this?
A. Yes.
Q. And from this?
A. Yes.
Q. Okay. So we will mark as Exhibit 6 all the DAP documents.
(Wylie Deposition Exhibit No. 6 was marked for identification.)
BY MS. ABRAMS:
Q. Would you go to the stack that you have clipped together. Is there a reason those are clipped together?
A. They're all photomicrographs.
Q. Do they all -- do you know what they refer to?
A. These are all related to a study on western talc.
Q. Okay. We'll mark those as Exhibit 7.
(Wylie Deposition Exhibit No. 7 was marked for

identification.)
BY MS. ABRAMS:
Q. Where did you find these notes? Do you have a folder that says western talc?
A. No.
Q. What --
A. I have a lab notebook.
Q. A lab notebook just on western talc?
A. No.
Q. What is the lab notebook?
A. It's just a book where I enter my observations.
Q. Are they kept sequentially in, in any kind of order?
A. Not really. I have four or five active ones, and I pick them up, and they're spread out among the three.
Q. Do you keep your old lab notebooks?
A. I do.
Q. Did you look in all your old lab notebooks?
A. I did.
Q. How far back do they go?
A. To the beginning of my time as a professor.
Q. Do you keep in your lab notebooks your consulting work and your University of Maryland research together?
A. I do.
Q. So you'd have to look through your lab notebook -- you don't have a separate consulting lab notebook?

A. I don't.
Q. Okay. You ment- -- Exhibit 3 is about Mouldene. Do you have notes that pertain to Nytal in your materials?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. All right. Let's go through your lab notes and see what else they pertain to, if we might.
A. This says sample 78-88 from John Kelse.
Q. Okay. May I have the notes that go with that. Is that just one page of notes?
A. Yes.
Q. And what's the next?
A. Let me see that. This doesn't pertain. That's all I have on that one. The next one says Westal 003. This is a western talc sample.
Q. Okay.
A. These are, these are pictures related to that.
Q. Western talc?
A. Mm-hmm.
Q. We'll clip these together. So the -- just for the record the July 2nd, 1988, notation the first page you gave me, I'm sorry, was for which?
A. That has no relevance.
Q. Okay. So what is this page before?
A. It says it's from John Kelse, R. T. Vanderbilt, and

it says 78-88. I know nothing else about it.
Q. Do you believe 78-88 is in this pile of --
A. I don't think so.
Q. So you don't have any idea what that is?
A. No.
Q. Would it have been received possibly in 1988 or is that 88 not related?
A. I have no idea.
Q. Okay. You don't keep records by --
A. No.
Q. Okay.
MR. RADCLIFFE: Got to wait until she finishes her question.
BY MS. ABRAMS:
Q. And then the west -- you have Westal at the top which is 1/6/90 so that has to do with Westal. What other lab notes do you have?
A. Actually this does not, is not relevant. This says Vansil MG. That's western talc.
Q. And just for the record you've ripped off the bottom. What did that pertain to?
A. Other work.
Q. Was it talc work?
A. It has nothing to do with R. T. Vanderbilt.
Q. Was it talc work?

A. I don't know. I just know it wasn't R. T. Vanderbilt. The next one is, says fibrous talc, XRD samples, and it has USNM 48277, 44866, 101849 and RT V1 fibrous concentrate.
Q. Do you know what that pertains to?
A. Samples from the Smithsonian and a sample from R. T. Vanderbilt of a fibrous concentrate.
Q. Do you know what you used those samples for?
A. I doubt it was -- I was probably just looking at them for my own interest. They probably are unrelated to anything that has to do with consulting. I probably ought to take them back.
MR. RADCLIFFE: Well, if it has to do with Vanderbilt, you can give them to her.
THE WITNESS: Okay.
BY MS. ABRAMS:
Q. Is there anything on these notes, these two pages of notes, that tell you what your findings are?
A. I'll have to look at them again. They're x-ray diffraction patterns, comparisons of x-ray diffraction patterns.
Q. And you don't have a recollection of why you looked at this material; correct?
A. I was comparing those four samples.
Q. And it says as a group the following peaks were

observed which do not conform to anthophyllite or talc. Can you see that notation at the top?

A. Yes.

Q. Did you write, anywhere note what they do conform to, if anything?

A. I did not.

Q. Could you tell from looking at that data what they do conform to?

A. No.

Q. What other information would you need?

A. Lots. Reference books, computer programs.

Q. Okay. We will mark, I just want to keep it in order, the Vansil MG half page as Exhibit 8. Westal 003 as Exhibit 9.

(Wylie Deposition Exhibit Nos. 8 and 9 were marked for identification.)

MS. ABRAMS: July 2nd, 1988, sample 78-88 from John Kelse, R. T. Vanderbilt, Exhibit 10. Fibrous talc -- sorry -- XRD samples Exhibit 11.

(Wylie Deposition Exhibit Nos. 10 and 11 were marked for identification.)

BY MS. ABRAMS:

Q. Is there any information on this document Exhibit 11 that would tell you how to locate the particular samples that you're, you looked at?

A. No. Well, I take that back. The -- those are numbers from the Smithsonian. So you could go to the Smithsonian and get those samples.
Q. How did you get the samples?
A. I went to the Smithsonian and I got them.
Q. How do you get samples from the Smithsonian?
A. You request as a researcher.
Q. How does the Smithsonian get samples?
A. People give them to them.
Q. How did you know that the Smithsonian had the samples that you wanted to look at?
A. I didn't. I went and looked through their collections.
Q. Were you particularly looking for fibrous talc --
A. No.
Q. -- at the time? Were you just looking for things of interest?
A. No. I was looking for amphiboles.
Q. Do you know, were you -- was that for a study that you were doing?
A. I was -- yes. It was for a study I was doing.
Q. Did you publish the study?
A. No. Well, some of it.
Q. Okay. Where did you publish it?
A. Some of it was published in the American

Mineralogist around 2001.
Q. Do you recall the name of the paper?
A. Tremolite, ferroactinolite, systematics, cell dimensions, optical properties.
Q. Was there anything about asbestos in that paper?
A. The habit of the samples that were used in the paper were identified as asbestos or nonasbestos, whatever habit they had. They were so identified.
Q. Did you find asbestiform habit in any of the talc samples that you reviewed for the paper?
MR. RADCLIFFE: Objection to form.
THE WITNESS: I didn't review talc samples for that paper.
BY MS. ABRAMS:
Q. So this fibrous talc XRD sample, that was not included in the paper?
A. No.
Q. And this particular fibrous talc XRD sample, do you recall any publication or reference that, why you referred to this particular sample?
A. Not that I recall.
Q. Do you know if you communicated your findings to R. T. Vanderbilt?
A. I don't know.
Q. If we could just go through the rest of your

studies.
A. This says R. T. Vanderbilt, and it says ceiling textured paint. So I think that belongs to the first set of exhibits that we were discussing this, this one.
Q. Okay. Now, we still haven't figured out what these go to; right?
A. No.
Q. Okay. So why don't I put that together and we'll --
A. This also says paint samples from Langer.
Q. Let's put all that together. Okay. We'll mark this as the next in order.
(Wylie Deposition Exhibit No. 12 was marked for identification.)
BY MS. ABRAMS:
Q. When was the last time you ever, you have talked to Dr. Langer?
A. Two or three years. Two years.
Q. So you haven't talked to Dr. Langer about this case that we're --
A. No.
Q. -- currently talking about?
A. No.
Q. Okay. Why don't we continue on.
A. That's all the lab notes that I have.
Q. Okay. You have some handwritten notes?

A. These are, have Furman's name on it. So they probably belong to that, this (indicating).

Q. This goes with Exhibit 6; correct?

A. I think so.

Q. Put these in here. Okay. Now, you produced in Exhibit 3 lab notes regarding Mouldene, and you have sent -- from R. T. Vanderbilt 7/89. Can you tell me, Dr. Wylie, is it your understanding that with respect to the July 28th, 1989, letter you wrote to Dr. Thompson these, this is the only written information that you have in your lab regarding that sample in these, in these pages?

MR. RADCLIFFE: Object --

BY MS. ABRAMS:

Q. Is that correct?

MR. RADCLIFFE: Object to the form.

THE WITNESS: I've given you everything I have from my lab, from my notes, with respect to everything that I have ever done for R. T. Vanderbilt.

BY MS. ABRAMS:

Q. Okay. And that would include anything you have with respect to the Mouldene talc S-158 sample; correct?

A. I've given you everything that I have with respect to every sample that I've ever analyzed for R. T. Vanderbilt.

Q. Okay. If I could ask you to go through the rest of those documents and see if you can tell me which ones go

together and what they are, please?
A. This is a study that I did on the western talc materials.
Q. Okay. Let's put all the western talc materials together, if you would. And with respect to that study, we have the notes and photomicrographs in Exhibit 7. Do these pertain to the same study that you've just --
A. Yes.
Q. -- handed me the documents for? So we'll mark these 7-B.
(Wylie Deposition Exhibit No. 7-B was marked for identification.)
BY MS. ABRAMS:
Q. What else did you bring?
A. This is a letter and a set of samples from a flotation project that R. T. Vanderbilt had undertaken.
Q. What's a flotation project?
A. Flotation is a process of mineral separation.
Q. Did you do the flotation for them?
A. No.
Q. They did the flotation?
A. Yes.
Q. What's the purpose of it?
A. You have to ask them.
Q. Did they send you sample -- they apparently sent you

samples from the flotation project?
A. Yes.
Q. Can you look at the pages and tell me what they've asked you to do there?
A. It says they're for fiber evaluation.
Q. Okay. Did you do a fiber evaluation; do you know?
A. Here it is.
MS. ABRAMS: Could you repeat the question?
(The reporter read back the previous question.)
THE WITNESS: That, if you look at the beginning of that report, it answers some specific questions that were posed about those samples, and that's what I answered.
BY MS. ABRAMS:
Q. Do you know where the samples were from or what they are?
A. They were samples that came from the Gouverneur talc district, as far as I know, but actually I don't know. It doesn't say but --
Q. So you --
A. Assumed.
Q. Do you know whether the seven samples for the flotation project are included in the group of samples here?
A. They are.
Q. So we'll mark this as --
THE REPORTER: 13.

MS. ABRAMS: Okay. Exhibit 13.
(Wylie Deposition Exhibit No. 13 was marked for identification.)
BY MS. ABRAMS:
Q. Can you look through your papers and tell us what else is referred to, what other studies?
A. This is a letter on ceramic greenware.
Q. Do you recall looking at ceramic greenware?
A. I don't really know what it is, so --
Q. And did you get it from Mr. Kelse?
A. Mm-hmm. This is --
Q. How did -- go ahead.
A. Go ahead.
Q. Please.
A. I was just going to continue.
Q. Are there other documents in there that pertain to the ceramic greenware study you might have done?
A. I think that's the only one that has that name on it.
Q. Okay. I'll put this aside. What else do you have?
A. NC Ceramic Supply gear casting slip.
Q. Okay. Is that -- do you think that's related in some way?
A. Probably.
Q. Okay. Are there other documents in there regarding

ceramics?
A. Ceramics.
Q. Let's put them all together.
A. Here, ceramic greenware.
Q. And this is -- you had -- you did some, a report from work that you did at STEMicro; correct?
A. Right.
Q. On the ceramic greenware. Anything else that pertains to ceramic greenware? Let's just mark them all as one exhibit.
A. No.
MS. ABRAMS: Okay. This will be 14.
(Wylie Deposition Exhibit No. 14 was marked for identification.)
BY MS. ABRAMS:
Q. Do you recall any issue with respect to asbestos in ceramic, encased ceramics that R. T. Vanderbilt was interested in knowing about?
A. I don't really know how to answer that question.
Q. Okay. Do you recall anything about this analysis?
A. No.
Q. Let's continue. What else --
A. This says something about ceramics also, and it also says Nytal 99.
Q. Okay. Any other ceramics? This is a 1984 document,

and we'll mark this as Exhibit 15. This shows that there was a Texas, Texas lawsuits regarding Nytal 99. Do you recall Texas lawsuits --
A. No.
Q. -- with the customer Aztec Ceramic?
A. No.
Q. Do you know if Vanderbilt supplied materials to Aztec Ceramic?
A. I don't.
MS. ABRAMS: This letter will be 15.
(Wylie Deposition Exhibit No. 15 was marked for identification.)
BY MS. ABRAMS:
Q. And you did analysis -- or strike that. Did you do analysis on this sample in 1984 for R. T. Vanderbilt so far as you know?
A. I don't know. If it's not in my, among my papers, I don't know that I did.
Q. And would you look that -- there's actual chain of custody information as to what that material is that's in the letter; correct?
A. I don't recognize chain of custody. I wouldn't know what you were talking about.
Q. Well, it tells, this letter tells you what the material is and where it came from. Isn't that right?

A. It says, it gives a date. It says RTV order number. It says the grade. I mean I can read it from here; Aztec Ceramic, car number and tons.

Q. It says the retained shipment sample enclosed was identified as follows; correct? And then it tells you how it was identified. That was right?

A. Would you like me to read it? The retained shipment sample enclosed was identified as follows.

Q. What else do you have documents?

A. This is Nytal 200, a report of a sample I received from the Environmental Protection Agency.

Q. Do you know why you received a sample from the Environmental Protection Agency of Nytal?

A. I don't.

Q. Do you recall receiving it in 1985?

A. No.

Q. Do you recall that you were asked to determine if there was chrysotile or amphibole asbestos in the material as reported by you on your notes?

A. It says I received this bag identified. The objectives were stated, that the sample was examined to determine if chrysotile asbestos or amphibole asbestos was present in the material and to identify all fibrous constituents in the material.

Q. And that was to Al Harvey? You sent him your

report; is that correct?
A. Yes.
Q. And you knew Al Harvey personally?
A. Yes.
Q. And you know John Kelse personally?
A. Yes.
Q. You met and talk to him many times?
A. Who?
Q. John Kelse.
A. What -- define many.
Q. How many times have you talked to John Kelse?
A. Ten.
Q. How many times have you talked to Slim Thompson?
A. Twenty.
Q. You wrote papers with Mr. Thompson? Have you written papers with Slim Thompson?
A. Hmm, you know, I don't think so. You've got my CV?
Q. I probably do. I have everything else.
A. Well, you can look at it and tell me.
Q. You've written with John Kelse?
A. No.
Q. Do you recall this document, the "Asbestiform and Prismatic Mineral Growth Habit and Their Relationship to Cancer Studies"?
A. Oh, this, I do, mm-hmm.

Q. And that was with John Kelse; correct?
A. No, not that I know of. Oh, he's on here, but this is a paper that -- it's not a paper.
Q. What is it?
A. I'm sorry. So I really didn't understand your question.
Q. Okay.
A. It's not a published paper. It was put out by the National Stone Association, and I mean the information is, is worthy, but it just wasn't a published paper.
Q. And how did you come to be part of this group that put this paper out?
A. I was probably invited to participate.
Q. And that was with -- do you know Kelly Bailey from Vulcan Minerals?
A. I do.
Q. And you know John Kelse?
A. I do.
Q. And Rich Lee?
A. I do.
Q. And is Mr. Lee a friend of yours also?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I know Rich Lee. He's a colleague.
BY MS. ABRAMS:
Q. When, when did you write this paper?

A. I didn't write it.
Q. What participation did you have in this paper?
A. I provided some of the data.
Q. And for the record this is a March 2004 pictorial presentation, "The Asbestiform and Prismatic Mineral Growth Habit and Their Relationship to Cancer Studies," and we'll mark this as the next in order, but I'll need a copy because I need my copy back.
(Wylie Deposition Exhibit No. 16 was marked for identification.)
BY MS. ABRAMS:
Q. I just want to be clear for the record. This isn't something you brought. This is something I brought, and I'm putting it in the middle of your papers so we'll have a clear record on that.
Do you know what, where this has been used or what your purpose was in participating in it?
A. That's two questions. The first question, do I know where it's been used? The answer to that is no, other than to say that I believe that the National Stone Association has taken the document to the regulatory bodies to present the data from it.
Q. Who was the principal author of this paper?
A. Kelly Bailey.
Q. Was he the one that you were communicating with --

A. Yes.
Q. -- about the paper? So did you know that Mr. Kelse was involved in the paper?
A. I don't remember.
Q. Or Mr. Lee?
A. Oh, I'm sure along the way that I, I did know, but it's a -- you know, we all contributed to that paper. I did some specific analysis actually on that paper.
Q. What analysis?
A. Provided data.
Q. What, do you recall what that was?
A. If you give it back to me, I can tell you. I provided the material for Exhibit P and photographed it.
Q. Okay.
A. Anyway, I probably took some of the other photographs. I can't remember.
Q. Did you prepare any of the text?
A. I edited it. I reviewed it.
Q. So you reviewed the whole paper?
A. I did review it, yes.
Q. Do you -- did you review the -- and in this paper you talked about the Stanton talc samples as Vanderbilt samples?
A. I, I have to refresh my memory.
Q. It says Stanton tremolitic talc samples 6 and 7.

Those are the ones that you understand that Dr. Stanton --
A. Yes.
Q. -- that's your testimony --
A. Yes.
Q. -- that it's, that it's Vanderbilt talc. Now, in this paper on page 44, do you know who summarized the health studies with respect to R. T. Vanderbilt Company?
A. Prob -- I don't know.
Q. Do you endorse, did you endorse for this paper the statement that the Brown, Wagoner NIOSH 1980 publication concluded, quote, "exposures to asbestiform tremolite and anthophyllite stand out as the prime suspect etiological factors associated with observable increase in bronchogenic cancer," end quote, which is their findings, and then the statement of the paper no confirmed mesotheliomas?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Did you read that when you, when you endorsed these findings?
A. My, my expertise, when you do a joint paper, your expertise is the part that you involve yourself in.
Q. Do you know, Dr. Wylie, whether there have been cases of mesothelioma in Gouverneur?
A. That question is too open-ended, I'm sorry. In the town? I don't really know what you're talking about.

Q. Do you know that Gou --

MR. RADCLIFFE: Let me just say that, that you represented to the court that you needed to take Dr. Wylie's deposition as a percipient witness, and is it your position that the incidence of mesothelioma cases in Gouverneur has to do with her involvement in the past as a percipient witness?

MS. ABRAMS: This is a paper that Dr. Wylie wrote which --

MR. RADCLIFFE: That's not accurate.

MS. ABRAMS: Excuse me. This is a paper that she edited, reviewed and endorsed. She just testified to that. The paper states there were no mesotheliomas in Gouverneur. I'm just asking her if she's aware that there are mesotheliomas in Gouverneur.

MR. RADCLIFFE: Fine, but we also --

MS. ABRAMS: So we can talk about it --

MR. RADCLIFFE: We also --

MS. ABRAMS: -- or she can answer the question or you can tell her not to, but I don't want to spend a lot of time on this because I have a very limited time, Tom, and I just want to move on.

MR. RADCLIFFE: I don't want to spend any time on it because that's not why we're here.

MS. ABRAMS: So that's my question, and I want to know if she's going to answer it.

MR. RADCLIFFE: Well, it's -- you do have -- we all have a limited amount of time, and if you're going to waste it like this, it's going to be severe. Go ahead and answer, Doctor, if you know.

THE WITNESS: I don't understand the question.

MS. ABRAMS: Could you read back the question?

(The reporter read back the previous question.)

THE WITNESS: In the town of Gouverneur?

BY MS. ABRAMS:

Q. Among Gouverneur talc workers.

MR. RADCLIFFE: Same objection.

THE WITNESS: I, I don't know that.

BY MS. ABRAMS:

Q. You -- do you know that there are mesotheliomas in the town of Gouverneur?

A. I don't know that.

Q. Do you know of any mesotheliomas in the Gouverneur talc area?

A. There's a report of, that I am aware of of mesotheliomas in the area.

Q. Is that the Hull Abraham paper?

A. Yes.

Q. And that's about New York State talc workers?

A. I don't think so. I don't -- that's not the way they're identified.

Q. How -- what's your understanding of how that --
A. They're people that, from that area. That's all I understood.
Q. Just general pop --
A. I haven't read it in a long time. That was my understanding.
Q. Okay.
THE VIDEOGRAPHER: Excuse me, Miss Abrams.
MS. ABRAMS: Yes. Go ahead and change the tape.
THE VIDEOGRAPHER: This marks the end of volume one, tape number one, in the deposition of Dr. Ann Wylie. Going off the record. The time is 3:55 p.m.
(Discussion off the record.)
(Wylie Deposition Exhibit No. 2 was re-marked for identification.)
THE VIDEOGRAPHER: Back on the record. Here marks the beginning of volume one, tape number two, in the deposition of Dr. Ann Wylie. The time is 3:58 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, I want to go back to the bottles that you brought and ask you, each of these bottles has a little label inside of it. Did you write those labels?
A. I did.
Q. And was that recently when you just produced these samples?

A. Yes.
Q. So is it correct that you found some sample in a drawer or somewhere, you took material out of that sample and put it in a bottle, and you put a label in the bottle that was, that identified the material that, where you took it from?
A. That's correct.
Q. So is the label in the bottle the exact label that you have in your sample in your lab?
A. It's the exact label.
Q. Okay. How do you know that these are all the samples that you looked at for R. T. Vanderbilt?
A. They're the samples that I have in my laboratory. I looked through all my places where I keep them and --
Q. Well, you mentioned to us you didn't look or produce the Stanton samples. So obviously you didn't look in that area where the Stanton samples are; correct?
MR. RADCLIFFE: Object to the form. Go ahead.
THE WITNESS: I didn't look at the Stanton samples for R. T. Vanderbilt.
BY MS. ABRAMS:
Q. You didn't look at any Stanton samples; correct?
A. Oh, I've looked at a lot of Stanton samples, but I didn't look at them for R. T. Vanderbilt.
Q. Let me rephrase the question.

A. Okay.
Q. When you produced samples for us --
A. Yes.
Q. You did not go to the place where you have the Stanton samples and produce any of that material; is that correct?
A. I did not.
Q. Okay. So you didn't look in that material for this production. How do we know that you have looked everywhere in your lab where samples might be?
A. Because I'm telling you I did.
Q. So the only other place where you might have looked is a box of samples that came from, that were Dr. Stanton's samples, and you specifically didn't look there; correct?
A. That's correct.
Q. Okay. I'd like to move on and ask you some questions about some of the documents that were produced to us by R. T. Vanderbilt that may also be contained in the exhibits that we have been looking at. Let me just find my notes here. When you received material from R. T. Vanderbilt to analyze, what form did it come in?
A. Usually in a plastic bag.
Q. Was it generally a powder material?
A. Generally.
Q. Was there any other kind of material you received

other than powder?
A. The samples of western talc were particulate.
Q. Are those included in the --
A. Yes.
Q. -- bag here?
A. You know, pieces. By particulate I mean gravel-sized pieces.
Q. Okay. You did a study with Dr. Mossman?
A. Yes.
Q. And Skinner?
A. Yes.
Q. And that, in that study you received some materials from R. T. Vanderbilt; correct?
A. That is correct.
Q. Are those materials contained in this group of materials?
A. No, they're not.
Q. And why not?
A. Because that was a research project.
Q. So every, it is not correct that everything that R. T. Vanderbilt sent was put in there; correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I'm sorry about that. I thought I made it quite clear that the samples that they gave me for the work that Bill Greenwood did are also not there. So any

samples that I receive for research projects I, I did not include.

BY MS. ABRAMS:

Q. What's your definition of a research project?

A. It's a project over which I have total control, and it's a project that I've undertaken because I want to study a problem.

Q. So is it your testimony that no one got paid for any of the work that was done in the paper that you did with Mossman/Skinner?

A. No. I had -- that's not so. I had students working on that project, measuring and counting and sizing, you know, particles and the, all of that. They were paid.

Q. By who?

A. They were -- they must have been paid by a grant to the University of Maryland. So I guess there was another grant.

Q. From R. T. Vanderbilt?

A. It must have been, yes.

Q. Did R. T. Vanderbilt pay Professor Skinner?

A. I don't know.

Q. Did R. T. Vanderbilt pay Professor Mossman?

A. I don't know.

Q. If R. T. Vanderbilt granted money to the University for your research with Professors Skinner and Mossman, you

consider that not -- you consider that independent research; correct?
A. I do.
Q. And, therefore, for some reason those samples can't be included?
A. They belong --
MR. RADCLIFFE: It's not for some reason. She's already stated that they belong to the University of Maryland and not to her.
MS. ABRAMS: Is that an objection?
MR. RADCLIFFE: It's an attempt to stop the same questions over and over again because, as you say, we are here for a limited amount of time.
MS. ABRAMS: What's the objection?
MR. RADCLIFFE: Asked and answered.
MS. ABRAMS: Could you read the question back, please?
(The reporter read back the previous question.)
BY MS. ABRAMS:
Q. Is there a reason they can't be included?
A. They belong to the University of Maryland.
Q. And how much material do you have left from the Mossman/Skinner work?
A. I don't know.
Q. Is it more than what's included in one of those

bottles?
A. I don't know.
Q. When was the last time you looked at that?
A. Many years.
Q. Where is that material kept in your lab?
A. It's in my laboratory.
Q. Where?
A. I don't know.
Q. Did you run across it when you were looking and producing these samples?
A. No.
Q. Did you -- and you received no legal advice from your attorney or the University that you could not produce material that was requested from the subpoena because it belonged to the University; is that correct?
MR. RADCLIFFE: Object. Asked and answered. Misstates prior testimony. Go ahead.
THE WITNESS: Answer, okay. I asked the University attorney whether I had to produce samples that were part of research projects, and he told me no.
BY MS. ABRAMS:
Q. What other samples other than for the Mossman study and the Stanton studies do you have that you have not produced today that have to do with R. T. Vanderbilt or International Talc?

MR. RADCLIFFE: Object to the form.

THE WITNESS: I've already answered that question, that the samples that were provided for William Greenwood's thesis research.

BY MS. ABRAMS:

Q. I'm sorry. That's correct. Anything else?

A. No.

Q. I'll attach as the next in order -- could you look at these documents and tell me if you recall Mr. Kelse paying money to Catherine Skinner for work done on the research project?

MR. RADCLIFFE: For the record let me note that this is a, evidently a bill from Yale University with a check, two checks which you're showing to Dr., I'm sorry, I'm showing to Dr. Wylie.

BY MS. ABRAMS:

Q. Right. Were you aware of those?

A. I know nothing about this.

Q. Were you aware that -- well, strike that. Do you generally provide drafts of papers, research papers to corporations prior to publication?

A. No. I take that back. If in the event that there is proprietary material, it is sometimes required that papers be reviewed.

Q. Are you aware that -- let me attach as the next in order a letter to you from Catherine Skinner and some attachments and ask you if you recall receiving that letter?

(Wylie Deposition Exhibit Nos. 17 and 18 were marked for identification.)

A. No.

Q. Do you know that there was correspondence during the time of the research that you, Brooke Mossman, Catherine Skinner did between Catherine Skinner and John Kelse and Brooke Mossman?

A. Well, this says it's to me, but I don't have any recollection.

Q. Well, that wasn't my question.

MS. ABRAMS: Could you read the question back, please?

(The reporter read back the previous question.)

THE WITNESS: I, I don't remember. I have no memory of it.

BY MS. ABRAMS:

Q. Do you know, was there a grant to the University for, from R. T. Vanderbilt for mineralogical characteristics of fibrous talc?

A. Yes.

Q. What was mineralogical characteristics of fibrous talc?

A. That was the work that William Greenwood worked on.

Q. Did you publish a paper out of that?
A. I think I already answered that question that his --
Q. No, I didn't -- I'm not asking if he published a paper.
A. No.
Q. Did you use --
A. His work.
Q. Did you use any of his research in your own publications?
A. I may have referenced him. I, I don't recollect.
Q. I'd like to show you an August 25th, 1982, letter from you to George MacDonald, Rollins Burdick Hunter of Illinois, and ask you to take a look at that.
A. Okay.
Q. And actually before we talk about this paper, is it correct that the samples in the paper you did with Mossman and Skinner came from R. T. Vanderbilt?
A. Um --
Q. Or some of the samples?
A. Some of the samples.
Q. You don't know where they got those samples from; correct?
A. No.
Q. You didn't go to the mines or mill the product; correct?

A. No.
Q. And it didn't come from a bag that they sent you, an unopened bag of finished product material; correct?
A. That's correct.
Q. It was taken on their representation that the material that they sent you is what it was; correct?
A. Correct.
Q. Okay. Now, turning to this August 25th letter. If you would, please, look at your definition here of what is asbestos, the four characteristics.
A. Excuse me. This is not a -- these are not characteristics of asbestos. They're characteristics of the habit of asbestos.
Q. Okay. All right. With that correction would you take a look at that.
A. Mm-hmm.
Q. And if I could just read that for the record. I apologize I don't have another copy, unless there's one in this stack here. That in your -- in 1982 you noted that there needed to be fiber bundles exhibiting splayed ends, parallel extinction, parentheses, (the non-asbestiform varieties may exhibit oblique extinction); curved fibers, and extreme elongation often in excess of a 100 to 1. Did I state that right?
A. (Witness nodded head.) Yes.

Q. Can you tell me what the parallel extinction and your statement the non-asbestiform varieties may exhibit oblique extinction, what that means?

A. The non-asbestiform vari -- the asbestos, asbestos is composed of amphiboles that have formed in the asbestiform habit and a serpentine mineral known as chrysotile in the asbestiform habit. Of the amphiboles there is most of the amphiboles in the world, and there's probably about a hundred of them, occur in a crystal with a structure that has, it belongs to a crystal system known as orthorhombic. The rest of them belong to a crystal system known as monoclinic, and monoclinic minerals exhibit extinction characteristics at an angle to their direction of elongation. That's the normal case.

In the asbestiform habit, however, the fibrills are smaller than a wavelength of light. They occur in bundles, and their properties are anomalous, and so instead of displaying this oblique characteristic at an angle their extinction is parallel to the direction of elongation. So it's an anomalous property associated with that habit.

Q. Is there a way to state that in lay terms?

A. No.

Q. Is there a way to state that in any less -- in any more available vocabulary?

A. I thought I was explaining it fairly straight-

forwardly. I could have been much more complicated.
Q. Is there a way to make it simpler?
A. I could tell you that the property must be observed under the polarized light microscope, and that parallel extinction is the property of, under polarized light, under the polarized light when the nickels are crossed. You know, do you want me to go into this?
Q. No. Thank you.
A. It's a very distinctive property. I can tell you that.
Q. You said curved fibers. Does crocidolite have curved fibers?
A. Yes.
Q. In what way are they curved?
A. They're curved.
Q. For example, there's a very different presentation between a crocidolite fiber and a chrysotile fiber; correct?
A. They're different minerals.
Q. Did -- is -- chrysotile is curved or --
A. Well, chrysotile can be curved. It's curved, yes, and when it's in the asbestiform variety.
Q. Okay. So that's not -- the curve or straightness of a fiber is not a distinction between chrysotile and amphiboles?
A. No.

Q. Okay. And here you said that extreme elongation often in excess of 100 to 1. That's the aspect ratio?
A. Yes.
Q. Do you know in 1982 where you obtained that definition?
A. I wrote it.
Q. Do you know what you relied on to write that definition?
A. Observations of many, many samples.
Q. Was there an existing mineralogy text that you relied on with that definition in it?
A. No.
Q. Were there mineralogy texts that had definitions of asbestos?
A. Hand specimen characteristics, yes.
Q. What do you mean by that?
A. I mean they're -- the definition that you find in the most famous mineralogical reference book called Dana, Dana's Textbook of Mineralogy has hand specimen descriptions of minerals. So they describe and it describes asbestos. There's a Dictionary of Geology. It has hand specimens with the kinds of properties that you observe if you pick this stuff up in your hand, not under the microscope. That's a microscopic definition.
Q. Were there textbooks that ident -- had microscopic

definitions of asbestos, asbestiform habit as you say?
A. Not directly. There are some optical texts that point out the parallel extinction characteristics of asbestos.
Q. So in 1982 is it fair to say that you identified this as a definition of asbestiform habit that was not necessarily documented in any prevailing texts?
A. The charact -- the characteristic of asbestos as having parallel extinction had been well documented.
Q. How about as a 100 to 1 aspect ratio?
A. That's based on my observations.
Q. And that's in looking at, well, observations of which, what types of asbestos?
A. All types.
Q. For example.
A. Crocidolite, amosite, actinolite asbestos, anthophyllite asbestos, tremolite asbestos, chrysotile --
Q. So you --
A. -- asbestos.
Q. Who identified the tremolite asbestos as asbestos that you looked at to know that that was, that fit within an appropriate definition?
A. Who? Well, the samples came from building materials. The samples came from the Smithsonian. The samples came from the collections at the United States Bureau of Mines. The samples came from mine products, asbestos mine

products. They were mining it and they produced it as that. It's a commercial term and it had that as their product; lots of different sources.

MS. ABRAMS: Respectfully move to strike as nonresponsive. It was a bad question.

BY MS. ABRAMS:

Q. It's not your fault. Let me try it again. Did you --

MR. RADCLIFFE: If it was a bad question, it probably was responsive then, but go ahead. Sorry to interrupt.

MS. ABRAMS: That's okay, Tom.

BY MS. ABRAMS:

Q. It's correct that in 1982 when you wrote this definition to George McDonald there is not a textbook that you could point to to say this is, you can go and look here and this is kind of a textbook definition. Is that fair?

A. Yes. You know, I don't know what year the publication came out from the Bureau of Mines, but I believe that a facsimile of that definition is published, and I'm not -- I think it was after this. So if that's the case, and it's not a text -- it's not a textbook. Textbooks generally don't have that kind of information in them.

Q. The government's definition, the NIOSH definition of asbestos, asbestiform habit was different, correct --

MR. RADCLIFFE: Object to form.
BY MS. ABRAMS:
Q. -- at that time 1982?
A. I don't remember.
Q. You say in this letter -- well, strike that. Was it your observation that materials that were amphiboles in this sample that did not meet this definition were cleavage fragments?
A. Yes.
Q. Was it a process of elimination so that those materials that did not exhibit the four characteristics that were amphiboles would by definition be in the alternative cleavage fragments?
A. Those are population characteristics, not individual particle characteristics.
Q. So would that be correct for the population of amphiboles that if they did not fit the four criteria, by definition they would have then been defined as cleavage fragments?
A. No.
Q. Okay. What would they be if they were something that didn't fit the four categories and were not cleavage fragments?
A. They could have been bisolite fibers. There are, there are other habits. They could have been massive

varieties that didn't exhibit cleavage.
Q. Well, in this letter you say, and I'll hand it to you, the tremolite and anthophyllite present as major constituents of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments.
A. That's correct, because they exhibited all of the characteristics of cleavage fragments.
Q. Did you -- and what characteristics -- and then you go on to say most of the cleavage fragments are elongated and many have aspect ratios in excess of 3 to 1.
A. That's correct.
Q. So then you go on to say, according to our existing federal government regulations these cleavage fragments can be called fibers. However, this is not mineralogically valid. I observed no anthophyllite or tremolite asbestos fibers in the samples I examined.
A. That's correct.
Q. Did you state here why you believed that those fibers were cleavage fragments?
A. I didn't.
Q. Now, you mention in here also fibrous talc, and that's something you had seen in the samples, in some of the samples that you have reviewed from Gouverneur; correct?
A. I have, yes.

Q. And the fibrous talc, can you tell me, if you could, was the fibrous talc in that material asbestiform, if you can tell from that?
A. Yes. It says it also exhibits the characteristics listed above for the asbestiform habit.
Q. The fibrous talc?
A. Yes.
Q. And you, do you recall, you looked with polarized light microscopy and dispersion staining. What's dispersion staining?
A. It's a method of evaluating the index of refraction of the material.
MR. RADCLIFFE: Can I see that exhibit for a moment?
MS. ABRAMS: Sure.
BY MS. ABRAMS:
Q. What -- could you briefly say what you do?
A. Sure. You put them out, make them out of, small amount of material, you put it in an oil with known index of refraction, and for dispersion staining which you, is one method of looking at it you use a special objective, and the objective has like a little black dot on the back focal point of the objective, and so the, some of the light is refracted at the boundary between the mineral and the oil.
Q. Okay.
A. And the, if the, if there are, there are, are many

different indices of refraction for different wavelengths within the visible spectrum. So take, for example, a situation where you have a mineral whose, some of the middle part of the visible spectrum has an index of refraction that's equal to the oil; it's not bent. If it's the upper part of the spectrum or the lower part of the spectrum it has different indices of refraction and so it will be bent at the interface.

So when you have this little black dot on the back of the objective, the central part of the light coming through in the middle part of the visible spectrum is blocked, and so you don't see it, and so you end up with the mineral particle taking on a color, and that color is a, the result of part of the spectrum coming through and the, and part not, part being blocked.

So that's what dispersion staining actually does. And so you can put a mineral in a lot of different oils. You put this special objective in. You see the particles take on particular colors. That tells you something about which part of the visible spectrum the oil and the mineral have basically the same index of refraction.

MR. RADCLIFFE: I hate to interrupt, but I want to double check something with the court reporter, if I may. Can you show me the previous question?

MS. ABRAMS: Would you mind reading it? Don't you

-- you can --

MR. RADCLIFFE: No, before. Okay. No, before that.

MS. ABRAMS: What was the question? You don't have to put this on the record. What was the question?

MR. RADCLIFFE: It was, and the fibrous talc, can you tell me if you could was the fibrous talc in that material asbestiform habit, if you can tell from that?

MS. ABRAMS: Okay. Are you ready?

MR. RADCLIFFE: Yep.

BY MS. ABRAMS:

Q. So do you -- this sample is not identified. Do you know whether the sample that is referred to in this 1982 paper is included in this package?

A. It said it's identified as tremolitic talc. I don't know.

Q. Okay. You mention in here there may be a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc present from this locality. Strike that. I take that back. I apologize. I misread that. Although I did not observe any in the sample portion I examined, there may be a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc present from this locality. Do you know what you based that observation on?

A. Probably other material from the area.

Q. So you, you know that there are fibers that are in that anthophyllite asbestos fibrous talc transition. Is that a transition?

MR. RADCLIFFE: Object to the form.

THE WITNESS: There are particles that have optical properties that are intermediate between the mineral anthophyllite and the mineral talc.

BY MS. ABRAMS:

Q. Is that a transitional fiber?

MR. RADCLIFFE: Object to the form.

THE WITNESS: That has --

BY MS. ABRAMS:

Q. Go ahead.

A. It has been referred to as that.

Q. Do you refer to it as a transitional fiber?

A. I usually use the term intermediate, but maybe I've used it. You know, that's -- there are particles between.

Q. So your -- in this letter your, your aspect ratio was in the 100 to 1 neighborhood; correct?

A. That does not mean that all particles have that aspect ratio. It means that within the population of the material, the mineral, you find particles that range up to a 100 to 1.

Q. Did you have a lower limit at the time in 1982 of what the aspect ratio needed to be that you recall that's not stated on this paper?

A. No.
Q. Do you know what reason there was that you didn't state it here?
A. No.
Q. Let me show you --
MR. RADCLIFFE: Is that -- did you mark that?
MS. ABRAMS: Sorry. This is -- it's produced by R. T. Vanderbilt as WES 000840.
MR. RADCLIFFE: Thank you.
BY MS. ABRAMS:
Q. The next document I want to talk to you about, Dr. Wylie, is WES 000838. If you would take a look at that.
A. Mm-hmm.
Q. It's, there's a handwritten date at the top March 8th, it appears to be 1983. Is that your handwriting?
A. It looks like it.
Q. And does that -- is that correct, it's 1983?
A. It looks like it.
Q. So this was written less than a year later. This is a letter to Mr. Guy Driver. Do you know who that is?
A. He was a lawyer for R. T. Vanderbilt.
Q. You were testifying, it says with a view towards testifying. Was that a case that you were doing some work for R. T. Vanderbilt for, the Poindexter case?
A. I have -- I don't remember that.

Q. You don't have an independent recollection right now about this incident?

A. No.

Q. And without looking through all the samples do you recall whether these Nytal samples are among the ones that you produced here?

A. I, I don't remember.

Q. Now, you -- here you use polarized light microscopy Becke line technique and dispersion staining. What is Becke line technique?

A. It's a different -- it's a traditional or a typical technique that mineralogists have used for centuries really to determine the relationship between the index of refraction of the mineral and the index of refraction of an oil. The dispersion staining methodology that I described to you before is a different way of viewing the same phenomenon. Becke line is a different way of viewing the same phenomenon: The split of part of the visible spectrum having one relationship to the solid and part of the visible spectrum having a different one, and when that occurs, one sees, when you sort of defocus the microscope, you see rings of color around the edges of the micro, of the particle, sometimes going into the particle.

Q. Was there a reason you didn't use the Becke line technique in 1982, in the previous study?

A. I have no -- I don't remember.

Q. Is there a -- is there some rationale for particular situation where you would have used it?

A. Normally speaking, I use Becke line technique. Dispersion staining I was experimenting with at that time to see how it worked. So maybe I just applied it because I was experimenting with it. It's the same -- you're using the microscope in exactly the same way. You're observing a physical phenomenon in two dif -- using two different ways of seeing exactly the same phenomenon, and so I, you know, was probably experimenting with dispersion staining. I may have begun to be teaching it. I don't know.

Q. Do you know whether this was the case, the litigation case was a mesothelioma case?

A. I have no recollection.

Q. Do you -- now if you look at your four characteristics of the asbestos, asbestos habit, number two is parallel extinction, a characteristic of asbestos only when the ordinary varieties exhibit oblique extinction such as for tremolite. That was a little bit of a refinement from your previous letter; is that right?

A. Slightly different, mm-hmm.

Q. And do you know why you changed that statement?

A. No. It says the same thing.

Q. Okay.

A. It says for those minerals that normally exhibit oblique extinction. I believe it really says exactly the same thing.

Q. So it -- do you know whether, was this the first litigation case that you were involved in for R. T. Vanderbilt?

A. I don't remember.

Q. Do you know, have you ever been involved in cases of workers' compensation in New York?

A. I, I don't -- I don't know.

Q. Okay.

A. I mean, you know, I've been involved in a very small number of cases, and to tell you the truth I really don't know what they were.

Q. Okay. And again, you say extreme elongation often in excess of 100 to 1 without a definition of the lower limit; correct?

A. Correct.

Q. Did you have at that time an idea of what the lower limit was?

A. I don't believe there is a lower limit. Asbestos is asbestos independent of the aspect ratio.

Q. So the aspect ratio could be 3 to 1?

A. Or 2 to 1.

Q. Could there be -- well, strike that. Now, in this report you found that tremolite and anthophyllite were major

constituents of the samples; is that right?
A. Yes.
Q. And again you said that these were cleavage fragments?
A. Yes.
Q. In fact, if you look back at the other letter, that the language of this letter is quite similar to the first letter. Was this something that -- strike that. Let's look at the first letter.
The first letter says in August 1982 to Mr. MacDonald the tremolite and anthophyllite present as major constituents, present as major constituents of the samples, of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments. Those are identical statements; correct?
A. Yes.
Q. From 1982 of August to Mr. MacDonald to Mr. Driver in 1983. These were different samples; correct?
A. I believe the first one is just labeled tremolitic talc. I don't know what it was.
Q. One was done -- well, was the first one done for purposes of litigation?
A. I don't know. They were different materials. I'm sorry. They were definitely different samples.

Q. The sample that you were talking about here in 1983, well, you said most of the cleavage fragments are elongated and many have aspect ratios in excess of 3 to 1. Rarely particles with aspect ratios up to 20 to 1 were observed. Was that a finding that you were looking for, greater than 20 to 1?

A. I, I was not looking for that. I was looking to determine if there was any asbestos in the sample.

Q. When you say I observed no anthophyllite or tremolite asbestos fibers in the sample I examined, what definition were you using? Was that the definition as identified in numbers 1 through 4?

A. Yes.

Q. Now, you found true mineral fibers in the sample that you identified as fibrous talc. By that did you mean asbestiform fibers?

A. I meant fibrous talc.

Q. Correct. When you said true mineral fibers, were those asbestiform fibers?

A. They have the habit of asbestos -- asbestiform habit. They occur in the asbestiform habit. Yes. It exhibits characteristics listed above for the asbestiform habit. Yes.

Q. The -- when you say the maximum index of refraction of fibrous talc does not exceed 1.6 --

A. Yes.
Q. -- for -- could you read that?
A. The lambda equals 589 nanometers.
Q. Okay. If the -- if the fibers had -- if you observed fibers greater than 1.6, would that have meant that they weren't talc?
A. If I had --
MR. RADCLIFFE: Object to the form.
THE WITNESS: Yes.
BY MS. ABRAMS:
Q. Okay. So that the importance of the 1.6 and below is that that identified for you or helped identify that it was talc and not something else?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Does that make sense? Let me modify that. That showed you --
A. The inverse.
Q. That showed you it -- I'm sorry. Could you say what it is?
A. Well, just because something has an index of refraction less than 1.6 doesn't mean it's talc. Okay. I mean --
Q. The fact that it was less than 1.6 told you that it was too low to be tremolite or anthophyllite?

A. Correct.
Q. Okay. What did it need to be to be tremolite or anthophyllite?
A. Well, that's a complicated question, because the index of refraction of amphiboles is very much a function of their composition which is a variable, particularly iron-magnesium ratio, but in general what I looked for when I was using this as a discriminator was throughout the literature and all the samples, all the published data that I could have ever found on anthophyllite and tremolite I looked for the lowest indices of refraction that I could find, and that was my discriminator.
Q. Do you recall what that was?
A. For anthophyllite the highest index of refraction was around, as I recollect, around 1.606 that I -- the lowest --
Q. Yes.
A. -- highest index of refraction.
Q. Okay. Now, this says in the samples I examined there were a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc. What do you call those?
A. We, we already had this conversation.
MR. RADCLIFFE: Object to form.
THE WITNESS: Yeah, intermediate fibers.

BY MS. ABRAMS:
Q. Is there -- is there a textbook that says that those particular fibers would not be called anthophyllite asbestos?
A. The basic work on this was published in the '60s by Stemple and Brindley, and he was one of the premier mineralogists in the nation, and he called it fibrous talc.
Q. He was examining talc from Gouverneur?
A. He was.
Q. Other than that is there any reason in your mind why at this time when you were writing this you would not have called that anthophyllite asbestos?
MR. RADCLIFFE: Object to the form.
THE WITNESS: It did not have the appropriate optical properties for anthophyllite.
BY MS. ABRAMS:
Q. Part of it did; correct?
A. No.
Q. No part of that fiber looked like anthophyllite?
A. It had the wrong indices of refraction.
Q. Okay. In, in your 1982 report you say the maximum index of refraction of fibrous talc does not exceed 1.596; correct?
A. Yes.
Q. In your letter of --
A. Well, I assume -- you're reading something. I can't

see it.

Q. Well, I'm happy to show it to you.

A. I mean I'm assuming you're reading correctly. Yes.

Q. And in this letter in front of you in March of 1983 you say the maximum index of refraction of fibrous talc does not exceed 1.6.

A. Yes.

Q. Where is that difference from?

A. Well, it's almost within the error of the methodology, and I, I you know, may just be the oil that I was using. I don't really know. They're almost identical. That's not a big difference.

Q. Okay. Now, if I could, the next letter that I have that's or a report is WES 000410 through 422, and this is a December 4th, 1983, report of investigation from you to, regarding two samples received from Mr. N.v.d. Burgh sent at the request of Mr. J. L. Spoormaker of R. T. Vanderbilt Company. The two samples are labeled IT-325 and IT-FT. Could you take a look at that?

A. Mm-hmm.

Q. And I'm going to -- I'm going to mark and give you copies of these documents WES 0840 as Exhibit 19, and WES 838 as Exhibit 20.

MR. RADCLIFFE: I don't have any problem with you marking for identification a document with your highlighting or writing on it.

MS. ABRAMS: I'm going to get copies.

MR. RADCLIFFE: But I do want to substitute at some point a copy without writing or highlighting.

MS. ABRAMS: Right. Hopefully the copies won't be highlighted, and I'll ask the court reporter to do that. May I have that for a minute?

THE WITNESS: Sure.

MS. ABRAMS: Thank you. I got you. Do you want to take a break, a five-minute break? Do you need a break? Anybody need a break? Do you want to take a few minutes?

MR. RADCLIFFE: Are you almost done?

MS. ABRAMS: Hmm?

MR. RADCLIFFE: Are you almost done? Do you want to just go through and wrap it up?

MS. ABRAMS: I'm not almost done. What time is it?

THE WITNESS: Ten minutes to 5.

MS. ABRAMS: No. I've got quite a bit. I haven't talked to her about any of that.

(Wylie Deposition Exhibit Nos. 19 and 20 were marked for identification.)

MS. ABRAMS: But I'm almost -- well, I've got probably another half hour on this line of questioning.

MR. RADCLIFFE: Let's go.

BY MS. ABRAMS:

Q. Okay. Do you know who Mr. N.v.d. Burgh is?
A. No.
Q. Do you know who Mr. Spoormaker is of R. T. Vanderbilt?
A. No.
Q. In this report it says that you used polarized light microscopy and Cargille index of refraction liquids. Are those different from the ones you used in the past --
A. No.
Q. -- two reports? It's the same?
A. Same.
Q. You say scanning electron microscopy and energy dispersion x-ray analysis was not used because four of the major components of the material: Talc, serpentine, anthophyllite and talc-amphibole, cannot be distinguished readily by this method; is that correct?
A. Correct.
Q. What about --
MR. RADCLIFFE: Was your question did you read it correctly or --
MS. ABRAMS: Well --
MR. RADCLIFFE: -- was your question is that a correct statement of fact?
BY MS. ABRAMS:
Q. You can look at it. Would that also be true of TEM?

A. This was true in 1983.
Q. Okay. What about TEM?
A. I didn't have a TEM in 1983.
Q. In 1983 was there TEM?
A. I assume.
Q. And would TEM have been able to make that distinction?
A. No.
Q. You say in this, why don't you take a minute and just look at this report so that you can, I can ask you some questions about it.
A. All right. Well, I'm, I'm not going to read the whole thing. It's pages. Why don't you just ask me a question.
Q. Do you know, do you recall what the samples that were labeled, what they came in?
A. Bottles.
Q. Do you recall, was there any chain of custody with the samples as to where they came from?
A. No.
Q. They did not come from any particular product bags, sealed bags of the product?
A. I told you they, they just came in bottles.
Q. Could you read -- the aspect ratios for the tremolite were between what numbers?

A. One to 1 to 20 to 1. Most are in the range 3 to 1 to 10 to 1.
Q. And that would have at the time qualified as an asbestos fiber under the government's definition; correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I mean it would have classified, it would have qualified as a fiber.
BY MS. ABRAMS:
Q. Now, if you would, you found in this material fibrous talc in two different habits. If you could start and just review that paragraph and tell me were both of those habits in your analysis in that report asbestiform?
A. It says the first type can be called asbestiform, bundles, et cetera. Type II described as ribbon-like. These particles appeared wide low birefringent particles that may be almost isotropic.
Q. Is that asbestiform, the second one?
A. No.
Q. Okay. You say that anthophyllite particles are generally more acicular than the tremolite particles. They frequently have aspect ratios of 20 to 1 and when they have the shape they can only be distinguished from talc amphibole and talc by careful evaluation of the indices of refraction. Did those anthophyllite particles with greater than 20 to 1 aspect ratios, and I'll let you review your report, have the

appearance of asbestos?
A. Repeat the question, please.
(The reporter read back the previous question.)
THE WITNESS: No.
Q. You mention that -- and why is that? You say here that they --
A. Characteristics of asbestos were lacking in the anthophyllite mineral in the sample.
Q. You mentioned there's no indication of fiber bundle growth flexibility or extreme aspect ratio. What, what is fiber bundle growth flexibility? Was there, was there an indication of fiber bundle growth without flexibility? And feel free to look in your report.
A. I think there's a comma missing.
Q. Okay.
A. Fiber bundle growth, comma, flexibility. There's a comma missing.
Q. So in this report you did not see fiber bundle growth --
A. I didn't.
Q. -- for the anthophyllite?
A. I did not.
Q. But because this material -- strike that. You say but, however, the high aspect ratio particles may be mineral fibers even though they are not asbestiform. What does that

mean? What kind of mineral fibers? Strike that question.
What, what other type of fiber, anthophyllite fiber is there besides a non-asbestiform anthophyllite fiber and an asbestiform anthophyllite fiber?
A. All fibers are not asbestiform. There are minerals. There are mineral fibers. There are amphiboles that grow in a fibrous habit that is not asbestos.
Q. Is, is it correct, Dr. Wylie, that in this report you found something, you found anthophyllite fibers that you believed needed further examination? And I'll let you look at that.
A. Examination of the unprocessed ore would probably enable the distinction to be made.
Q. So is it fair to say there that you did not have sufficient information to make the determination as to whether or not the anthophyllite in that sample was asbestiform or not just based on the sample that you had?
MR. RADCLIFFE: Object to the form.
THE WITNESS: No. You -- no. What this question -- what this states is that in the definition I used for fiber is going to be quite different from the regulatory definition. So I'll tell you what it is so when I'm speaking about it you'll understand what I'm talking about. The word --
BY MS. ABRAMS:
Q. Well, I think we need to know what you meant then.

A. That's what I meant, then.
Q. Okay.
A. A fiber is a mineral particle that attains its shape by growth, not by breakage, and it's very difficult when you have these, in this case, these small number of highly elongated particles to determine whether or not they attained their shape by growth or by cleavage, and that is the question that I raised here. Examination of the unprocessed ore would better enable that distinction because the unprocessed ore has not been ground, and so you can determine from the unprocessed ore whether or not this material is a fiber, in other words, attained its shape by growth, versus having been crushed into this particular form.
Q. Assuming -- well, strike that. That examination then, if, if the material was from that examination by growth rather than breakage, that would have indicated it was asbestiform material; correct?
A. No.
MR. RADCLIFFE: Object to the form.
THE WITNESS: It would have indicated that it had attained its shape by growth and that it was a fiber. All fibers are not asbestiform.
BY MS. ABRAMS:
Q. It could also have shown that it -- well, don't fiber bundles get crushed as well in the processing?

A. Actually --
Q. Or do you know one way or the other?
A. Yes, I do. Asbestos, let's -- well, fiber bundles of --
Q. Actually let me just --
A. Let's start all over again.
Q. -- interrupt you for one second. Did you know back at this time when you wrote this whether fiber bundles were, when they were crushed, could be crushed with the milling process?
A. Fiber bundles of what?
Q. Of asbestos.
A. Okay. Asbestos, one of the properties of asbestos is that it has extraordinarily high tensile strength. It has such high tensile strength that it's practically impossible to crush it.
Q. Did Slim Thompson ever show you the rock that he got from Mine 3 that he said he couldn't crush with a sledgehammer?
MR. RADCLIFFE: Objection. It misstates the testimony.
THE WITNESS: No.
BY MS. ABRAMS:
Q. Is that what you mean by tensile strength?
A. No.

Q. Okay. Did you ever examine the unprocessed ore in order to be able to make the distinction?
A. No.
Q. So you were never asked to do further studies on this material in order to answer that question?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Is that correct?
A. Not that I recollect.
Q. So in your conclusion you say that Type I fibrous talc is clearly asbestiform, and talc amphibole and fibrous talc Type II form acicular particles, and there's evidence to suggest they are marginally asbestiform; is that correct?
A. That's what it says.
Q. Okay. Then you say the anthophyllite is both acicular and prismatic, and the particles may be formed by growth or cleavage or both. However, the anthophyllite does not appear to be asbestiform. You did not elaborate on why you believe that; correct, in the conclusion?
A. That's what, that's what it says.
Q. So had you ever, other than the Gouverneur talc area have you ever seen asbestiform talc before -- strike that. Other than in Gouverneur have you ever seen asbestiform talc?
A. Yes.
Q. What other areas?

A. Other talc deposits.
Q. Do you know where they are?
A. Yes.
Q. Where?
A. Georgia, California.
Q. The desert talc that you examined, was that also asbestiform talc?
A. No.
Q. Do you remember where in California you've --
A. No.
Q. Okay.
A. Montana.
Q. Then you say regarding, at the end you say, in fact, there is an apparent continuum between fibrous talc and anthophyllite in optical properties and habit. A similar series of minerals is present in anthophyllite asbestos from Finland. Do you recall saying that?
A. Yes.
Q. So is this the talc, the anthophyllite material that you viewed in this IT-325 and IT-FT had similar optical properties to the anthophyllite asbestos in Finland?
A. No.
Q. Okay. Could you just read that statement for me?
A. Sure. A similar series of minerals is present in anthophyllite asbestos from Finland. However, there fibrous

talc is a minor constituent while anthophyllite is abundant. Here fibrous talc is the most common phase, while talc-amphibole and anthophyllite occur in minor amounts.
Q. So that's the difference. They're kind of the reverse of one another; is that correct, in terms of the amount of anthophyllite and talc?
MR. RADCLIFFE: Object to the form.
THE WITNESS: The -- this is a series of minerals. This is not a series of mineral habits. This is a series of minerals.
BY MS. ABRAMS:
Q. Okay.
A. Okay. Minerals and mineral habits are two different things.
Q. Was what I just asked you correct though?
MS. ABRAMS: Could you read the question back, the one before?
(The reporter read from the record as requested.)
THE WITNESS: Yes.
MR. RADCLIFFE: Same objection.
THE WITNESS: That's correct.
BY MS. ABRAMS:
Q. Thank you. Now, I want to move on to, and then we'll take a break after this, the January 25th, 1985, report of lab analysis, and this is WES 000397. And let's mark the

December 4th, 1983, exhibit we just talked about as next in order which was WES 410 and pages following.

(Wylie Deposition Exhibit No. 21 was marked for identification.)

MS. ABRAMS: And the next in order for the January 25th, 1985, report of laboratory analysis, it will be Exhibit 22.

(Wylie Deposition Exhibit No. 22 was marked for identification.)

BY MS. ABRAMS:

Q. In this report on Nytal 99 which you -- well, strike that. This was about a sample of Nytal 99 that you got from Slim Thompson in October of 1984; correct?

A. Yes.

Q. And you used polarized light microscopy in conjunction with immersion oil techniques; correct?

A. Yes.

Q. And that's similar to what you'd done in the past?

A. (Witness nodded head.)

Q. Correct?

A. Correct.

Q. Here, here you say no asbestos was identified in the sample. Asbestos fiber populations are composed of either chrysotile or a member of the amphibole family that occur as particulates that display some or all of the following characteristics: Fiber bundles with splayed ends, curved fibers, aspect ratios in excess of 20 to 1 and widths less than one micrometer for fibers longer than five micrometers and matted masses of individual fibers. Did I read that correctly in the third paragraph?

A. Sounds right, mm-hmm.

Q. Where, where did you get that definition, from Dr. Wylie?

A. I wrote it.

Q. So you created it?

A. Mm-hmm.

Q. And what did you create it based on?

A. Well, I think by this point we had begun measuring particles. Data were available on the actual sizes of asbestos fibers, so we were able to be a little bit more -- I was able to be a little bit more specific.

Q. Where did you get the data from?

A. I measured the particles.

Q. So you measured material that you believed was asbestos and then you measured -- and then you determined based on those measurements what the appropriate parameters were for defining an asbestos material; is that correct?

A. In the optical microscope, yes.

Q. Did you discuss this definition -- well, strike that. Did, did you publish this definition in any, in any

peer reviewed literature?
A. I think so, yes.
Q. Do you know where at the time in 1985?
A. Oh, I don't remember.
Q. And here again in the fourth paragraph you note that you found asbestiform or fibrous talc; is that right?
A. Yes. Yes.
Q. So it's very -- you -- strike that. You had discussed in written form with R. T. Vanderbilt Company in the 1980s that they had a material called, that you determined was an asbestiform talc material?
A. Yes.
Q. Then you go on again in the last paragraph to discuss the tremolite and anthophyllite in the sample. You did find tremolite and anthophyllite; correct?
A. I believe that's what it says.
Q. And you say that they displayed the characteristics typical of cleavage fragments. Amphibole cleavage fragments lack the characteristics of asbestos. Individual particles longer than five micrometers typically do not exceed 20 to 1 in aspect ratio. That was the report on what you were finding in the sample; correct? The particles that you found that were longer than five micrometers did not exceed a 20 to 1 aspect ratio?
A. I think I was generalizing here. Individual

particles longer than five micrometers typically do not -- yes. I think that's -- I wasn't generalizing. I think I was referring to the subject -- you know, it's been a long time. I assume.

Q. So that's what you saw generally, but does that -- that's only what you saw generally. There may have been some in the sample that did fit that criteria; correct?

A. I -- it -- I said -- whatever I said there is what I said. I mean I, you know, I said generally, so it's possible they were a lot less, too. I mean --

Q. You say while some of the particles of anthophyllite in the intermediate talc amphibole have aspect ratios that are higher than those typical of tremolite, they do not display the characteristics of the asbestiform habit; correct?

A. Yes.

Q. So you found anthophyllite material and intermediate material that did display some characteristics of asbestos under your definition but not necessarily the characteristics of what you called the asbestiform habit; correct?

A. That would be correct.

Q. Now I want to move on to, and that is Exhibit 22. I want to move on to Exhibit, what I'll call Exhibit 23, report on sample of Nytal, August 14th, 1985, and your definition, here you're talking about tremolite under results, and you say no asbestiform tremolite was observed. Asbestiform tremolite and other asbestiform am -- amphiboles are --

(The reporter requested clarification.)

BY MS. ABRAMS:

Q. Asbestiform tremolite and other asbestiform amphiboles are characterized by fiber bundles exhibiting splayed ends longer than five micron -- um fibers with aspect ratios typically in excess of 20 to 1 and with less than 1 um, micrometer, flexible fibers, fiber bundles showing parallel extinction and/or matted masses of fiber. Was that your definition then?

A. Yes.

Q. Would you read the second-to-last paragraph, please --

A. Sure.

Q. -- on the study.

A. A few particles were encountered whose index of refraction parallel to elongation fell between 1.600 and 1.610. These particles are quite rare. They compromise (sic) much less than 0.1 percent of the sample. They have high aspect ratio greater than 20 to 1 and are best classified as talc-amphibole. They do not appear to be asbestiform although they are clearly fibers.

Q. So again you're noting an -- anthophyllite -- strike that. Were those anthophyllite fibers?

A. There -- I don't know.

Q. You're noting fibers that appear to have some of the characteristics of asbestos but that you do not believe to be asbestiform; is that correct?
A. That's what it says.
Q. And that would be based on the definition that you used that we just read of what you believed asbestos was at the time?
A. Yes.
Q. That's 23.
(Wylie Deposition Exhibit No. 23 was marked for identification.)
BY MS. ABRAMS:
Q. February -- oh, sorry. February 13th, 1987, you looked at for R. T. Vanderbilt samples of Nytal 100 and Pfizer CP 36-30 (sic) talc. Do you recall doing that analysis?
A. I don't remember doing it, but I have this document.
Q. Your definition of asbestiform now in 1987 is that it has to meet the following criteria: Mean aspect ratios ranging from 20 to 1 to 100 to 1 or higher in particles longer than five microns; (2) very thin fibrills usually less than .5 microns in width; and (3) two or more of the following: (a) parallel fibers occurring in bundles; (b) fiber bundles displaying splayed ends; (c) fibers in the form of thin needles; (d) matted masses of individual fibers; and (e) fibers showing curvature. Where was that definition from?

A. I wrote it.

Q. And that definition is not the same as the definition you previously had in 1980 -- in the earlier 1980s?

A. No. Knowledge advances. I knew a lot more about asbestos then.

Q. And so in this definition you believe the fibers needed to be now less than .5 microns instead of one micron?

A. At this point we had electron microscopy studies of populations, so we had better data.

Q. Okay. And who, and did you, did you write any text or other material that is used in educational institutions to define asbestos after 1987 to alert people of the change in the definition?

A. I've published a lot of papers, and they're out there, and they may be used in educational institutions or they may not. I don't know.

Q. Is it fair to say that the, this was still quite different from the federal definition of what asbestos was?

MR. RADCLIFFE: Object to the form.

BY MS. ABRAMS:

Q. At the time?

MR. RADCLIFFE: Object to the form. You keep on saying -- you said federal definition several times as if there's one single federal definition of what asbestos is, much less asbestos fiber.

MS. ABRAMS: That's fine.
BY MS. ABRAMS:
Q. Do you know of any federal definition of asbestos that was analogous to the one that you posit here in 1987 at that time?
A. Federal government has never really defined asbestos.
Q. Do you know of one federal entity that subscribed to this definition of asbestos in 1987?
A. Bureau of Mines.
Q. Any others?
A. No.
Q. Does -- is this specific definition in, of asbestos, was that published somewhere by the Bureau of Mines?
A. I think so, but I have to look at the paper. I published it a lot of places.
Q. So you published it for the Bureau of Mines?
A. No. I said I published a lot of places. The Bureau of Mines may also have published it.
Q. Do you know for a fact any publication where the Bureau of Mines adopted your definition of asbestos as written here in February 13, 1987?
A. I can't remember.
Q. And did -- you didn't use TEM in this analysis, did you?

A. In that analysis? No.
Q. You say some of the fibrous talc has the characteristics of the asbestiform habit. However, because it is talc it's not asbestos. Is it -- is it correct, Doctor, that there was a time when chrysotile was not considered to be in the same family as other asbestos materials?
A. It isn't today. It's a different mineral group.
Q. Okay.
A. Still considered that.
Q. So chrysotile is not considered asbestos?
A. Yeah. Chrysotile is asbestos.
Q. Okay. But it's a different mineral group; correct?
A. Correct.
Q. Let's mark this as 24.
A. But it's used commercially as asbestos.
(Wylie Deposition Exhibit No. 24 was marked for identification.)
MS. ABRAMS: Why don't we take a break now because I'm on the -- up to Mouldene.
THE VIDEOGRAPHER: This marks the end of volume one, tape number two, in the deposition of Dr. Ann Wylie. Going off the record. The time is 5:22 p.m.
(A recess was taken.)
THE VIDEOGRAPHER: Back on the record. Here marks the beginning of volume one, tape number three, in the

deposition of Dr. Ann Wylie. The time is 5:33 p.m.
BY MS. ABRAMS:
Q. We're back on the record. I want to go back to a discussion of the Mossman paper, the paper you did with Mossman and Skinner.
THE REPORTER: Excuse me. Can I shut this?
MS. ABRAMS: Yeah, sure. I can do that.
BY MS. ABRAMS:
Q. Let me see if I can refresh your recollection that the study you did from, with Mossman and Skinner was in response to a request from R. T. Vanderbilt?
A. Yes.
Q. Let me just show you. So these pages found in the files of R. T. Vanderbilt refer to the study that you did with Mossman and Skinner?
A. It seems to. I've never seen it before.
Q. Mark that next in order.
MR. RADCLIFFE: May I -- may I see that?
(Wylie Deposition Exhibit No. 25 was marked for identification.)
BY MS. ABRAMS:
Q. Let me show you, this is W -- this is RTV Weston 007943 which is a document produced by the R. T. Vanderbilt Company from the, stated by them from the files of John Kelse. I show you this, Dear John and Slim, and that will be John

Kelse and Slim Thompson; correct? And this is from you?

MR. RADCLIFFE: She hasn't --

BY MS. ABRAMS:

Q. Enclosing a draft number 3 of the paper that you sent to Brooke and Cathy. Does that refresh your recollection that R. T. Vanderbilt reviewed drafts of the paper you presented?

A. Yes.

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

BY MS. ABRAMS:

Q. Can you tell us now any more information on how this study came about and what R. T. Vanderbilt's role was in the study that you published with Mossman and Skinner and others?

A. They funded it and they provided the samples.

Q. Do you recall correspondence with them during the various steps of the process?

A. No.

THE VIDEOGRAPHER: Ma'am, I'm sorry. Those papers are rubbing up against your microphone.

MS. ABRAMS: Oh, I'm sorry. Thank you.

BY MS. ABRAMS:

Q. Do you recall that, that there was an issue that, that Professor Skinner found asbestiform anthophyllite or what appeared to be asbestiform anthophyllite in the material from R. T. Vanderbilt and that that was an issue that was raised

prior to the publication of the study?
A. There was -- are you referring to a document? Perhaps I could look at it.
Q. Well, right now I'm looking at a letter from John Kelse to Catherine Skinner which was not cc'd to you, but you're welcome to look at it and tell me if you recognize it.
A. I don't remember the letter.
Q. Do you remember, do you remember the discussion about anthophyllite asbestos that is referred to in the letter?
A. I remember a discussion about anthophyllite, identification of anthophyllite.
Q. Do you remember the identification potentially of anthophyllite asbestos by Professor Skinner?
A. I remember a discussion about the identification of anthophyllite.
Q. And just reading from the letter it says, I believe Slim feels, and that will be Slim Thompson; correct? Is that correct?
A. I didn't write the letter. I assume.
Q. As I do, that we must still explore the anthophyllite issue you raise. As I understand it, you are suggesting the existence of anthophyllite asbestos in some of these samples. And this is a letter from John Kelse to Catherine Skinner, and we'll mark that as the next in order.

I'll let the court reporter mark those. And the letter will be Exhibit 27.

(Wylie Deposition Exhibit Nos. 26 and 27 were marked for identification.)

BY MS. ABRAMS:

Q. There's a No. 7941 is, it says, Ann, and I'll represent to you again this came from Kelse's files, attached please find recent correspondence from Catherine and my response to her. Neither Slim nor I are thrilled about the extra work through her. We'd rather you were doing it but diplomatically we really can't stop it. And it appears Catherine is trying to resolve this mixed fiber issue in her own mind. So, with some uneasiness, I don't think we should stop her.

Do you recall getting that kind of a --

A. No.

Q. -- correspondence from John Kelse?

A. No.

Q. Is it typical when you write peer reviewed research articles that you correspond first with corporate sponsors?

A. You already asked me that question, and I answered it.

Q. And what's the answer?

MR. RADCLIFFE: Why does she have to answer it again?

MS. ABRAMS: I didn't ask that question. I asked --
BY MS. ABRAMS:
Q. I just asked you is it typical?
MS. ABRAMS: You can read the question back, please.
MR. RADCLIFFE: Well, she said she answered it before. Why does she have to answer it again?
THE WITNESS: You asked me that exact question, but I'll answer it again. It is typical to provide a copy of a manuscript to insure that there's no proprietary information quoted.
BY MS. ABRAMS:
Q. My, my question is, is it typical to correspond back and forth about the substance of the research paper with the corporate sponsor that is, that is sponsoring the research?
A. I've only had two corporate sponsors for research, so typical is hardly a question I can answer. It appears that there was correspondence on this. There was disagreement between myself and Catherine about the criteria for the identification of the mineral anthophyllite. It has nothing to do with anything except a scientific disagreement about what criteria she should apply.
Q. This was in --
A. I'd be happy to describe that to you if you are at all interested.
Q. This was in 1995?

A. I -- whatever.
Q. And my question was, you, the paper that you published with Professor Skinner and Professor Mossman and others, that was a peer reviewed article; correct?
A. It was.
Q. Did you tell the publication or the peer reviewers that that article was done in conjunction with direct input from R. T. Vanderbilt?
A. It was not done in, with direct input from R. T. Vanderbilt.
Q. So you don't consider e-mails and comments and questions about the information that you're studying and writing about from a corporation that is the subject matter of the research as, as having any bearing on that publication?
A. I don't.
MR. RADCLIFFE: Objection; argumentative.
BY MS. ABRAMS:
Q. And you don't believe that there was any need to disclose any of those communications or the input and interaction with R. T. Vanderbilt regarding the substance of the paper prior to, or to the reviewers of the paper?
MR. RADCLIFFE: Same objection.
THE WITNESS: They -- we did disclose that they funded the project.
BY MS. ABRAMS:

Q. My question is, you did not feel it necessary to disclose that they interacted with you regarding the substance of the information?
A. They did not interact with me regarding the substance of the paper.
Q. And you don't believe they interacted with Catherine Skinner or Brooke Mossman?
A. I'm neither one of those people. I'm not answering for them.
Q. This is an exhibit next in order RTV Weston 7938. This is a -- apparently this is a communication from you by e-mail to Catherine Skinner about your differences regarding the substance of the paper. Do you know why that communication was found in the files of John Kelse at R. T. Vanderbilt?
A. I don't.
Q. Did you bcc John Kelse with this communication, blind copy him?
A. I doubt it.
Q. Did you give it to him?
A. I don't remember.
MS. ABRAMS: Mark that next in order. So that would be -- the exhibit we just talked about would be Exhibit 29, and the exhibit with Ann, comma, at the top, please, attached please find correspondence, is 28. I'll let you mark those.

(Wylie Deposition Exhibit Nos. 28 and 29 were marked for identification.)

BY MS. ABRAMS:

Q. I want to show you right now a July 28th, 1989, letter that says Dear Dr. Thompson crossed out at the top and says Slim, from you. It's WES 751. Do you recall that letter?

A. I've seen it in my files.

Q. See if I have another -- yeah. Let me hand you that one. We'll mark it Exhibit 30. This is about Mouldene S-158. Do you recall what, how you received that specific sample?

A. No.

Q. Do you recall whether there was any chain of custody attached to that specific sample?

A. I don't recall.

Q. You didn't see one in your files?

A. Whatever I gave you on those samples are the, all the information that I have on the containers of the samples.

Q. Do you know why in, on July 28th, 1989 -- or strike that. Do you know why you were sent a sample of Mouldene S-158 to examine?

A. No.

Q. Did Slim Thompson, to your recollection, ever tell you why in 1989 he wanted you to examine a sample of a material that had not been produced since the 1970s?

A. No.

Q. Did he tell you it was for purposes of litigation?

A. I, I don't remember anything about it.

Q. Do you know when you wrote this letter which of your definitions that we've read in the last series of definitions you applied to this sample in determining whether or not there was asbestos in it?

A. No.

Q. Could you look at the paragraph on fibrous talc. It says fibrous talc occurs in fiber bundles with splayed ends and as what appears to be individual fibers. So that would be an asbestiform habit; correct?

MR. RADCLIFFE: Object to the form.

THE WITNESS: It is. It says it appears in fiber bundles with splayed ends.

BY MS. ABRAMS:

Q. And the end of the paragraph it says, in general the more the fibers display the classic characteristics of asbestos, fiber bundles with splayed ends, with small fiber width, curved fibers, et cetera, the lower are the indices of refraction within the ranges given above.

A. That's correct. That's what it says.

Q. So were you looking at fibrous talc, some of which was in an asbestiform habit and some of which was approaching a non-asbestiform habit?

A. You know, this was 20 years ago. I really couldn't tell you what was in my mind at the time.

Q. Okay. You said the anthophyllite does not display asbestiform characteristics. It's most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. What is a striped extinction pattern?

A. When you put the material under cross nickels and you rotate it, some parts of it have one type of optical behavior and another, another part has a different optical behavior. So they go to extinction at different positions.

Q. Do you know, you did not write down here how you examine this material, that I can see. Do you recall or can you tell what you did?

A. Well, I used polarized light microscopy and index of refraction analysis.

Q. You didn't use SEM or TEM?

A. There's nothing in here that would suggest that I did.

Q. Was -- strike that. The tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky but an occasional particle has an aspect ratio in excess of 10 to 1. Did you record anywhere the amount other than generally?

A. I doubt it.

Q. You noted that tremolite and anthophyllite were about five to ten percent of the sample. In your experience from what you had reviewed of Gouverneur talc from R. T. Vanderbilt was that typical or atypical?
A. I don't remember.
Q. What does the quartz -- does the quartz have any significance in there?
A. It was there.
Q. Did you ever look at any Mouldene to your knowledge after this?
A. I have no indication in any of my papers that I did.
Q. When did you first -- well, strike that. How -- you first met Slim Thompson in the 1970s; correct?
A. I first met Slim when I started working with the Bureau of Mines.
Q. And did you interact with Slim Thompson in, in terms of your work with the Bureau of Mines? Did you have a professional, frequent professional interaction based on that?
A. No. He, he lives in another place. The Bureau of Mines -- I mean I remember him coming to the Bureau of Mines once. I don't know whether there were two times, but not that frequently, no.
Q. So you -- do you consider him a friend?
A. Yes, mm-hmm.
Q. So you've over the years been, have you been social

friends?
A. No.
Q. Professional friends?
A. Professional friends.
Q. That you see frequently at meetings and that kind of thing?
A. No, not frequently, but I have seen him at meetings. I generally tend not to go to too many meetings recently.
Q. So how often have you talked to Slim Thompson say in the last five years?
A. Probably not at all. Maybe once.
Q. Okay. And if you still had a Mouldene sample S-158, it would be in there?
A. Yes. It's there.
MS. ABRAMS: Okay. I'll take that and mark that as 30. Is that 30? Yes.
(Wylie Deposition Exhibit No. 30 was marked for identification.)
BY MS. ABRAMS:
Q. You in this July 28th, 1989, letter do not define in terms of aspect ratio or fiber diameter any specifics with respect to your definition.
A. No.
Q. Is -- that's correct?
A. That's correct.

Q. You didn't note here whether either the tremolite or anthophyllite appeared as bundles with splayed ends or otherwise; is that correct?
A. Would you like me to read it out loud?
Q. I'd like you to answer my question, please.
A. It said -- well, you could read this yourself. Tremolite like anthophyllite does not display the characteristics of asbestos. I mean what are you asking me? The anthophyllite does not display asbestiform characteristics.
MS. ABRAMS: Could you read the question back, please?
(The reporter read back the previous question.)
THE WITNESS: I said tremolite like anthophyllite does not display the characteristics of asbestos. I didn't specify those characteristics. If that's the question, that's correct.
BY MS. ABRAMS:
Q. Well, what my question is, you didn't state in there that the anthophyllite or tremolite were, were characteristic of cleavage fragments?
A. I didn't use the term cleavage fragments in the document.
Q. Okay.
MS. ABRAMS: Why don't we just go off the record for

a minute and I can see what else I have here.
THE VIDEOGRAPHER: Going off the record. The time is 5:58 p.m.
(Discussion off the record.)
THE VIDEOGRAPHER: Back on the record. The time is 6:03 p.m.
BY MS. ABRAMS:
Q. Looking at what we've marked as Exhibit 3, the Mouldene talc notes that you have, the first two pages of Exhibit 3, the Mouldene talc notes, you note, the first thing you note is 1.600 many asbestiform bundles; is that correct?
A. Yes.
Q. Then you note -- well, could you read this notation, please, there?
A. 1.584, some still gamma less than 1.584, i.e., chrysotile-like, in general the more form the lower gamma. Looks like asbestiform but then it's crossed out. Straight fibers - higher gamma.
Q. So you started to write asbestiform and then you crossed out something there; correct?
A. That's what it looks like.
Q. And your observation was that some of the material you were looking at was chrysotile-like; is that correct?
A. That's what it says.
Q. And could you read the notation 1.560?

A. Most straight fibers have N perpendicular to elongation greater than 1.560. A few have alpha prime less than 1.560. More chrysotile-like, lower N than 1.560, fiber bundles N alpha less than 1.560.

Q. These are -- can you tell us, are these, is this a series of observations or what are these different numbers as you go down referring to? Are they your observations or counting?

A. No. Those are different index of refraction oils. Those are the oils, the index of refraction of the oils that I put the samples in.

Q. And then the notes are your observations of the material based on the specific oils?

A. Yes.

Q. How did it happen that NCI decided to give Dr. Stanton's materials to Maryland; do you know?

A. They asked me if I wanted it.

Q. Do you know why they asked you as opposed to anybody else?

A. I was interested in mineral fibers.

Q. Who was it there that you knew that knew that you were interested in mineral fiber?

A. Marta Wade and Lewis Lipkin.

Q. Did you know Dr. Stanton?

A. I never met him. I heard him speak.

Q. I just have to confirm that you have absolutely no plans of testifying in this case as an expert; correct?
A. Correct.
MR. RADCLIFFE: She's testifying right now. Half the questions you've asked her have been for her expert opinion.
MS. ABRAMS: Not at all. She was not -- she was disclosed and withdrawn as an expert.
BY MS. ABRAMS:
Q. Is there any chance in the world that you would come and testify in California in this case?
A. Any chance? No.
MR. RADCLIFFE: It's my understanding that since you've taken her deposition I'm free to designate her on this transcript.
MS. ABRAMS: I don't think so.
MR. RADCLIFFE: Why not? Taken in a western case. You noted it.
MS. ABRAMS: First of all, we're not done. We have like many hundreds of pages of stuff to go through. Second of all, if you have something that you want to present to the judge, present it, but we don't have to meet and confer about that now. My understanding is, no, you don't get that opportunity.
MR. RADCLIFFE: Well, I --

MS. ABRAMS: But if you plan on calling her in any form or shape as an expert, I'm going to tell you right now I need to go through her qualifications. I need to go through her job history. I need to go through her entire curriculum vitae. I need to go through the basis of any opinions she might be asked to give, and I need to depose her as an expert, so --

MR. RADCLIFFE: I don't need to call her as an expert witness. I'm not going to ask for any expert opinions. I'm going to ask her -- I'm going to ask her questions about her, as a percipient witness. Sorry. I meant to call Dr. Wylie. I shouldn't talk about her as, talk about you as if you're not sitting right here listening to us.

MS. ABRAMS: It was kind of rude. I'm just trying to make sure I'm not going to ask you something I've already asked you, so you have to bear with me. Mr. Radcliffe didn't tell me you'd be providing 200 pages of documents and a bunch of samples --

MR. RADCLIFFE: That's -- that's --

THE WITNESS: Most of what you have --

MS. ABRAMS: -- at 1:30 in the afternoon which I could have looked at at a lunch break.

MR. RADCLIFFE: That's a bit -- that's stretching it a bit since you served Dr. Wylie with a subpoena and asked for these materials.

MS. ABRAMS: Well, I just mentioned the subpoena to you yesterday, and you never said yes she has things and she'll be bringing them.

MR. RADCLIFFE: If you --

MS. ABRAMS: Because otherwise I probably wouldn't have agreed to a 1:30 deposition.

MR. RADCLIFFE: If you mentioned the subpoena to me, you did, but I think it's unfair and incorrect for you to suggest that you asked me if there was going to be a production, because if you had, I would have said yes.

MS. ABRAMS: Anyway, it doesn't matter. We can meet and confer later.

MR. RADCLIFFE: Okay. It doesn't matter. I agree.

MS. ABRAMS: No. We can meet and confer later. Not on, you know --

MR. RADCLIFFE: I have nothing to meet and confer about. Sorry.

MS. ABRAMS: So I think what I need to do now is go off the record and look at some of the materials that we didn't talk about and see what's in there because I haven't had a chance to do that.

THE WITNESS: You'll find mostly what I gave you is what you've already looked at.

MS. ABRAMS: Okay. That would be great.

THE VIDEOGRAPHER: Going off the record. The time

is 6:11 p.m.
(A recess was taken.)
THE VIDEOGRAPHER: Back on the record. The time is 6:25 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, we were talking about the Mossman paper. I'm going to attach that as -- well, it's Wylie, Skinner, Marsh, Snyder, Garzione, Hodkinson -- Hodgkinson (sic), Winters and Mossman, 1997. I want to attach that as next in order. In the acknowledgements it says that work was supported in part by a grant from NIEHS to BTM and from R. T. Vanderbilt Company to AGW and CS. Did you reflect -- did you bring for us in the invoices -- I didn't see it -- information on the grant that you received from R. T. Vanderbilt for this study?
A. I don't have any information -- I don't have -- I think it was to the University, so I don't have it. I have no other papers. I went through everything I had. I've given you everything I had.
Q. So if you had gotten a grant from R. T. Vanderbilt to do research, that information wouldn't necessarily be in your files? It might be in the University's files?
A. If it was a grant to the University, it would be in the University's files.
Q. Is there a way to access that information for old

grants; do you know?
A. I don't know.
Q. As an administrator have you ever attempted to access that information for any purpose?
A. No.
Q. It doesn't -- I've read the paper, and I have never seen in here any information that there was correspondence or interaction between R. T. Vanderbilt and the principals in this. That's a correct statement?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Prior to the publication of the study?
MR. RADCLIFFE: Object to the form. Go ahead. It's also asked and answered, but go ahead.
THE WITNESS: Yeah. I think the question was you've read it and you didn't find anything. Is that correct?
BY MS. ABRAMS:
Q. Well, is it there?
A. Well, I don't -- if you didn't find it, I'll take your word for it.
Q. Well --
A. I doubt it because there was no substantive interaction with them on the conclusions of the paper.
Q. And the samples FD-14, S-157 and CPS-183, would those not be included in there because this was a University

grant?
A. That's correct. There is a CPS-183 sample, however, right here.
Q. Why did you include that?
A. I don't know.
Q. So that would have been part of the University's property?
A. Not necessarily.
MR. RADCLIFFE: No. That -- you're assuming facts not in evidence. We've already been over the over study --
MS. ABRAMS: Well, I haven't said anything.
MR. RADCLIFFE: -- that involved this material.
BY MS. ABRAMS:
Q. So you used material that you got from R. T. Vanderbilt for a prior study that was done not for purposes of research in this study that was done for research purposes?
A. No. I don't think so.
Q. And as you sit here today, you don't recall the amount of the grant?
A. No.
Q. Is it fair to say that your conclusion in this study is that the talc from -- well, strike that. Did you have a conclusion in this study as to whether the talc from R. T. Vanderbilt was carcinogenic?
MR. RADCLIFFE: You don't think that's an expert

opinion?

MS. ABRAMS: I'm just asking what she wrote.

THE WITNESS: Shall I read you the discussion?

BY MS. ABRAMS:

Q. I'm actually asking is, is there in the paper a conclusion as to whether or not the talc is carcinogenic or is that not something that you dealt with?

A. There's a discussion of some hypotheses about what characteristics have been observed in a variety of cells that are exposed to high concentrations of fibers. These are cell studies. These are not animal studies. They're not human studies. They're not epidemiological studies. They're cell studies. So they look at properties that are associated with materials that are known to be carcinogens, and those are compared. That's what the study concludes.

Q. So it -- then this paper does not necessarily conclude that the material from -- strike that. There is not a conclusion in there that the material -- that's a double negative. Let me try it again.

You would not draw from your paper a conclusion that the material that, the talc material that you studied from New York State was not carcinogenic. That wouldn't be a proper conclusion, would it?

MR. RADCLIFFE: I object. I think you're asking for an opinion.

BY MS. ABRAMS:
Q. I'm actually not. I don't want your opinion. I want to know what your paper said.
A. Okay. So really what it says is that the data suggests caution in generalizing about durable fibers greater than five microns. It's significant because it re -- it supports the reanalysis of the Stanton data which I did in 1987 on crocidolite and others and provides data implicating the importance of mineral fiber type rather than fiber length per se.
So really what we were looking at here, the general conclusions about this is that in response to these particular cells that were treated in this particular way that talc fiber behaves differently than asbestos. That's all the conclusions.
Q. And in your -- did you ever do any studies to take that conclusion to a more general conclusion?
A. Did I do any follow-up work with Dr. Mossman?
Q. To perhaps broaden the scope of that finding?
A. No, but I would like to.
Q. So -- okay. So your conclusion here was to the issue of it's not necessarily the length of the fiber. It's what it's made up of?
A. That's right.
Q. And that was in -- that contradicts or is different

from what Dr. Stanton had said in his paper?
A. Somewhat, yes, mm-hmm.
Q. Do you know if Dr. Mossman has done any studies, follow-up studies on this issue?
A. Dr. Mossman's done a lot of work. I don't know whether it was after this paper, before this paper. I'm not familiar enough with her vitae to be able to tell you that.
Q. Have you ever done any other research with Catherine Skinner other than this, for this paper?
A. No.
Q. And what about Brooke Mossman?
A. Have I done any research? No.
Q. I'd like to show you this correspondence regarding International Talc 325 analysis of asbestos content which I'll show you as a group and mark it as the next in order.
A. Okay.
MS. ABRAMS: Are you running out of exhibit --
THE REPORTER: No. Is this Exhibit 31?
MS. ABRAMS: Yes. Are you willing to stay longer? Are you okay? If you need a break for food or something, let us know.
(Wylie Deposition Exhibit No. 31 was marked for identification.)
THE WITNESS: They're two copies of the same report, so we can look at them together.

BY MS. ABRAMS:
Q. Oh, good. Thank you. This -- is it correct that in 1995 according to this letter John Kelse sent you a sample of USG material to analyze?
A. May I see the letter that suggests --
Q. Oh, I'm sorry. I thought you had all this. I'll take the report. You keep the rest.
A. Yeah. That's what I thought. It didn't come from -- it didn't come from John Kelse. It came from Charlie Byers.
Q. Okay. Did you know Mr. Byers before this?
A. Huh-uh, no.
Q. So John Kelse asked you to look at the material though; correct?
A. Yes.
Q. Do you recall that United States Gypsum analyzed International Talc material from R. T. Vanderbilt and believed that it had asbestos in it? That's why you were asked to examine the material?
A. Is that stated in here somewhere? I can't really remember all this. Let me just see. It appears that Mr. Struss's report is in some contention here.
Q. Mr. Struss believed there was asbestos in the material?
A. Mr., Mr. Struss applied apparently the definition of

longer than five, narrower than three, micrometers and with a length-width ratio of at least five, and he used that parameter, those parameters and, as the definition for asbestos.

Q. And in this report to Mr. Byers you defined the characteristics of a population of amphibole particles that would be asbestiform; correct?

A. Yes.

Q. And based on that definition you reported that this was something besides an asbestiform material?

A. Yes, but I think what you said was incorrect. Mr., Mr. Struss used a, dimensions that are advocated by NIOSH for counting fibers. They are not definitions of asbestos, but rather, which portion of the asbestos population should be included in the analysis.

It's a very important distinction, and it is characteristic of all of the federal criteria. They define asbestos, and then they give you the criteria that should be applied that portion of the population that's to be counted. It's a different distinction, and Mr. Struss made the leap that the counting rules were a definition which I do not think that they ever have been, and I think that he made a mistake.

MS. ABRAMS: Move to strike to the extent that response was nonresponsive.

BY MS. ABRAMS:

Q. We don't have Mr. Struss's report, I don't think, do we?
A. I didn't have it.
Q. Do you know what -- you wrote directly to Mr. Byers of United States Gypsum; correct?
A. The letter's addressed to Mr. Byers.
Q. And you -- do you know whether or not what -- well, strike that. Do you know what United States Gypsum did as a result of obtaining this information from you?
A. I do not.
Q. Do you know if they still continued to purchase International Talc 325?
A. I do not know.
Q. Did -- is it -- well, strike that. Can I have that? We can mark that.
John Kelse writes to you, as always, we appreciate your willingness to assist with these sporadic inquiries and emergencies. Do you know what the emergency was here?
A. No.
Q. Do you know whether they were going to lose USG as a customer?
A. I know nothing about, about it.
Q. Did -- so did John Kelse call you from time to time with requests to sample material that customers believed had asbestos in them?

A. All the information that you have is all the contacts that I've had with John Kelse.
Q. We'll mark these pages as 32.
(Wylie Deposition Exhibit No. 32 was marked for identification.)
BY MS. ABRAMS:
Q. Next, 33 is a Declaration of Ann Wylie in Support of Defendant Soco-Lynch Corporation's Motion For Summary Judgment. Do you -- do you recall that declaration?
A. I actually don't, but I signed it.
Q. Do you know why you wrote that declaration?
A. No.
Q. Was it a lawyer that contacted you asking you to write a declaration?
A. You know, I really don't know.
Q. Do you know Chuck Sheldon?
A. No.
Q. Is this -- do you know why this included the International Talc mines?
A. I do not.
Q. Do you know that you have sampled materials from the former International Talc mines?
A. We've already discussed the two samples that have IT written on the samples, and those are -- mean International Talc.

Q. So is that the basis of your understanding that you sampled materials from the former International Talc mines?
A. That's the basis for my -- mm-hmm.
Q. You don't, you don't know which particular mines?
A. No. You asked me that before, too. I don't know.
MS. ABRAMS: This is 33, the declaration.
(Wylie Deposition Exhibit No. 33 was marked for identification.)
BY MS. ABRAMS:
Q. 34 is --
MS. ABRAMS: Oops, I'll wait for you.
BY MS. ABRAMS:
Q. -- a declaration that you signed on June, in June 1993 regarding affidavits of Arthur Rohl and Jerald Abraham. Do you recall that declaration?
A. Not really, but it was -- I did it. It's in my files.
Q. Apparently you believe that Dr. Rohl and Dr. Abraham misquoted information from you at some point?
A. Mr. Rohl.
Q. Do you want to -- can you answer the question?
A. Dr. Rohl used a definition that I disagree with. It's not mineralogical, and, and Dr. Abraham states that I support his contention, and I have never so stated that, that there's asbestiform tremolite, 1993.

Q. Do you know what you were referring to there?
A. No, I don't.
Q. This is a letter to Nora Grimbergen, Hoagland, Longo, Moran, Dunst & Doukas, LLP, regarding the -- you're writing in response to a letter you received on April 15th from Dr. Jerald Abraham in which -- strike that. Dear Miss Grimbergen: I'm writing in response to a letter you received on April 15th from Dr. Jerald Abraham in which my work is quoted extensively. Does that --
A. Mm-hmm. I remember this.
Q. Does that have anything to do with this affidavit or is that a different issue?
A. You know, there's many years between these two. So I assume it has a different issue.
Q. Okay. Do you recall anything about that issue? This is in 2004.
A. I don't.
Q. Is -- do you know who this attorney is?
A. No.
Q. Or who she represented?
A. No.
Q. Do you get inquiries from attorneys around the country regarding issues about asbestos in Nytal or other talcs?
A. Yes.

Q. Other than R. T. Vanderbilt?
A. Yes.
Q. How often would you say you get those kind of inquiries?
A. Once a month.
Q. And generally what are they in reference to?
A. I don't -- I don't know. I don't -- I tell them I'm not interested.
Q. So it's to ask you if you'll --
A. Work for them.
Q. -- work for them, okay. This is a 1989 letter to you from Dennis Race. Enclosed is the long promise CPSC taped transcript. Do you know what that is? Is that Consumer Products Safety Commission?
A. Possible.
Q. You don't recall this?
A. No.
Q. You don't recall the transcript?
A. No.
Q. And you didn't find it in your files?
A. No.
MS. ABRAMS: I'll just mark these three as Exhibit 34.
(Wylie Deposition Exhibit No. 34 was marked for identification.)

THE VIDEOGRAPHER: Your papers are rubbing up again.
MR. RADCLIFFE: It's coming up on 7:00. How much longer do you think you have?
MS. ABRAMS: Well, I just want to get through these. Some of these are duplicates which is good, but I just have to find them.
MR. RADCLIFFE: Okay. But that's not really an answer to my question.
MS. ABRAMS: I don't have a whole lot more after this.
MR. RADCLIFFE: What does that mean? Ten minutes? Fifteen minutes?
MS. ABRAMS: I don't know, Tom. I just don't know how much stuff is in here that I haven't seen before because I can't really --
MR. RADCLIFFE: And what is in here? Are those the documents that Dr. Wylie provided?
MS. ABRAMS: Yes. They are the documents Dr. Wylie provided. Like here's a duplicate. I mean I can try to go off the record, put these in some kind of date order and go through them or --
MR. RADCLIFFE: Let's just keep going, although let me note again that in your papers filed with the court in Maryland you said that Dr. Wylie was instrumental to the defense of R. T. Vanderbilt and that everybody relied upon her

and that she had, Dr. Wylie has information that was, that you had to get.

MS. ABRAMS: I've asked her.

MR. RADCLIFFE: If you've asked her, then we're done, right?

MS. ABRAMS: I've asked her some of it. I don't know what's in here.

MR. RADCLIFFE: All right.

MS. ABRAMS: I mean --

MR. RADCLIFFE: Let's go. Let's go.

MS. ABRAMS: We can suspend for today. I probably have --

THE WITNESS: No.

MS. ABRAMS: I can probably go through stuff, and then if I need to spend a few more minutes or an hour, we can do it on the telephone. I'm happy to do that because I don't think there's a lot, but there may be some, and I don't know what's in there. I have to go through all the samples, see what's in there.

MR. RADCLIFFE: Let's go off the record.

THE VIDEOGRAPHER: Going off the record. The time is 6:51 p.m.

(Discussion off the record.)

MR. RADCLIFFE: So let's go on the stenographic record. And what we've discussed is that Ms. Abrams is going to suspend her questioning with the agreement that if she needs up to another hour in the future, we will find the time to do that, mutually agreeable time to do it by telephone, and that has to do with the papers. Ms. Abrams has indicated she doesn't know if she has any questions about the samples, and if she does --

MS. ABRAMS: Well, I have to go through all of this and make sure I don't have any more questions based on what I brought, but I don't think there's much.

MR. RADCLIFFE: I'm not limiting the content of your hour. I'm just saying that you get an hour, and that if she has any questions about the samples, we'll deal with that.

MS. ABRAMS: If I can't do them in the hour --

MR. RADCLIFFE: We'll discuss it.

MS. ABRAMS: Okay.

MR. RADCLIFFE: And I'm going to ask, I'm going to ask a few questions on the video tape.

MS. ABRAMS: But if you ask her more questions, I may ask her some questions based on your questions, so I reserve my right to ask them later.

THE VIDEOGRAPHER: One moment. Back on the record. The time is 6:55 p.m.

MS. ABRAMS: And just for the record, Dr. Wylie, I may have some objections, so if you could wait until Mr. Radcliffe finishes his question and give me an opportunity to put my objection on the record, I'd appreciate that.

THE WITNESS: Okay.

MR. RADCLIFFE: Dr. Wylie, she will have some objections, so pause.

EXAMINATION

BY MR. RADCLIFFE:

Q. Dr. Wylie, good evening. Can you, can you tell me how long ago R. T. Vanderbilt started to send you samples of minerals for you to examine? Approximately when was the first time?

A. Around 1980, '81.

Q. And in front of us you've actually produced, it's probably not on the camera, but there must be 30, 40, 50 different types of samples of minerals. Are these all from R. T. Vanderbilt?

A. Yes.

Q. And are these minerals that R. T. Vanderbilt sent you over time to analyze?

A. Yes.

Q. The -- have all the mineral samples that R. T. Vanderbilt sent to you, have they all been talc minerals?

MS. ABRAMS: Lacks foundation, calls for speculation. You can answer, if you know, from just sitting here, and it's overbroad and vague and ambiguous, compound.

THE WITNESS: Almost every single one. There might have been one sample in there that was just a tremolite sample.

BY MR. RADCLIFFE:

Q. Okay. And, and have those samples been sent to you over time? In other words, were they all sent to you in 1980, or have they been sporadic --

MS. ABRAMS: These are leading questions.

BY MR. RADCLIFFE:

Q. -- from 1980 on?

MS. ABRAMS: Objection. It's overbroad, compound and leading.

THE WITNESS: They have been sent to me over a period of about 15 years.

BY MR. RADCLIFFE:

Q. And when R. T. Vanderbilt sent you the talc samples for you to analyze, did they -- was one of the questions in which R. T. Vanderbilt was interested whether or not there was asbestos in the sample?

MS. ABRAMS: Objection; leading, vague and ambiguous, lacks foundation, speculative, overbroad.

THE WITNESS: That was the question that they, they asked.

BY MR. RADCLIFFE:

Q. And in response to the question, in response to the questions asked by Vanderbilt about these talc samples, did you ever report that you found asbestos in any of the talc samples?

MS. ABRAMS: Same objection.

THE WITNESS: No.

MR. RADCLIFFE: Those are all the questions I have.

EXAMINATION

BY MS. ABRAMS:

Q. Dr. Wylie, when they sent samples, many of those samples that are sitting there in those 50 samples were for purposes of litigation where R. T. Vanderbilt was sued in asbestos case; is that correct?

A. No.

Q. That's not correct?

A. That most of the samples were for litigation? No.

Q. And how do you know that?

A. Because I put them in the bag. I think the vast majority of them were for their flotation product -- project.

Q. How many of them?

A. I don't remember; 25.

Q. So 25 samples were for the flotation project and what --

A. Yes, roughly.
Q. And what was the flotation project?
A. This is a, a process they were using somewhere, I don't know where, to try to separate out the minerals that composed their material, perhaps purify the talc. I don't really know what, what they were using. I don't know if they were using their regular ore. I don't know if they were using a prospect somewhere, but they were assessing the effectiveness of an, a flotation process.
Q. So what was the question there?
A. What, what did the flotation do to the material.
Q. What did the flotation do to the material?
A. Well, it had varying -- there were a lot of samples for different runs with different numbers of process times they went through the flotation process, and if I recollect correctly, they, they were able to pretty well purify the, the talc, the mineral talc, but I don't believe it was -- it wasn't a hundred percent effective. I don't remember. It's in some of those reports I gave you, but that's the process.
Q. So it wasn't about was there asbestos in the material; it was about what did the flotation process work; correct?
A. Those -- that's right.
Q. And that's for most of the samples that are in there?

A. Probably --
MR. RADCLIFFE: Object to the form. Go ahead.
THE WITNESS: Probably half.
BY MS. ABRAMS:
Q. And the other half were for litigation purposes?
A. No. There were a number of samples provided from western talc, and to my knowledge they had nothing to do with litigation.
Q. Well, do you know if they did or didn't?
MR. RADCLIFFE: Asked and answered.
THE WITNESS: To my knowledge they had nothing to do with litigation.
BY MS. ABRAMS:
Q. What did they have to do with?
A. They were interested in what the mineralogy of their materials out there looked like.
Q. So again, that was just to see what was in there?
A. Yes.
Q. And that wasn't about asbestos. It was just to see what was in that material?
A. They were interested in what the material looked like, what the tremolite looked like, what it was like, what the materials, the minerals that were in there and what their habits were.
Q. And that material was from Death Valley; do you

know?

A. I don't know.

Q. But, in fact, you did not ever find asbestos in any western talc, did you?

A. No.

Q. Are you aware of other people that have found asbestos in talc from Death Valley?

A. It's, it's reported in the literature that there's asbestos from Death Valley.

MS. ABRAMS: That's it for me. Those are all the questions I have with the reservation of --

MR. RADCLIFFE: With our agreement.

MS. ABRAMS: With the reservation of rights pursuant to the stipulation. Thank you very much for coming tonight.

THE VIDEOGRAPHER: Here marks the end of volume one, video tape number three, in the deposition of Dr. Ann Wylie. Going off the record. The time is 7:02 p.m.

(Whereupon, signature having not been waived, the videotaped deposition of ANN G. WYLIE, Ph.D. was concluded at 7:02 p.m.)

* * *

ACKNOWLEDGMENT OF DEPONENT

I, ANN WYLIE, Ph.D., do hereby acknowledge that I have read and examined the foregoing testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any corrections appear on the attached Errata sheet signed by me.

(DATE) (SIGNATURE)

CERTIFICATE OF SHORTHAND REPORTER

I, Janet A. Hamilton, Registered Diplomate Reporter and Notary Public before whom the foregoing deposition was taken, do hereby certify that the foregoing transcript is a true and correct record of the testimony given; that said testimony was taken by me stenographically and thereafter reduced to typewriting under my direction and that I am neither counsel for, related to, nor employed by any of the parties to this case and have no interest, financial or otherwise, in its outcome.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of September, 2009.

Janet A. Hamilton

Registered Diplomate Reporter
Notary Public in and for the
State of Maryland
My Commission Expires
March 4, 2012

E R R A T A   S H E E T

IN RE: WESTON vs. ASBESTOS CORPORATION LIMITED, et al.

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(DATE) (SIGNATURE)

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Janet A. Hamilton

Registered Diplomate Reporter
Notary Public in and for the
State of Maryland
My Commission Expires
March 4, 2012

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EXHIBIT
#1 (Wylie)
JH 9-18-09

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of and production of documents by said witness cannot be procured in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena duces tecum for the production of documents by ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to produce the required records.

The production of documents shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

September 21, 2009, at 10:00 a.m., or an alternate date, time and other nearby location to be announced in the production of documents subpoena issued under the laws of Maryland.

DATED: August 18, 2009 Clerk of the Superior Court for Alameda County

PAT S. SWEETEN By ______________________

Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
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ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23596 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.

2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**

3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for the Production of Deposition & Attachment A** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.

4. Date and Time of service: 8/20/2009 at 2:35 pm

5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'6, Weight: 130, Hair: Greyish, Glasses: N

6. Additional Information pertaining to this service:

   Hearing to held on the 21th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:

8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

Billy J Edwards Jr
(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

Circuit Court for Prince George's County
Clerk of the Circuit Court
Courthouse
Upper Marlboro, MD 20772-9987
MD Relay Service/TDD
1-800-735-2258

Case Number: CAL09-23595

Case Description: Eric Weston vs. Asbestos Corporation Limited

State of Maryland, Prince George's County to Wit:

Subpoena

To: Ann Wylie
Office of the President
University of Maryland
1101 Main Administration
College Park, Maryland 20742

On or by the 21st day of September, 2009

You are commanded to produce the following documents or Objects: See Attachments

Subpoena Requested by: Plaintiff
And any questions should be referred to: Justin Bosl 171 Twelfth Street, 3rd Floor, Oakland, CA 94607 (510) 302-1000

Date issued: August 20, 2009

Peggy Magee #58
Clerk

Notice:
(1) You are liable to body attachment and fine for failure to obey this subpoena.
(2) This Subpoena shall remain in effect until you are granted leave to depart by the court of by an officer acting on behalf of the court.
(3) If this subpoena is for attendance at a disposition and the party served is an organization, notice is hereby given that the organization must designate a person to testify pursuant to rule 2-412 (D) .

Sheriff's Return

( ) Served and copy delivered on date indicated below.
( ) Un-served, by reason of ______________________________

Date: ______________ Fee $______________ ______________________
Sheriff

ATTACHMENT A

1. All **DOCUMENTS** relating to all tests and/or analyses performed on talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC**.

2. All **DOCUMENTS** relating to all correspondence with **VANDERBILT** and **INTERNATIONAL TALC** or any of their employees, agents or attorneys.

3. All **DOCUMENTS** relating to all tests and/or analyses performed on Mouldene talc.

4. All **DOCUMENTS** relating to your 1989 examination, testing, or analysis of Mouldene talc, including but not limited to sample S-158.

5. All **DOCUMENTS** relating to all tests and/or analyses performed on Nytal talc.

6. All **DOCUMENTS** relating to all tests and/or analyses performed on Asbestine talc.

7. All **DOCUMENTS** relating to all tests and/or analyses performed on 3X talc.

8. All **DOCUMENTS** relating to all tests and/or analyses performed on International Fibre talc, including but not limited to International Fibre #1, International Fibre #2, International 6N Fibre, International Fibre PL, International 80 WSA, and International W.

9. All financial **DOCUMENTS** relating to all work performed for **VANDERBILT** and **INTERNATIONAL TALC**, including but not limited to billing records, purchase orders, and any other financial statements.

10. All physical samples of talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC** in your possession or control.

11. All physical samples of Mouldene talc in your possession or control.

12. All physical samples of talc identified by you as "Mouldene (S-158)" in your July 28, 1989 letter to Dr. C. S. Thompson. See Exhibit 1.

13. All physical samples of **VANDERBILT** talc from the Stanton study identified by you as **VANDERBILT** talc in your deposition testimony of August 8, 2007 in Franklin vs. General Motors Corp, et al. See Exhibit 2.

14. All documents identifying the source of the talc samples identified as **VANDERBILT** talc from the Stanton study you refer to in your deposition testimony of August 8, 2007 in the Franklin case. See Exhibit 2.

15. Copies of all written statements or affidavits you've signed on behalf of **VANDERBILT** or any of their employees, agents or attorneys, including but not limited to the affidavit you signed in the case of Bonnie Parker, individually and executrix to the Estate of Peter Hirsch in 2005. See Exhibit 3.

16. All financial **DOCUMENTS** relating to all work performed for **FORD,** including but not limited to billing records, purchase orders, and any other financial statements.

17. All financial **DOCUMENTS** relating to all work performed for **CHRYSLER,** including but not limited to billing records, purchase orders, and any other financial statements.

18. All financial **DOCUMENTS** relating to all work performed for **GENERAL MOTORS,** including but not limited to billing records, purchase orders, and any other financial statements.

"DOCUMENTS" as used herein shall refer to all manually, mechanically or electronically written or recorded audio or visual materials and computer files known to you, including but not limited to databases, electronic mail messages, financial data, spreadsheets, accounting system information, indices of computer records, correspondence, memoranda, telegrams, drats, notations, records, receipts, invoices, bills, purchase orders, sales records, delivery records, shipping manifests, bids, contracts, contract logs, catalogs, specifications, approved material submittals and change orders, as-built specifications, applications specifications, blueprints, plans, diagrams, indexes, computer-stored records, computer record indexes, microfilms, microfiche, warranties, guarantees, calendars, diaries, videotapes, images in computer or machine readable format, including, but not limited to, images and images of DOCUMENTS, stored on media such as, Compact Discs ("CD"), Digital Video Disc/Digital Versatile Discs ("DVD"), computer hard drives, computer back up tapes, or other electronic media, and/or including but not limited to, formats such as Portable Document Format (".pdf"), Graphic Interchange Format (".gif"), Tagged Image File (".tif"), Joint Photographic Experts Group (".jpeg"/ "jpg"), Hypertext Markup Language ("html"), etc., photographs, tape recordings, asbestos surveys, asbestos sample testing reports, abatement reports, books, brochures, safety manuals, union regulations, company regulations, depositions, trial testimony, trial exhibits, and statements.

"VANDERBILT" as used herein shall refer to R. T. Vanderbilt Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to Gouverneur Talc Company, Inc., Vanderbilt Minerals Corporation, and Western Talc Company.

"INTERNATIONAL TALC" as used herein shall refer to International Talc Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to St. Lawrence Liquidating Corporation, Carbola Chemical Company, Inc., W. H. Loomis Minerals Corp. and W. H. Loomis Talc Company.

"FORD" as used herein shall refer to Ford Motor Company all its predecessors, subsidiaries, and affiliates.

"CHRYSLER" as used herein shall refer to DaimlerChrysler Corporation and all its predecessors, successors, subsidiaries, and affiliates, including but not limited to Chrysler LLC, DaimlerChrysler Company LLC, Chrysler Corporation, and Chrysler Motor Corporation.

"GENERAL MOTORS" as used herein shall refer to General Motors Corporation and all its predecessors, successors, subsidiaries, and affiliates.

Circuit Court for Prince George's County
Clerk of the Circuit Court
Courthouse
Upper Marlboro, MD 20772-9987
MD Relay Service/TDD
1-800-735-2258

Case Number: CAL09-23596

Case Description: Eric Weston vs. Asbestos Corporation Limited

State of Maryland, Prince George's County to Wit:

Subpoena

To: Ann Wylie
Office of the President
University of Maryland
1101 Main Administration
College Park, Maryland 20742

You are hereby commanded to attend and testify at a deposition at:
Inn and Conference Center, University of Maryland, 3501 University Blvd. E., Hyattsville, Maryland 20783

On the 4th day of September 2009 at 10:00 am

You are commanded to produce the following documents or Objects:

Subpoena Requested by: Plaintiff
And any questions should be referred to: Justin Bosl 171 Twelfth St. 3rd Floor, Oakland, CA 94607 (510)302-1000

Date issued: August 20, 2009

Peggy Magee #158
Clerk

Notice:
(1) You are liable to body attachment and fine for failure to obey this subpoena.
(2) This Subpoena shall remain in effect until you are granted leave to depart by the court of by an officer acting on behalf of the court.
(3) If this subpoena is for attendance at a disposition and the party served is an organization, notice is hereby given that the organization must designate a person to testify pursuant to rule 2-412 (D) .

Sheriff's Return

( ) Served and copy delivered on date indicated below.
( ) Un-served, by reason of ______________________________

Date: ______________ Fee $______________ ______________________
Sheriff

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23595 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for Deposition** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742,** and informed said person of the contents therein, in compliance with state statutes.
4. Date and Time of service: 8/20/2009 at 2:35 pm
5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'8, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 4th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

Billy Edwards Jr
(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

Circuit Court for Prince George's County
Clerk of the Circuit Court
Courthouse
Upper Marlboro, MD 20772-9987
MD Relay Service/TDD
1-800-735-2258

Case Number: CAL09-23596

Case Description: Eric Weston vs. Asbestos Corporation Limited

State of Maryland, Prince George's County to Wit:

Subpoena

To: Ann Wylie
Office of the President
University of Maryland
1101 Main Administration
College Park, Maryland 20742

You are hereby commanded to attend and testify at a deposition at:
Inn and Conference Center, University of Maryland, 3501 University Blvd. E., Hyattsville, Maryland 20783

On the 4th day of September 2009 at 10:00 am

You are commanded to produce the following documents or Objects:

Subpoena Requested by: Plaintiff
And any questions should be referred to: Justin Bosl 171 Twelfth St. 3rd Floor, Oakland, CA 94607 (510)302-1000

Date issued: August 20, 2009

Peggy Magee #133
Clerk

Notice:
(1) You are liable to body attachment and fine for failure to obey this subpoena.
(2) This Subpoena shall remain in effect until you are granted leave to depart by the court of by an officer acting on behalf of the court.
(3) If this subpoena is for attendance at a disposition and the party served is an organization, notice is hereby given that the organization must designate a person to testify pursuant to rule 2-412 (D) .

Sheriff's Return

( ) Served and copy delivered on date indicated below.
( ) Un-served, by reason of ______________________________

Date: ______________ Fee $______________ ______________________
Sheriff

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23595 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for Deposition** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.
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5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'8, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 4th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of and production of documents by said witness cannot be procured in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena duces tecum for the production of documents by ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to produce the required records.

The production of documents shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

September 21, 2009, at 10:00 a.m., or an alternate date, time and other nearby location to be announced in the production of documents subpoena issued under the laws of Maryland.

DATED: August 18, 2009 Clerk of the Superior Court for Alameda County

PAT S. SWEETEN By S. Oyamu

Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

Superior Court of California
County of Alameda

Superior Court of California, County of Alameda
Rene C. Davidson Alameda County Courthouse
1225 Fallon Street
Oakland, CA 94612

Receipt Nbr: 372185
Clerk: siyamu
Date: 08/18/2009

Type	Case Number	Description	Amount
Service	Rg09430145	1 MSC Out of State Deposition Docum	$30.00

Total Amount Due:	$30.00
Prior Payment:	
Current Payment:	$30.00
Balance Due:	$.00
Overage:	
Excess Fee:	
Change:	

Payment Method:

Cash:	
Check:	$30.00

THIS CHECK HAS A COLORED BACKGROUND AND CONTAINS MULTIPLE SECURITY FEATURES - SEE BACK FOR DETAILS

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 Twelfth St., Suite 300
Oakland, CA 94607
(510) 465-7728

UNION BANK OF CALIFORNIA
East Bay Commercial Banking Oakland, CA 94612
11-49/1210

092809

VOID VOID VOID

8/18/2009

PAY TO THE ORDER OF Alameda County Superior Court $ **30.00

Thirty and 00/100** DOLLARS

Alameda County Superior Court
1221 Fallon Street
Oakland, CA 94607

HEAT SENSITIVE RUB AREA TO VERIFY

MEMO

CHECK VOID AFTER SIX MONTHS

⑈092809⑈ ⑆121000497⑆ 7150144706⑈

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION Oakland, CA 94607 (510) 465-7728

092809

Alameda County Superior Court 8/18/2009
ff-121 Commission for out of State Subpoena/Weston, E 30.00

CASH IN COMMERCI 30.00

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION Oakland, CA 94607 (510) 465-7728

092809

Alameda County Superior Court 8/18/2009
ff-121 Commission for out of State Subpoena/Weston, E 30.00

PAYMENT RECORD

CASH IN COMMERCI 30.00

Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of said witness cannot be procured at deposition in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena for the deposition of ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to appear for oral testimony.

The deposition shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on **September 4, 2009, at 10:00 a.m.**, or an alternate date, time and other nearby location to be announced in the

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

deposition subpoena issued under the laws of Maryland.

Said deposition will be recorded stenographically, through instant visual display, and videotaped pursuant to C.C.P. §2025.220(a)(5) and plaintiffs reserve the right to use the videotape deposition at trial under C.C.P. §2025.620.

DATED: August 17, 2009 Clerk of the Superior Court for Alameda County

By ______________________

PAT S. SWEETEN Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of and production of documents by said witness cannot be procured in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena duces tecum for the production of documents by ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to produce the required records.

The production of documents shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

Exhibit D

September 4, 2009, at 10:00 a.m., or an alternate date, time and other nearby location to be announced in the production of documents subpoena issued under the laws of Maryland.

DATED: August 17, 2009 Clerk of the Superior Court for Alameda County

Orida Baker

PAT S. SWEETEN By ____________________

Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

IN THE CIRCUIT COURT FOR PRINCE GEORGE'S COUNTY, MARYLAND

ERIC WESTON	*	
Plaintiff	*	
vs.	*	Case No. CAL09-23596
ASBESTOS CORP. LTD., et al	*	
Defendants	*	

ORDER

UPON CONSIDERATION of Plaintiff's Motion to Reconsider and any Response thereto, it is this 11TH day of September, 2009, hereby

ORDERED that Defendant's Motion for Protective Order Granted on September 1, 2009, is reconsidered and DENIED, and it is further

ORDERED that the deposition and *duces tecum* of Dr. Ann Wiley will go forward on a mutually convenient date, time and place prior to September 21, 2009.

Honorable Leo E. Green

cc: Jeffrey L. Harding
Sasscer, Clagett & Bucher
5407 Water Street, Suite 101
Upper Marlboro, MD 20772

Steven J. Parrott, Esquire
DeHay & Elliston, L.L.P.
36 South Charles Street, Suite 1300
Baltimore, MD 21201

CHAMBERS OF HONORABLE LEO E. GREEN, JR
14735 MAIN STREET, SUITE M1407
UPPER MARLBORO, MARYLAND 20772
(301) 952-3142   FAX (301) 952-5837

FACSIMILE TRANSMITTAL

TO: **Steve Parrott, Esq.**
Jeffrey Harding, Esq.

FROM: **Lori Hester, Exec. Admin. Aide**
To the Honorable Leo E. Green, Jr.

RE: **Eric Weston v. Asbestos Corp**
Case No.: CAL09-23596

DATED: **September 11, 2009**

PAGES: **1, including cover page**

If you have any questions, please do not hesitate to contact me at (301) 952-3142.

Thank you.

IN THE CIRCUIT COURT FOR PRINCE GEORGE'S COUNTY, MARYLAND

ERIC WESTON	*	
Plaintiff	*	
vs.	*	Case No. CAL09-23596
ASBESTOS CORP. LTD., et al	*	
Defendants	*	

LINE OF APPEARANCE

Please enter the appearance of Jeffrey L. Harding and Sasscer, Clagett & Bucher, on behalf of Plaintiff, Eric Weston, in the captioned case.

Respectfully submitted,

Jeffrey L. Harding
Sasscer, Clagett & Bucher
5407 Water Street, Suite 101
Upper Marlboro, MD 20772
(301) 627-5500

CERTIFICATE OF SERVICE

I hereby certify that on this 11 day of September, 2009, a copy of the foregoing Line of Appearnace was mailed, postage prepaid, to:

Steven J. Parrott, Esquire
DeHay & Elliston, L.L.P.
36 South Charles Street, Suite 1300
Baltimore, MD 21201
Attorney for R.T. Vanderbilt Company, Inc. and Ann Wylie, Ph.D.

Jeffery L. Harding, Esquire

IN THE CIRCUIT COURT FOR PRINCE GEORGE'S COUNTY, MARYLAND

ERIC WESTON *

Plaintiff *

vs. * Case No. CAL09-23596

ASBESTOS CORP. LTD., et al *

Defendants *

MOTION TO SHORTEN TIME FOR RESPONSE

Comes now Plaintiff, Eric Weston, by Jeffrey L. Harding and Sasscer, Clagett & Bucher and files this Motion to Shorten Time for Response for the following reasons:

1. Trial is currently scheduled for September 25, 2009.

2. To prepare for trial, the Plaintiff needs to depose Ann Wylie, Ph.D.

3. The response time allowed under the Maryland Rules would not permit the deposition to go forward giving Plaintiff enough time to adequately prepare for trial.

4. Counsel for Defendant has previously filed and obtained a protective order in this matter. Therefore, Defendant has stated its position for the record.

WHEREFORE, Plaintiff prays that this Honorable Court shorten the time for a responsive pleading allowed by the Maryland Rules.

Respectfully submitted,

Jeffrey L. Harding
Sasscer, Clagett & Bucher
5407 Water Street, Suite 101
Upper Marlboro, MD 20772
(301) 627-5500

CERTIFICATE OF SERVICE

I hereby certify that on this 11 day of September, 2009, a copy of the foregoing Line of Appearance was mailed, postage prepaid, to:

Steven J. Parrott, Esquire
DeHay & Elliston, L.L.P.
36 South Charles Street, Suite 1300
Baltimore, MD 21201
Attorney for R.T. Vanderbilt Company, Inc. and Ann Wylie, Ph.D.

Jeffery L. Harding, Esquire

IN THE CIRCUIT COURT FOR PRINCE GEORGE'S COUNTY, MARYLAND

ERIC WESTON	*	
Plaintiff	*	
vs.	*	Case No. CAL09-23596
ASBESTOS CORP. LTD., et al	*	
Defendants	*	

ORDER

Upon consideration of the Motion to Shorten Time to Respond to Plaintiff's Motion for Reconsideration of Order Granting Defendant R.T. Vanderbilt Company, Inc. and Ann Wylie, Ph.D.'s Motion for Protective Order and any response thereto, it is this _______ day of _________________, 2009, hereby

ORDERED that the Defendant and Ann Wylie must respond to the Motion within three (3) days from the date of this Order.

JUDGE

cc: Jeffrey L. Harding, Esquire
Sasscer, Clagett & Bucher
5407 Water Street, Suite 101
Upper Marlboro, MD 20772
Attorney for Plaintiff

Steven J. Parrott, Esquire
DeHay & Elliston, L.L.P.
36 South Charles Street, Suite 1300
Baltimore, MD 21201
Attorney for R.T. Vanderbilt Company, Inc. and Ann Wylie, Ph.D.

IN THE CIRCUIT COURT FOR PRINCE GEORGE'S COUNTY, MARYLAND

ERIC WESTON	*	
Plaintiff	*	
vs.	*	Case No. CAL09-23596
ASBESTOS CORP. LTD., et al	*	
Defendants	*	

PLAINTIFF'S MOTION FOR RECONSIDERATION OF ORDER GRANTING DEFENDANT R.T. VANDERBILT COMPANY, INC. AND ANN WYLIE, Ph.d.'S MOTION FOR PROTECTIVE ORDER

I. Introduction

Plaintiff Eric Weston opposes defendant R.T. Vanderbilt ("RTV") and Ann Wylie's motion for protective order and asks this Court to reconsider its order quashing plaintiff's subpoena for Ann Wylie's deposition and production of documents, on which Plaintiff was not heard. Ann Wylie is an important percipient witness and possesses documents and evidence otherwise unavailable to plaintiff. It is in this capacity that plaintiff desires to depose her. Time is of the essence, Plaintiff's trial will commence on September 24, 2009.

Plaintiff therefore asks the court to reconsider its ruling in light of the evidence and arguments presented below.

II. Procedural History

Plaintiff has sued R. T. Vanderbilt Company in Superior Court for Alameda County, California, namely Weston v. Asbestos Corporation Limited, et al, Case No. RG08426405. The trial date is September 24, 2009. The Superior Court issued a Commission on August 17, 2009, to depose Ann Wylie, finding that she "has information relevant to this action pending… that the personal attendance of said witness cannot be procured at deposition in California… we hereby authorize the issuance of a subpoena for the deposition of Ann Wylie in Prince George's County, Maryland to compel Ann Wylie, necessary witness, to appear for oral testimony." The California Court has therefore found her testimony to be relevant and necessary in its case and has authorized her deposition in Maryland.

A subpoena duces tecum was issued by the Circuit Court for Prince George's County on August 20, 2009. Defendant R.T. Vanderbilt prepared a Motion for Protective Order dated August 27, 2009, thereafter filed and granted by Judge Green on September 1, 2009, without a motion to shorten time or any response from Plaintiff. R. T. Vanderbilt's motion argued discoverability and relevance of the testimony of the witness, a matter to be determined by the Superior Court. Undersigned has entered his appearance on behalf of the Plaintiff in CAL09-23596 and respectfully requests that this Court reconsider its ruling and reinstate the subpoenas. Plaintiff will schedule a mutually convenient date, time and place for the deposition.

III. Argument

A. No Work Product Privilege for Factual Information In Possession of Witness

Dr. Ann Wiley has tested materials, publicly presented as scientific fact statements, put forth theories and evidence relating to Mouldene and other products, and issued reports on the products that are the key issue in the Superior Court case (see Appendix). RTV has produced to Weston in discovery a copy of Dr. Wylie's study of Mouldene and her statements thereon, which are relied upon by RTV's experts and form the cornerstone of RTV's litigation defense and expert opinions.

It is established law in Maryland that facts supporting contentions are not protected as work product and are discoverable. *Baltimore Transit v. Messanotti*, 227 Md. 8 (1961).

Plaintiff Weston is clearly entitled to depose Dr. Wylie and have her produce the relevant materials.

B. Dr. Wylie's Studies and Reports Were Considered And Relied Upon By RTV's Experts

As discussed more specifically in the attached Appendix, Dr. Wylie's work has been considered and relied upon by RTV's experts, and has been partially produced by RTV in discovery. All of this material has been produced as accepted fact without the benefit of cross-examination and discovery.

When facts are provided to an expert witness for the purpose of providing opinion testimony at trial, these facts are discoverable even if the expert did not rely on them forming his or her opinion, so long as the expert considered it while developing them. *Mussellman v. Phillips*, 176 F.R.D. 194 (D. Md. 1997). It cannot be argued by RTV that this is at issue, since each of their experts rely on Dr. Wylie's studies and materials. Plaintiff Mason is clearly entitled to the deposition and *duces tecum* of Dr. Wylie.

B T Edwards Process Service LLC
6501 Gold Yarrow Lane
Upper Marlboro, Maryland 20772-4022
Office: (301) 505-2020
Fax: (301) 952-0007
Web Page: BTEdwardsProcessService.com
email: billy@serveit247.com

FAX

Date: 8.21.09

To: Chenie Songstad

RE: Return of Service

Company:

Fax Number: 510 835-4913

NUMBER OF PAGES INCLUDING THIS COVER SHEET

Your Return of Service

(2 Returns)

Billy Edwards

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23595 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for Deposition** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.
4. Date and Time of service: 8/20/2009 at 2:35 pm
5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'8, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 4th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23596 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for the Production of Deposition & Attachment A** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.
4. Date and Time of service: 8/20/2009 at 2:35 pm
5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'8, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 21th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

Billy J Edwards Jr
(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

cuit Court for Prince George's Count
Clerk of the Circuit Court
Courthouse
Upper Marlboro, MD 20772-9987
MD Relay Service/TDD
1-800-735-2258

Case Number: CAL09-23595

Case Description: Eric Weston vs. Asbestos Corporation Limited

State of Maryland, Prince George's County to Wit:

Subpoena

To: Ann Wylie
Office of the President
University of Maryland
1101 Main Administration
College Park, Maryland 20742

On or by the 21st day of September, 2009

You are commanded to produce the following documents or Objects: See Attachments

Subpoena Requested by: Plaintiff
And any questions should be referred to: Justin Bosl 171 Twelfth Street, 3rd Floor, Oakland, CA 94607 (510) 302-1000

Date issued: August 20, 2009

Peggy Magee #58
Clerk

Notice:
(1) You are liable to body attachment and fine for failure to obey this subpoena.
(2) This Subpoena shall remain in effect until you are granted leave to depart by the court of by an officer acting on behalf of the court.
(3) If this subpoena is for attendance at a disposition and the party served is an organization, notice is hereby given that the organization must designate a person to testify pursuant to rule 2-412 (D).

Sheriff's Return

( ) Served and copy delivered on date indicated below.
( ) Un-served, by reason of ____________________

Date: __________ Fee $__________ ____________________
Sheriff

ATTACHMENT A

1. All **DOCUMENTS** relating to all tests and/or analyses performed on talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC.**

2. All **DOCUMENTS** relating to all correspondence with **VANDERBILT** and **INTERNATIONAL TALC** or any of their employees, agents or attorneys.

3. All **DOCUMENTS** relating to all tests and/or analyses performed on Mouldene talc.

4. All **DOCUMENTS** relating to your 1989 examination, testing, or analysis of Mouldene talc, including but not limited to sample S-158.

5. All **DOCUMENTS** relating to all tests and/or analyses performed on Nytal talc.

6. All **DOCUMENTS** relating to all tests and/or analyses performed on Asbestine talc.

7. All **DOCUMENTS** relating to all tests and/or analyses performed on 3X talc.

8. All **DOCUMENTS** relating to all tests and/or analyses performed on International Fibre talc, including but not limited to International Fibre #1, International Fibre #2, International 6N Fibre, International Fibre PL, International 80 WSA, and International W.

9. All financial **DOCUMENTS** relating to all work performed for **VANDERBILT** and **INTERNATIONAL TALC**, including but not limited to billing records, purchase orders, and any other financial statements.

10. All physical samples of talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC** in your possession or control.

11. All physical samples of Mouldene talc in your possession or control.

12. All physical samples of talc identified by you as "Mouldene (S-158)" in your July 28, 1989 letter to Dr. C. S. Thompson. See Exhibit 1.

13. All physical samples of **VANDERBILT** talc from the Stanton study identified by you as **VANDERBILT** talc in your deposition testimony of August 8, 2007 in Franklin vs. General Motors Corp, et al. See Exhibit 2.

14. All docume. .dentifying the source of the talc samp... identified as **VANDERBILT** talc from the Stanton study you refer to in your deposition testimony of August 8, 2007 in the Franklin case. See Exhibit 2.

15. Copies of all written statements or affidavits you've signed on behalf of **VANDERBILT** or any of their employees, agents or attorneys, including but not limited to the affidavit you signed in the case of Bonnie Parker, individually and executrix to the Estate of Peter Hirsch in 2005. See Exhibit 3.

16. All financial **DOCUMENTS** relating to all work performed for **FORD**, including but not limited to billing records, purchase orders, and any other financial statements.

17. All financial **DOCUMENTS** relating to all work performed for **CHRYSLER**, including but not limited to billing records, purchase orders, and any other financial statements.

18. All financial **DOCUMENTS** relating to all work performed for **GENERAL MOTORS**, including but not limited to billing records, purchase orders, and any other financial statements.

"**DOCUMENTS**" as used herein shall refer to all manually, mechanically or electronically written or recorded audio or visual materials and computer files known to you, including but not limited to databases, electronic mail messages, financial data, spreadsheets, accounting system information, indices of computer records, correspondence, memoranda, telegrams, drats, notations, records, receipts, invoices, bills, purchase orders, sales records, delivery records, shipping manifests, bids, contracts, contract logs, catalogs, specifications, approved material submittals and change orders, as-built specifications, applications specifications, blueprints, plans, diagrams, indexes, computer-stored records, computer record indexes, microfilms, microfiche, warranties, guarantees, calendars, diaries, videotapes, images in computer or machine readable format, including, but not limited to, images and images of DOCUMENTS, stored on media such as, Compact Discs ("CD"), Digital Video Disc/Digital Versatile Discs ("DVD"), computer hard drives, computer back up tapes, or other electronic media, and/or including but not limited to, formats such as Portable Document Format (".pdf"), Graphic Interchange Format (".gif"), Tagged Image File (".tif"), Joint Photographic Experts Group (".jpeg"/ "jpg"), Hypertext Markup Language ("html"), etc., photographs, tape recordings, asbestos surveys, asbestos sample testing reports, abatement reports, books, brochures, safety manuals, union regulations, company regulations, depositions, trial testimony, trial exhibits, and statements.

"**VANDERBILT**" as used herein shall refer to R. T. Vanderbilt Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to Gouverneur Talc Company, Inc., Vanderbilt Minerals Corporation, and Western Talc Company.

"**INTERNATIONAL TALC**" as used herein shall refer to International Talc Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to St. Lawrence Liquidating Corporation, Carbola Chemical Company, Inc., W. H. Loomis Minerals Corp. and W. H. Loomis Talc Company.

"FORD" as used herein shall refer to Ford Motor Company all its predecessors, subsidiaries, and affiliates.

"CHRYSLER" as used herein shall refer to DaimlerChrysler Corporation and all its predecessors, successors, subsidiaries, and affiliates, including but not limited to Chrysler LLC, DaimlerChrysler Company LLC, Chrysler Corporation, and Chrysler Motor Corporation.

"GENERAL MOTORS" as used herein shall refer to General Motors Corporation and all its predecessors, successors, subsidiaries, and affiliates.

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	FOR COURT USE ONLY
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23596 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for the Production of Deposition & Attachment A** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.
4. Date and Time of service: 8/20/2009 at 2:35 pm
5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'6, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 21th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

Billy Edwards Jr
(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

Denise Abrams, Esq. (C.S.B. #124139)
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William F. Ruiz, Esq. (C.S.B. #243783)
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A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of and production of documents by said witness cannot be procured in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena duces tecum for the production of documents by ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to produce the required records.

The production of documents shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

September 21, 2009, at 10:00 a.m., or an alternate date, time and other nearby location to be announced in the production of documents subpoena issued under the laws of Maryland.

DATED: August 18, 2009 Clerk of the Superior Court for Alameda County

PAT S. SWEETEN By [signature]

Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
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OAKLAND, CA 94607
(510) 302-1000
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K..ZAN, McCLAIN, LYOI..S, GREENWOOD & HARLEY

A Professional Law Corporation

Steven Kazan
David M. McClain
Dianna Lyons
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Michael T. Stewart
Daniel Wasson
William F. Ruiz
Elina Agnoli
Rafael Vazquez
Gloria C. Amell

August 25, 2009

Ann Wylie, Ph.D.
Vice President for Administrative Affairs
University of Maryland
1132 Main Administration Building
College Park, Maryland 20742

Re: ***ERIC WESTON v. ASBESTOS CORPORATION LIMITED, et al.***
Alameda County Superior Court No. RG08426405

Dear Dr. Wylie:

On August 20, 2009, you were served with a subpoena to produce documents or objects in the above-matter, a copy of which is enclosed. As set forth in the Commission issued by the Alameda County Superior Court for the State of California, a copy of which is also enclosed, the documents pursuant to the enclosed subpoena shall be produced on September 21, 2009 at 10:00 a.m. at Inn and Conference Center, University of Maryland, 3501 University Boulevard East, Hyattsville, Maryland 20783.

Please feel free to contact me if you have any questions about the production.

Very truly yours,

Francis E. Fernandez

/c
Enclosures

CSONGSTAD/432692.1

*Certified Appellate Specialist, The State Bar of California Board of Legal Specialization

PROOF OF SERVICE

Re: ***ERIC WESTON v. ASBESTOS CORPORATION LIMITED, et al.***
Alameda County Superior Court Case No. RG08426405

I declare that:

I am employed in the County of Alameda, State of California. I am over the age of 18 years and not a party to the within action. My business address is 171 Twelfth Street, Third Floor, Oakland, California 94607. On August 25, 2009, I served the following document(s):

Subpoena to Ann Wylie to Product Documents or Objects; Alameda County Superior Court Commission; 8/25/2009 Letter to Ann Wylie

by transmitting a true copy via the following methods:

________ (By Facsimile Machine [FAX]) By personally transmitting a true copy thereof via an electronic facsimile machine to the facsimile numbers for the parties to this action.

________ (By PERSONAL SERVICE) By causing to be hand delivered via Modern Express Courier a true copy to

________ (By OVERNIGHT DELIVERY) By delivering to an authorized courier authorized by the express service to receive documents or depositing in a box or other facility regularly maintained by the express carrier a true copy thereof, on this date, and addressed to

XX (By U.S. MAIL) I am readily familiar with this office's business practice for collection and processing of correspondence for mailing with the United States Postal Service. This document will be sealed with postage fully prepaid and will be deposited with the United States Postal Service this date in the ordinary course of business, in envelopes addressed to **See attached service list**

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 25, 2009 at Oakland, California.

Chehie Songstad

Chehie Songstad

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
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171 TWELFTH STREET
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(510) 465-7728
FAX (510) 835-4913

BERRY & BERRY
P.O. Box 16070, Oakland, CA 94610
FOR: DESIGNATED DEFENSE COUNSEL
PH: (510) 835-8330
FAX: (510) 835-5117

COUNSEL UNKNOWN
FOR: INDUSTRIAL & FOUNDRY SUPPLY COMPANY, INC. OF CALIFORNIA

FOLEY & MANSFIELD
1111 Broadway, 10th Floor, Oakland, CA 94607
FOR: CALAVERAS ASBESTOS, LTD; REGENTS OF THE UNIVERSITY OF CALIFORNIA
PH: 510-590-9500
FAX: 510-590-9595

HASSARD BONNINGTON
2 Embarcadero Center, Suite 1800, San Francisco, CA 94111
FOR: KAISER GYPSUM COMPANY, INC.
PH: (415) 288-9800
FAX: (415) 288-9802

HERR & ZAPALA
152 North 3rd Street, Suite 500, San Jose, CA 95112
FOR: MODERN PLASTICS, INC sii/pae/et INDUSTRIAL FOUNDRY SUPPLY CO. OF CALIF; MODERN PLASTICS, INC.
PH: (408) 287-7788
FAX: (408) 927-0408

JACKSON & WALLACE
55 Francisco Street, Sixth Floor, San Francisco, CA 94133
FOR: DAP, INC.
PH: (415) 982-6300
FAX: (415) 982-6700

KASOWITZ, BENSON, TORRES & FRIEDMAN LLP
101 California Street, Suite 2050, San Francisco, CA 94111
FOR: CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/CYPRUS MINES CORP/PAUL W. WOOD; CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/SIERRA TALC & CHEMICAL COMPANY; CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/UNITED SIERRA DIVISION; CYPRUS AMAX MINERALS COMPANY
PH: 415-421-6140
FAX: 415-398-5030

McKENNA, LONG & ALDRIDGE
101 California Street, 41st Floor, San Francisco, CA 94111
FOR: CERTAINTEED CORPORATION
PH: (415) 267-4000
FAX: (415) 267-4198

PERKINS COIE LLP
Four Embarcadero Center, Suite 2400, San Francisco, CA 94111
FOR: GEORGIA PACIFIC CORPORATION
PH: (415) 344-7000
FAX: (415) 344-7288

SELMAN & BREITMAN
33 New Montgomery Street, Sixth Floor, San Francisco, CA 94105
FOR: R. T. VANDERBILT COMPANY, INC.; R. T. VANDERBILT COMPANY, INC. sii/pae/et INTERNATIONAL TALC CO INC.
PH: (415) 979-0400
FAX: (415) 979-2099

STEPTOE & JOHNSON
633 West Fifth Street, Suite 700, Los Angeles, CA 90071
FOR: METROPOLITAN LIFE INSURANCE COMPANY
PH: (213) 439-9400
FAX: (213) 439-9599

WALSWORTH, FRANKLIN, BEVINS & McCALL
601 Montgomery Street, 9th Floor, San Francisco, CA 94111
FOR: HENRY COMPANY; THE W.W. HENRY COMPANY
PH: (415) 781-7072
FAX: (415) 391-6258

End of Service List

Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE CIRCUIT COURT OF THE STATE OF MARYLAND, CIVIL DEPARTMENT

PRINCE GEORGE'S COUNTY

ERIC WESTON,

Plaintiff,

vs.

ASBESTOS CORPORATION LIMITED, *et al.*,

Defendants.

REQUEST TO FILE FOREIGN SUBPOENA FOR PRODUCTION OF DOCUMENTS

The petitioner, Eric Weston, plaintiff in the action entitled *Eric Weston v. Asbestos Corporation Limited, et al.*, Superior Court of the State of California, in and for the County of Alameda, Case No. RG08426405, and pursuant to Maryland Code § 2-510, makes this request to file a foreign subpoena for the production of documents upon citizen ANN WYLIE, to be served by personal service at her residence or employment site located at Office of the President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742.

The grounds for issuance of the subpoena for production of documents are as follows:

1. Petitioner Eric Weston has been diagnosed with mesothelioma, a terminal cancer the only known cause of which is exposure to asbestos. On December 19, 2008, plaintiff Eric Weston filed a personal injury action against various defendants alleging that Mr. Weston was exposed to asbestos brought home on his father, John Weston's clothes, shoes, and person, from his work in the U.C. Berkeley Shipping Department, in Berkeley, California between 1955 and

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
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(510) 465-7728
FAX (510) 835-4913

1979. Plaintiff was also a carpenter who, between 1973 and 2000, worked around and was exposed to asbestos and asbestos products manufactured and/or sold by the defendants.

2. R.T. Vanderbilt Company, Inc. ("Vanderbilt") and its affiliates supplied asbestos-containing products to Mr. Weston's work sites while he worked there.

3. ANN WYLIE has played an important role for defendant Vanderbilt and its affiliates. Corporate documents produced by Vanderbilt show Dr. Wylie did multiple commissioned mineralogical tests on Vanderbilt talc to analyze its asbestos content. See Exhibits A-C.

4. Petitioner needs the assistance of this Court to discover information and evidence necessary for preparation of the above-referenced California action. The production of documents is needed for proper adjudication of the case as Dr. Wylie possesses information about Vanderbilt products petitioner was exposed to. Petitioner seeks the records described in Attachment A which are believed to be in Dr. Wylie's possession, custody, and control.

5. Maryland Code § 2-411 allows depositions to be taken for the purpose of discovery and/or for use as evidence. Under Maryland Code § 2-510(a)-(b), the Circuit Court may issue a subpoena directing its citizen to appear for a deposition and produce designated documents.

6. The Superior Court of Alameda County, California has issued a Commission requesting that this Court issue a subpoena duces tecum upon ANN WYLIE, which is presented to this Court as Exhibit D.

WHEREFORE, Petitioner prays that this Court will enter an Order to issue a Subpoena Duces Tecum for Maryland resident ANN WYLIE commanding each to produce those documents described in Attachment A by 10:00am on September 21, 2009.

DATED: August 18, 2009

Respectfully submitted,

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation

By ______________________
William Ruiz

Attorney for Plaintiff

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
71 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

ATTACHMENT A

1. All **DOCUMENTS** relating to all tests and/or analyses performed on talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC**.

2. All **DOCUMENTS** relating to all correspondence with **VANDERBILT** and **INTERNATIONAL TALC** or any of their employees, agents or attorneys.

3. All **DOCUMENTS** relating to all tests and/or analyses performed on Mouldene talc.

4. All **DOCUMENTS** relating to your 1989 examination, testing, or analysis of Mouldene talc, including but not limited to sample S-158.

5. All **DOCUMENTS** relating to all tests and/or analyses performed on Nytal talc.

6. All **DOCUMENTS** relating to all tests and/or analyses performed on Asbestine talc.

7. All **DOCUMENTS** relating to all tests and/or analyses performed on 3X talc.

8. All **DOCUMENTS** relating to all tests and/or analyses performed on International Fibre talc, including but not limited to International Fibre #1, International Fibre #2, International 6N Fibre, International Fibre PL, International 80 WSA, and International W.

9. All financial **DOCUMENTS** relating to all work performed for **VANDERBILT** and **INTERNATIONAL TALC**, including but not limited to billing records, purchase orders, and any other financial statements.

10. All physical samples of talc mined or supplied by **VANDERBILT** and/or **INTERNATIONAL TALC** in your possession or control.

11. All physical samples of Mouldene talc in your possession or control.

12. All physical samples of talc identified by you as "Mouldene (S-158)" in your July 28, 1989 letter to Dr. C. S. Thompson. See Exhibit 1.

13. All physical samples of **VANDERBILT** talc from the Stanton study identified by you as **VANDERBILT** talc in your deposition testimony of August 8, 2007 in Franklin vs. General Motors Corp, et al. See Exhibit 2.

14. All documents identifying the source of the talc samples identified as **VANDERBILT** talc from the Stanton study you refer to in your deposition testimony of August 8, 2007 in the Franklin case. See Exhibit 2.

15. Copies of all written statements or affidavits you've signed on behalf of **VANDERBILT** or any of their employees, agents or attorneys, including but not limited to the affidavit you signed in the case of Bonnie Parker, individually and executrix to the Estate of Peter Hirsch in 2005. See Exhibit 3.

16. All financial **DOCUMENTS** relating to all work performed for **FORD,** including but not limited to billing records, purchase orders, and any other financial statements.

17. All financial **DOCUMENTS** relating to all work performed for **CHRYSLER,** including but not limited to billing records, purchase orders, and any other financial statements.

18. All financial **DOCUMENTS** relating to all work performed for **GENERAL MOTORS,** including but not limited to billing records, purchase orders, and any other financial statements.

"DOCUMENTS" as used herein shall refer to all manually, mechanically or electronically written or recorded audio or visual materials and computer files known to you, including but not limited to databases, electronic mail messages, financial data, spreadsheets, accounting system information, indices of computer records, correspondence, memoranda, telegrams, drats, notations, records, receipts, invoices, bills, purchase orders, sales records, delivery records, shipping manifests, bids, contracts, contract logs, catalogs, specifications, approved material submittals and change orders, as-built specifications, applications specifications, blueprints, plans, diagrams, indexes, computer-stored records, computer record indexes, microfilms, microfiche, warranties, guarantees, calendars, diaries, videotapes, images in computer or machine readable format, including, but not limited to, images and images of DOCUMENTS, stored on media such as, Compact Discs ("CD"), Digital Video Disc/Digital Versatile Discs ("DVD"), computer hard drives, computer back up tapes, or other electronic media, and/or including but not limited to, formats such as Portable Document Format (".pdf"), Graphic Interchange Format (".gif"), Tagged Image File (".tif"), Joint Photographic Experts Group (".jpeg"/ "jpg"), Hypertext Markup Language ("html"), etc., photographs, tape recordings, asbestos surveys, asbestos sample testing reports, abatement reports, books, brochures, safety manuals, union regulations, company regulations, depositions, trial testimony, trial exhibits, and statements.

"VANDERBILT" as used herein shall refer to R. T. Vanderbilt Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to Gouverneur Talc Company, Inc., Vanderbilt Minerals Corporation, and Western Talc Company.

"INTERNATIONAL TALC" as used herein shall refer to International Talc Company, Inc. and all its predecessors, subsidiaries, and affiliates, including but not limited to St. Lawrence Liquidating Corporation, Carbola Chemical Company, Inc., W. H. Loomis Minerals Corp. and W. H. Loomis Talc Company.

"FORD" as used herein shall refer to Ford Motor Company all its predecessors, subsidiaries, and affiliates.

"CHRYSLER" as used herein shall refer to DaimlerChrysler Corporation and all its predecessors, successors, subsidiaries, and affiliates, including but not limited to Chrysler LLC, DaimlerChrysler Company LLC, Chrysler Corporation, and Chrysler Motor Corporation.

"GENERAL MOTORS" as used herein shall refer to General Motors Corporation and all its predecessors, successors, subsidiaries, and affiliates.

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

Dr. C.S. Thompson
R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06852

July 28, 1989

Dear ~~Dr. Thompson~~, Slim

I have examined the sample of Mouldene(S-158) which you sent to me on July 19, 1989. The material consists primarily of fibrous talc with small amounts of tremolite, anthophyllite, carbonate, quartz, platy talc and feldspar.

The fibrous talc occurs in fiber bundles with splayed ends and as what appear to be individual fibers. The indices of refraction of this material are highly variable,. Parallel to elongation, γ ranges from 1.594 to 1.576; however, most of the fibers and fiber bundles have γ's between 1.582 and 1.588. Perpendicular to elongation the indices of refraction are much more variable; ranging from 1.536 to 1.578. These values represent the range in α and β. In general, the more the fibers display the classical characteristics of asbestos, i.e., fiber bundles with splayed ends, small fibril width, curved fibers,etc., the lower are the indices of refraction within the ranges given above.

The anthophyllite does not display asbestiform characteristics. It is most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. These characteristics might be explained as an intergrowth of anthophyllite and talc. γ for anthophyllite is always greater than 1.600 while α was measured as 1.596.

Tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky, but an occasional particle has an aspect ratio in excess of 10:1. α for tremolite was measured as 1.600, and γ for tremolite is greater than 1.600.

Tremolite and anthophyllite are about equally abundant. Together they total 5-10% of the sample. A few percent of the sample is carbonate, a little less is quartz and feldspar occurs only in trace quantities.

If you have any questions, please let me know.

Sincerely yours,

Ann

Ann G. Wylie

College Park, Maryland, 20742 (301) 454-3548

Exhibit A

ANDERSON CIRCUIT COURT

- -x

JOHNNY FRANKLIN, Individually
and as Administrator for the
Estate of FLORA FRANKLIN,

Plaintiff,

-against-

GENERAL MOTORS CORP., et al.,

Defendants.

- -x

100 Mill Road
Westhampton Beach, New York

August 9, 2007
12:10 p.m.

DEPOSITION of ANN WYLIE, M.D., a Witness in the above-entitled action, held at the above time and place, taken before Kelly A. Cruz, a Notary Public of the State of New York, pursuant to Order and stipulations between Counsel.

* * *

COPY

Exhibit B

Q. You would agree with me that the Stanton paper has nothing at all to do with Nytal 99 or Nytal 100, correct?

A. Well, the Nytal products, as I understand, and you can perhaps clarify that from the company themselves, but it is my understanding that they are different sizes of the same material roughly, or different, slightly different formulations of the basic raw products from the ore and to the extent that they can make the case that this is something they can tell you about this, I'm not going to talk about Nytal 99 or Nytal 100. My intention is to talk about the Stanton samples, so that those talcs in that paper are identified what they are, where they came from.

Q. And I may have asked this, and I apologize: But does Stanton in his paper identify where the samples, which portion of the mines the samples came from?

A. No, they are product names.

Q. Does Stanton identify in his

paper --

A. They are not identified in the paper at all. They are identified as talc with a number after them.

Q. And for me to -- do you have other documents back in your office relating to these talc six and seven?

A. The keys to what the materials are are on pieces of paper that I came on by going through the archives at the National Cancer Institute and Dr. Stanton's attic, and those pieces of paper that identified the materials that are labeled in there just with the mineral name and number are pieces of information that tell me about how they -- where they came from, how they prepared them in the case of the talc samples. They are a list with a number of product names on them.

Q. Can you -- and you have those papers still?

A. Yeah, somewhere.

Q. Would you agree to provide that to the court reporter, specifically the papers related to talc six and seven?

A. It's just a single piece. I'll look for it.

Q. If you find it, will you provide it?

A. I'll provide you with a Xerox copy of it.

MS. O'NEILL: Do you want to make that a late file exhibit?

MR. SATTERLEY: Yeah, late file. Why don't we call it 17, because we have this document here. We are going to mark this.

[Exhibit 17, document, was hereby marked as for identification, as of this date.]

MS. O'NEILL: You already have late filed 16. Okay. Let's mark 18 a peer review conflict form.

[Exhibit 18, peer review conflict form, was hereby marked as for identification, as of this date.]

A. Yes.

Q. And it's got your signature?

ANDERSON CIRCUIT COURT

- -x

JOHNNY FRANKLIN, Individually
and as Administrator for the
Estate of FLORA FRANKLIN,

Plaintiff,

-against-

GENERAL MOTORS CORP., et al.,

Defendants.

- -x

100 Mill Road
Westhampton Beach, New York

August 9, 2007
12:10 p.m.

DEPOSITION of ANN WYLIE, M.D., a Witness in the above-entitled action, held at the above time and place, taken before Kelly A. Cruz, a Notary Public of the State of New York, pursuant to Order and stipulations between Counsel.

* * *

COPY

Exhibit C

for mesothelioma. In any situation, mesothelioma seems to be caused by mineral dust.

Q. Have you attempted to analyze the mines in Upstate New York, to what portions of those mines could contain minerals to cause mesothelioma?

A. As you know, I tend not to comment on what causes what.

Q. So for that reason you haven't made that investigation?

A. No.

Q. You have in the past supported affidavits to support R.T. Vanderbilt?

A. I don't understand. Oh, I signed an affidavit on the Stanton samples.

Q. Was that in the Hirsch case?

A. I don't know.

Q. Have you submitted more affidavits than that one?

A. No.

Q. When did you submit that affidavit?

A. I don't remember.

Q. Can you give me an approximate time frame, past five years?

A. It might have been, five years.

Q. Okay. I think I may have that affidavit.

Is that a document I'm handing you, the affidavit that you signed on behalf of R.T. Vanderbilt relating to the Stanton paper?

A. Yes, 2005.

Q. Okay. So it's been two years ago?

A. Yes.

Q. Is this the one affidavit that you signed on behalf of R.T. Vanderbilt?

A. Yeah, that's the only one I remember.

MR. SATTERLEY: Just so the record is clear, I'm not going to mark this as an exhibit. That's in the case of Bonnie Parker, individually, and executrix to the estate of Peter Hirsch.

Q. I think the date of your signature was June 24, 2005?

A. Yeah, that's what it says. Um-hmm.

Q. That's your signature, correct?

A. That's me. Um-hmm.

Q. Did you ever meet Dr. Stanton?

A. Yes, once.

Q. Where did that occur?

A. At a conference at the National Institute of Health.

Q. Did you and he discuss at all this paper or --

A. No no,

Q. And Mearl Stanton, what field is he; a mineralogist like yourself?

A. No.

Q. Do you know what his expertise is in?

A. He worked for the National Institute of Health. He was a biological doctor or doctor. I don't know, medical doctor.

Q. That's what I wanted to know.

Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff
ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of and production of documents by said witness cannot be procured in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena duces tecum for the production of documents by ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to produce the required records.

The production of documents shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

September 21, 2009, at 10:00 a.m., or an alternate date, time and other nearby location to be announced in the production of documents subpoena issued under the laws of Maryland.

DATED: August 18, 2009 Clerk of the Superior Court for Alameda County

PAT S. SWEETEN By [signature]

Clerk of the Court

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
71 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
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Denise Abrams, Esq. (C.S.B. #124139)
Justin A. Bosl, Esq. (C.S.B. #241117)
William F. Ruiz, Esq. (C.S.B. #243783)
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation
171 Twelfth Street, Third Floor
Oakland, California 94607
Telephone: (510) 302-1000

Attorneys for Plaintiff

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, et al., Defendants.	No. RG08426405 **_AMENDED_ NOTICE OF TAKING DEPOSITION AND NOTICE OF VIDEOTAPING DEPOSITION** Deponent: Ann Wylie Date: September 4, 2009 Time: 10:00 a.m. Location: Inn & Conference Center, University of Maryland 3501 University Boulevard East Hyattsville, Maryland ACTION FILED: December 19, 2008 TRIAL DATE: September 21, 2009

TO: All Defendants and Their Attorneys of Record:

PLEASE TAKE NOTICE that pursuant to the attached Commission for personal attendance, the deposition of Ann Wylie will be taken by plaintiffs' attorneys, Kazan, McClain, Lyons, Greenwood & Harley, at 10:00 a.m. on September 4, 2009 at Inn & Conference Center, University of Maryland, 3501 University Boulevard East, Hyattsville, Maryland.

The deposition will be taken before a duly authorized Notary Public and shall continue from day to day thereafter, Sundays and holidays excepted, until completed. The deposition will be recorded stenographically, through instant visual display, and videotaped pursuant to C.C.P. §§2025.220(a)(5), 2025.330(b) and 2025.340. Plaintiffs reserve the right to use the videotaped depositions at trial under C.C.P.§§2025.220(a)(5) and 2025.620.

NOTICE IS FURTHER GIVEN that Ann Wylie is not a party to the above-captioned action.

DATED: August 20, 2009

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation

By Denise Abrams
Denise Abrams
Attorneys for Plaintiff

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

PROOF OF SERVICE

Re: ***ERIC WESTON v. ASBESTOS CORPORATION LIMITED, et al.***
Alameda County Superior Court Case No. RG08426405

I declare that:

I am employed in the County of Alameda, State of California. I am over the age of 18 years and not a party to the within action. My business address is 171 Twelfth Street, Third Floor, Oakland, California 94607. On August 20, 2009, I served the following document(s):

AMENDED **NOTICE OF TAKING DEPOSITION AND NOTICE OF VIDEOTAPING DEPOSITION (Ann Wylie)**

by transmitting a true copy via the following methods:

________ (By Facsimile Machine [FAX]) By personally transmitting a true copy thereof via an electronic facsimile machine to the facsimile numbers for the parties to this action.

________ (By PERSONAL SERVICE) By causing to be hand delivered via Modern Express Courier [Tracking No.] a true copy to

XX (By Mail) I am readily familiar with this office's business practice for collection and processing of correspondence for mailing with the United States Postal Service. This document will be sealed with postage fully prepaid and will be deposited with the United States Postal Service this date in the ordinary course of business, in envelopes addressed to **See attached service list**

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 20, 2009 at Oakland, California.

Chehie Songstad
Chehie Songstad

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET
THIRD FLOOR
OAKLAND, CA 94607
(510) 302-1000
(510) 465-7728
FAX (510) 835-4913

ARCHER NORRIS — PH: (925) 930-6600 FAX: (925) 930-6620
2033 N. Main Street, Suite 800, Walnut Creek, CA 94596
FOR: ST. LAWRENCE LIQUIDATING CORP, trustee for INTERNATIONAL TALC CO INC.

BERRY & BERRY — PH: (510) 835-8330 FAX: (510) 835-5117
P.O. Box 16070, Oakland, CA 94610
FOR: DESIGNATED DEFENSE COUNSEL

COUNSEL UNKNOWN
FOR: INDUSTRIAL & FOUNDRY SUPPLY COMPANY, INC. OF CALIFORNIA

FOLEY & MANSFIELD — PH: 510-590-9500 FAX: 510-590-9595
1111 Broadway, 10th Floor, Oakland, CA 94607
FOR: CALAVERAS ASBESTOS, LTD; REGENTS OF THE UNIVERSITY OF CALIFORNIA

HASSARD BONNINGTON — PH: (415) 288-9800 FAX: (415) 288-9802
2 Embarcadero Center, Suite 1800, San Francisco, CA 94111
FOR: KAISER GYPSUM COMPANY, INC.

HERR & ZAPALA — PH: (408) 287-7788 FAX: (408) 927-0408
152 North 3rd Street, Suite 500, San Jose, CA 95112
FOR: MODERN PLASTICS, INC sii/pae/et INDUSTRIAL FOUNDRY SUPPLY CO. OF CALIF; MODERN PLASTICS, INC.

JACKSON & WALLACE — PH: (415) 982-6300 FAX: (415) 982-6700
55 Francisco Street, Sixth Floor, San Francisco, CA 94133
FOR: DAP, INC.

KASOWITZ, BENSON, TORRES & FRIEDMAN LLP — PH: 415-421-6140 FAX: 415-398-5030
101 California Street, Suite 2050, San Francisco, CA 94111
FOR: CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/CYPRUS MINES CORP/PAUL W. WOOD; CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/SIERRA TALC & CHEMICAL COMPANY; CYPRUS AMAX MINERALS CO/sii/pae/alt/eqt/UNITED SIERRA DIVISION; CYPRUS AMAX MINERALS COMPANY

McKENNA, LONG & ALDRIDGE — PH: (415) 267-4000 FAX: (415) 267-4198
101 California Street, 41st Floor, San Francisco, CA 94111
FOR: CERTAINTEED CORPORATION

PERKINS COIE LLP — PH: (415) 344-7000 FAX: (415) 344-7288
Four Embarcadero Center, Suite 2400, San Francisco, CA 94111
FOR: GEORGIA PACIFIC CORPORATION

SELMAN & BREITMAN — PH: (415) 979-0400 FAX: (415) 979-2099
33 New Montgomery Street, Sixth Floor, San Francisco, CA 94105
FOR: R. T. VANDERBILT COMPANY, INC.; R. T. VANDERBILT COMPANY, INC. sii/pae/et INTERNATIONAL TALC CO INC.

STEPTOE & JOHNSON — PH: (213) 439-9400 FAX: (213) 439-9599
633 West Fifth Street, Suite 700, Los Angeles, CA 90071
FOR: METROPOLITAN LIFE INSURANCE COMPANY

WALSWORTH, FRANKLIN, BEVINS & McCALL — PH: (415) 781-7072 FAX: (415) 391-6258
601 Montgomery Street, 9th Floor, San Francisco, CA 94111
FOR: HENRY COMPANY; THE W.W. HENRY COMPANY

End of Service List

Circuit Court for Prince George's County
Clerk of the Circuit Court
Courthouse
Upper Marlboro, MD 20772-9987
MD Relay Service/TDD
1-800-735-2258

Case Number: CAL09-23596

Case Description: Eric Weston vs. Asbestos Corporation Limited

State of Maryland, Prince George's County to Wit:

Subpoena

To: Ann Wylie
Office of the President
University of Maryland
1101 Main Administration
College Park, Maryland 20742

You are hereby commanded to attend and testify at a deposition at:
Inn and Conference Center, University of Maryland, 3501 University Blvd. E., Hyattsville, Maryland 20783

On the 4th day of September 2009 at 10:00 am

You are commanded to produce the following documents or Objects:

Subpoena Requested by: Plaintiff
And any questions should be referred to: Justin Bosl 171 Twelfth St. 3rd Floor, Oakland, CA 94607 (510)302-1000

Date issued: August 20, 2009

Peggy Magee #156
Clerk

Notice:
(1) You are liable to body attachment and fine for failure to obey this subpoena.
(2) This Subpoena shall remain in effect until you are granted leave to depart by the court of by an officer acting on behalf of the court.
(3) If this subpoena is for attendance at a disposition and the party served is an organization, notice is hereby given that the organization must designate a person to testify pursuant to rule 2-412 (D) .

Sheriff's Return

( ) Served and copy delivered on date indicated below.
( ) Un-served, by reason of ____________________

Date: __________ Fee $__________ ______________
Sheriff

ATTORNEY OR PARTY WITHOUT ATTORNEY: TELEPHONE NO.: ATTORNEY FOR:	*FOR COURT USE ONLY*
SUPERIOR COURT OF CALIFORNIA, COUNTY OF ALAMEDA	
PLAINTIFF: ERIC WESTON DEFENDANT: ASBESTOS CORPORATION LTD. ET AL	CASE NUMBER: CAL09-23595 // RG08426405
PROOF OF SERVICE	Ref. No. or File No.:

1. I am over 18 years of age and not a party to this action.
2. Received by B T EDWARDS PROCESS SERVICE LLC to be served on **ANN WYLIE, 1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742.**
3. **INDIVIDUALLY/PERSONALLY** served by delivering a true copy of the **Subpoen for Deposition** with the date and hour of service endorsed thereon by me, to: **ANN WYLIE** at the address of: **1101 MAIN ADMINISTRATION BUILDING, COLLEGE PARK, Prince George's County, MD 20742**, and informed said person of the contents therein, in compliance with state statutes.
4. Date and Time of service: 8/20/2009 at 2:35 pm
5. Description of Person Served: Age: 57, Sex: F, Race/Skin Color: White, Height: 5'8, Weight: 130, Hair: Greyish, Glasses: N
6. Additional Information pertaining to this service:

   Hearing to held on the 4th of September 2009 @ 10:00 am

7. My name, address, telephone number, and, if applicable, county of registration and number are:
   Name: Billy T. Edwards Jr.
   Firm: B T EDWARDS PROCESS SERVICE LLC
   Address: 6501 Gold Yarrow Lane, Upper Marlboro, MD 20772-4022
   Telephone number: (301) 505-2020
   Registration Number: Process Server
   County: All Areas
   The fee for the service was:
8. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date:

Billy T. Edwards Jr.
(TYPE OR PRINT NAME OF PERSON WHO SERVED THE PAPERS)

(SIGNATURE OF PERSON WHO SERVED THE PAPERS)

PROOF OF SERVICE

Re: ***ERIC WESTON v. ASBESTOS CORPORATION LIMITED, et al.***
Alameda County Superior Court Case No. RG08426405

I declare that:

I am employed in the County of Alameda, State of California. I am over the age of 18 years and not a party to the within action. My business address is 171 Twelfth Street, Third Floor, Oakland, California 94607. On August 24, 2009, I served the following document(s):

AMENDED **NOTICE OF TAKING DEPOSITION AND NOTICE OF VIDEOTAPING DEPOSITION (Ann Wylie); Circuit Court for Prince Georgia's County SUBPOENA; and PROOF OF SERVICE of subpoena**

by transmitting a true copy via the following methods:

________ (By Facsimile Machine [FAX]) By personally transmitting a true copy thereof via an electronic facsimile machine to the facsimile numbers for the parties to this action.

__XX__ (By PERSONAL SERVICE) By causing to be hand delivered via Modern Express Courier a true copy to
See attached service list

__XX__ (By OVERNIGHT DELIVERY) By delivering to an authorized courier authorized by the express service to receive documents or depositing in a box or other facility regularly maintained by the express carrier a true copy thereof, on this date, and addressed to
Steptoe & Johnson
633 West Fifth Street, Suite 700
Los Angeles, California 90071

Attorneys for defendant Metropolitan Life Insurance Company

________ (By U.S. MAIL) I am readily familiar with this office's business practice for collection and processing of correspondence for mailing with the United States Postal Service. This document will be sealed with postage fully prepaid and will be deposited with the United States Postal Service this date in the ordinary course of business, in envelopes addressed to

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 24, 2009 at Oakland, California.

Chehie Songstad

Chehie Songstad

KAZAN, MCCLAIN, LYONS, GREENWOOD & HARLEY
A PROFESSIONAL LAW CORPORATION
171 TWELFTH STREET THIRD FLOOR
OAKLAND, CA 94607
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SERVICE LIST CASE: Weston, Eric [NE 1414] ACTION #: RG08426405 August 24, 2009 1:48 PM

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Attorneys for Plaintiff

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, et al., Defendants.	No. RG08426405 **NOTICE OF TAKING DEPOSITION AND NOTICE OF VIDEOTAPING DEPOSITION** Deponent: Ann Wylie Date: August 24, 2009 Time: 9:00 a.m. Location: Inn & Conference Center, University of Maryland 3501 University Boulevard East Hyattsville, Maryland ACTION FILED: December 19, 2008 TRIAL DATE: September 21, 2009

TO: All Defendants and Their Attorneys of Record:

PLEASE TAKE NOTICE that pursuant to the attached Commission for personal attendance, the deposition of Ann Wylie will be taken by plaintiffs' attorneys, Kazan, McClain, Lyons, Greenwood & Harley, at 9:00 a.m. on August 24, 2009 at Inn & Conference Center, University of Maryland, 3501 University Boulevard East, Hyattsville, Maryland.

The deposition will be taken before a duly authorized Notary Public and shall continue from day to day thereafter, Sundays and holidays excepted, until completed. The deposition will be recorded stenographically, through instant visual display, and

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videotaped pursuant to C.C.P. §§2025.220(a)(5), 2025.330(b) and 2025.340. Plaintiffs reserve the right to use the videotaped depositions at trial under C.C.P.§§2025.220(a)(5) and 2025.620.

NOTICE IS FURTHER GIVEN that Ann Wylie is not a party to the above-captioned action.

DATED: August 7, 2009

KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY
A Professional Law Corporation

By ______________________
William F. Ruiz
Attorneys for Plaintiff

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ERIC WESTON

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, Plaintiff, vs. ASBESTOS CORPORATION LIMITED, *et al.*, Defendants.	No. RG09430145 **COMMISSION**

WHEREAS, it appears to the Superior Court of the State of California for Alameda County that non-party witness **ANN WYLIE**, located at Office of President, University of Maryland, 1101 Main Administration, College Park, Maryland 20742 has information relevant to this action pending in the above-entitled court and that the personal attendance of said witness cannot be procured at deposition in California, under the authority of C.C.P. § 2026.010(c) and (f), we hereby authorize the issuance of a subpoena for the deposition of ANN WYLIE in Prince George's County, Maryland to compel ANN WYLIE, necessary witness, to appear for oral testimony.

The deposition shall be governed and proceed under the laws of the State of California, and a representative of Kazan, McClain, Lyons, Greenwood & Harley, PLC will take the deposition of the witness, and inspect and copy any documents at Inn and Conference Center, University of Maryland, located at 3501 University Blvd E, Hyattsville, Maryland 20783, on **August 24, 2009, at 9:00 a.m.**, or a at an alternate time and nearby location to be announced in the deposition

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subpoena issued under the laws of Maryland.

Said deposition will be recorded stenographically, through instant visual display, and videotaped pursuant to C.C.P. §2025.220(a)(5) and plaintiffs reserve the right to use the videotape deposition at trial under C.C.P. §2025.620.

DATED: August 6, 2009 Clerk of the Superior Court for Alameda County

AUG - 6 2009 By ______________________________

Clerk of the Court

SUPERIOR COURT OF CALIFORNIA ALAMEDA EUREKA

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PROOF OF SERVICE

Re: ***ERIC WESTON v. ASBESTOS CORPORATION LIMITED, et al.***
Alameda County Superior Court Case No. RG08426405

I declare that:

I am employed in the County of Alameda, State of California. I am over the age of 18 years and not a party to the within action. My business address is 171 Twelfth Street, Third Floor, Oakland, California 94607. On August 7, 2009, I served the following document(s):

NOTICE OF TAKING DEPOSITION AND NOTICE OF VIDEOTAPING DEPOSITION (Ann Wylie)

by transmitting a true copy via the following method:

__XX__ (By Mail) I am readily familiar with this office's business practice for collection and processing of correspondence for mailing with the United States Postal Service. This document will be sealed with postage fully prepaid and will be deposited with the United States Postal Service this date in the ordinary course of business, in envelopes addressed to

See attached service list

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 7, 2009 at Oakland, California.

Chehie Songstad

Chehie Songstad

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DEPARTMENT OF
GEOLOGY
301-454-3548

August 25, 1982

Mr. George MacDonald
Rollins Burdick Hunter of Illinois, Inc.
10 South Riverside Plaza
Chicago, Illinois 60606

Dear Mr. MacDonald;

Using polarized light microscopy and dispersion staining, I have examined the sample you sent to me identified as tremolitic talc. I have identified the following minerals in this sample: platy talc, tremolite, fibrous talc and anthophyllite. Of these, tremolite and anthophyllite can occur in nature in an asbestiform habit and are then called asbestos. The characteristics of this habit which are visible using the optical misroscope are:

1. fiber bundles exhibiting splayed ends
2. parallel extinction (The non-asbestiform varieties may exhibit oblique extinction.)
3. curved fibers
4. extreme elongation often in excess of 100:1

The tremolite and anthophyllite present as major constituents of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments. Most of the cleavage fragments are elongated and many have aspect ratios in excess of 3:1. According to our existing federal government regulations these cleavage fragments can be called fibers. However, this is not mineralogically valid. I observed no anthophyllite or tremolite asbestos fibers in the sample I examined.

There are, however, true mineral fibers in the sample. I have identified them as fibrous talc. They are distinguished from the amphiboles tremolite and anthophyllite on the basis of their index of refraction. The maximum index of refraction of fibrous talc does not exceed 1.596. All of the fibers I observed in this sample had indices of refraction equal to or less than 1.596. This value is much too low for tremolite or anthophyllite asbestos. Fibrous talc is thought to form from anthophyllite. It also exhibits the characteristics listed above for the asbestiform habit. Although I did not observe any in the sample portion I examined, there may be a few fibers which fall somewhere between anthophyllite-asbestos and fibrous talc present from this locality. The abundance of this material is vanishingly small and is should be considered as occuring in trace quantities only.

Sincerely yours,

EXHIBIT
#2 Wylie
9/8-09 JH

Ann G. Wylie
Associate Professor

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

301-454-3548

December 4, 1983

Report of Investigation

I. SAMPLES

Two samples were received from Mr. N.v.d. Burgh. They were sent at the request of Mr. J.L. Spoormaker of R.T. Vanderbilt Company. The two samples are labeled IT-325 and IT-FT.

II. METHOD OF ANALYSIS

The samples were examined by polarized light microscopy and Cargille index of refraction liquids. Scanning electron microscopy with energy dispersive x-ray analysis was not used because four of the major components of the material: talc, serpentine, anthophyllite, and talc-amphibole, cannot be distinguished readily by this method. The habits of talc, talc-amphibole and anthophyllite in some cases are similar. Chemically, they vary only in their Mg:Si ratio, a quantity which is not easily measured quantitatively by energy dispersive x-ray analysis, and qualitative analysis in not definitive. X-ray diffraction was not used because mineral habit cannot be evaluated by x-ray diffraction and minerals which occur in small quantities cannot be detected by it. Optical microscopy allows the determination of many optical properties including the measurement of the indices of refraction while simultaneously observing habit.

III. RESULTS

A. Elongated minerals

Four minerals occur in the samples in an elongated form. Of these, the most abundant is tremolite, followed by fibrous talc. Anthophyllite and talc-amphibole occur in very small quantities. The optical properties, habits, and central stop dispersion staining colors which can be observed in Cargille immersion oil, n_D = 1.604*, are given for all four.

* Throughout this report, all indices of refraction are given for λ = 5893 A°, the Fraunhofer D line.

1. Tremolite

Deer, Howie and Zussman (1966)** give the optical properties of tremolite as follows:

$$\alpha = 1.599 - 1.688$$
$$\beta = 1.612 - 1.697$$
$$\gamma = 1.622 - 1.705$$
$$c\wedge Z = 21 - 10°$$

α, γ and $c\wedge Z$ were measured from the tremolite found in IT-FT and IT-325 as follows:

$$\alpha = 1.598 \pm 0.002$$
$$\gamma = 1.622 \pm 0.002$$
$$c\wedge Z = 19°$$

Tremolite can be distinguished from the other elongated minerals in these samples by its oblique extinction, indices of refraction and shape.

Most tremolite particles will show oblique extinction but only a few will show the characteristic maximum angle ($c\wedge Z = 19°$). Those for which the extinction angle is maximum will also have the highest birefringence (highest order interference colors under crossed nicols), and will have indices of refraction α and γ. Most tremolite particles will lie parallel to {110} and will have indices of refraction of α' and γ'. These particles will also have oblique extinction but their extinction angles are less than 19 degrees. Most have extinction angles between 10 and 15 degrees. Tremolite viewed on {100} will show parallel extinction. Indices of refraction β and γ are characteristic of this orientation. By tapping the cover slip and causing the particles to roll, an observor can view the particle in a different orientation. In this way, it is possible to distinguish tremolite, which has parallel extinction in only one orientation, from anthophyllite, which has parallel extinction in all orientations.

When these samples are put in Cargille immersion oil $n_D = 1.604$ and are viewed through a central stop dispersion staining objective, the tremolite will appear yellow to golden yellow when the elongation direction of the particle is parallel to the privileged direction of the lower polarizer. They will be blue, blue magenta or magenta when the elongation direction is perpendicular to the polarizer's privileged direction. The colors reflect the variability of the magnitude of γ' parallel to elongation and of the magnitude of α' to β perpendicular to elongation. This variability is due to differences in crystallographic orientation among the particles.

The principle indices of refraction appear to be quite constant throughout the material. They are among the lowest given for tremolite generally. This suggests that this tremolite is essentially iron-free. It should have a chemical formula close to that of the Mg end member: $Ca_2Mg_5Si_8O_{22}(OH)_2$.

** Deer, Howie and Zussman (1966) are used throughout as the source for standard optical data. Their data do not differ significantly from Kerr (1966), Heinrich (1972) Winchell and Winchell (1951) or Bloss (1962).

Tremolite (continued)

The tremolite particles have shapes which are typical of amphibole cleavage fragments. (Figure 1) Their aspect ratios (length:width) range from 1:1 to 20:1; most are in the range 3:1 to 10:1. Rarely, a long thin cleavage fragment will be found. Figure 2 illustrates the formation of such a particle. That this long thin particle is not a fiber but rather a cleavage fragment is suggested by the fact that it is in optical continuity with the large, blocky particle from which it is being cleaved. None of the tremolite particles show any characteristics of the asbestiform habit; they do not grow in bundles, show flexibility through curvature, nor occur with the high aspect ratios typical of asbestos.

2. Fibrous talc

Deer, Howie and Zussman (1966) give the optical properties of talc as follows:

$$\alpha = 1.539 - 1.550$$
$$\beta = 1.589 - 1.594$$
$$\gamma = 1.589 - 1.600$$

There are both platy and fibrous talc present in IT-FT and IT-325. The optical properties of the fibrous talc were measured as follows:

$$\alpha = 1.538 - 1.550 \pm 0.002$$
$$\beta \cong \gamma$$
$$\gamma = 1.578 - 1.600 \pm 0.002$$
$$\text{elongation direction } \Lambda Z = 0 - 20°$$

Fibrous talc can be distinguished from the other elongated minerals present in these samples on the basis of indices of refraction, extinction angle and habit.

For talc, all indices of refraction are less than 1.600. Therefore, in immersion oil $n_D = 1.604$, when the direction of elongation is parallel to the privileged direction of the polarizer and the particles are observed through a central stop dispersion staining objective, the talc fibers will appear blue, bluegreen or blue white. The color variation reflects the variability of α. When viewed with the elongation direction perpendicular to the polarizer's privileged direction, the talc particles may exhibit essentially the same dispersion staining colors as they do parallel to their length when β is parallel to the privileged direction of the polarizer ($\beta \cong \gamma$); they will appear white if it is α or α' which is parallel to the privileged direction of the polarizer.

The wide range of the indices of refraction which were measured from the fibrous talc suggests that its chemical composition is not constant. It may be the presence of small quantitites of Ca and/or excess water which are responsible for the variability.

Fibrous talc occurs in two different habits in these samples. The first type can be called asbestiform (Type I). These particles are clearly made up of bundles of fibers which are obviously flexible (Figure 3).

Fibrous Talc (continued)

These asbestiform talc fibers have high birefringence and two indices of refraction: γ' perpendicular to elongation and α' parallel to elongation. γ' and α' of the asbestiform talce are lower than the corresponding indices of Type II talc fibers. Type II talc fibers can be described as ribbon-like. In one orientation, these particles appear as wide, low birefringent particles (they may be almost isotropic). The indices of refraction γ and β occur in this orientation and oblique extinction of up to 3 degrees may be observed. Aspect ratios vary from 3:1 to 15:1; most are from 5:1 to 10:1. (Figure 4a) These particles may also be seen in another orientation where they have higher birefringence, indices of refraction α and γ, parallel extinction and aspect ratios that range up to 20:1 or 30:1. (Figure 4b) Some of the Type II fibrous talc particles may exhibit splayed ends (Figure 5), and appear to be marginally asbestiform.

3. Anthophyllite

Deer, Howie and Zussman (1966) give the indices of refraction and extinction angle of anthophyllite as follows:

$$\alpha = 1.596 - 1.694$$
$$\beta = 1.605 - 1.710$$
$$\gamma = 1.615 - 1.722$$
$$c \wedge Z = 0°$$

α, β and γ were measured from the anthophyllite found in IT-FT and IT-325 as follows:

$$\alpha \geqq 1.594 \pm 0.002$$
$$\beta \geqq 1.604 \pm 0.002$$
$$\gamma \geqq 1.614 \pm 0.002$$
$$c \wedge Z = 0°$$

Prismatic anthophyllite can be distinguished from tremolite by its parallel extinction in all orientations. Also, its birefringence is slightly less than that of tremolite and its largest index (γ) is somewhat less than γ of tremolite. Acicular anthophyllite can be distinguished from talc and talc-amphibole only on the basis of index of refraction. In Cargille oil n_D = 1.604, its dispersion staining colors will be golden to golden magenta when the direction of elongation is parallel to the privileged direction of the polarizer. They will be blue magenta to bright blue green when the privileged direction of the lower polarizer is perpendicular to the direction of elongation. The indices of refraction of the anthophyllite present in these samples are very low. Low indices of refraction are characteristic of anthophyllite which is essentially iron-free.

The anthophyllite particles are generally more acicular than the tremolite particles (Figure 6). They frequently have aspect ratios of 20:1, and, when they have this shape, they can only be distinguished from talc-amphibole and talc by careful evaluation of the indices of refraction. Blocky anthophyllite particles are also present. (Figure 3) The habit of anthophyllite does not appear to be asbestiform. There is no indication of fiber bundle growth flexibility, or extreme aspect ratio. However, the high aspect ratio particles may be mineral fibers even though they are not asbestiform. But, because the material has been processed, fibers cannot be distinguished from cleavage fragments with high aspect ratio. Examination of the unprocessed ore would probably enable this distinction to be made.

4. Talc-amphibole

Present in these samples are elongated mineral particles which have optical properties which do not conform to any recognized mineral species. They are:

$$\alpha = 1.550 - 1.592$$
$$\beta = 1.590 - 1.600$$
$$\gamma = 1.590 - 1.608$$

elongation direction $\wedge Z = 0$

$(\gamma - \beta)$ appears to increase as α and γ increase. Therefore, at one extreme, $\gamma = 1.590$, $\alpha = 1.550$ and $(\gamma - \beta) = 0$. At the other, $\gamma = 1.608$, $\alpha = 1.592$ and $(\gamma - \beta) = 0.008$. Most of the talc-amphibole particles have parallel extinction.

This mineral resembles both talc and amphibole. When γ and β are close together, it is similar to talc but at least one index of refraction is too high for talc. When $(\gamma - \beta)$ is approximately the same as $(\beta - \alpha)$, the material resembles an amphibole but the indices of refraction are too low. In addition, electron diffraction of some fibrous talcs have shown a residual amphibole lattice may be present (Stemple and Brindley 1960). Therefore, the name talc-amphibole seems appropriate for this material. The extinction angle data suggest that the "amphibole" part of this mineral may be both an orthorhombic amphibole (anthophyllite?).

In Cargille immersion oil $n_D = 1.604$, the appearance of these particles will be highly variable due to the large variability of α and γ. When the direction of elongation is parallel to the privileged direction of the polarizer, and they are viewed with a central stop dispersion staining objective, the particles may appear reddish magenta, magenta, blue magenta, blue green or blue white. Perpendicular to the direction of elongation, they will be blue green, blue white or white.

The habit of talc-amphibole appears to be variable. Some particles are ribbon-like and similar to the Type II fibrous talc; some are similar to anthophyllite; and some resemble the talc fibers shown in Figure 5 in which case they would be described as marginally asbestiform. Aspect ratios on the order of 20:1 are common. Some typical particles are shown in Figures 7 and 8.

B. Other minerals

In addition to the four minerals described above, serpentine, platy talc, and calcite were observed in the samples. None of the serpentine is chrysotile. All of it has a platy habit; it is probably antigorite. In Cargille immersion oil $n_D = 1.556$, it can be seen that the indices of refraction of the serpentine particles are close to the indices of refraction of this oil. None of the elongated mineral particles have an index of refraction parallel to elongation which is close to 1.556. For all the elongated minerals, the index of refraction which is parallel to the direction of elongation is greater than 1.556. Perpendicular to the direction of elongation, all amphibole particles have indices of refraction much greater than 1.556. Only fibrous talc may have α equal to 1.556. Still, fibrous talc should not be confused with chrysotile because fibrous talc has a high birefringence and a much larger γ.

CONCLUSIONS

Samples IT-IF and IT-325 are composed of essentially the same minerals. Four of these are elongated. Type I fibrous talc is clearly asbestiform. The talc-amphibole and fibrous talc Type II form acicular particles and there is evidence to suggest that they are marginally asbestiform. However, fiber bundles are rare and many of the particles may simply be acicular cleavage fragments like those shown in Figure 4. The anthophyllite is both acicular and prismatic, and the particles may be formed by growth or cleavage or both. However, the anthophyllite does not appear to be asbestiform. The tremolite particles are prismatic and blocky and are probably formed by cleavage alone. They are the most common elongated mineral particles in these samples. Type I fibrous talc and tremolite are readily distinguished from the other elongated minerals by their distinct habits. Type II fibrous talc, talc-amphibole and anthophyllite require precise determination of index of refraction data to make a positive identification. In fact, there is an apparent continuum between fibrous talc and anthophyllite in optical properties and habit. A similar series of minerals is present in anthophyllite-asbestos from Finland (UICC). There, however, fibrous talc is a minor constituent while anthophyllite is abundant. Here, fibrous talc is the common phase while talc-amphibole and anthophyllite occur in minor amounts.

Ann G. Wylie
Associate Professor

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REPORT OF LABORATORY ANALYSIS

I have examined the sample of Nytal 99 which Dr. C. S. Thompson of R.T. Vanderbilt sent to me in October, 1984. I used polarized light microscopy in conjunction with immersion oil techniques. The purpose of this examination was to identify the elongated minerals present in the sample and to determine if any of these particles are asbestos.

Mineral identification was based on the optical properties of the minerals which include: index of refraction, sign of elongation, extinction angle, birefringence, color, and the relationship between the optic and cleavage directions. The most abundant elongated mineral found in this sample is tremolite. The other elongated minerals which were identified include anthophyllite, talc, and an intermediate talc-amphibole.

No asbestos was identified in this sample. Asbestos fiber populations are composed of either chrysotile or a member of the amphibole family that occur as particulates that display some or all of the following characteristics: fiber bundles with splayed ends, curved fibers, aspect ratios in excess of 20:1 and widths less than 1 micrometer for fibers longer than 5 micrometers, and matted masses of individual fibers. None of these properties were observed on any of the amphibole particulates in this sample.

The elongated talc particles, although rare, display the characteristics common to asbestos. Splayed ends, curvature, and parallel growth in bundles are common characteristics of this population. Such material is referred to as "fibrous" or "asbestiform" talc.

The particles of tremolite and anthophyllite in this sample display the characteristics that are typical of cleavage fragments of amphiboles. Amphibole cleavage fragments lack the characteristics of asbestos. Individual particles longer than 5 micrometers typically do not exceed 20:1 in aspect ratio. Stair-stepping along the particle edges are common. Cleavage fragments never show curvature or occur as fiber bundles with splayed ends. While some of the particles of anthophyllite and the intermediate talc-amphibole have aspect ratios that are higher than those typical of tremolite, they do not display the characteristics of the asbestiform habit.

Ann G. Wylie

Ann G. Wylie, PhD
Associate Professor of Geology
Jan 25, 1985

ANN GILBERT WYLIE, PH.D.
16244 BATCHELLORS FOREST RD.
OLNEY, MARYLAND 20832

TELEPHONE 301 - 774-2452
301 - 454-3548

REPORT OF LABORATORY ANALYSIS

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Ann G. Wylie

Ann G. Wylie, PhD
Associate Professor of Geology
Jan 25, 1985

R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

September 12, 1985

Dr. Ann Wylie
Geological Consultant
16244 Batchellors Forest Road
Olney, MD 20832

Dear Ann:

Enclosed are copies of the Felius and finalized Dunn reports.

The Felius report was recently completed by Dr. R. O. Felius of the University of Utrecht following an arrangement between us and Dr. Meyer of the TNO for additional analytical work on the same sample of talc previously analyzed by you and by Dr. Van der Burgh.

Frankly, we were not prepared for the results we received. Slim and I had talked to Dr. Felius on the telephone a couple of times, but Slim now feels we should not have gone along with this analysis without personal contact with Felius.

The best we can do now, we believe, is to request Dr. Felius to omit the reference to the OSHA definition of asbestos (especially in view of the latest OSHA intentions) and give us a straight, mineralogically accurate report.

The Dunn report is finished as far as we are concerned, and will be distributed as you see it. We are going to reproduce the photos in order to provide better resolution, and we can send you one of these copies later if you so desire.

Let us know if you have any comments on the Felius report.

Sincerely,

R. T. VANDERBILT COMPANY, INC.

al

Allan M. Harvey, Director
Environmental Affairs

AMH:lsm
Enclosure

R.T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
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August 31, 1988

Ann G. Wylie PhD
STEMICRO CORPORATION
15817 Crabbs Branch Way
Rockville, MD 20855

Dear Ann:

It was a pleasure seeing you at the pneumoconioses conference. The quality of presentations seemed to vary all over the lot but yours were certainly among the better offerings.

During the conference several items came up which we'd like to follow-up. In the interest of brevity, I've listed these below:

1) Would you please forward a copy of any dimensional data you have on the Libby Montana asbestiform tremolite. Hopefully we will be able to incorporate it in our paper.

2) To expand consensus on the "mineralogical" definition it was tentatively agreed broader formal endorsement was desirable. Accordingly, I have attached a possible approach for use through the mail. Suggestions, comments, etc. are encouraged.

3) It appears Mr. Baer (OSHA) who chaired your session late Thursday was quite taken by your presentation. Ever ready to capitalize on such enthusiasm, we wondered whether the OSHA hierarchy would now be interested in hearing about what is and what is not asbestos (better late than never).
Since we are such a popular company with OSHA, Kelly Bailey suggested the stone people try to organize such a presentation. If this can be organized, we hope you will be able and willing to participate.

I haven't heard from Slim on the proposed EPA mineral fiber standard as yet. I'm sure he will fill you in on that soon.

Respectfully,

R. T. Vanderbilt Company, Inc.

John Kelse

John W. Kelse
Mgr. Occupational Health & Safety

JWK:cje

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BRUCE P. MANDEL

February 5, 1993

Ann G. Wylie, Ph.D.
Associate Professor
Department of Geology
Building 237, Room 4113
University of Maryland
College Park, Maryland 20742

Re: **R.T. Vanderbilt Company, Inc.**
Summit County [Akron, Ohio] Tireworker Litigation

Dear Dr. Wylie:

Pursuant to your February 3, 1993 conversation with Elaine Kuczynski (my asbestos paralegal), this letter will confirm that the talc defendants have entered into a tentative settlement agreement with plaintiffs' counsel in a large segment of the captioned litigation. Due to the apparent settlement agreement, I would appreciate your immediately cancelling all work with respect to the specific assignments requested to be performed, until further notice is received from me or Mr. Martillotta.

On behalf of Sam Martillotta and myself, I thank you for your generous cooperation in assisting us in defending this litigation and for your hospitality during our recent visit to the University. It has been a pleasure working with you, and I look forward to working with you in the future. In this regard, we continue to represent defendants in other lawsuits so it is quite possible that you will be hearing from us again; however, if we need your services, it probably will not be for some time. Thanks again.

Best regards.

Sincerely,

Bruce P. Mandel

47:eak
G:18019.C1
cc: Samuel Martillotta, Esq.

Ar. Wylie ③
L/P

ANN GILBERT WYLIE, PH.D.
16244 BATCHELLORS FOREST RD.
OLNEY, MARYLAND 20832

TELEPHONE 301 · 774-2452
301 · 454-3548

4001

January 25, 1985

Mr. Dennis Race
Akin, Gump, Strauss, Hauer and Feld
1333 New Hampshire Avenue, N.W.
Suite 4000
Washington, D.C. 20036

Dear Mr. Race,

I am enclosing a report on a sample of Nytal 99 which I received from Dr. C.S. Thompson of R.T. Vanderbilt in October, 1984. I have given this material to Dr. Phil Candela with the instructions that he analyse this material for the presence of asbestos. You should be receiving his report in the near future. I have also enclosed an invoice for this report and analysis.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie

Tech. Expert
Dr. Wylie

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

February 13, 1987

Report of Investigation

Ann G. Wylie
Associate Professor

I. Samples

Two samples were received by mail from the House of Ceramics in Memphis, Tennessee on Monday, February 2, 1987. The samples were sent at the request of Mr. Dennis race who asked that I analyze the samples for asbestos. The samples were labeled Nytal 100 HR Talc and Pfizer CP 96-30 Talc.

II. Method of Analysis

The samples were examined by polarized light microscopy. Subsamples were mounted in Cargille index of refraction liquids for determination of index of refraction. Other properties used in the identification of the minerals include sign of elongation, extinction angle, birefringence, color and the relationship between optic and cleavage directions. Mineral names were assigned by comparing these data to those given in standard optical mineralogy textbooks. Once the minerals were identified, the determination of whether or not the mineral was asbestos was based on morphology. A mineral is considered to be asbestiform if it meets the following criteria:

1) mean aspect ratios ranging from 20:1 to 100:1 or higher in particles longer than 5 μm,
2) very thin fibrills, usually less than 0.5 μm in width, and
3) two or more of the following:
   a) parallel fibers occurring in bundles,
   b) fiber bundles displaying splayed ends,
   c) fivers in the form of thin needles,
   d) matted masses of individual fibers, and
   e) fibers showing curvature.

To be asbestos, an asbestiform particle must be an amphibole or chrysotile. Cleavage fragments lack these properties. Cleavage fragment aspect ratios are generally less than 20:1 and stair-stepping along particle edges is common.

College Park, Maryland, 20742 (301) 454-3548

III. Results

Pfizer CP 96-30 Talc

This sample contains talc and tremolite as major constituents. The tremolite is not asbestiform. It has none of the porperties characteristic of asbestos. Its characteristics are consistent with those of a population of cleavage fragments. Some of the talc particles are elongated, but the talc does not appear to be asbestiform. No asbestos was detected in this sample.

Nytal 100 HR Talc

This sample contains talc and tremolite and trace quantities of anthophyllite and a talc-amphibole mineral. The tremolite and anthophyllite are not asbestiform. Their characteristics are consistnet with those of a population of cleavage fragments. There are two types of talc present in the sample: platy and fibrous. Some of the fibrous talc has the characteristics of the asbestiform habit. However, because it is talc, it is not asbestos. The intermediate talc-amphibole particles are very rare. They have a higher aspect ratio than is typical for cleavage fragments. However, they do not dispaly the characteristics of the asbestiform habit. No asbestos was detected in this sample.

Ann G. Wylie
Feb 13, 1987

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

Talc analysis

Dr. C.S. Thompson
R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06852

July 28, 1989

Dear Dr. Thompson, Slim

I have examined the sample of Mouldene(S-158) which you sent to me on July 19, 1989. The material consists primarily of fibrous talc with small amounts of tremolite, anthophyllite, carbonate, quartz, platy talc and feldspar.

The fibrous talc occurs in fiber bundles with splayed ends and as what appear to be individual fibers. The indices of refraction of this material are highly variable,. Parallel to elongation, γ ranges from 1.594 to 1.576; however, most of the fibers and fiber bundles have γ's between 1.582 and 1.588. Perpendicular to elongation the indices of refraction are much more variable, ranging from 1.536 to 1.578. These values represent the range in α and β. In general, the more the fibers display the classical characteristics of asbestos, i.e., fiber bundles with splayed ends, small fibril width, curved fibers,etc., the lower are the indices of refraction within the ranges given above.

The anthophyllite does not display asbestiform characteristics. It is most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. These characteristics might be explained as an intergrowth of anthophyllite and talc. γ for anthophyllite is always greater than 1.600 while α was measured as 1.596.

Tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky, but an occasional particle has an aspect ratio in excess of 10:1. α for tremolite was measured as 1.600, and γ for tremolite is greater than 1.600.

Tremolite and anthophyllite are about equally abundant, Together they total 5-10% of the sample. A few percent of the sample is carbonate, a little less is quartz and feldspar occurs only in trace quantities.

If you have any questions, please let me know.

Sincerely yours,

Ann

Ann G. Wylie

College Park, Maryland, 20742 (301) 454-3548

File
Talc Analyses

UNIVERSITY OF MARYLAND AT COLLEGE PARK

DEPARTMENT OF GEOLOGY

FAX COVER SHEET

TO:

Company Name:

Contact Name: Dennis Race

Fax No: 202-887-4195

FROM:

Sender: Ann Wylie

Description: Laboratory Report. Please call to confirm receipt + review.

NUMBER OF PAGES: 3 (including cover page)

DATE SENT: Apr 30

IF THERE IS A PROBLEM WITH THIS TRANSMISSION PLEASE CALL (301) 405-4365.

DE YOE, HEISSENBUTTEL & MATTIA

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PHILIP F. MATTIA
CERTIFIED CIVIL TRIAL ATTORNEY
GARY R. MATANO
ANNE HUTTON
ROBERT H. GARDNER
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CHRISTOPHER G. MEIKLE
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CHARLES C. STALTER
1919-1968
CHARLES P. DeYOE
1950-1973
THOMAS M. GUINEY
1962-1983

OF COUNSEL
JOHN SELAWSKY
MEMBER N. J. & N. Y. BAR

REFER TO FILE
H5136

April 6, 1989

Dr. Ann Wiley
Assistant Professor of Geology
Building 237
Room 4113
University of Maryland
College Park, Maryland 20742

Re: Hoffman v. Winston Towers, et als.

Dear Dr. Wiley:

With regard to the above referenced matter, I enclose various documentation regarding this claim. As I had discussed with Dennis Race, Esq., the personal counsel for R. T. Vanderbilt, I am given to understand that you have served as an expert for purposes of preparation of reports and testimony regarding asbestos and allegations of asbestos of the products of R. T. Vanderbilt.

After you have had a chance to review these items, kindly contact the undersigned with regard to setting up a convenient time when Mr. Race, Mr. Vanderbilt, yourself and the undersigned can get together for purposes of discussing this matter.

I look forward to hearing from you in the near future.

Very truly yours,

DEYOE, HEISSENBUTTEL & MATTIA

BY: Robert H. Gardner
ROBERT H. GARDNER

RHG/lg
Enc.
CC: Dennis Race, Esq.

DE YOE, HEISSENBUTTEL & MATTIA

COUNSELLORS AT LAW

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OF COUNSEL
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MEMBER N. J. & N. Y. BAR

REFER TO FILE #
H/R5136

August 14, 1989

Ann G. Wylie, PhD.
Acting Dean
Department of Geology
University of Maryland
College Park, Maryland 20742

Re: Hoffman vs. Centex Corporation
- R. T. Vanderbilt Company

Dear Doctor Wylie:

In furtherance of our meeting on August 3rd, 1989, this is to confirm your retention in this matter as an expert on behalf of R. T. Vanderbilt, Inc. This is also to confirm that your hourly rate will be $150.00 per hour.

I have currently requested authority from C N A, the insurer for R. T. Vanderbilt, to obtain the services of a survey and testing lab for obtaining a sample of the ceiling in question.

Upon receipt of the authority and the sample, we shall, of course, forward it on to you.

It was good to meet you finally after all this time, and I look forward to working with you in the future.

If you have any further questions, and/or you require any further materials, please do not hesitate to call.

Very truly yours,

DE YOE, HEISSENBUTTEL & MATTIA

BY: ______________________
ROBERT H. GARDNER

RHG:jd
cc: Mr. Dennis Race, Esq.
Paul Vanderbilt, Esq.
Mr. Paul Hellmold-CNA
File #36-285398

DE YOE, HEISSENBUTTEL & MATTIA

COUNSELLORS AT LAW

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OF COUNSEL
JOHN SELAWSKY
MEMBER N. J. & N. Y. BAR

October 10, 1990

REFER TO FILE #

H5136

Ann G. Wylie, PhD.
department of Geology
UNIVERSITY OF MARYLAND
College Park, Maryland 20742

Re: Hoffman v. Centex

Dear Dr. Wylie:

With regard to the above referenced matter, it is my understanding that the samples that you had requested have been recently taken and forwarded to you for analysis. Kindly advise me of the status with regard to your investigation.

In addition, kindly forward a copy of any additional report you may render in this matter so that we might send same to the plaintiff's attorney.

I look forward to hearing from you in the near future. Please advise as soon as possible if you did not receive the samples.

Very truly yours,

DEYOE, HEISSENBUTTEL & MATTIA

BY:__________________________
ROBERT H. GARDNER

RHG/dt
cc: Dennis Race, Esq.
cc: CNA
Att: Alan Gayles; File #36-285398

DE YOE, HEISSENBUTTEL & MATTIA

COUNSELLORS AT LAW

WOOD M. DeYOE
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MEMBER N. J. & N. Y. BAR

October 10, 1990

REFER TO FILE #

H5136

Ann G. Wylie, PhD.
Department of Geology
UNIVERSITY OF MARYLAND
College Park, Maryland 20742

Re: Hoffman v. Centex

Dear Dr. Wylie:

As you will recall, we had been discussing a supplemental report with regard to the Hoffman case.

I enclose for your reference additional reports rendered by the plaintiff's attorney in this matter.

You will note that the plaintiff's expert, using the old reports, conclude that there was asbestos or asbestos form material in the talc provided by R. T. Vanderbilt.

I would like you to render a report refuting these allegations if possible using reasonable scientific evidence. Please document your report accordingly.

In addition, I enclose for your reference a copy of a Release from the Federal Register dated Monday, February 12, 1990 regarding changes in 29 CFR Parts 1910 and 1926. I am not sure whether you have this information due to your other research for Vanderbilt.

Kindly comment on how this proposed change would effect the prior reports of the plaintiff in this matter. Please render a supplemental report to us as soon as possible. We are a bit "under the gun" with regard to rending a report due to an impending trial date in the near future.

If you have any questions, please do not hesitate to call. I look forward to hearing from you in the near future.

Very truly yours,

DEYOE, HEISSENBUTTEL & MATTIA

BY:____________________________
ROBERT H. GARDNER

RHG/dt
cc: Dennis Race, Esq., w/enc.
cc: CNA, w/enc.
Att: Alan Gayles; File #36-285398
cc: Mr. Paul Vanderbilt, w/enc.

H5/36

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WILLIAM C. SULLIVAN, JR.**
STEFANIE A. BRAND*
PETER GUARINO
ROSEMARY E. LYNCH**

*N.J. & N.Y. BARS
**N.J. & PA BARS

TELECOPIER:
(201) 736-2675

OCT - 5 1989

October 4, 1990

All Counsel

RE: Hoffman v. Centex

Dear Counsel:

Enclosed please find expert reports by plaintiffs' experts in this matter. Please be advised that we will be forwarding our additional expert reports early next week. Thank you for your cooperation in this matter.

Very truly yours,

GORDON & GORDON, P.C.

By: Michael Gordon
MICHAEL GORDON

MG:ps
Enclosures

10 Client
Expert

DE YOE, HEISSENBUTTEL & MATTIA
COUNSELLORS AT LAW

WOOD M. DeYOE
FREDERICK C. HEISSENBUTTEL
MEMBER N. J. & MASS. BAR
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ANTHONY CARBONE
MEMBER N. J. & PA. BAR
GLENN Z. POOSIKIAN

January 16, 1991

REFER TO FILE #

H5136

Ann G. Wylie, PhD.
Department of Geology
UNIVERSITY OF MARYLAND
College Park, Maryland 20742

Re: Hoffman v. Centex

Dear Dr. Wylie:

With regard to the above referenced matter, enclosed please find additional samplings taken this summer in the Hoffman unit at Winston Towers.

Please contact me so we can discuss this further.

Very truly yours,

DEYOE, HEISSENBUTTEL & MATTIA

BY:______________________

ROBERT H. GARDNER

RHG/dt
cc: Dennis Race, Esq.
cc: R. T. Vanderbuilt
cc: CNA
Att: Laura V. Schimpf; File #36-285398

JAN 26 1990

DE YOE, HEISSENBUTTEL & MATTIA

COUNSELLORS AT LAW

WOOD M. DeYOE
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OF COUNSEL
JOHN SELAWSKY
MEMBER N. J. & N. Y. BAR

January 23, 1990

REFER TO FILE #
H/S5136

Ann G. Wylie, PhD.
Acting Dean
Department of Geology
University of Maryland
College Park, Maryland 20742

Re: Hoffman vs. Centex Corporation-
R. T. Vanderbilt Company

Dear Doctor Wylie:

With regard to the above referenced matter, enclosed please find a letter from Klein Chapman, Attorneys for defendant, Amsterdam paint in this matter. I apologize for not forwarding this to you sooner.

Apparently this firm and Klein Chapman had retained a joint expert on a previous occasion. I believe that the interest of Amsterdam paint and ourselves are compatible for purposes of you testifying on behalf of them as well as us.

I ask you to review the enclosed report. We shall be forwarding to you a series of samples taken by a testing laboratory in New Jersey from the Hoffmans' apartment. We are currently attempting to set this up and, if necessary, get a Court Order to compel the Hoffmans to allow us to enter the apartment.

I look forward to hearing from you in the near future. If you have any questions, please do not hesitate to call.

Very truly yours,

DE YOE, HEISSSENBUTTEL & MATTIA

BY:
ROBERT H. GARDNER

RHG:jd
Enc.
cc: Dennis Race, Esq.
Akin, Gump, Strauss, Hauer & Feld, Esqs.

R.T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, P.O. BOX 5150, NORWALK, CONNECTICUT 06856-5150 • (203) 853-1400
FAX (203) 853-1452 • CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

December 28, 1989

Ann Wylie, Ph.D.
UNIVERSITY OF MARYLAND
Department of Geology
College Park, MD 20742

Dear Ann:

I understand that you have spoken with Mark Geraghty and Dennis Race on the matter of analyzing a sample of "Westal" talc from our mothballed California mine. I enclose a sample, WESTAL 003, for this purpose. Please contact me if you have any questions.

Best wishes for a happy New Year!

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

Paul Vanderbilt

Paul Vanderbilt
Vice President
Environmental Affairs

PV/sk
enclosure

cc: Mark S. Geraghty, Esq.

Mr. Robert H. Gardner
De Yoe, Heissenbuttel, and Mattia
401 Hamburg Turnpike
P.O. Box 2449
Wayne, New Jersey 07470

August 28, 1989

Dear Mr. Gardner;

As per your instructions, I have reviewed the files in the Hoffman v. Winston Towers case with special attention to the various laboratory analyses. Taken together, most of the discrepancies in the laboratory reports can be explained by the difficulty that many laboratories have in identifying fibrous talc.

The Vanderbilt products contain tremolite cleavage fragments, serpentine, platy talc, carbonate, quartz, anthophyllite cleavage fragments, and fibrous talc. Fibrous talc, which occurs in an asbestiform habit, is generally composed of the mineral talc, that has formed pseudomorphically after an amphibole. In some of the fibers, a residual amphibole lattice may still be perceptible by electron diffraction and indicated by indices of refraction higher than normal for talc, but in most cases, the fibers are pure talc. Those fibers that still retain some amphibole characteristics may be 'biopyroboles' or 'talcboles'. These names refer to a group of silicate minerals that fall structurally and chemically between the classical divisions of the silicate minerals. In the case of the mineral in question here, it may be half-way between a sheet silicate such as talc and a double chain silicate such as anthophyllite. From the optical properties it is evident that fibrous talc is not a single material but gradational in its properties.

When examined with the TEM, analysts frequently misidentify fibrous talc as anthophyllite although McCrone misidentified it as tremolite because of the presence of a small amount of calcium. The criteria that are applied in the TEM analysis: chemical composition, habit, and the presence of a 5.3A spacing between layer lines, are simply not specific for anthophyllite but include fibrous talc as well. These criteria also include chrysotile although chrysotile has a characteristic tubular structure which fibrous talc and anthophyllite lack. If electron diffraction patterns are obtained from fibrous talc fibers and all the spots are indexed, it is possible to differentiate fibrous talc from anthophyllite. However, this is a laborious process and not done in a routine analysis. It was not done by any of the analysts that have examined the material from Winston Towers. As far as I can see from the reports of Rohl, McCrone, and EMSL, they relied on the criteria indicated above and therefore, could not differentiate between fibrous talc and anthophyllite.

The most revealing analyses are those of McCrone in 1975 and 1987. They examined the material by optical microscopy, electron microscopy, and X-ray diffraction. In 1975, the McCrone scientists when examining the materials optically found tremolite. While they found no anthophyllite optically (It occurs in very small amounts), they did find fibrous talc in abundance. However, when they looked at the material with the TEM, they found the three criteria described above and conclude that the fibrous mineral "appears to be a low Ca tremolite". They are forced into this conclusion because no anthophyllite was found optically and they must not have recognized that fibrous talc was a possibility. In fact, there is no such thing as "low Ca tremolite." All tremolite contains at least 10% Ca. Cummingtonite, an amphibole similar in structure and composition to tremolite except for a low to negligible Ca content, would be a possibility except the McCrone analysts knew that this identification was not consistent with the optical properties. Clearly from the way the analytical report is worded, the analysts were uncertain in their conclusions about the exact mineral that they found as fibers. They were sure it was asbestiform and just did not know what to call it. The same uncertainty is reflected in McCrone's 1987 analysis.

The other analysts who used TEM did not bother to examine the material optically and therefore called the material anthophyllite and accepted the small amount of Ca as a contaminant. If they had examined the material optically, they would have recognized that their identification had to be incorrect. You will note that there are no optical reports indicating the presence of anthophyllite.

Some of the analyses performed with the optical microscope report chrysotile. I cannot tell from the files if chrysotile might have been added from some source other than a Vanderbilt product when the ceiling material was formulated. Certainly, other things were added, i.e., perlite, vermiculite. However, the Vanderbilt materials do not contain chrysotile so either the analysis is wrong, or chrysotile was added. Optically, fibrous talc has indices of refraction much lower than for either anthophyllite or tremolite. While the indices of refraction of fibrous talc do not match those of chrysotile, an inexperienced analyst might call it chrysotile.

If you would like a detailed critique of each of the analytical reports in the file, I would be happy to provide this. I hope these comments will give you some idea of my explanation for the fact that every time the Vanderbilt materials are analyzed, a different result is obtained.

I hope you are able to obtain a sample for me to analyze. As we discussed, the points I raise in the preceeding discussion would be supported by such an analysis.

Sincerely yours,

Ann G. Wylie
Associate Professor

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

February 13, 1987

Report of Investigation

Ann G. Wylie
Associate Professor

I. Samples

Two samples were received by mail from the House of Ceramics in Memphis, Tennessee on Monday, February 2, 1987. The samples were sent at the request of Mr. Dennis race who asked that I analyze the samples for asbestos. The samples were labeled Nytal 100 HR Talc and Pfizer CP 96-30 Talc.

II. Method of Analysis

The samples were examined by polarized light microscopy. Subsamples were mounted in Cargille index of refraction liquids for determination of index of refraction. Other properties used in the identification of the minerals include sign of elongation, extinction angle, birefringence, color and the relationship between optic and cleavage directions.. Mineral mames were assigned by comparing these data to those given in standard optical mineralogy textbooks. Once the minerals were identified, the determination of whether or not the mineral was asbestos was based on morphology. A mineral is considered to be asbestiform if it meets the following criteria:

1) mean aspect ratios ranging from 20:1 to 100:1 or higher in particles longer than 5 m,
2) very thin fibrills, usually less than 0.5 m in width, and
3) two or more of the following:
   a) parallel fibers occurring in bundles,
   b) fiber bundles displaying splayed ends,
   c) fivers in the form of thin needles,
   d) matted masses of individual fibers, and
   e) fibers showing curvature.

To be asbestos, an asbestiform particle must be an amphibole or chrysotile. Cleavage fragments lack these properties. Cleavage fragment aspect ratios are generally less than 20:1 and stair-stepping along particle edges is common.

III. Results

Pfizer CP 96-30 Talc

This sample contains talc and tremolite as major constituents. The tremolite is not asbestiform. It has none of the porperties characteristic of asbestos. Its characteristics are consistent with those of a population of cleavage fragments. Some of the talc particles are elongated, but the talc does not appear to be asbestiform. No asbestos was detected in this sample.

Nytal 100 HR Talc

This sample contains talc and tremolite and trace quantities of anthophyllite and a talc-amphibole mineral. The tremolite and anthophyllite are not asbestiform. Their characteristics are consistnet with those of a population of cleavage fragments. There are two types of talc present in the sample: platy and fibrous. Some of the fibrous talc has the characteristics of the asbestiform habit. However, because it is talc, it is not asbestos. The intermediate talc-amphibole particles are very rare. They have a higher aspect ratio than is typical for cleavage fragments. However, they do not dispaly the characteristics of the asbestiform habit. No asbestos was detected in this sample.

R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

July 8, 1981

Dr. Ann Wylie
Geological Consultant
16244 Batchellors Forest Road
Olney, MD 20832

Dear Ann:

Attached is a galley proof of a booklet that we intend to distribute when we show the film about our talc problem.

The quotes are taken directly from the voice track on the film. Please let me know as soon as possible if there is any need for revision of the text.

Sincerely,

R. T. VANDERBILT COMPANY, INC.

al

Allan M. Harvey, Director
Environmental Affairs

AMH:lsm

Attachment

The truth about tremolitic talc

Prepared by
the R. T. Vanderbilt Company, Inc.
Producers of minerals and
chemicals for industry

For almost a decade . . .

there has been a continuing controversy concerning the safety of tremolitic talc, a valuable industrial mineral product for the ceramic, paint and plastic industries mined, milled and processed by the R. T. Vanderbilt Company, Inc.

A faulty asbestos standard established by OSHA (the Occupational Safety and Health Administration) in 1972 has given our customers the mistaken impression that all tremolite is asbestos, while mineral scientists have demonstrated that the asbestiform variety is a rare occurrence.

This booklet will discuss the origins of the confusion, state the facts, review the scientific research and present the conclusions of mineral and medical experts on the actual properties and safety of Vanderbilt's tremolitic talc.

What is asbestos?

In the *Glossary of Geology* Asbestos is defined as . . .

"A commercial term applied to a group of highly fibrous silicate minerals that readily separate into *long, thin, strong* fibers of sufficient flexibility to be woven . . ."

It is an accepted fact that excessive exposure to Asbestos can cause serious adverse health effects among humans.

How did the confusion begin?

In July of 1972, OSHA, the Occupational Safety and Health Administration made final and published its asbestos standard.

It defined asbestos as any one of these six minerals:

- chrysotile, or white asbestos
- crocidolite, or blue asbestos
- amosite, or brown asbestos
- anthophyllite
- actinolite
- tremolite

This definition contains important errors of scientific fact which the National Bureau of Standards and the Bureau of Mines and the U.S. Geological Survey have seriously questioned.

The confusion and problems emerging from these errors are the substance of the following discussion.

The essence of the problem

As you can see to the right, each of these six minerals included in OSHA's asbestos standard occurs in both an asbestiform and a non-asbestiform variety.

Three of the six minerals have been given a different name for each of their two forms. *Chrysotile* in its non-asbestiform variety is called *antigorite*. *Crocidolite* is called *riebeckite*. *Amosite* is called *cummingtonite-grunerite*.

The other three minerals — because they occur in their asbestiform varieties so rarely in nature — are each called by only *one* name, regardless of their form.

Tremolite, anthophyllite and *actinolite* are labeled asbestos by OSHA in both their forms. According to mineralogists, this is incorrect and it is poor science.

Dr. Malcolm Ross, an eminent mineralogist and asbestos specialist with the U.S. Geological Survey, explains:
"This has been the area where there has been a problem with the definitions. The base of the problem first is nomenclature — you have prismatic tremolite and you have an asbestiform tremolite — they both have the same mineral name and when you get to people who really don't know a great deal about mineralogy, the two things are synonymous. For convenience, I think a number of people have said all tremolite is dangerous because some tremolite is asbestiform."

Dr. Ann Wylie, a Professor of Mineralogy at the University of Maryland agrees:
In referring to the two distinct types of Tremolite, she observes that, "these two materials have very different physical properties . . . in our regulation we do not recognize the difference between the two and I think we should. I think that's the root of the problem."

What's the difference?

A graphic depiction of an asbestiform mineral — it grows in a single line until it forms long, thread-like strands. It doesn't shatter but simply bends much like a wire that cannot be easily broken.

The non-asbestiform mineral grows in all directions in random prismatic patterns. When pressure is applied it fractures easily, fragmenting into prismatic particles.

It's clear from this analysis that there are two distinctly different forms of tremolite, each with distinctly different physical properties.

The asbestiform variety of tremolite obviously fits the definition of asbestos and deserves to be labeled as such. But the non-asbestiform variety of tremolite has none of the properties set forth in the definition of asbestos and should not be included in this family of hazardous minerals. The known medical problem is only associated with commercial asbestos; chrysotile, crocidolite and amosite.

It is the non-asbestiform variety and *only* the non-asbestiform variety of tremolite that is present in the ore and the talc products mined and milled by the R. T. Vanderbilt Company, Inc.

How long will major industries suffer the effects of a faulty government standard based on a scientific error which has never been corrected?

The medical facts

THE HRI STUDY. At Fairleigh Dickinson University in New Jersey, the prestigious Health Research Institute undertook an intensive scientific study to determine if there was indeed any health hazard relating to the tremolitic talc mined at the R. T. Vanderbilt Company, Inc. mine at Gouverneur, New York.

A high dose of tremolite from the Vanderbilt Company was introduced into the chest cavity of 70 hamsters. Another 70 were injected with a lower dose. At the end of the experiment which ran for 600 days, none of these hamsters had developed tumors. (In a similar experiment when an asbestiform material was injected into hamsters, tumors subsequently developed.)

According to William E. Smith, M.D., Director of the Fairleigh Dickinson Health Research Institute, **"We did not get tumors with the tremolitic ore that came from the Vanderbilt Mine. So, from the results of the test that we did, we concluded that the sample was non-carcinogenic."**

THE TOMA STUDY. In 1975, the National Institute for Occupational Safety and Health began an epidemiological study at the mine in Gouverneur, N.Y. with the full cooperation of the Vanderbilt Company. As a result allegations have been made of a possible association between tremolitic talc and asbestos.

Because there were various questions raised by the government study, Vanderbilt asked Tabershaw Occupational Medicine Associates, TOMA, specialists in this field to undertake their own epidemiological study and evaluate the NIOSH study.

TOMA found that the NIOSH study was lacking much of the relevant information that had a direct bearing on the final results.

After exhaustive testing of their own under the most rigid controls, Jim Sharpe, Medical Administrator for Tabershaw concluded:

"We don't see any relationship at all between industrial talc as mined at Gouverneur Talc Company, Inc. and cancer, in any form."

Dr. Robert Murray of Robert Murray Associates, London, England, is accepted throughout the world as a leading authority on occupational medicine. He was also asked to examine both the TOMA and the government studies and to comment on procedures and conclusions. **"The TOMA Study seemed to me to be a perfectly competent, legitimate study — the NIOSH Study was not because it used a number of people and attributed the effect on their lung to talc, when in fact some of the people had had very short exposures indeed. To lump in everybody regardless of exposure is, to me, very bad epidemiology . . . . . . The most important thing was the absence of any smoking history because cancer of the lung is so basically due to smoking. I don't think the government study stands up to serious consideration. I don't think it is a good epidemiological study which effectively associates the exposure to talc with the occurrence of lung cancer."**

The final analysis

Fact. . . the industrial talc mined in Gouverneur, New York contains approximately 50% tremolite . . . *all of which* is of the non-asbestiform variety.

Fact. . . in this form, no scientific study or medical evidence has ever associated tremolite with asbestos.

Fact. . . the science of mineralogy confirms that there *is* an essential difference between the fiber of an asbestiform variety of a mineral and a particle resulting from fragmentation of the non-fibrous or non-asbestiform variety of that mineral.

Fact. . . a complete and extensive epidemiological study failed to provide any evidence linking lung cancer with work at the mine or mill.

Fact. . . an intensive study of the effects of the industrial talc mined at Gouverneur, New York on the lungs of test animals failed to produce *a single tumor* related to the test exposures in *any* of the animals under examination.

Despite the fact that the tremolite present in *this* industrial talc is clearly non-asbestiform and, therefore, unrelated to asbestos in any way, the future of the product has been put in jeopardy.

Because of the failure to separate the two forms of tremolite *by name*, a company's future is in doubt and the jobs of many men and women may be lost.

The evidence is clear. . . the time to remedy past error is now.

EXHIBIT
#3 Wylie
JH 9-18-09

July 24 Mouldene ~~Fate~~ S-158
Sent from RT Vanderbilt 7/19/89

1.560 -
mm

feldspar
carbonate

1.600 - many asbestiform bundles
allen < 1.600

1.556 -

small amount of blocky tremolite also present ~ 5%
also, small amount of quartz

1.550 -

α tremolite ≅ 1.600
Anthophyllite, distinctive striped ext pattern $\alpha \cong 1.596$ $\gamma > 1.600$

1.546

1.596 - all $\gamma <$ 1.598 all $\gamma <$

1594 - most fibers have $\gamma < 1.594$
one bundle $\gamma \cong 1.594$ $\alpha \leq$
one bundle $\gamma > 1.594$ $\alpha \leq 1.594$
one bundle $\gamma \cong 1.594$

1.542

1.538 -

1.592 - a few =, >, most < (γ)

1.564 -

1.586 γ =, >, <, much ~ =

1.570 -

1.574

1.584 - some still γ < 1.584, ie, chrysotile-like
in general the more ~~asbestiform~~, the lower the γ. straight fibers - higher γ,

1.580 - most γ > some still slightly less

1.578 - a few ≅ 1.578 - almost all $\gamma > 1.578$, all $\alpha < 1.578$
a few $\gamma \leq 1.578$

~~some tremolite has a peculiar striped extinction pattern. Probably could be an intergrowth? photo taken~~

1.576 - all $\gamma = \alpha > 1.576$
a very small number of straight HAR fibers
have $n \perp$ to elongation $= n$ slightly $> 1.576 - 1.578$

Summary γ 1.594 - 1.576 most 1.582 - 1.588
α 1.578 - 1.536 most 1.574 - 1.560

1.560 - most straight fibers have $n \parallel$ elongation > 1.560. A few have $\alpha' < 1.560$
more chrysotile-like, ~~so~~ lower n than 1.560 (fiber bundles $n_2 < 1.560$)

1.556 - still $\alpha < 1.556$ and $\alpha = 1.556$ and $\alpha > 1.556$ most

1.550 - $\alpha < 1.556$, $\alpha = \alpha >$ most

1.546 some α still < 1.546

1.542 $\overset{some}{\alpha} > 1.542$

1.538 - blocky material matches (feldspar?)
one fiber $\alpha \leq 1.538$ ~1.536

1.564 - some $\alpha >$, some less

1.570 - " "

1.574 - $\alpha > \alpha = \alpha <$ most < 1.574

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

Dr. C.S. Thompson
R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06852

July 28, 1989

Dear Dr. Thompson, Jim

I have examined the sample of Mouldene(S-158) which you sent to me on July 19, 1989. The material consists primarily of fibrous talc with small amounts of tremolite, anthophyllite, carbonate, quartz, platy talc and feldspar.

The fibrous talc occurs in fiber bundles with splayed ends and as what appear to be individual fibers. The indices of refraction of this material are highly variable,. Parallel to elongation, γ ranges from 1.594 to 1.576; however, most of the fibers and fiber bundles have γ's between 1.582 and 1.588. Perpendicular to elongation the indices of refraction are much more variable, ranging from 1.536 to 1.578. These values represent the range in α and β. In general, the more the fibers display the classical characteristics of asbestos, i.e., fiber bundles with splayed ends, small fibril width, curved fibers,etc., the lower are the indices of refraction within the ranges given above.

The anthophyllite does not display asbestiform characteristics. It is most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. These characteristics might be explained as an intergrowth of anthophyllite and talc. γ for anthophyllite is always greater than 1.600 while α was measured as 1.596.

Tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky, but an occasional particle has an aspect ratio in excess of 10:1. α for tremolite was measured as 1.600, and γ for tremolite is greater than 1.600.

Tremolite and anthophyllite are about equally abundant, Together they total 5-10% of the sample. A few percent of the sample is carbonate, a little less is quartz and feldspar occurs only in trace quantities.

If you have any questions, please let me know.

Sincerely yours,

Ann

Ann G. Wylie

College Park, Maryland, 20742 (301) 454-3548

R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

July 19, 1989

Dr. Ann G. Wylie
Associate Professor of Geology
UNIVERSITY OF MARYLAND
Department of Geology
College Park, MD 20742

Dear Dr. Wylie:

At the request of Slim Thompson, please find enclosed a sample of Mouldene (S-158).

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

Sue Kelly

Sue Kelly
Environmental Affairs

/sk
enclosure

cc: Dr. C. S. Thompson

THE UNIVERSITY OF MARYLAND
COLLEGE PARK CAMPUS
Department of Geology

INVOICE

July 28, 1989

To: R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06855

Analysis of one sample of
Mouldene by PLM

$200

Ann G. Wylie
Associate Professor

College Park, Maryland 20742 (301) 454-3548

STEMICRO CORPORATION

15817 Crabbs Branch Way
Rockville, Maryland 20855
301/975-9798

July 8, 1988

INVOICE

To: John Kelse
R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06855

Mineralogical analysis and report of one sample for asbestos

$150.00

Please make check payable to Stemicro Corporation.

DE YOE, HEISSENBUTTEL & MATTIA

COUNSELLORS AT LAW

WOOD M. DEYOE
FREDERICK C. HEISSENBUTTEL
MEMBER N. J. & MASS. BAR
PHILIP F. MATTIA
CERTIFIED CIVIL TRIAL ATTORNEY
GARY R. MATANO
ANNE HUTTON
ROBERT H. GARDNER
SCOTT B. PIEKARSKY
MARGARET MARY McVEIGH
MEMBER N.J. & N.Y. BAR
CHRISTOPHER G. MEIKLE
MEMBER N. J., N. Y. & CONN. BAR
ANTHONY CARBONE
MEMBER N. J. & PA. BAR

401 HAMBURG TURNPIKE
P.O. BOX 2449
WAYNE, NEW JERSEY 07470
(201) 595-6300
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CHARLES C. STALTER
(1919-1968)
CHARLES P. DEYOE
(1950-1973)
THOMAS M. GUINEY
(1962-1983)

OF COUNSEL
JOHN SELAWSKY
MEMBER N. J. & N. Y. BAR

REFER TO FILE #

June 26, 1990

H5136

CNA
9 Entin Road
Parsippany, New Jersey 07054
Att: Mr. Alan Gayles

Re: Hoffman v. Centex et als.
Assd: R. T. Vanderbilt Co., Inc.
File # 36 285398

Dear Mr. Gayles:

With regard to the above referenced matter, enclosed please find an outstanding bill from the University of Maryland (Ann G. Wylie) in the amount of $1125.00 which is past due.

Kindly check your file and if this was not paid, please pay same as it is in order.

I hope this meets with your approval. We shall keep you advised of any further status changes as they occur. If you have any questions, please do not hesitate to call.

Very truly yours,

DEYOE, HEISSENBUTTEL & MATTIA

BY: ______________________
ROBERT H. GARDNER

RHG/dt
Enclosures
cc: Ann G. Wylie ✓
cc: Dennis Race

THE UNIVERSITY OF MARYLAND
COLLEGE PARK CAMPUS
Department of Geology

RECEIVED
FEB 22 1990

February 20, 1990

Mr. Robert Gardner
DeYoe, Heissenbuttel and Mattia
410 Hamburg Turnpike
Wayne, New Jersey 07470

Dear Mr. Gardner;

I received your letter and enclosures dated January 23, 1990. I will review the documents as you requested.

On August 28, 1989, I sent you a report reviewing the documents you had previously provided to me. I also sent you a bill for $1125 for my time. I have not heard from you regarding either. Did you receive them?

I look forward to hearing from you.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Associate Professor

cc: Dennis Race

College Park, Maryland, 20742 (301) 454-3548

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

INVOICE

Mr. Robert H. Gardner
De Yoe, Heissenbuttel and Mattia
4Ø1 Hamburg Turnpike
P.O. Box 2449
Wayne, New Jersey Ø747Ø

August 28, 1989

Analysis of Hoffman File and Analytical Reports

April 2Ø, 1989	1 1/2 hours
August 3, 1989	2
August 22, 1989	2
August 28, 1989	2
TOTAL HOURS	7 1/2

Fee for service, 71/2 hours @ $15Ø/ hour $1125

Please make check payable to Ann G. Wylie and send to the above address. Thank you.

College Park, Maryland, 20742 (301) 454-3548

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

301-454-3548

INVOICE

To: RT Vanderbilt Co
30 Winfield Street
Norwalk. Conn 06855

Analysis of one sample of
Nytal 200 and report.

$200.00

August 13, 1985
Ann G. Wylie

ANN GILBERT WYLIE, PH.D.
16244 BATCHELLORS FOREST RD.
OLNEY, MARYLAND 20832

TELEPHONE 301 - 774-2452
301 - 454-3548

INVOICE

Mr. Dennis Race
Akin, Gump, Strauss, Hauer and Feld
1333 New Hampshire Avenue, N.W.
Suite 400
Washington, D.C. 20036

Analysis of Nytal 99 and Report
R.T. Vanderbilt Company

$150

January 25, 1985

THE UNIVERSITY OF MARYLAND
COLLEGE PARK CAMPUS
Department of Geology

INVOICE

Mr. Dennis Race
Akin Gump Strauss Hauer and Feld
1333 New Hampshire Avenue NW
Suite 400
Washington, D.C.

Analysis of Nytal 100 and
Pfizer CP 96-30 from
House of Ceramics

#200.00

Ann G. Wylie
Feb 13, 1997

College Park, Maryland 20742 (301) 454-3548

UNIVERSITY OF MARYLAND AT COLLEGE PARK

DEPARTMENT OF GEOLOGY

February 9, 1993

Mr. Bruce P. Mandel
Ulmer and Berne
1300 East Ninth Street, Suite 900
Cleveland, Ohio 44111583

Dear Mr. Mandel;

I received your letter about a settlement in the Tireworker Litigation and understand that it will not be necessary for me to spend any more time on this case. My fee for litigation related consultation is $150/hour. Prior to February 1, 1993 I spent 3.5 hours on this case in consultation with you and associates on January 12. My fee for this time is $425.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Professor

DEPARTMENT OF GEOLOGY • UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND 20742, USA
OFFICE: (301) 405-4365 • DIRECT LINE: 301-405-4077 • FAX: (301) 314-9661

Mr. John Kelse
R.T. Vanderbilt
30 Winfield Street
Norwalk, CT 06855

June 16, 1995

Dear John;

I enclose a copy of a letter I wrote to Byers at USG regarding Talc 325. My fee for the consultation, analysis and report is $200.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
16244 Batchellors Forest Rd.
Olney, Maryland 20832

John Kelse
R.T. Vanderbilt Company
30 Winfield Street
Norwalk, Connecticut 06856-5150

June 28, 1998

INVOICE

Analysis of 10 samples for fiber content at $25/sample	$250.00

Ann G. Wylie

Ann G. Wylie
16244 Batchellors Forest Rd
Olney, Maryland 20832

John Kelse
R.T. Vanderbilt Company
30 Winfield Street
Norwalk, Connecticut 06856-5150

May 28, 1998

INVOICE

Analysis of 11 samples for fiber content at $25/sample	$275.00

Ann G. Wylie

Ann G. Wylie, PhD

UNIVERSITY OF MARYLAND AT COLLEGE PARK

DEPARTMENT OF GEOLOGY

Mr. John Kelse
R.T. Vanderbilt Company
30 Winfield Street
Norwalk, Connecticut 06855

February 7, 1994

Dear John;

I spent 1 1/2 days in preparation for and attending the conference on talc and cancer. My fee for consultation is $500/day. My fe for service for this project is $750.

Sincerely yours,

Ann

Ann G. Wylie
Professor

DEPARTMENT OF GEOLOGY • UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND 20742, USA
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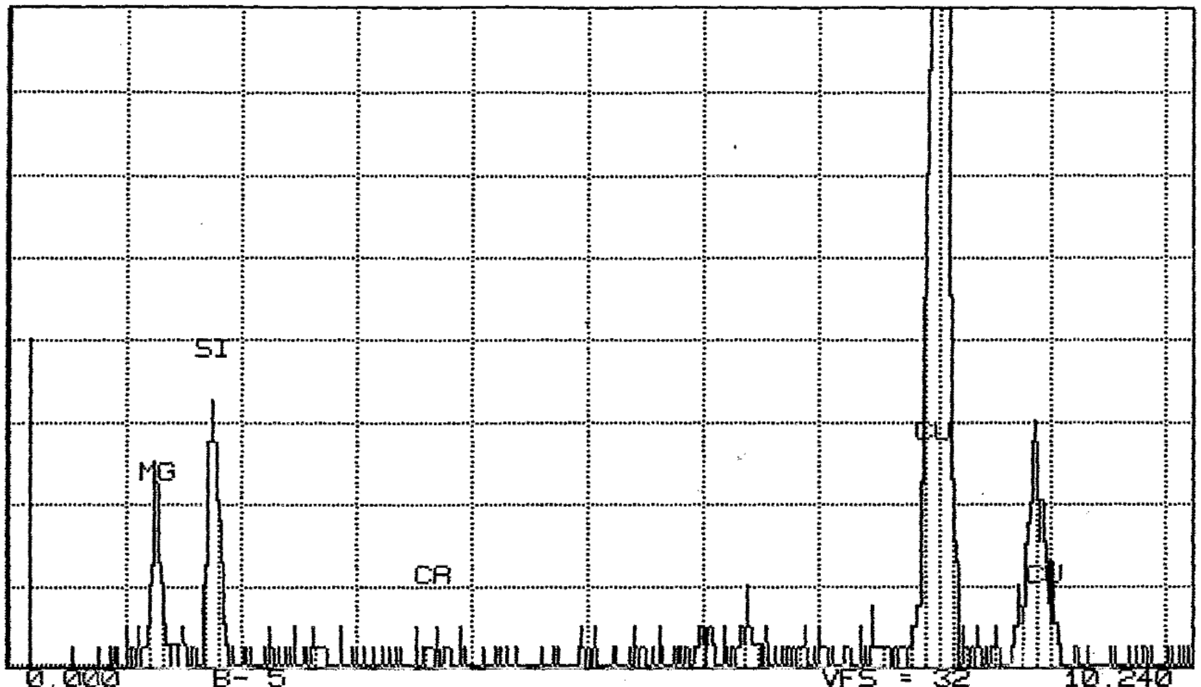

101 WHITE SAMPLE CHRYSOTILE

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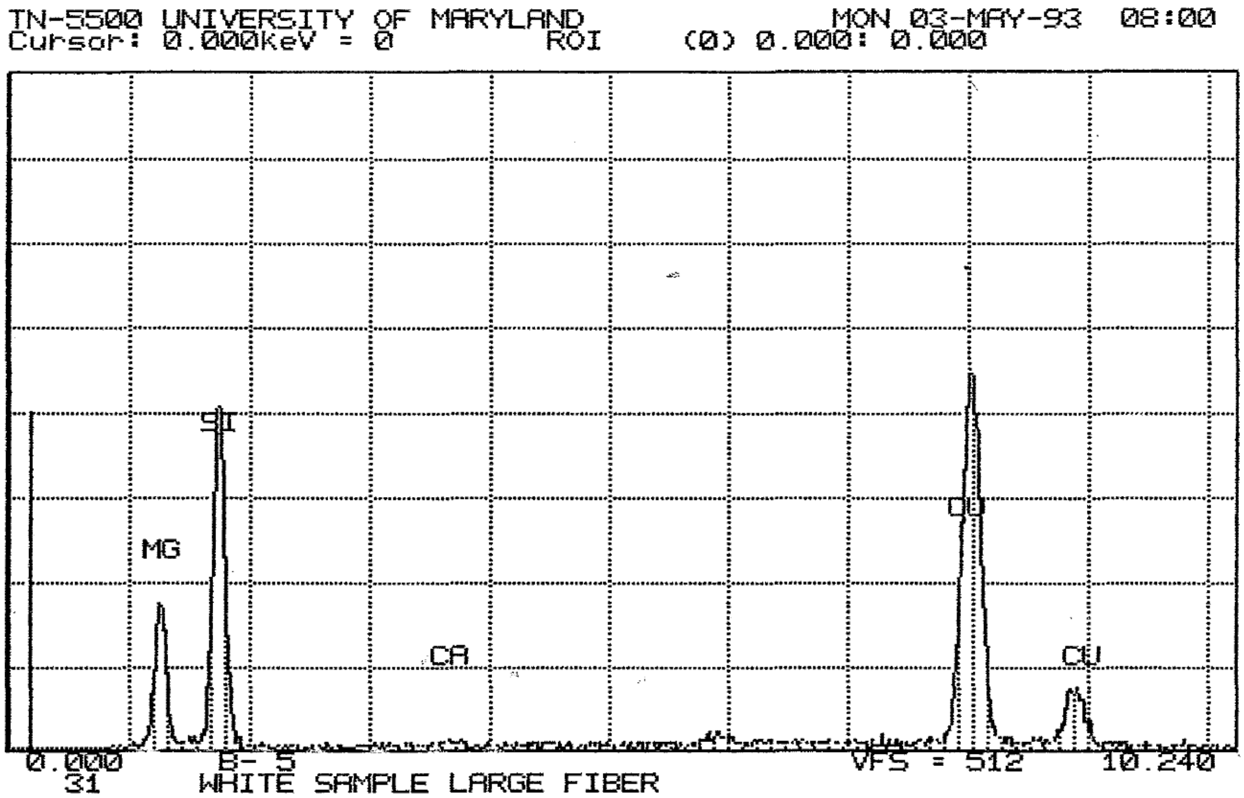
EXHIBIT
#5 (Wylie)
JH 9-18-09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WHITE SAMPLE LARGE FIBER

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

301-454-3548

August 14, 1985

Mr. Al Harvey
R.T. Vanderbilt Co.
30 Winfield Street
Norwalk, Connecticut 06855

Dear Mr. ~~Harvey~~ Al:

I am enclosing a report on a sample of Nytal 200 I received from the EPA. Dr. Phil Candela will analyze this sample later in the week; you should be hearing from him shortly.

Sincerely yours,

Ann

Ann G. Wylie
Associate Professor

Enclosure

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

August 14, 1985

301-454-3548

REPORT ON SAMPLE OF NYTAL 200

SAMPLES

On July 15, 1985 I received from Mr. Irwin Katz of Region II of the Environmental Protection Agency a sample labeled 67708 and identified as having come from a 50 lb. bag of Nytal 200 taken from the Amsterdam Color Works, Inc., 1546 Stillwell Avenue, Bronx, New York.

OBJECTIVES

The sample was examined to determine if chrysotile-asbestos or amphibole-asbestos was present in the material and to identify all fibrous constituents in the material.

METHODS

Subsamples were placed on glass slides, immersed in oils of known index of refraction and examined by polarized light microscopy. The following properties were evaluated: index of refraction, birefringence, color, extinction angle, extinction characteristics, sign of elongation and morphology.

RESULTS

The major minerals present in the material are talc, tremolite, serpentine, carbonate, and anthophyllite.

The serpentine is one of the platy varieties: antigorite or lizardite. No chrysotile-asbestos was observed.

Tremolite is abundant. However, no asbestiform tremolite was observed. Asbestiform tremolite and other asbestiform amphiboles are characterized by fiber bundles exhibiting splayed ends, longer than 5μm fibers with aspect ratios typically in excess of 20:1 and widths less than 1μm, flexible fibers, fiber bundles showing parallel extinction and/or matted masses of fibers. None of these properties were observed in any of the material identified as tremolite. The tremolite in this material occurs as cleavage fragments. Cleavage fragments typically have aspect ratios less than 20:1, show stair-step cleavage along the edges of some particles, exhibit oblique extinction and do not exhibit any of the asbestiform characteristics.

Anthophyllite is an uncommon constituent of the material. Like tremolite, it occurs as cleavage fragments and not as asbestos. It typically has aspect ratios which are greater than those of the tremolite particles.

There are two types of talc present in the material. Platy talc is abundant and is characterized by equidimensional colorless particles with very low birefringence. Fibrous talc is also present. Fibrous talc occurs as both needle-like particles and as asbestiform fiber bundles. Its indices of refraction are typically greater than those of platy talc; parallel to elongation the index of refraction ranges from 1.578 to 1.600. The high index of refraction in some particles and its asbestiform habit suggest that fibrous talc may have originated as a pseudomorph after amphibole. In some particles a residual of the amphibole lattice may be present as the work by Semple and Brindley (Ref. 1) and Virta (Ref. 2) indicates. However, the fact that the maximum value of the index of refraction parallel to elongation is not greater than 1.600 and that the minimum value of the index of refraction parallel to elongation given for anthophyllite in the literature is 1.614 (see Refs. 3-5) point clearly to the fact that the transformation to talc is almost complete. In fact, most of talc fibers have indices of refraction parallel to elongation which are quite typical of platy talc, i.e. $\leq$ 1.590.

A few particles were encountered whose index of refraction parallel to elongation fell between 1.600 and 1.610. These particles are quite rare. They comprise much less than 0.01% of the sample. They have high aspect ratio > 20:1 and are best classified as talc-amphibole. They do not appear to be asbestiform although they are clearly fibers.

In addition to the silicates described above, an unusual organic fiber also was observed. Its indices of refraction are less than 1.550, its birefringence is almost 0 and the fibers occur in groups of several fibers which range in length up to a centimeter. It was identified as an organic fiber because it does not resemble any mineral fiber I am familiar with and because the individual fibers appear to pinch and swell, a property common to cellulose.

References:

1. Semple, I.S. and G.W. Brindley, "A Structural Study of Talc and Talc Tremolite Relations", J. Am. Ceramic Soc., V. 43 No. 1, Jan. 1960, p. 35-42.

2. Virta, R.L., "The Phase Relationship of Talc and Amphiboles in a Fibrous Talc Sample", USBM RI 8923 1985, 11p.

3. Fleisher, M. et al., "Microscopic Determination of the Nonopaque Minerals", USGS Bull. 1627, 1984, pp. 451.

4. Kerr, P., Optical Mineralogy 4th Ed., McGraw Hill, 1977.

5. Winchell, A.N. and H. Winchell, Elements of Optical Mineralogy, John Wiley and Sons, 1951.

Ann Wylie
Aug 14, 1985

AIP ENVIRONMENTAL LABORATORY

Division of Associates in Pathology P.A.

EXHIBIT
#6 (Wylie)
JH 9-18-09

REPORT FOR TEM ANALYSIS OF BULK SAMPLE: DAP 1012 Glazing Compound
CASE # APE91-1007

On November 21, 1991 AIP Environmental received two samples of DAP 1012 Glazing compound. One sample was an uncured sample and was labeled sample #1. The other sample was a cured sample and was labeled sample #2. Our instructions were to examine the two samples for asbestos content using Transmission Electron Microscopy (TEM). The samples were given our case number APE91-1007.

METHODS:

A representative portion of the cured sample (sample #2) was crushed with a mortar and pestle and suspended in highly purified mineral spirits (watch cleaning solution) which as been previously checked for particulate contamination under the TEM. This suspension was sonicated for about 2 hours over the course of 1 week. A representative portion of this suspension was diluted 1:10 with mineral spirits (watch cleaning solution). One microliter portions of this dilution were deposited on copper 3mm EM grids which had been previously coated with collodion and carbon. Each grid was given a light coating of carbon and examined under a JEOL 100CX TEMSCAN electron microscope at low magnification (ca. 1000X) for uniformity of particle loading. Four grid squares with a uniform particle loading of approximately 25% were examined. Fibrous structures found were characterized with selected area diffraction (SAED) and energy dispersive X-ray analysis (EDS). EDS was performed with the aid of a Tracor Northern TN5500 X-ray analyzer.

A representative portion of the uncured sample (sample #1) was treated and examined in a similar manner to the cured sample with the following exceptions: the crushing step with the mortar and pestle was eliminated, and 8 grid squares were examined under the JEOL TEMSCAN electron microscope.

After examination of both samples 1 and 2 it was determined that sample number 2 (the cured sample) needed additional treatment because a good bit of the particles examined under the electron microscope were actually clumps of cured sample which had failed to desegregate in the mineral spirits.

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Additional treatment of sample #2 consisted of evaporating 1 ml of the 1:10 dilution in a 50 ml glass beaker and then ashing this evaporated sample for 16 hours in a low temperature plasma asher. This ashed sample was then resuspended in mineral spirits and 1 ul portions examined with the electron microscope (TEM) in the same manner as explained previously. Four grid squares at approximately 30 % particle loading were examined.

No silicates are known to be soluble in any of the solutions (including the mineral spirits) used in the processing of the above samples. The above processing is not known to cause any mineralogical alteration though sonication can cause a size alteration. Mineralogically, there is no difference between the ashing and sonication process, and the solvent dissolution technique.

RESULTS:

Both the uncured and the cured DAP samples (sample #1 and #2 respectively) had similar compositions, after the above processing, as determined under the TEM. The majority of the fibrous portions of these samples had a morphology, SAED pattern and EDS spectra that closely matched the USNM sample #48277 (fibrous talc) from the Smithsonian. Some of the fibrous portions of both the cured and uncured sample matched USNM sample #44866 (also fibrous talc from the Smithsonian) in morphology, SAED pattern and EDS spectrum.

Under the TEM both USNM samples #48277 and #44866 have a similar morphology, though #48277 has more fibers that appear to be composed of large compact bundles of small diameter fibers. Both samples exhibit a range of SAED patterns. Sample #44866 contained more patterns dominated by talc reflections (an hexagonal array of spots) then sample #48277. Sample 48277 contained more patterns with prominent amphibole reflections. The majority of SAED patterns from both samples #44866 and #48277 appeared to consist of a superposition of both talc patterns and amphibole patterns. EDS spectra was similar for both samples #44866 and #48277.

The remainder of the mineral content of the DAP samples consisted of a small amount of nonfibrous tremolite, platy talc, and a large amount of calcite.

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The SAED patterns of the fibrous components of both the cured and uncured samples appeared as a superposition of more than one pattern (i.e. they were generated by multiple lattices). In some cases they appeared as a superposition of two or more standard (hexagonal array) talc patterns. In other cases they appeared as a superposition of a talc pattern on an amphibole pattern. Clear, unequivocal amphibole patterns were not observed.

Copies of EDS spectra and photographs of SAED patterns and morphology of mineral particles found in the above samples are available on request.

Sincerely

Renate Reimshuessel, PhD
Laboratory Director

\wp51\ape9107

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Report of Analysis for R.T. Vanderbilt Company

BACKGROUND

After discussions with me by telephone, John Kelse sent two samples directly to AIP Environmental Laboratory, Baltimore, Maryland. These samples were labeled DAP 1012 Glazing compound, cured and uncured. In addition, I sent to AIP two samples of fibrous talc from the Gouverneur District, New York, which I obtained from the Smithsonian and which were labeled USNM #48227 and USNM 44866, and a sample of fiber concentrate obtained from John Kelse and labeled CPS 183 - 4. AIP was asked to analyze the two DAP sample by TEM for asbestos and to compare any fibers present to the fibers found in USNM samples 48227 and 44866. They were also asked to provide representative electron diffraction patterns from CPS 183-4, the fiber present in the two DAP samples, and from the fibers typical of the two USNM samples. In addition, I received a sample from J.Kelse labeled IT 3X which is a sample typical of the product currently being supplied to DAP for glazing compound.

METHODS OF ANALYSIS

Optical Microscopy

The inorganic components from two samples of glazing compound were separated from the binder as described in the AIP report and sent to me for analysis by polarized light microscopy (PLM). CPS 183-4, IT 3X, and the USNM samples were examined by PLM. The minerals present were identified by indices of refraction, extinction angles, birefringence, color, and habit. Abundances are based on visual estimates.

Transmission Electron Microscopy

The techniques for TEM analysis are described in the AIP report in the Appendix of this document.

X-ray Diffraction

CPS 183-4 and the USNM samples were analyzed by X-ray diffraction (XRD). The samples were run on a Phillips diffractometer. Scans were made at 1 degree per minute from 4 to 60 degrees two theta with Cu radiation. The diffractometer was calibrated with a quartz standard.

RESULTS

TEM

The results from the TEM analysis described in the attached AIP report indicate that fibers from the DAP samples give diffraction patterns that are similar to those from the USNM samples of fibrous talc. These patterns consist of an hexagonal array of spots with spacings appropriate for talc with minor contributions from another lattice (probably amphibole) (typical of USNM 44866 but also found in USNM 48227), patterns that appear to result from superposition of two or more talc patterns, and patterns that appear to be composed of at least two well-developed lattices, probably talc and amphibole (typical of USNM 48227 but also found in USNM 44866). Figures 1-4 are typical of the patterns obtained from the DAP samples and Figures 5-10 are typical of the USNM samples. AIP did not find any fibers that give unequivocal amphibole diffraction patterns in the DAP samples. The diffraction patterns from CPS 183-4 (Figures 11-14) are essentially identical to those from the DAP samples.

Energy dispersive x-ray spectra from the fibers from all samples are essentially identical, indicating the presence of Mg and Si in proportions typical of talc and indistinguishable from anthophyllite and cummingtonite.

No effort was made to quantify the abundance of fibers observed by TEM. Figures 15 and 16 are typical of the inorganic residue from the two DAP samples.

PLM

1) DAP Samples.

The inorganic residues from the two DAP samples were dispersed in oils of known indices of refraction and examined by PLM. The mineral composition of both samples appears to be identical. The major component, making up more than half of the samples, is calcite and, in order of decreasing abundance (after calcite) were tremolite, fibrous talc and other nearly equidimensional mineral particles. (From previous analyses of Gouverneur talc, the other minerals are probably talc, serpentine, and a small amount of quartz.)

All tremolite particles appear to be cleavage fragments. Although some particles with aspect ratios in excess of 10:1 were observed, fiber bundles of tremolite were not found and the vast majority of the tremolite particles longer than 5 um had widths in excess of 1 um.
There is no evidence for the presence of tremolite-asbestos in either of the DAP samples.

The fibrous talc component of the DAP samples is characterized by maximum value of $\gamma < 1.600$ and maximum value of $\alpha < 1.570$, with the majority of the fibers having γ =

1.585. Fibrous talc occurs in fiber bundles closely resembling chrysotile in form, in bundles of relatively straight fibers, and in compact, striated, elongated fragments without obvious fibrillar structure. The birefringence is generally typical of talc (0.03 - 0.04) and considerably greater than amphibole. However, many fibrous talc particles are flattened parallel to the Y-Z plane and the birefringence typical of the mineral was not observed in these fragments. Flattening parallel to Y-Z is particularly characteristic of the striated, elongated fragments without an obvious fibrillar structure and of those fibrous talc particles with the higher indices of refraction. Those fibers which exhibit morphology typical of chrysotile generally exhibit the maximum birefringence and the lowest indices of refraction.

No fibers with indices of refraction and parallel extinction characteristic of anthophyllite were observed.

2) USNM samples

The two samples from the Smithsonian labeled fibrous talc which were used by AIP for comparison to the fibers found in the DAP samples were also examined by PLM. Sample 48277 consists primarily of bundles of fibrous talc with γ = 1.595-1.605 and α < 1.570. In this sample, the fibers are typically straight, wide, and lath-like. They do not resemble chrysotile. Sample 44866 consists primarily of fibrous talc with $\gamma \lesssim$ 1.580 and α < 1.550. The fibers exhibit more curvature than USNM 48227 and generally have narrower widths. Both samples contain a few blocky cleavage fragments of probable amphibole with minimum index of refraction of greater than 1.600 and a trace of fiber, often intergrown with fibrous talc, with indices of refraction more typical of amphibole than of talc. These intergrown fibers may be amphibole, a talc-amphibole intergrowth, or an intermediate pyrobole.

3) CPS-123-4

This sample consists primarily of fibers with γ < 1.590 and α < 1.560 that are optically similar to fibrous talc in USNM 44866. Within some fiber bundles, there were a few fibers with indices of refraction greater than those of the other fibers. These fibers sometimes displayed oblique extinction. They could be tremolite, cummingtonite, some other clinoamphibole, an intergrowth of talc and amphibole, and/or a pyrobole. Also present in the sample were blocky cleavage fragments with indices of refraction and extinction angles close to those typical of tremolite.

4) IT-3X

This sample consists of about 20% tremolite, 25% fibrous talc, and the remainder platy minerals (talc, serpentine). The tremolite exhibits the morphology typical of cleavage fragments. Tremolite-asbestos was not observed in this sample. The fibrous talc is characterized by γ < 1.590 and α < 1.560. A trace amount of the fiber with γ > 1.600 and α < 1.590 was also observed. Fibers with these indices of refraction would be a talc-amphibole intergrowth or possibly a pyrobole. The habit of the fibers varies from bundles of flexible fibers with a morphology similar to chrysotile to straight elongated fragments. The later form may exhibit oblique extinction. The fibers in this sample cannot be distinguished from the fibers in the two DAP samples or from the fibers in CPS-183-4.

XRD

The diffraction pattern from CPS-183-4 was indexed and the following minerals were identified: talc, anthophyllite?, and quartz. In addition, at least four peaks were found that belonged to an unidentified phase or phases. The talc pattern and the quartz pattern were quite complete with multiple reflections that fit the theoretical pattern. Only a few peaks consistent with anthophyllite could be distinguished and therefore a positive identification as anthophyllite is not possible. One peak which is consistent with anthophyllite, however, is the 3.05 A peak which is assigned 100 relative intensity in anthophyllite. In the pattern from CPS-183-4, the 3.05 A peak is the most intense peak in the pattern not belonging to talc or quartz. It has approximately 1/10 the intensity of the largest talc peak and about 1/2 that of the largest quartz peak. Whether or not this mineral is anthophyllite, it is a minor phase in this fiber concentrate. The diffraction pattern of USNM 48227 showed a pattern similar to CPS 183-4 but with more intense peaks typical of anthophyllite indicating a more abundant amphibole component. The pattern from USNM 44866 also showed amphibole peaks more abundant than the probable amphibole peaks in CPS-183-4 but less abundant than those in USNM 48227.

SUMMARY

Optical microscopic examination of all samples suggests that the fibrous component is, in part, pure talc and, in part, an intergrowth between talc and an amphibole. Because all natural amphiboles have a maximum index of refraction greater than 1.610 and a minimum index of refraction greater than 1.595, the optical properties indicate that only the smallest trace of the fiber is likely to be amphibole asbestos. (While tremolite is present in abundance in the DAP samples, its habit is such that it cannot be labeled asbestos.) Talc, on the other hand, has a maximum index of refraction of about 1.602. For the Mg end member, the largest index of refraction for talc is 1.584, and 1.584 would be the expected value of γ for talc from the Gouverneur deposit which is known to be extremely low in iron. The optical properties of the fiber in all samples except USNM 48227 are generally consistent with those of talc although fiber with $\gamma \cong 1.600$ was observed in all samples (common in USNM sample 48227) in very small amounts. However, α > 1.595 was not observed. While a value of γ > 1.590 (when Fe is not present) suggests some contribution from an amphibole lattice, the relative proportion of amphibole vs talc (vs pyrobole?) is unknown.

The TEM analysis of the fiber shows that there is fiber which is essentially pure talc and fiber which is composed of some kind of intergrowth of talc and amphibole (or pyrobole?). The precise nature of the amphibole has not been determined but it may be anthophyllite, cummingtonite, a primitive clinoamphibole of similar composition and/or a pyrobole similar to chesterite. Further, it is not possible to determine from the diffraction patterns what the relative contributions of various minerals making up the fiber may be. It may be tempting to judge this from the relative intensity of the patterns but, as was the case from the optical properties, there is no basis on which to make this judgement. Components may vary along the lengths of fibers (optical examination indicates that this is likely) and the nature of the intergrowth may be such that the domains of talc are small, even though abundant, compared to the amphibole, or vice versa, both of which may affect the relative intensity of the diffraction patterns in a way unrelated to abundance.

X-ray diffraction analysis of the samples indicates that amphibole is probably a component of fibrous talc, but the proportion of amphibole may vary significantly among fibrous talc samples. It appears to be quite minor in the CPS-123-4 fiber concentrate, significant in USNM 48277, and intermediated in USNM 44866. However, one difficulty in this interpretation is the unknown contribution to the amphibole pattern from blocky cleavage fragments that are found in all samples.

Combining the information from XRD and PLM, it appears that the intensity of the 3.05 A XRD peak increases as the indices of refraction of the fibrous talc increase, suggesting that the amphibole component in the fibrous talc can be evaluated from the index of refraction. If so, the fiber concentrate CPS-123-4 and the fibers found in the DAP samples are composed of fibers that are almost entirely talc despite the fact that what appears to be a combined amphibole/talc diffraction pattern is common by TEM-SAED.

Despite numerous analyses, fibrous talc remains poorly known in detail. All who have studied it agree that some fibers are purely talc and some retain remnant of an amphibole lattice. More research is needed to determine the relative proportions of talc and amphibole, the exact nature of the amphibole intergrown with talc, and the distribution of the two phases within fibers.

Ann G. Wylie, PhD
April 6, 1992

Figure Captions

Figure 1. Fiber from uncured DAP window glazing. Striations are typical of the fibers in this material. Photo taken at 8,3ØØX. Magnification of the photograph is 22,4ØØX.

Figure 2. Diffraction pattern from the fiber in Figure 1. The pattern is best explained as an amphibole pattern superimposed on a talc pattern. (See Figure 17.) Note streaking parallel to the layer lines indicating probable variations in the width of the basic structural unit.

Figure 3. Fiber from the cured DAP window glazing. Photo taken at 13,ØØØX. Magnification of the photograph is 35,ØØØX.

Figure 4. Diffraction pattern from the fiber in Figure 3. Similar to the diffraction pattern in Figure 2. See Figure 17.

Figure 5. Fiber from USNM 48277. Photo taken at 33,ØØØX. Magnification of the photograph is 89,ØØØX.

Figure 6. Diffraction pattern from the fiber in Figure 5. The pattern can be interpreted as an amphibole patten superimposed on a talc pattern. Streaking is evident. This pattern is typical of this sample. Compare to Figure 17.

Figure 7. Fiber from USNM 44866.Photo taken at 6,6ØØX. Magnification of the photograph is 17,8ØØX.

Figure 8. Diffraction pattern from fiber in Figure 7. The dominant pattern is the hexagonal array typical of talc. A few extra spots which may arise from another lattice are evident.

Figure 9. Fiber from USNM 44866. Photo taken at 2Ø,ØØØX. Magnification of the photograph is 54,ØØØX.

Figure 1Ø. Diffraction pattern of fiber shown in Figure 9. The pattern can be interpreted as an amphibole pattern superimposed on a talc pattern. Compare to Figure 17.

Figure 11. Fiber from CMP-123-4. Photo taken at 2Ø,ØØØX. Magnification of the photograph is 54,ØØØX.

Figure 12. Diffraction pattern from fiber shown in Figure 11. The pattern can be interpreted as a set of slightly offset talc patterns with or without a superimposed amphibole pattern. Compare to Figure 17.

Figure 13. Fiber from CMP-123-4. Photo taken at 13,ØØØX. Magnification of the photograph is 35,ØØØX.

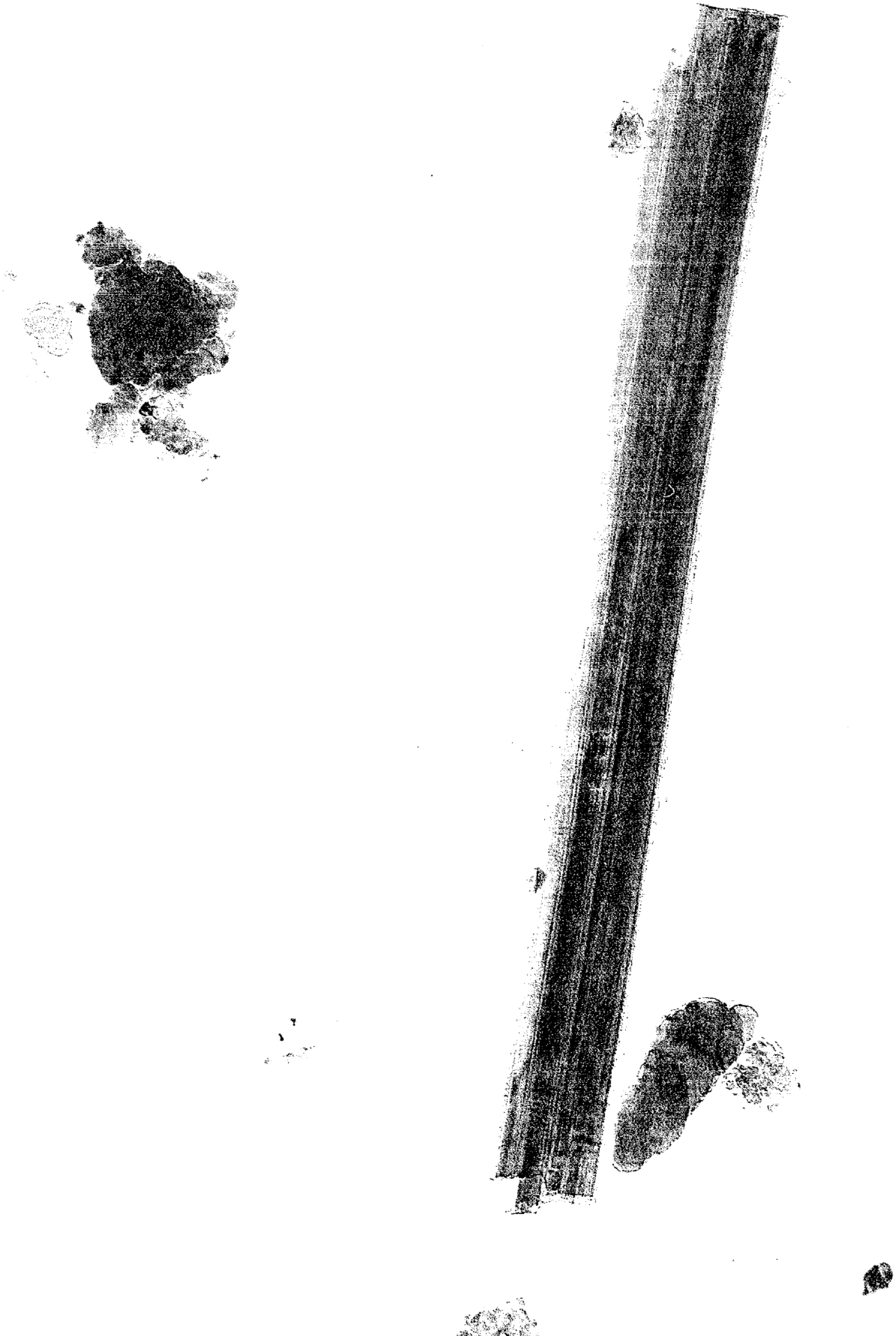
Figure 14. Diffraction pattern from fiber shown in Figure 13. The pattern can be interpreted as a talc pattern with a few extra spots which may be from a superimposed lattice of another

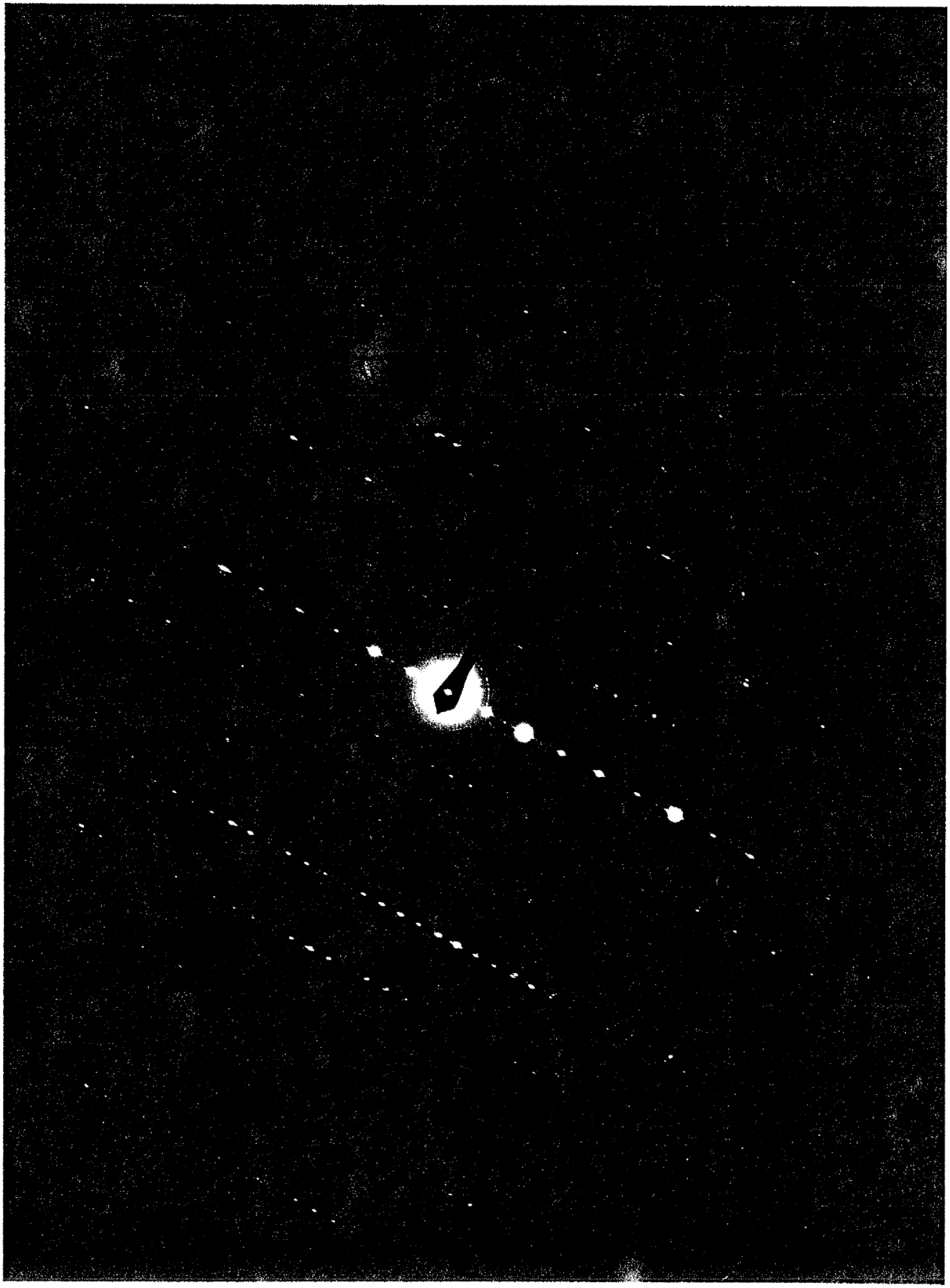
mineral.

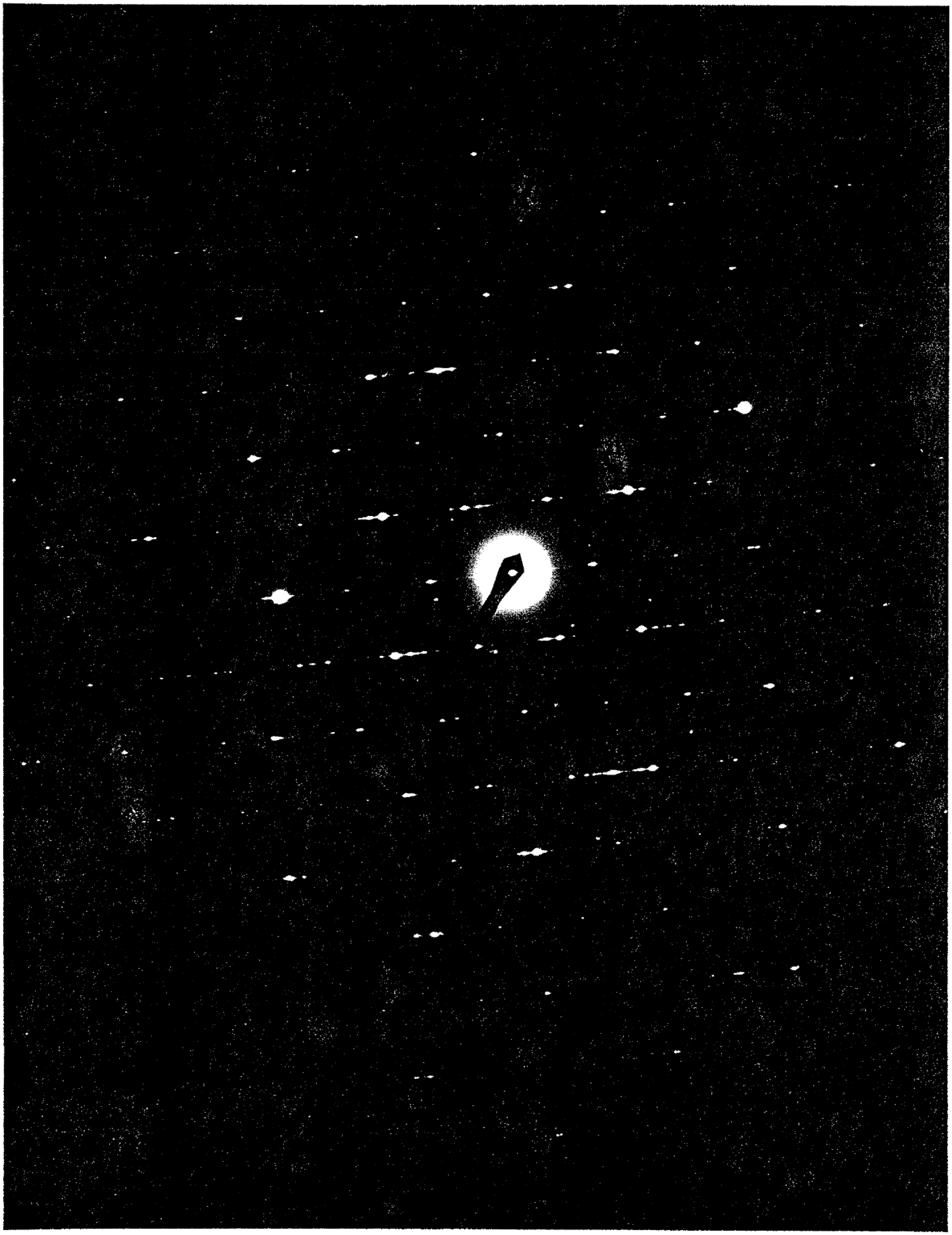
Figure 15. Inorganic residue from cured DAP window glazing. Photo taken at 5,000X. Magnification of the photograph is 13,500X.

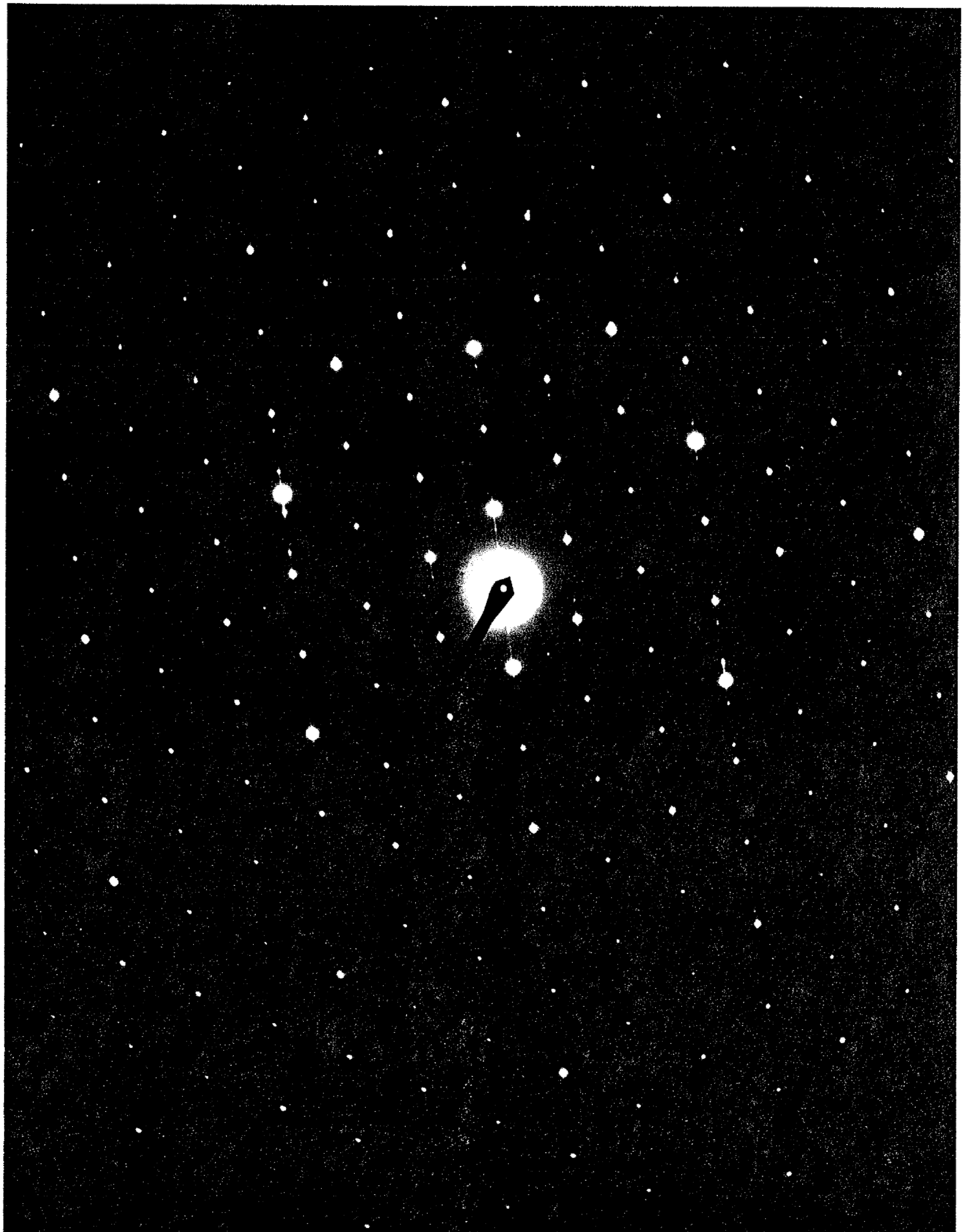
Figure 16. Inorganic residue from uncured DAP window glazing. Photo taken at 2,600X. Magnification of the photograph is 6,000X.

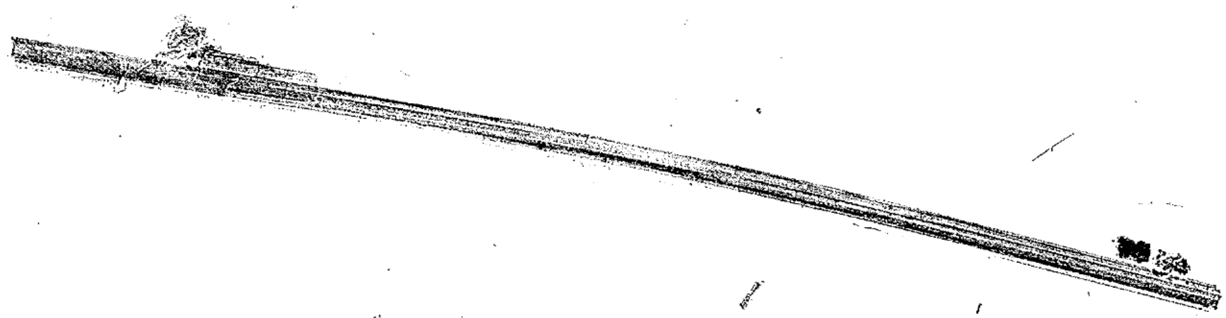
Figure 17. From Stemple and Brindley, 1960, A Structural Study of Talc and Talc-tremolite Relations, Journal of the American Ceramic Society, p.34-41. Schematic diagram of an electron diffraction pattern of a talc and superimposed amphibole lattice.

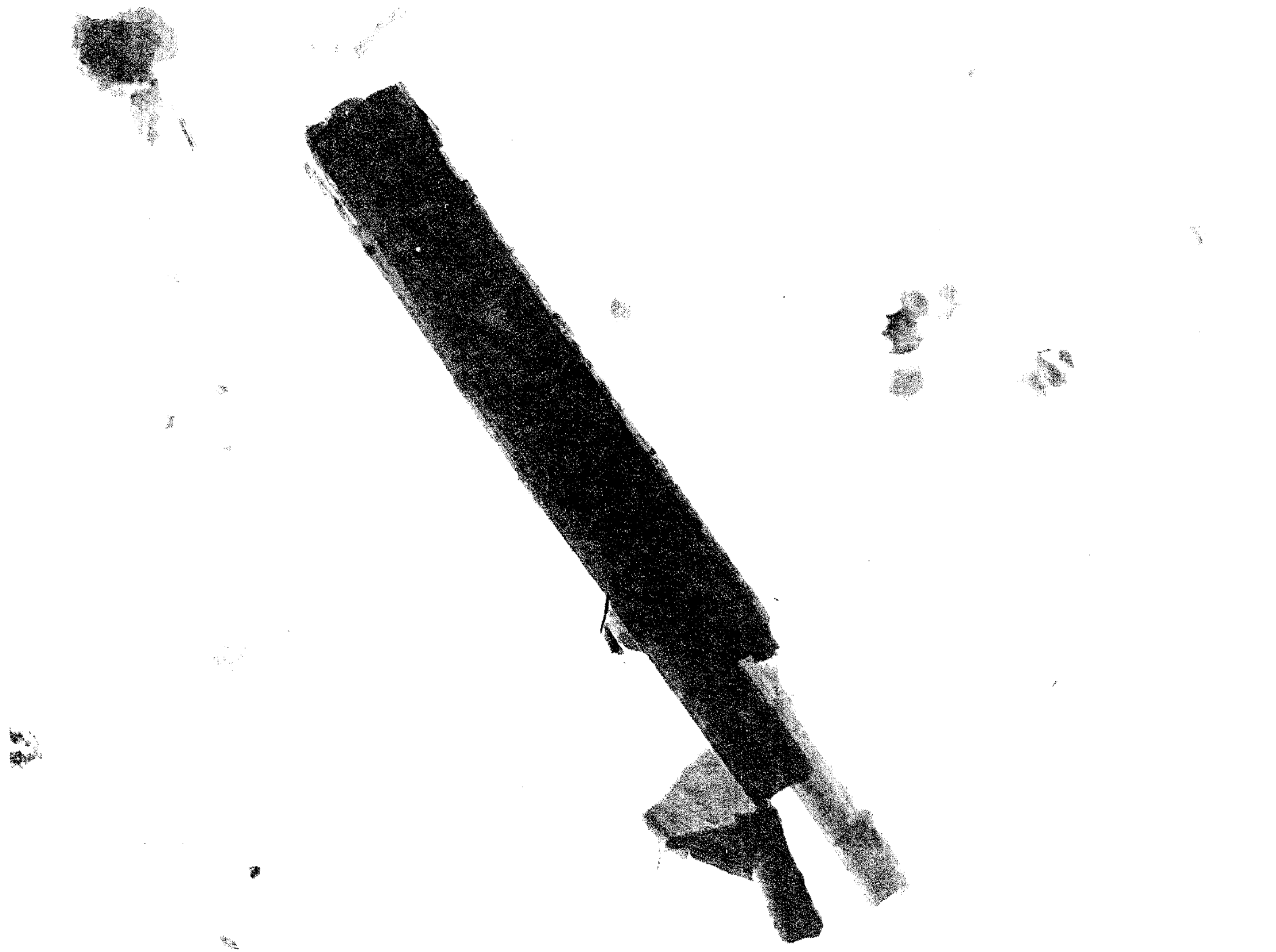












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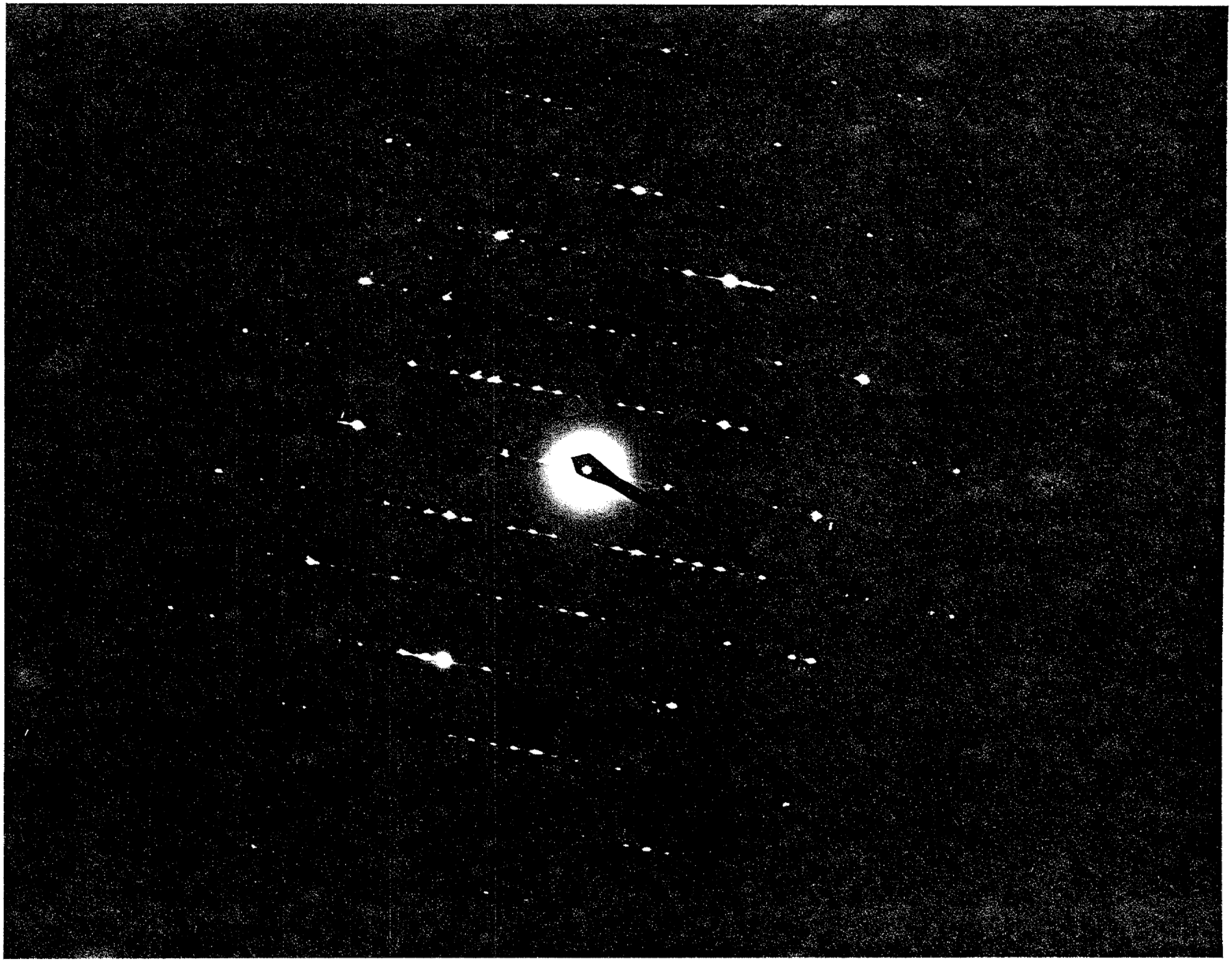

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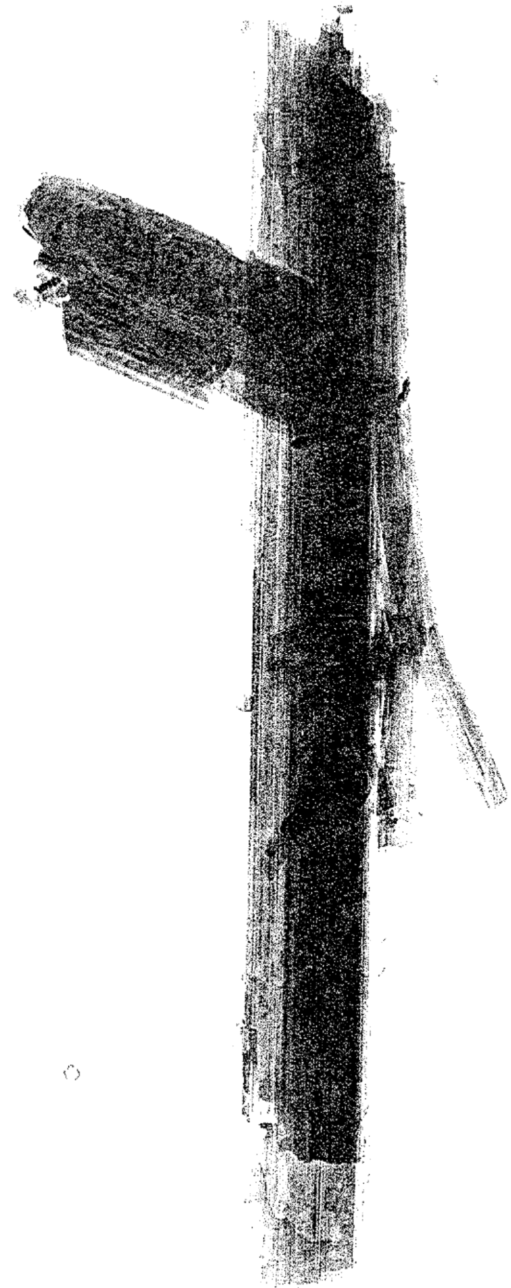
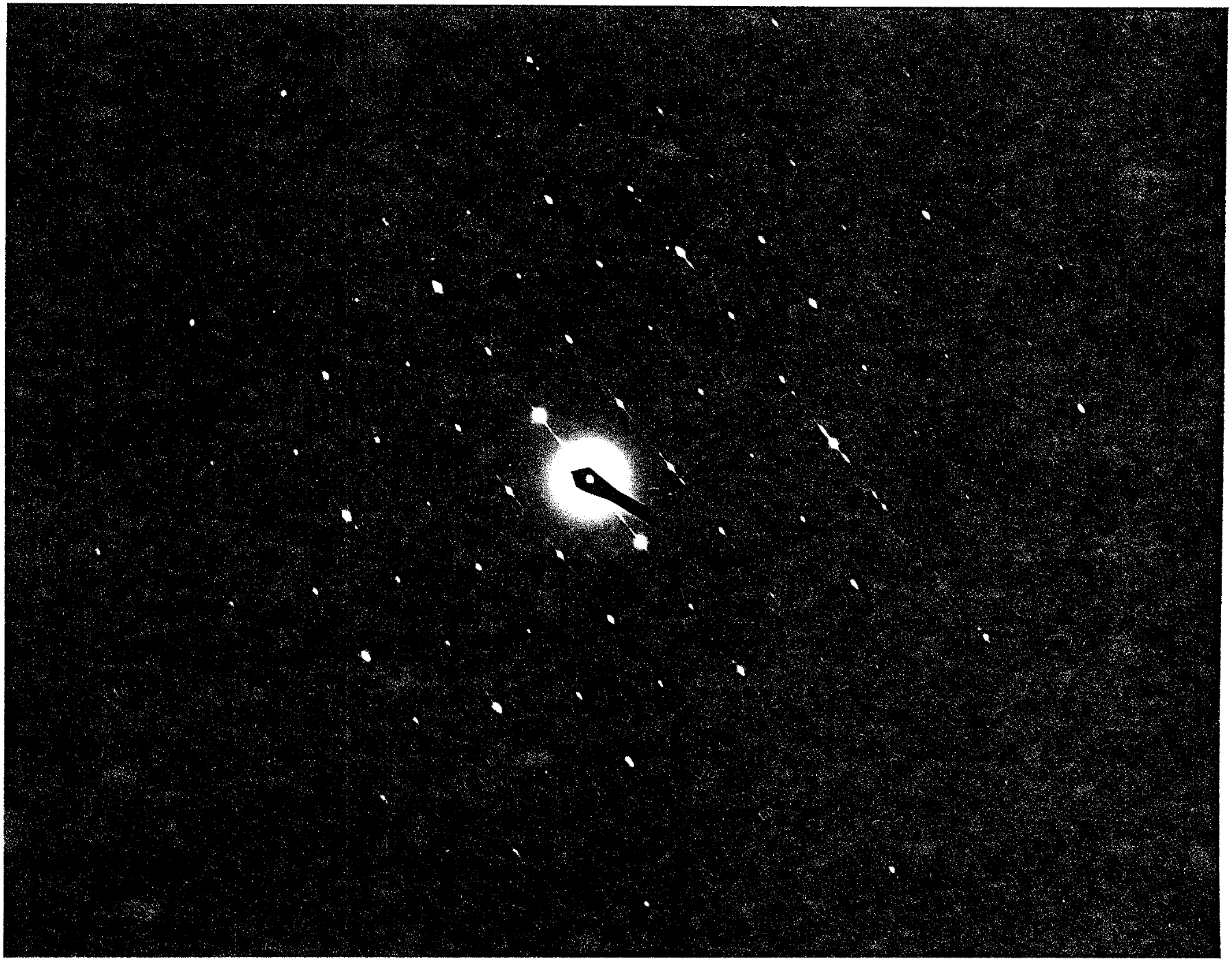


ATY CWS-183 fiber 9



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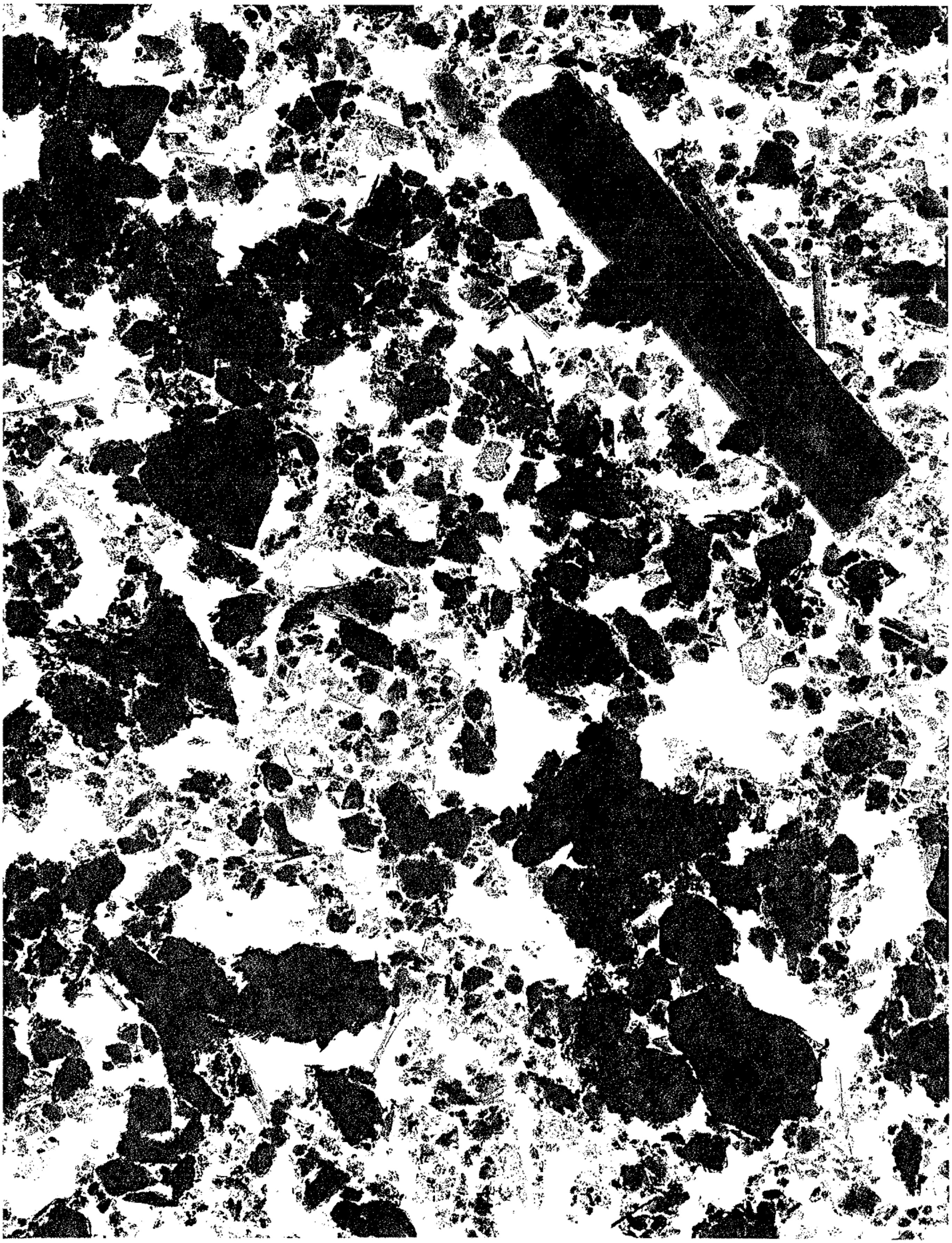


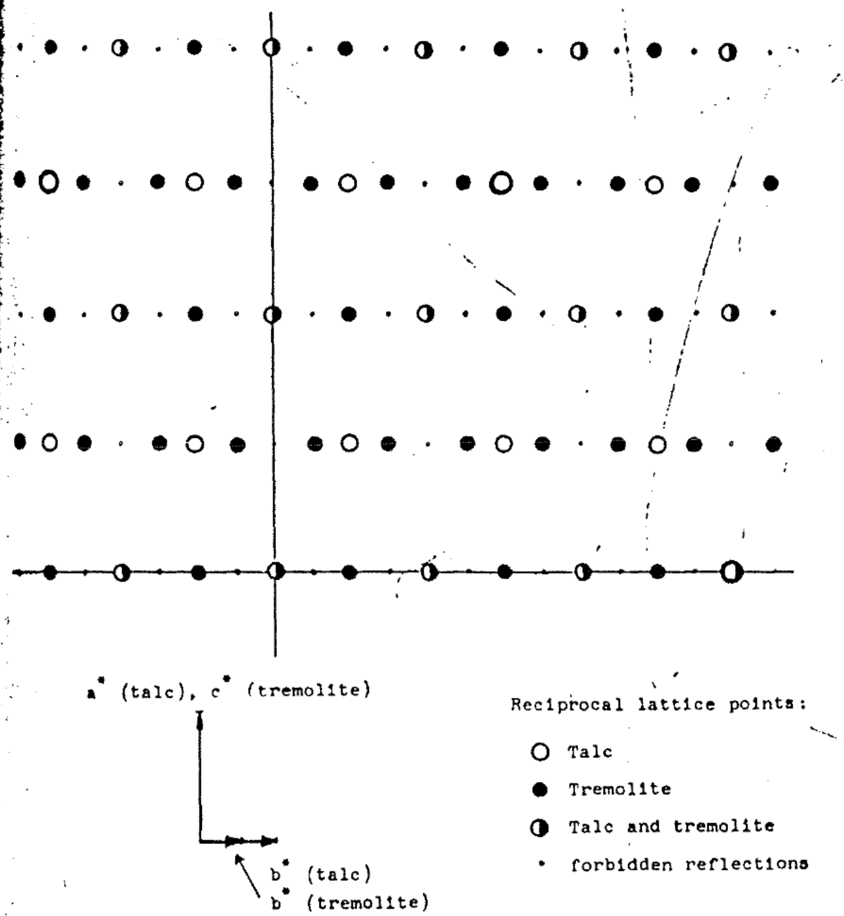


Fig. 5. Schematic diagram showing superposition of a^*b^* net of talc and c^*b^* net of tremolite. Diagram is idealized in that b^* (tremolite) is taken to be *exactly* $(^1/_2)b^*$ (talc).

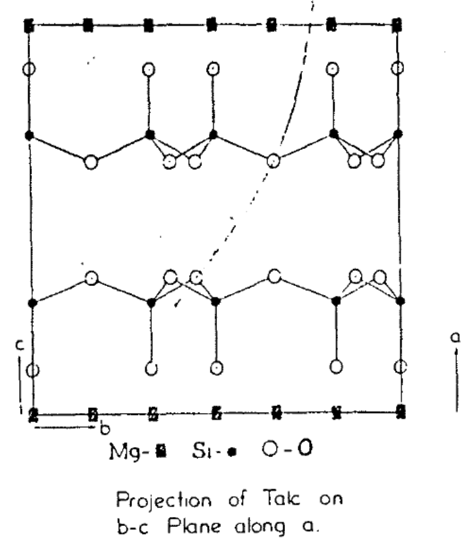


Fig. 6. Schematic representations of th
the *bc* plane and of tremolite projected
limited to showing the Si–O networks

Figures 4(*B*), (*C*), (*D*), and (*F*) reproduce four of these mixed diffraction patterns. Figure 4(*A*) shows an electron diffraction pattern of a platy talc crystal with a well-defined hexagonal arrangement of the spots. Using Fig. 4(*A*) as a key to the talc reflections, one can easily distinguish the corresponding reflections in Figs. 4(*B*), (*C*), and (*D*); where there appear to be groups of three reflections, the center one corresponds to talc. The intensity of the talc reflections diminishes from Fig. 4(*B*) to 4(*F*), with 4(*F*) predominantly tremolite. Figure 4(*E*) shows the individual fiber used for the diagram 4(*D*) *in the same orientation.*

The fact that the combined diffraction patterns have the appearance of a single pattern is a consequence of (*a*) simple relations between the dimensions of the two unit cells and (*b*) certain directional relations between the two components. The unit-cell dimensions of the two structures are as follows:

situation is depicted in Fig. 5 w
($hk0$) reflections of talc for which
circles show the ($0kl$) reflectio
($h + k + l$) must be even and h i
even. Since the b^* parameter of
of talc, the combined distributi
The threefold groups on the odd-
the two components separately,
flanked on either side by a tremoli
of reflections occurs on the even-o

The electron diffraction patter
seen in the electron micrograph
taining varying proportions of t
there is a well-defined orientatio
minerals.

V. The Talc-Tremo

The results described in the p
each composite fiber represents
one mineral into the other, pro
into talc, with the structural rel
served.

Figure 6 shows schematically t
by side with the observed orient
(fiber axis) of tremolite and the
one another and normal to the

A Wylie

53 50 13K 35.1 459353 Sample 10
54 49 chrysotile

55 48 76CM

56 47 6.6K 17.82 Sample 3

---

57 46 3.3K 8.91 White EDS 1
2 large fibers both have ↑
lot of fibrous
material

58 45 33K 89.1 chrysotile DP
Mg Si EDS no Al

White Sample
lots of large fibers
mostly amphibole DP
some Talc DP no Ca
just 1 small chrysotile
fiber found.

large fibers most
amphibole patt. ✓
Mg Si no Ca
some Talc

---

59 44 33K 89.1 Grey small chrysotile
chrysotile DP

60 43 33K 89.1 Grey 2nd chrysotile
fiber

61 42 20K 54K 459362 chrysotile

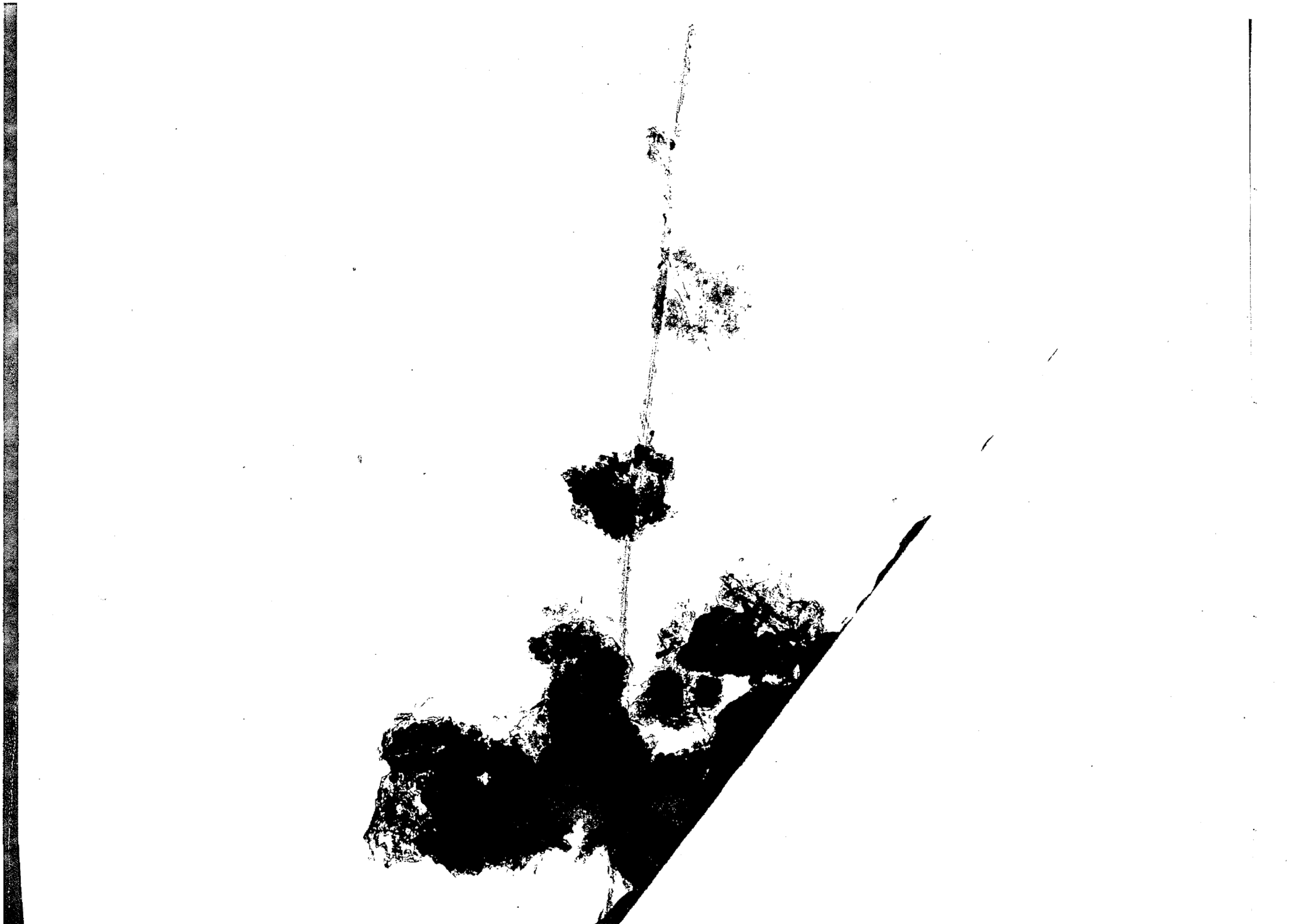
A Wylie Paint Samples JCF

B0093-

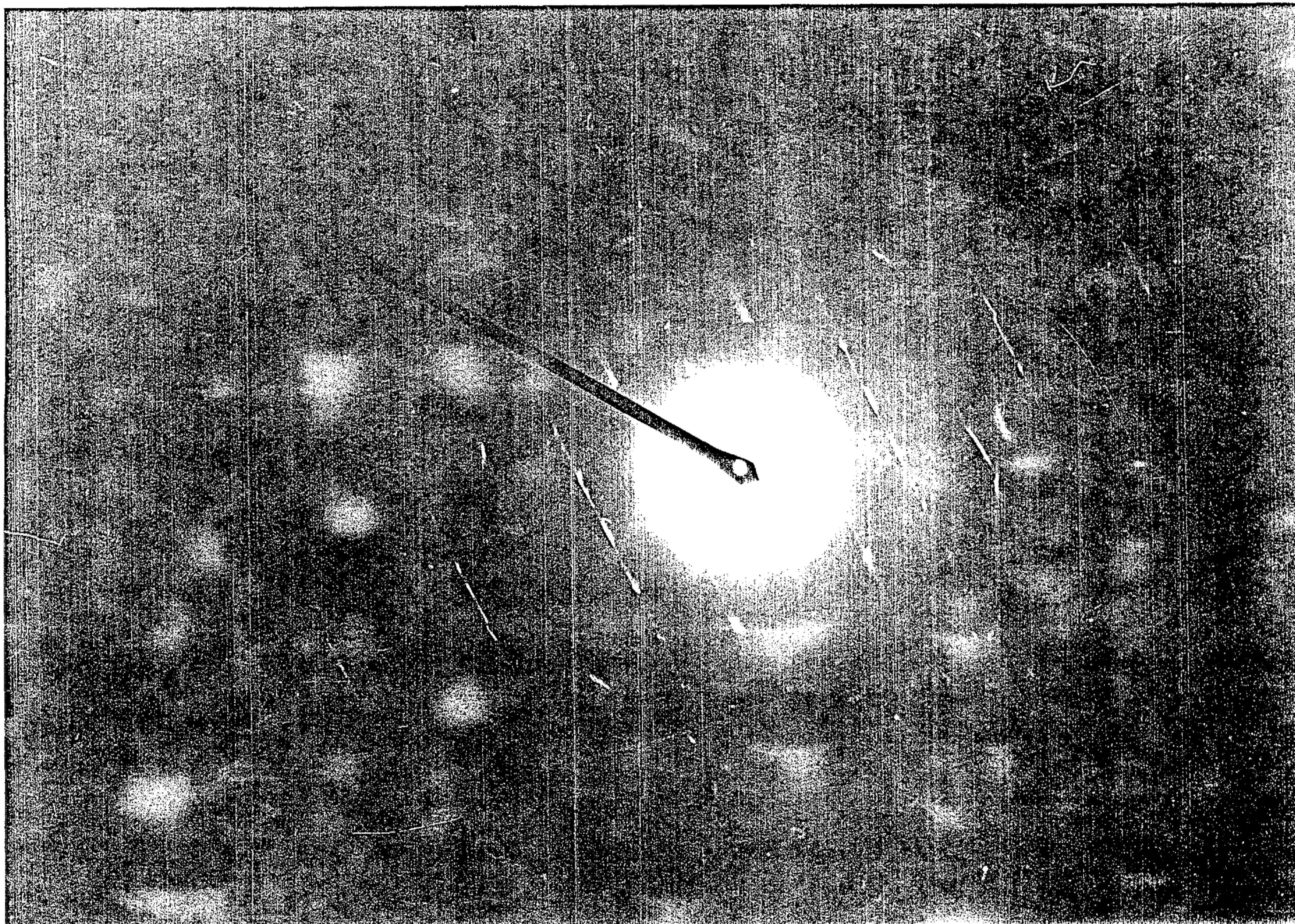
459230 43	76CM		2V 2, chrysotile D
3142			some
3241	10K		fibers of ↗ fiber ≈ 12 µ no EDS available
3240	76CM	2K	"chrysotile" bundle
3239	10K		part of ↗ no EDS
3938	76CM		chrysotile like [illegible]
3637	16K		part of ↗
3736	76CM		same as last 0°
2635	16K		part of 0° ↗
459239 34	10K		Sample 2 chrysotile like [illegible] last DP

no chrysotile detected
Sample 3K

Note 50-44 were used
by Scope Service Man



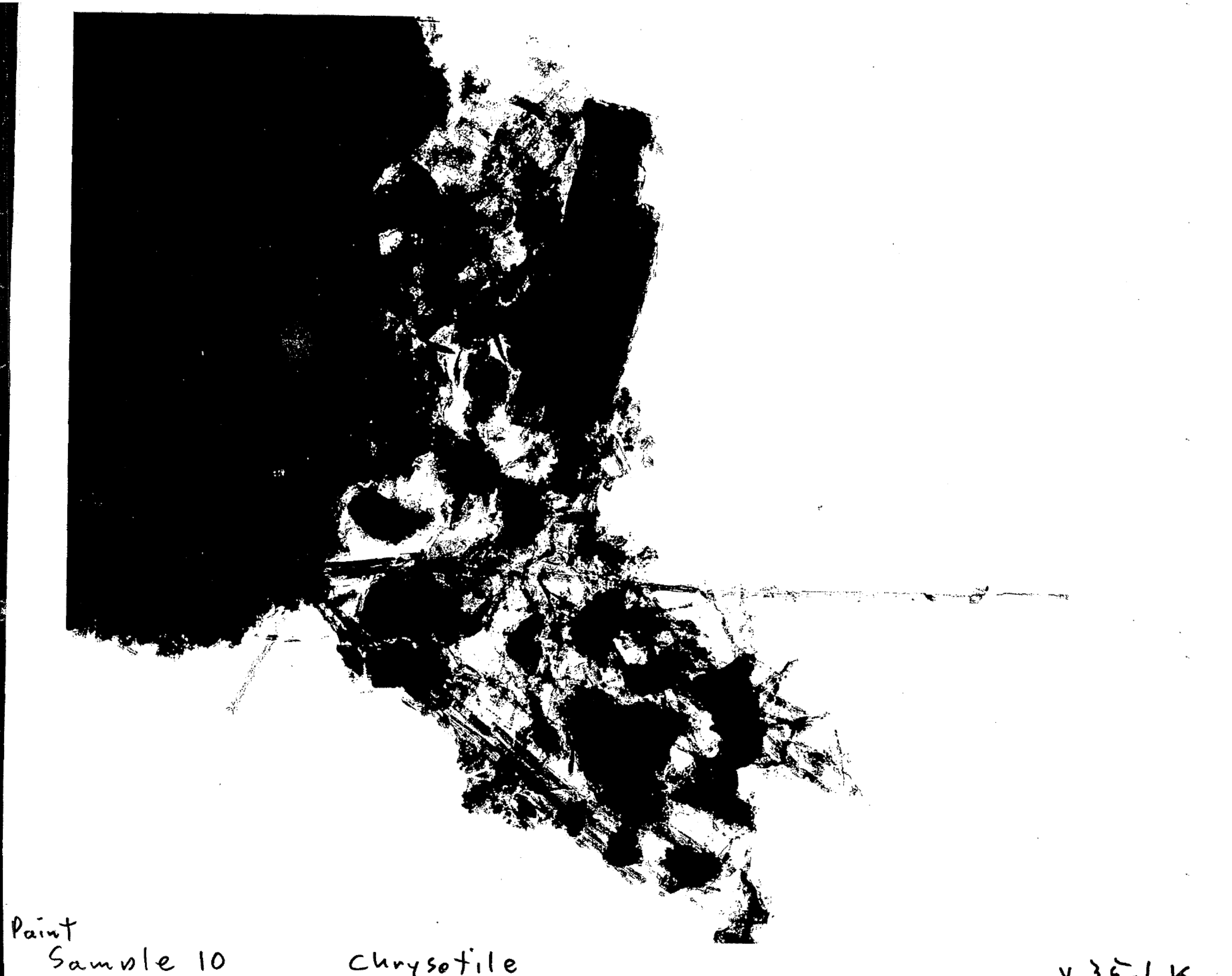
Paint Sample 2 Chrysotile Fiber 1 x 27,000



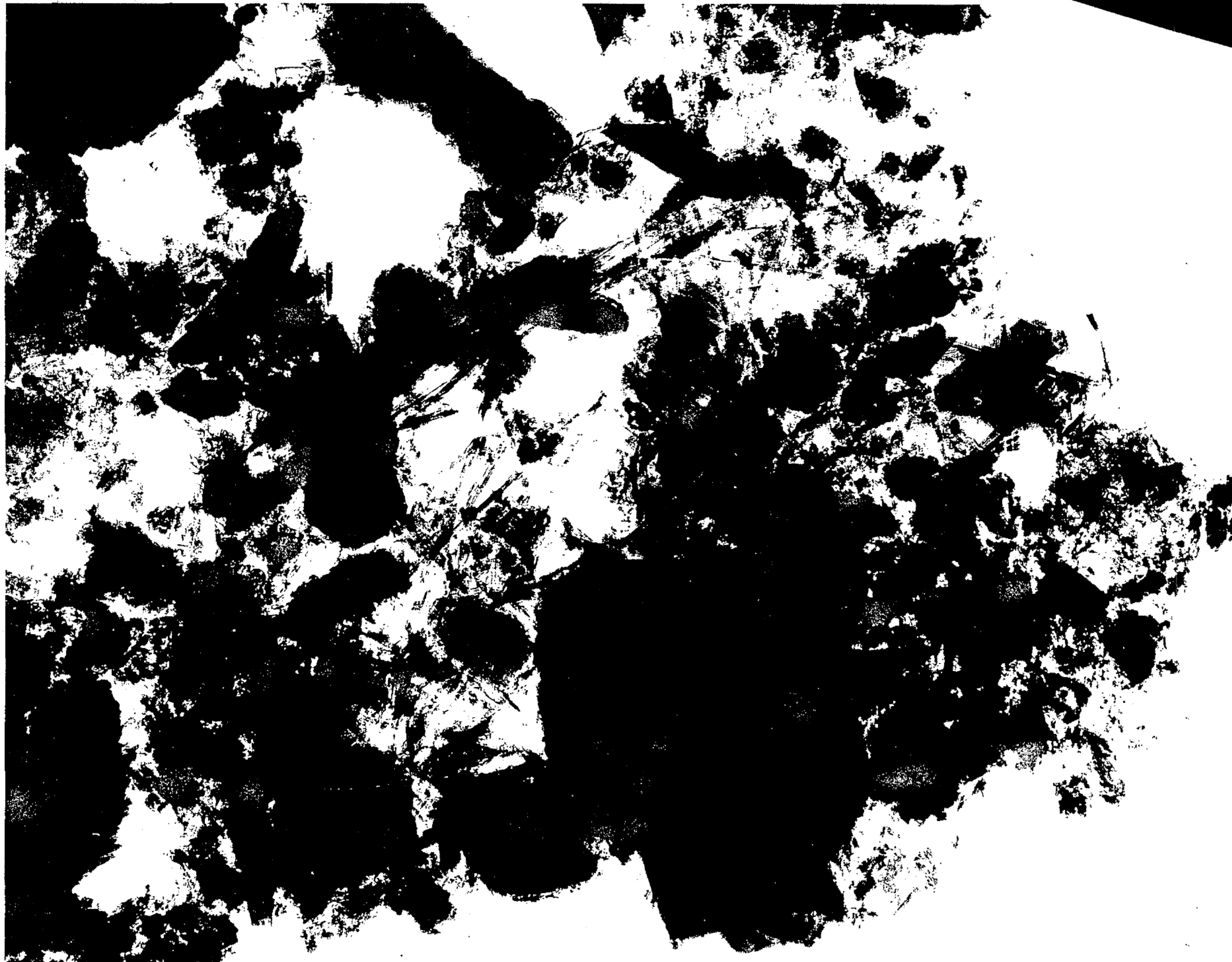
Paint Sample 2 Fiber 1
Chrysotile DP 76CM

Paint Sample 2
chrysotile Bundle

Fiber 2 X27,000



Paint
Sample 10 Chrysotile x35.1K



Paint Sample 2
Chrysotile Fibers

X 27,000

APE 91-1007 J. Firman 1

	no	Fno	Mag	Specimen (comment)	
4485°				Sample 1 uncured	
8581	50	29852	26K	1 conc. mineral spherules	
82	49	same		1M fiber - 1 EDS	
1 gm 83	48	76cm	29854	Diff of 7 0°	fibrous Talc
5g 84	47	29855	76cm	1M fiber - 2	
85	46	29856	6.6K	part fiber - 2	
86	45	29857	20K	high mag fiber 2	
87	44	29858	76cm	Diff fiber - 3	
88	43	29859	16K	fiber - 3	
89	42	29860	76cm	fiber - 4	
90	41	29861	33K	fiber - 4	
91	40	29862	50K	fiber 5	possible chrysotile
92	~~39~~	~~29863~~	66K	NDO	
	39	29863	66K	fiber 6	
93	38	29864	76cm	fiber - 7	fibrous talc
94	37	29865	20K	fiber - 7	
95	36	29866	16K	fiber - 8	Tremolite
96	35	29867	76cm	fiber - 8	unknown lone Zones
97	34	29868	50K	fiber 9	tremolite
98	33	29869	76cm	fiber 10	fibrous talc
99	32	29870	50K	fiber 10	

uncured DAP caulk sampled

	no	Fno	Mag	Specimen (comment)	
100	31	29871	20K	Sample fiber 1	fibrous talc EDS
101	30	29872	76cm	#2 fiber 2	~~fibrous talc~~
102	29	29873	13K	hardened fiber 2	Tremolite
103	28	29874	20K	(cured Particle 3	not fiber
104	27	29875	50K	caulk) ~~Particle~~ fiber 4	
105	26	29876	76cm	fiber 5	
106	25	29877	13K	fiber 5	
107	24	29878	16K	fiber 6 +350	
108	23	29879	10K	fiber 7	
109	22	29880	50K	possible chrys (EDS)	
110	21	29881	10K	fiber 10 3 fibers Talc DP	

No talc DP — Talc DP — No Talc DP & fiber 10

cured caulking compound

unwrouradddd

115	16	29886	21K	Low Mag 1 M
116	15	29887	2.6K	Low Mag 1 M.
117	14	29888	33K	1 M chrysotile Mineral
118	13	29889	76cm	Typical Fibrous Tal DP
119	12	29890	8.3K	Typical Fibrous Tal 2
120	11	29891	33K	Calcinated Sample 1
121	10	29892	76cm	Mde Dif massive
122	9	29893	20K	tile sample 2 Tremolite
123	8	29894	76cm	APE 91-1008 Vinyl
124	7	29895	76cm	Tile Chrysotile DP
				" "
125	6	29896	76cm	APE 91-1008 Amphibole DP 1
126	5	29897	50K	chrysotile fiber
127	4	29898	50K	" "
128	3	29899	8.3K	Low Mag 1 APE 91-1008 ≈ 40% chrysotile
129	2	29900	8.3K	" "

≈ 25% chrysotile in Vinyl Tile
APE 91-1008

1/18630	1	29901	6.6K	2 nickel APE 91-1008

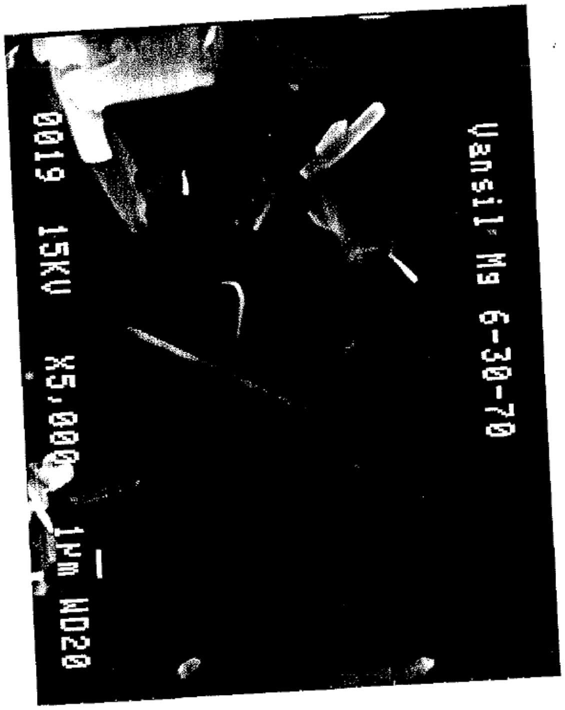
APF 91-1007 #2 [illegible] caulk [illegible]

4907[illegible]	No	Thomp	Mag/CC	Specimen/Comment
30	50	29902	76cut	[illegible] ~~[illegible]~~
31	49	"		"
32	48	29904	20k	[illegible]
33	47	29905	6.6k	[illegible] #2
34	46	29906	"	"
35	45	29907	"	"
36	44	29908	5k	[illegible] #2
37	43	29909	"	"
38	42	29910	5k	"
39	41	29911	5k	"

30° tilt

[illegible] 1-8-91

cured caulk sample

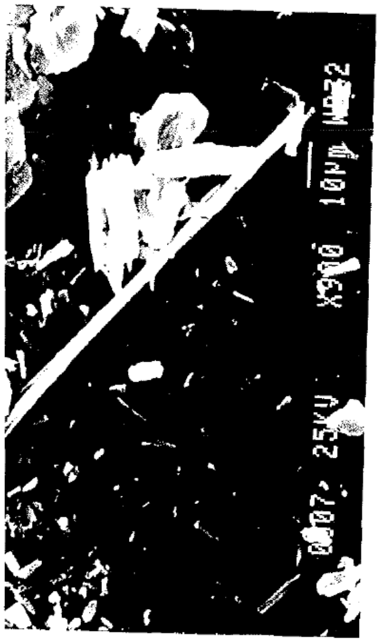


A #2

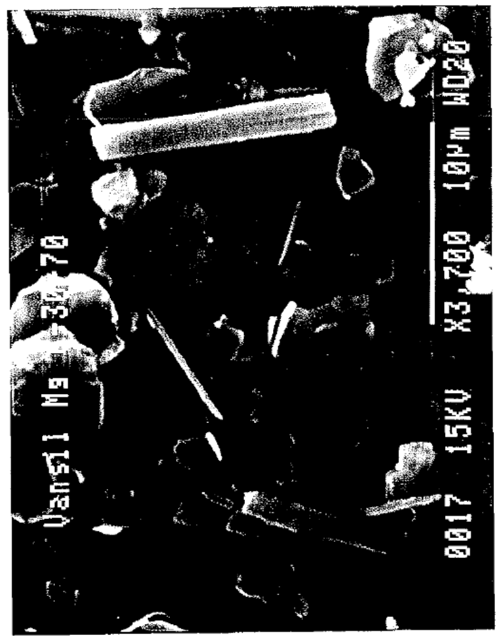
EXHIBIT

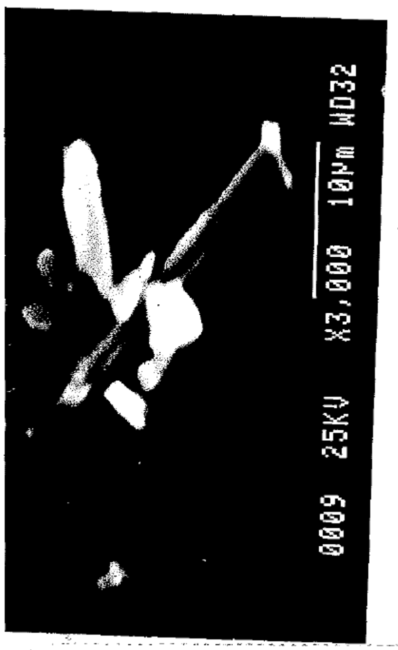
#7 (Wylie)

JH 9-18-09



C1 #3

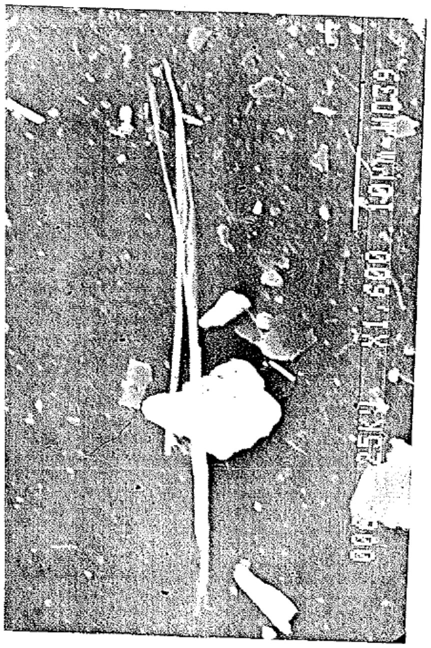




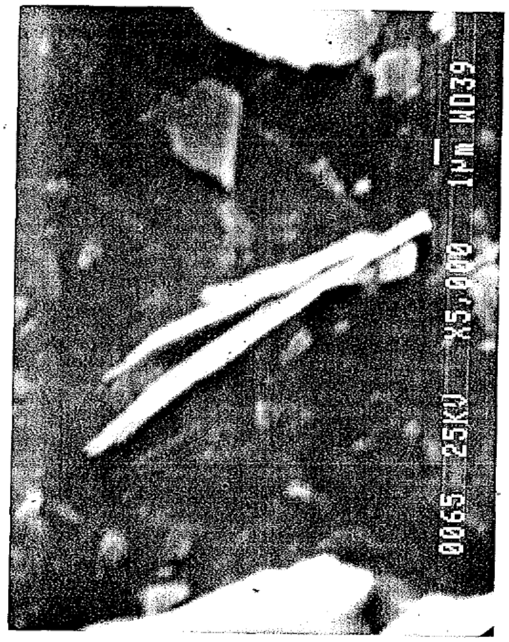
C1 #5

C1 #2

C1 #1

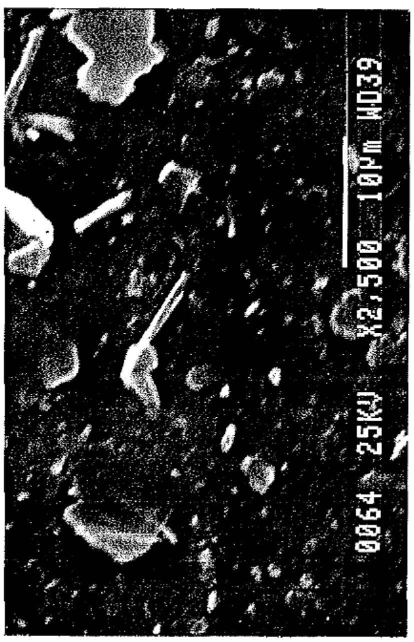


6 #3 B_2 6/17

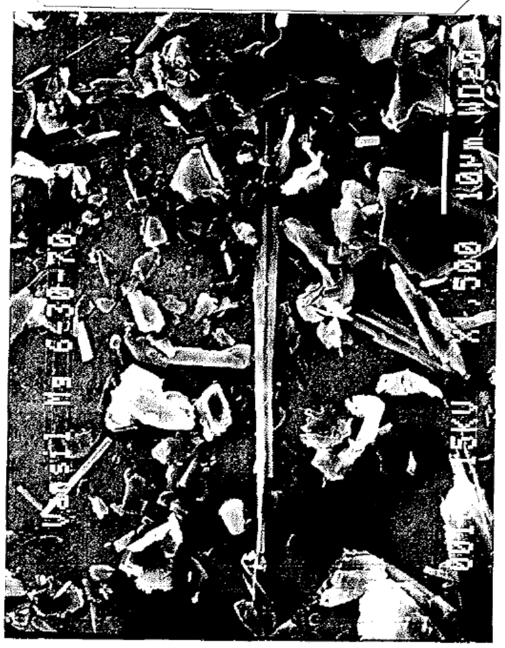


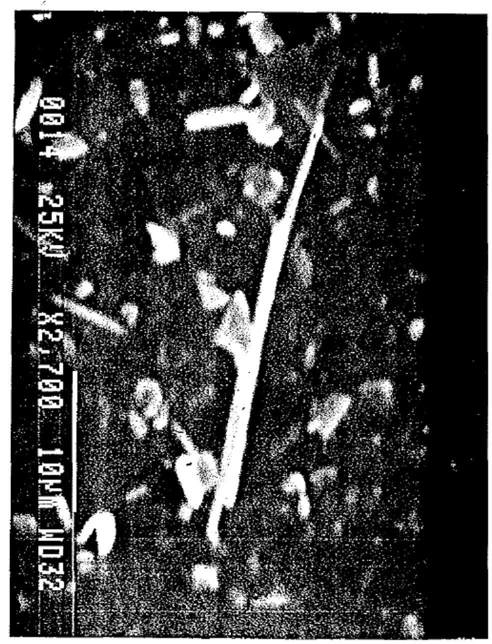
B_2 7/17 #2

C1 #4



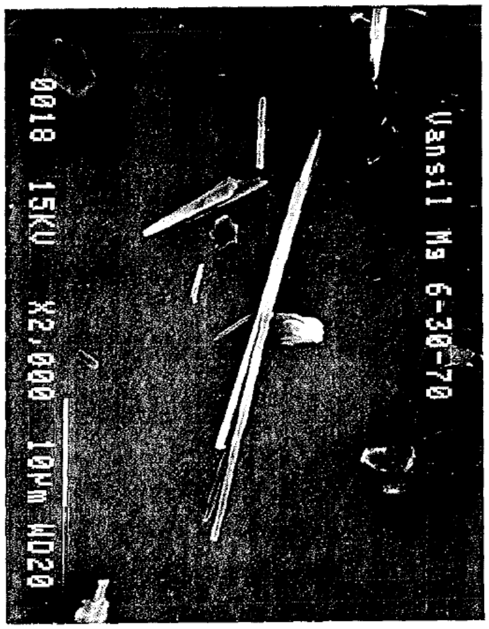
7/17 photo #1

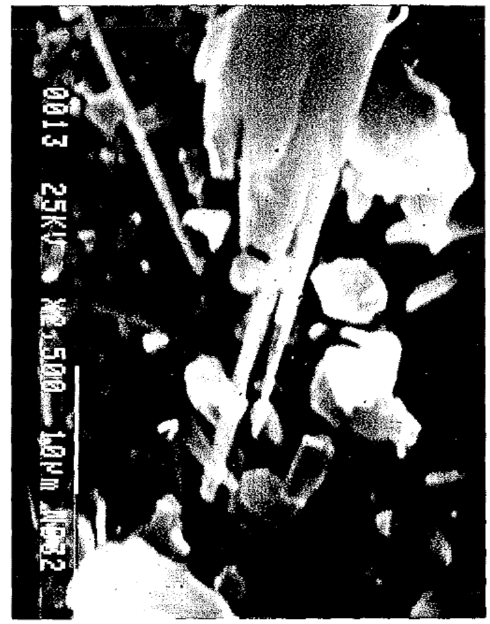




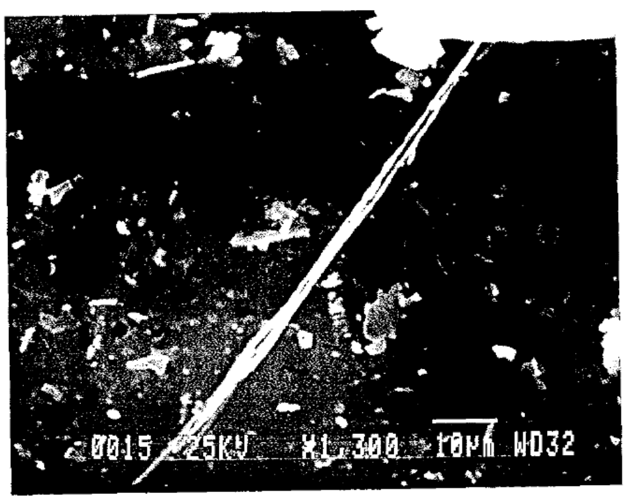
Al-#

Ag #1





Pa #1



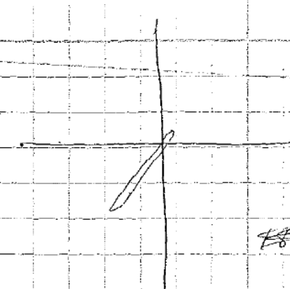
C1#3

June 3 1996

Vinsil K. White Wright

slide weight(s) 3.87399
slide + m (s+m) 3.87422
0.000023
.23 mg

1.600 - low contrast



~~180~~

1.596

slide + material

slide 3.75343

s + m 3.70393
s 3.70370
.00023
.23 mg

California Tremolite

s + m 3.40904
s 3.40867
.00037
.37 mg

Westal

s + m 3.89985
s 3.89960
.00025
.25 mg

180 divisions x 2

.00110 mm/division

.198 mm width x 2

4|18.0
16
20

$0.198 \times 2 \times 18 = mm^2$ = area of one pass

18×18 = Total area

$\frac{0.198 \times 2}{18}$ = portion area of one pass = 0.022 of sample / pass

Vansil 1.596

slide + material 3.39823
slide 3.39797
.00026
.26 mg.

1.596
slide+material 3.69282
slide 3.69250
0.00032
.32 mg

1.596
s+m 3.72375
s 3.72342
0.00033 g
.33 mg

1.596
s + m 3.61438
s 3.61416
.00022 g
.22 mg

1.596
s+m 3.70545
s 3.70519
.00026 g
.26 mg

Vestal 1.596
s+m 3.68957
s ~~3.71593~~ 3.68929
.00028
.28 mg

R. Wright

Vansil 1.596 refractive index liquid

s+m 3.64832g

s ~~3.62275g~~ 3.64795g

.00037g

Pass 1: ~~Frame 1~~ .37mg

roll 1: picture 1 - object in upper right quadrant near cross, what is it?
size: 12 x 4 μm

~~Frame 2~~:

picture 2 - object in upper right quad, running in coordinates
picture 3 horizontal 10-30 μm, and
vertical 10-16
~~size length~~

picture 4 - object extends horizontally from y=20, and extends from 10 to 34 on the x-axis. 1 μm thick

picture 5: object at 15 vertical, runs horizontally from 7-35
1 μm thick
possibly an unresolved object below it, at approximately 15-35 horiz

6-12-19

Westal 1.596
Stm 3.73691 g
S 3.73662 g
.00029 g
.29mg

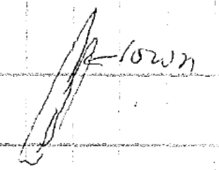
Stm
S

Westal 1.596 6-17-

~~Stm 3.62690~~
~~S 3.62670~~
0.000020 g
.20mg

Stm 3.62690
S 3.62670
.000020 g
.20 mg

objects in first Pass across slide
1) fiber - width <1µm, length = 15 µm
2) fiber - width <1µm, length = 40 µm
3) fiber - 2/3 µm width; length = 15 µm
4) fiber - .7 µm width, length = 20 µm
5) fiber - width <1µm; length 33 µm 6-1
6) fiber - .9 µm wide; 28 µm long
7) fiber .5 µm wide; 24 µm long
8) 10 µm long, <1 µm wide
9) 27 µm long, <1 µm wide
10) 25 µm long, <1 µm wide
11) 13 µm long, <1 µm wide
12) 10 µm long, <1 µm wide
13) 10 µm long, <1 µm wide
14) 30 µm long, <1 µm wide
15) 15 µm long, <1 µm wide
16) 15 µm long, <1 µm wide
17) 13 µm long, <1 µm wide
18) 15 µm long, <1 µm wide
19) 11 µm long, <1 µm wide
20) 11 µm long, <1 µm wide
21) 13 µm long, <1 µm wide
22) 10 µm long, <1 µm wide
23) 10 µm long, <1 µm wide
24) 11 µm long, <1 µm wide
25) 24 long, <1 µm wide
26) 14 long
27) 15 µm long



Fibers <1Mm wide - pass 1
28) 10 Mm long
29) 18 Mm long
30) 12 Mm long
31) 10 Mm long
32) 25 Mm long
33) 15 Mm long
34) 10 Mm long
35) 13 Mm long
36) 15 Mm long
37) 20 Mm long
38) 25 Mm long
39) 12 Mm
40) 10 Mm
41) 13 Mm
42) 10 Mm
43) 12 Mm
44) 15 Mm
45) 14 Mm
46) 15 Mm
47) 12 Mm
48) 25 Mm
49) 10 Mm
50) 10 Mm

Pass 2
objects <1Mm wide
1) 20 Mm long

2) 11 Mm long	25 Mm long, close to 1Mm in width	26 Mm long
10	15	20
10	15	35 Mm long, near 1Mm w[illegible]
15	12	20
12	35	12
10	15	15
50	20	20
10	18	15
30	15	20
34	10	15
11	15	10
10	15	15
		15

3
ed particle size 300-150 Mm
no asbestos fibers found

9 - no mineral fiber

icture 6 of Westal 20mg sample
may be a fiber bundle, or 2 pieces
lying together

ass 2 con't </Mm wide
0 Mm long
7
1
1
5
1
0
6
30 - near 1 Mm in width
23
0
19
10
11
10
10
14
25 - near 1 Mm width
10
30

9-20-97

Pass 2 of Westal con't
</Mm width

11 Mm long	30 Mm long	10 Mm long
35	20	10
15	25	10
28 near 1 Mm in width	10	~~13~~ 14
15, hidden under another particle	15	29
17	15	17
13	20	11
20		

 9-20-

Westal - Pass 2 con't
particles ≤ 1 μm wide
20 μm long
10
12
17
20
15
10
10
20
21
11
35
24
10
18
12
10
15
13
15
13
18 - near 1 μm wide
28
10
14
21
30
10
17
14
22
15
13
12
11
10 - near 1 μm in width

stern Talc MD 360 A (106-53M)

S+M	3.59171
S	~~3.59059~~ 3.59074
	.00087
	.97mg

6-24-'97

~~Westal .20mg sample - Pass 3~~

~~particles <1μ in width~~
~~1) 15μ long~~
~~2) 20μ long~~
~~3) 25μ~~
~~20μ~~
~~15μ~~
~~13μ~~
~~10μ~~
~~20μ~~

Western Talc MD 360A - .97mg sample, ~~[illegible]~~
picture 7 - under plain light
8 - under cross-nickles
70μ long, possibly a fiber bundle

Nestal .20mg sample pass 3 — 6-26-14

particles ≤1μ width:

1) 20μ long	15μ long
2) 11μ long	20μ long
25μ	12μ long
15μ	10μ long
20μ	12μ long
12μ	20μ
10μ	14μ
30μ	11μ
29μ	20μ
12μ	23μ
13μ	22μ
10μ	17μ
41μ	10μ
12μ	53μ - near 1μ in width
12μ	10μ long
23μ	14μ
15μ	10μ
20μ	10μ
20μ	35μ
15μ	30μ
10μ	15μ
14μ	18μ
11μ	21μ
30μ near 1μ in width	40μ - near 1μ in length
11μ	18μ
23μ	10μ
11μ	21μ
25μ near 1μ in width	20μ
17μ	13μ
18μ	26μ - near 1μ in width
20μ	10μ
	15μ - near 1μ wide
	30μ
	20μ - near 1μ wide
	10μ
	11μ
	15μ
	17μ

Filter preparation for SEM study.

MD 360-A Bico Ground	wt of slide + material wt of ~~?~~ slide wt of material	3.69768 3.69691 .00077
MD 360-B Bico Ground	wt of slide + material wt of slide	3.69722 3.69~~670~~76 .00056
MD 360-C Bico Ground	wt of slide + material wt of slide	3.69731 3.69676 .00055
MD 361-A Bico Ground	slide + material wt. of slide	3.69742 3.69676 .00066
MD 361-B Bico Ground	slide + material wt of slide	~~3.68778~~ ~~3.68735~~ ~~.00043~~
		3.68~~786~~ 73 3.687~~2~~5 ~~.00091~~ ,000~~5~~8
Westol 003	slide + material slide	3.687~~59~~ 75 3.68730 ,00~~29~~045
Vansil M6 6 30 70	slide + material slide	68776 3.68730 .00046

[Are]a of filter - Diameter = 4.3 cm r = 2.15 cm

$Area = \pi R^2 = 14.522\ cm^2 = 14.522 \times 10^8\ \mu m^2$

Radium. unusual data reading WESTAC.SYS

6-26-'97

.1 .20mg sample - pass 3
particles <1μ wide, con't

6-27-97

26μ long	20μ long
30μ	10μ
12μ	23μ
14μ	17μ
15μ	25μ
10μ	27μ
15μ	11μ
11μ	22μ
14μ	23μ
11μ - near 1μ wide	13μ
17μ	25μ - near 1μ wide
18μ - near 1μ wide	24μ - near 1μ wide (faint under x-nickle
15μ	15μ
11μ	33μ - near 1μ, (faint under x-nickle)
12μ	10μ
10μ	15μ
38μ	16μ - near 1μ (faint under x-nickle)
15μ	10μ
12μ	18μ
12μ	16μ
23μ	15μ
31μ	15μ
18μ - near 1μ wide	19μ
20μ	24μ
13μ	13μ
15μ	12μ
10μ	13μ
27μ	17μ
45μ	11μ
17μ	10μ
17μ	15μ - near 1μ wide
10μ	11μ
43μ	18μ
11μ	27μ
15μ	15μ
25μ	12μ
20μ - near 1μ wide	11μ
10μ	16μ
15μ	10μ

6-27-'97

picture 9 - odd object in center, 35μ long,
average ≈ 4μ wide
under normal light
picture 10 - under cross-nickle

Westal 20mg sample pass 3
Particles ~~≤1μ~~ wide con't.
15μ
10μ
10μ
20μ
18μ
14μ
25μ
10μ
12μ
18μ
12μ
17μ
13μ
10μ
16μ
14μ
12μ
18μ
20μ - near 1μ wide

Westal Stats

	Length
min	10
max	60
mean	16
SD.	7.4
SE	0.3
median	15

18

C_1 = MD360-C
Total filter = 0.55 mg
166 fields × 1446 μm^2 = $\frac{24 \times 10^4 \ \mu m^2 \text{ observed}}{\text{area of filter}}$ × 0.55 mg = mg observed

9 fibers observed

91 field of view × 1446 μm^2 = $\frac{13 \times 10^4}{\text{area of filter}}$ 2 fibers

18 1 fiber

Sample C1
166 + 91 + 18 = 275 fields of view × $\frac{1446 \ \mu m^2}{\text{field}}$ = $40 \times 10^4 \ \mu m^2$ observed

12 fibers

$\frac{40 \times 10^4 \ \mu m^2}{\text{Area of filter}}$ × 0.55 mg = mg observed = 1.515×10^{-4} mg

0.29%

$\frac{12}{\text{mg observed}}$ = fibers/mg × 10^{-3} = fibers/µg $\frac{12}{1.515 \times 10^{-4}} \times 10^{-3}$ = 7.9 × 10 fibers

79 fibers/µg

Sample B_1 = MD360-B = 0.56 mg
total # fields observed at 2500X = 248 × 1446 μm^2 = $\frac{36 \times 10^4 \ \mu m^2 \text{ observed}}{\text{area of filter}}$ × 0.56 mg
.1388 µg observed

mg observed 4 fibers total

29 fibers/µg

≤0.1%

Sample A_1 = MD360A = 0.77 mg
249 fields observed at 2500x = 249 × 1446 = $\frac{36 \times 10^4}{\text{Area of filter}}$ × 0.77 mg = µg observed = .1908

4 fibers

21 fibers/µg

≤0.1%

= Westal 003 = 0.45 mg
258 fields observed at 2500x = $\frac{37 \times 10^4}{\text{Area of filter}}$ × 0.45 mg = mg observed

5 fibers

0.11465 µg observed

≤0.1%

19

6/30/97

Sample holder - bottom hole

A, B, C,

Before Changing Samples

Motors: X = 25 Y = 35

sample load

insert holder

hit top button - wait 2 minutes for vacuum - light goes off

Detector switch - top off. Open chamber 1/4 turn cc wise - pull out, turn back 1/4 turn 52783

Put in dove

rotate vaccum don handle

insert

rotate again

Photographs

Set up photo WFM (blue)

adjust Bright & Cont

Base line - 2nd line

NORM (blue)

insert film

HIT PHOT

RDC - bug -

, acquire Acquire

c. Run

To Save:

Output

Write Spectrum

Run

2500 mag

5.2 cm = 10 μm   0.52 cm = 1 μm = 5.2 mm

Area of view: 23 x 17 cm = 391 cm^2 ÷ .52 x .52 = 1446 μm^2

1 cm^3 = 7.112 μm^3

Fields of view

160-C

V	size, cm	Ca, Mg, Si
1	4 x 0.5	✓
1	4 x 0.5	✓
.72	8 x 0.3	✓
.88	5.5 0.4	✓
.558	6.2 0.3	✓
1.5	6.0 x 0.5	✓
.88	5.5 x 0.4	
.54	6.0 0.3	
1.52	9.5 0.4	

est volume cm^3 8.598 = 61.15 μm^3

#1 photo of large particle showing irregular termination - splintery cleavage - not bundle

Lower mag to 1500 x to scan - photo #2 - bundle?

CaMgSi ✓

Scanning at ~~1500~~ 2500

1.75	0.5 x 7
.96	0.4 x 6
2.71	19.27 μm^3

sample C, continuing
2500x

4 x0.5
1 = 7.11 um^3

Reduce mag to 1000x – scanning for fiber bundles
10 μm = 2.1 cm

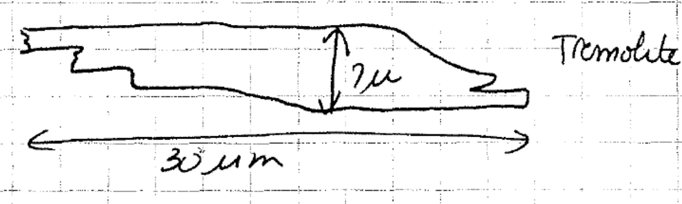


Photo #3 – tremolite
"fiber" – bundle??? and blocky
tremolite – photo #4 repeat

Photo #4 – tremolite

photo # 5

Σ Sample C$_1$ = $\boxed{87.53\ \mu m^3}$

Sample B, (small amt of sample).
2500X

cm

1.08 120 X 0.3

.56 3.5 X 0.4

2.625 10.5 X 0.5

1.305 14.5 X 0.3

5.570 = $\boxed{39.61\ \mu m^3}$

1000X scan for bundles

A_1

Cm

2500X

Photo #1 - failure

		$\bar{V}$ (cm^3)
	5 X ~~0.05~~ 0.5	1.25

photo #1-

19X 0.4	3.04
7 X 0.4	1.12
4.5 X 0.5	1.125

$\Sigma = 6.535\ cm^3 = 46.48\ \mu m^3$

value to 1000X

photo #2

2500X 15X 0.5 $3.75 \times 7.112 = 26.67\ \mu m^3$

$\boxed{\Sigma A_1 = 73.15\ \mu m^3}$

one ~~[illegible]~~ no picture taken -

A_2 A_3 A_4

A_3 2500X

11 X 0.4 — 1.76

7.5 X 0.3 — .675

5.5 X 0.4 — .88

5.5 X 0.4 — .88

6.0 X 0.4 — .96

$\boxed{\Sigma A_3 = 36.66\ \mu m^3}$ = 5.155(

1000 X

A4

2500

	7.0 X 0.5	1.75
	6.5 X 0.4	1.04
2.375	9.5 X 0.5	
3.25	13 X 0.5	
1.9	7.6 X 0.5	
1.5	6.0 X 0.5	
.63	7 X 0.3	
1.75	7 X 0.5	
3.75	15 X 0.5	
2.5	10 X 0.5	
2.25	9 X 0.5	
1.625	6.5 X 0.5	
1.375	5.5 X 0.5	
0.63	7.0 X 0.3	

Many tremolite w/ w > 1.0 μ not included.

A4 = Vansil = 0.46 mg

206 fields × 1446 μm²/field = 30 × 10⁴ / Area of filter (μm²) × .46 mg =

mg observed 14 fibers = .0950 μg observed

$\boxed{147 \text{ fibers}/\mu g}$

many very thin particles, no signal or inconclusive signal. Tremolite likely more abundant than this analysis indicate

= 0.5%

$\Sigma = 23.535 \text{ cm}^3 = 167.38\ \mu m^3$

1000 X

photo #1

photo #2

A_2 A_3 A_4

A_3 Wb 2500X

|||| |||||| |||||||||

11 X 0.4 — 1.76

7.5 X 0.3 — .675

5.5 X 0.4 — .88

5.5 X 0.4 — .88

6.0 X 0.4 — .96

$\Sigma A_3 = 36.66\ \mu m^3$ = 5.155 cm

1000 X

A4

2500

	7.0 X 0.5	1.75
	6.5 X 0.4	1.04
2.375	9.5 X 0.5	
3.25	13 X 0.5	
1.9	7.6 X 0.5	
1.5	6.0 X 0.5	
.63	7 X 0.3	
1.75	7 X 0.5	
3.75	15 X 0.5	
2.5	10 X 0.5	
2.25	9 X 0.5	
1.625	6.5 X 0.5	
1.375	5.5 X 0.5	
0.63	7.0 X 0.3	

Many tremolite with $w \geq 1.0\mu$ not included.

A_4 = Vanseil = 0.46 mg

$206 \text{ fields} \times 1446 \mu m^2/\text{field} = \dfrac{30 \times 10^4}{\text{Area of filter } (\mu m^2)} \times .46 \text{ mg}$

mg observed = 14 fibers .0950 μg observed

$\boxed{147 \text{ fibers}/\mu g}$

many very thin particles, no signal or inconclusive signal. Tremolite likely more abundant than this analysis indicates

$\Sigma = 23.535 \text{ cm}^3 = 167.38 \mu m^3$

= 0.5%

1000X

photo #1

photo #2

A_2 1000x — ~~few~~ very few particles

photo #1

225 fields ? view × 1446 μm^2

$$\frac{3.25 \times 10^5\ \mu m^2 \text{ observed}}{14.522 \times 10^8\ \mu m^2} = .22379 \times 10^{-3} \times$$

147.7×10^{-3} µg observed

.1477 µg observed

detection limit $\boxed{< 7 \text{ fibers / µg}}$

$\boxed{< 0.01\%}$

7/17/97 $\underline{B_2}$

2,500 magnification (looking for objects at least 4 cm long and $2\frac{1}{2}$ cm wide)
5.2 cm = 10µ

at 1,000 mag 2.2 cm = 10µ
at 1,500 mag 3.2 cm = 10µ

4.5 cm x .5 — Photo #1	1.875
5.5 x .3	.495
8 cm x .5	2.0
5 cm x .5 cm	1.25
5.6 x 0.4 cm	0.896
5.3 x .5	1.325
6.5 x .4 cm	1.04
4.6 x .4 cm	0.736
5 cm x .4	0.8
7.5 x .5 } photo 2	1.875
5.0 x 3 }	0.45

B_1 = MD361B = 0.48 mg

~~0.31 cm = 1 µm~~

1,500 mag — measurements at 2,500 mag

7.9 x .5 cm	1.975
8.6 x .5 cm	2.15
7.5 x .5 cm	1.875
5.9 x .2	0.236
10.5 x .5	2.625
12.7 x .6	4.572
8 x .5	2.0
4.6 x .3	0.414
6.5 x .4	1.04
8.3 x .4	1.328
6.5 x .5	1.625
5 x .4	0.8
9.5 x .2	0.38
5 x .2	0.2
7 x .3	0.63
12.7 x .5	3.175
0.5 x ~~0.5~~ 6.9	1.725
12.5 x 0.4	2.0
0.4 x 6.6	1.056

photo #3

at 1500x 20.0 x X 0.4-0.5

6.0 x	0.3	0.54
4.7	0.5	1.175

$31.521\ cm^2 = 224.18\ \mu m$

$\Sigma B_2 = 224.18 + 90.62 = 314.80\ \mu m^3 = .0009$

186 fields view at 1500x

$\frac{391}{.31 \times .31} = 4069\ \mu m^2/field \times 186 = \underset{\text{Total area}}{\underline{76 \times 10^4\ \mu m^2}} \times 0.48\ mg = mg$

.251 µg viewed

21 fibers

84 fibers/µg

All SEM data saved as WestSEM.sys

73 cases

	Length	width (µm)
min	6.7	0.38
max	230.8	1.15
mean	17.76	0.81
SD	26.06	0.17

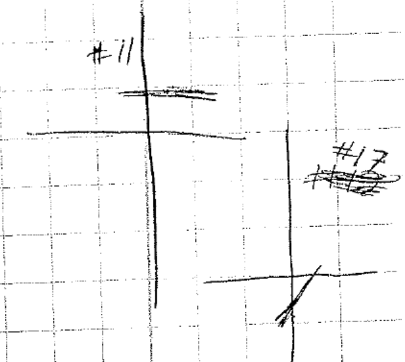
Length	Frequency
~~230~~ 40	1
25 - 40	6
20 - 25	6
15 - 20	7
10 - 15	36
	13

7-2-'98

K. Wright
Westal .20mg sample - pass 4
Particles ≤ 1μ wide:

19μ long, near 1μ wide
17μ long
10μ long
13μ long
18μ
10μ - near 1μ wide
11μ
12μ
11μ - near 1μ wide
20μ long
10μ
12μ
10μ
11μ
15μ
10μ long, near 1μ wide
13μ long, near 1μ wide
10μ
22μ long
25μ
10μ
12μ
47μ long, near 1μ wide
18μ
15μ
15μ
10μ - near 1μ wide
20μ
16μ
10μ
12μ
10μ
10μ
12μ
10μ
22μ - near 1μ wide
20μ - near 1μ wide
2[illegible]

#12-16 overexposed
picture 11 - object 26μ long
2μ wide
seems to be split
at one end
#11 under normal light
#17 under cross-nickles



*pictures numbered
10 + 11 are this object under
cross-nickles
(#12 is same, overexposed)

K. Wright

Westal .20mg sample - pass 4 7-2-'97

particles ≤ 1μ wide, continued:

picture #18 - odd object,
and #19 hard to resolve
nearly invisible under
cross-nickles
oriented ⟹
about 30μ long x 5μ wide

19μ long
21μ
11μ
15μ - near 1μ wide
20μ
12μ
21μ
10μ
20μ
15μ
45μ
14μ
10μ
17μ
16μ
14μ
17μ
12μ
10μ
10μ
10μ
15μ
13μ
18μ
16μ
16μ
20μ
10μ
10μ
14μ
10μ
11μ
22μ
13μ
10μ
12μ
10μ
10μ
10μ

7-3-'97

picture #20 - normal light
#21 - cross-nickles
object about 22μ long, 2μ wide

kw

7-4-'97

K. Wright
Westal. 20mg sample - pass 4
particles <1μ wide, cont:

30μ long
10μ
27μ - near 1μ wide
60μ long - near 1μ wide
30μ
20μ
17μ
22μ
10μ
10μ
11μ
27μ
17μ
12μ
15μ
15μ
15μ
10μ
12μ
20μ
13μ
11μ
10μ
20μ
16μ
10μ
11μ
21μ
25μ - near 1μ wide
10μ
17μ - near 1μ wide
13μ
13μ
13μ - near 1μ ~~long~~ wide
18μ
17μ - near 1μ wide
18μ
12μ - near 1μ wide
11μ
11μ
17μ

15μ
13μ - near 1μ wide
11μ
11μ
15μ - near 1μ wide
12μ
10μ
15μ
15μ - near 1μ wide
11μ
18μ
13μ
50μ
10μ
19μ
18μ
18μ
10μ
11μ
10μ
15μ
13μ
10μ
27μ
11μ
11μ
12μ
15μ
15μ
13μ
20μ
20μ
11μ
17μ
18μ

K. Wright

7-7-97

Westal, .20 mg sample - pass 4
particles ≤1 μ wide:
11 μ ~~wide~~ long
15 μ wide - near 1 μ wide
10 μ long
10 μ long
18 μ long
10 μ
11 μ
10 μ
10 μ
13 μ
10 μ
14 μ
16 μ
10 μ
11 μ
11 μ
14 μ - near 1 μ wide
16 μ
12 μ
14 μ
13 μ
10 μ
10 μ
15 μ
18 μ
14 μ
17 μ - near 1 μ wide
12 μ
10 μ
21 μ
16 μ
15 μ
17 μ
13 μ
15 μ
20 μ
20 μ
12 μ
17 μ
11 μ - near 1 μ wide

picture 22 - normal lt[illegible]
picture 23 - messed up
picture 24 - cross - particles
object is 10 μ long,
2 μ wide
(* end of film roll 1)

ulc

Westal
4 passes complete. # = 541 >10 ≤1.

$$\frac{541}{0.20\ mg \times \frac{0.198 \times 2}{18}} = \frac{541}{0.0044} = 122954.5\ fibers/mg$$

123 fibers/µg - optical study — file saved as westal.sys.

Westal stats

N = 577
min = 10
max = 60
mean = 16.44
STD = 7.401

= 122954.5 fibers/mg

d as westal.sys.

K. Wright

7-7-97

Westal, 20mg Sample - pass 5:
particles ≤1μ wide:

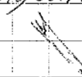
30μ long
23μ long, near 1μ wide
15μ long, near 1μ wide
18μ
12μ
27μ
30μ
10μ
10μ
11μ
10μ
12μ
11μ
17μ
11μ
13μ

30μ long
26μ long
18μ long
10μ
10μ
13μ

11μ - near 1μ ~~long~~ wide
12μ - near 1μ wide
11μ long, near 1μ wide
13μ long, near 1μ wide
11μ
25μ
19μ - near 1μ wide
12μ
12μ long, near 1μ wide
10μ
10μ - near 1μ wide
16μ
14μ
10μ

(pass 5 not yet completed) as of 7-9-97)

start roll 2 of film (taken 7-8-97)
object 27μ long, ~3μ wide
picture 1 - normal light, probably over or under exposed



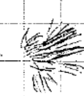
picture 2 - normal light
picture 3 - under cross-nickles
(object goes extinct ~~at once~~ all at once, not circular)

7-8-97

object 4μ wide, 17μ long
picture 4 - normal light
picture 5 - cross-nickles
(object does not go extinct all together)

7-9-97

object is 10μ wide, 13μ long, looks like fibers in a fan shape
circular extinction,
not visible enough under normal light for index of fraction



*picture 6 - under cross-nickles

K Wright 7-9-'97

Western Talc MD360A (106-53W).
Refractive liquid 1.596
sample + slide 3.72438
slide weight 3.72380
weight of sample .00056
.56mg

~~Particles <1u wide?~~
~~12u long~~
~~12u long~~
~~15u~~
~~22u~~
~~11u~~
~~10u~~
~~11u~~

7-10-'97

360A .56mg sample (con't)
Particles:
1) 29u long, 4u wide (fiber-like)
35u long, <1u wide (fiber-like)

object 36u long, 8-10u wide
mostly high-index with slash of low-index in the middle
picture 7 - normal light
picture 8 - cross-nickles

object 27u long, ~5u wide
bundle-like
picture 9 - normal light
picture 10 + 11 - shutter stayed open too long
picture 12 (rotated) - cross-nickles

object 32u long, 2-3u wide
(has dent in middle, one end splitting, high index of refraction)
picture 13 - shutter stayed open
14 - normal light
15 - cross-nickles

OM DATA

Fiber/cc raw data for one traverse.

360A 106-53 μ 0.00056g = ~~0.000~~ 0.56 mg

one traverse 0.022 × 0.56 mg = 0.0123 mg observed

L/μm	V	could be bundles	
29 μ	1080	36 × 10	$\frac{5}{.0123}$ = 406 f/mg
35	338	27 × 5	488 composite/mg
27	8096	23 × 32	
58	1450	29 × 10	
41	735	30 × 6-7	
5	750	60 × 5	
= 0.3%	12449	6/.0123	

360 B 106-53 μ 0.00032g = 0.32 mg × .022 = 0.00704 mg

	313	25 × 5	142 71 × 2	$\frac{7}{.00704}$ = 994 f/mg
32	32	1.3 × 31	117.5 29 × 9	
28	200	25 × 4	200 25 × 4	2556.8 comp/mg
38	252	56 × 3	126 28 × 3	
37	850	68 × 5	1643	
43	1400	28 × 10	16159	
39	9000	30 × 20	17802	
30	1100	22 × 10		
	17	33 × 1		.008 %
	15	30 × 1		0.8 %
	185	41 × 3		
	2520	12 × 35		
	117	26 × 3		
	158	35 × 3		
	16159			

0.21 mg 361A (106-53μ) 0.21 × 0.022 mg = 0.00462

29 4225 13 × 50

711 29 × 7 $\frac{1}{.00462}$ = 216 f/mg

28 55 × 1 0.462μg comp. 649.3/mg

4964 = 0.15388 μg 0.3 % (wt % composite)

MD 361-B (106-53) 0.00027 g = 0.27 mg 0.00594 mg obscure

413 33 × 5 0 f/mg

84 42 × 2 336.7 cm/mg

497 0.02 % (wt % composite)

360-C 0.32 mg

28 1216 38 × 8 0.32 × .022 = 0.00704

~~38~~ 74 37 × 2 $\frac{3}{.00704}$ = 426 f/mg

39 86 43 × 2

30 2520 12 × 35 1420 comp/mg

117 26 × 3

158 35 × 3

142 71 × 2 0.2 % (wt % composite)

1175 29 × 9

200 25 × 4

126 28 × 3

5814

K. Wright

-object 27µ long, nearly 1µ wide, fiber-like

-58µ long, near 1µ wide, fiber-like

-41µ long, near 1µ wide, fiber-like

24-29 7-10-'97

object 29µ long, 10µ wide (Bundle-like. index of refraction difficult to determine.)

picture 18 - diagonal below exact center

(pictures 16 + 17 shutter stayed open)

picture 19 - cross-nickles

object 30µ long, 6-7µ wide bundle-like,

picture 20 - normal light

picture 21 - cross-nickles

object 5µ wide, 60µ long

tern Talc MD 360-B (106-53µ) (1.596 liquid used)

slide + sample	3.60772
slide	3.60740
weight of sample	.00032
	.32mg

K. Wright

7-11-'97

Western Talc MD 360-B .32mg sample

matt-like assembledge of fibers?
roll 2-last picture-normal light

roll 3-picture 1-cross-nickles
25x25µ dimentions

object 1.3µ wide, 31µ long
overlying a piece of talc
pictured 2-under cross-nickles

object 25µ long, 4µ wide
picture 3-normal light
picture 4-cross-nickles

3 objects of high index, long and
thin, among large piece of talc
most prominent is 56µ long, 3µ wide,
and bundle-like
picture 5-normal light
picture 6-cross-nickles

K. Wright

Western Talc MD 360-B (continued) .32mg sample - traverse 1
<traverse 1 completed>

Western Talc MD 360-C (106-53μ)
1.596 liquid
sample + slide 3.64224
slide 3.64192
sample 0.00032 g
.32 mg

- fiber-like object, 32μ long, 1μ wide
- 28μ, <1μ fiber

- 38μ long, 8μ wide, bundle-like
  picture 22 cross-nickles
  23 normal light

- 37μ long, 2μ wide
  roll 3 picture 24 cross-nickles (maybe overexposed)
  roll 4 picture 1 cross-nickles
  picture 2 cross-nickles
  picture 3 normal light
- 43μ long, 2μ wide
  picture 4 - cross-nickles
  5 - normal light

- object 68μ long, 5μ wide
  roll 3 picture 7 cross-nickles
  roll 3 picture 8 - normal light

- object 28μ long, 10μ wide
  roll 3 picture 9 - normal light
  picture 10 - cross nickles, overexposed
  picture 11 - cross-nickles
  *possibly both high and low index present

- object 30μ long, 20μ wide, jumble
  picture 12 cross-nickles
  13 - normal light

- 22μ long, 10μ wide
  picture 14 normal light
  15 - cross nickles

- 33μ long, <1μ wide
  may have some splitting fibers
  picture 16 - normal light
  17 - cross-nickles

- 30μ long, ~~2~~ 1μ wide
  picture 18 - cross-nickles
  19 normal light

- 41μ long, 3μ wide
  20 cross-nickles (?)
  21 normal light

7-14-

traverse 1

long, 5μ wide
cross-nickles
normal light

g, 10μ wide
normal light
ss nickles overexposed
oss-nickles
hand low under

10μ wide, jumble
cross-nickles
normal light

10μ wide
normal light
cross-nickles

1μ wide
ne splitting fibers
normal light
cross-nickles

1μ wide
ross-nickles
ormal light

Tuesday

K. Wright

7-15-'97

Western Talc MD 360-C .32mg sample <continued>

· fiber-like object, 39μ long, near 1μ wide

· fiber-like object 30μ long, ≤1μ wide

· 12μ wide, 35μ long
roll 4 picture 6 - cross-nickles
7 - normal light

· 26μ long, 3μ wide
picture 8 - crossnickles
9 - normal light

· 35μ long, 3μ wide
picture 10 - cross-nickles
11 - normal light

· 71μ long, 2μ wide
picture 12 - crossnickles (faint)
13 - crossnickles (bright)
14 - normal light

· 29μ long, 9μ wide
picture 15 - cross-nickles,
16 - normal light

· 25μ long, 4μ wide
picture 17 - cross-nickles
18 - normal light

· 28μ long, 3μ wide
picture 19 cross-nickles
20 - normal light

Traverse 1 of 360-C completed

Western Talc MD ~~360~~ 361 A (106-50μ) (1.596 liquid)
~~slide + sample 3.70488~~
slide weight 3.70467
sample weight .00021g
.21mg

K. Wright 7-16

361 A .21 mg sample - traverse 1

· fiber-like piece, 29μ long, near 1μ wide

· 13μ wide, 50μ long
roll 4 - picture 21 - cross-nickles
22 - normal light

· 29μ long, 7μ wide
picture 23 - cross-nickles
24 - normal light

· 55μ long, 1μ wide
picture 25 - cross-nickles
26 - normal light
roll 5 - picture 1 - normal light

(Completed 1 traverse)

7-1[illegible]

Western Talc MD 361 - B (106-53μ)
1.596 Index liquid
weight of slide + sample 3.68223
slide 3.68200
sample .00023 g
.23 mg

Western Talc MD 361 - B (106-53μ)
1.596 index liquid
slide + sample 3.63613
slide 3.63586
sample .00027 g
.27 mg

Traverse 1

· object 33μ long, 5μ wide
roll 5 - picture 2 - normal light
4+3 - cross-nickles
(3 over exposed)

rerse 1

13 μ wide, 50μ long
114-picture 21-cross-nickles
22-normal light

29μ long, 7μ wide
picture 23-cross-nickles
24-normal light

55μ long, 1μ wide
picture 25-cross-nickles
26-normal light
115-picture 1-normal light

06-53μ)

-53μ)

ormal light
oss-nickles
er exposed)

K. Wright 7-18-'9

Talc MD 36 1-B .27mg traverse 1 continued

42μ long, 2μ wide
5 picture 5 (over or under exposed) cross-nickles
6 cross nickles
7 normal light

115 picture 8 - cross nickles
9 normal light

traverse 1 completed

~~t material 3.71501~~
~~e 3.71478~~
~~terial weight .00023 g~~
~~.23 mg~~

+ material 3.62040
e weight ~~3.64560~~ 3.62032
aterial .00008
.08 mg

traverse 1: particles ≥10μ long

object 38μ long, 1.5μ wide
roll 5 picture 10-cross-nickles
11-normal light

Fibers: (<1μ wide)
- 28μ long
- 44μ long, near 1μ wide
- 12μ long
- 12μ long
- 10μ long
- 12μ long, near 1μ wide
- 10μ long
- 23μ long, near 1μ wide
- 11μ
- 10μ
- 15μ
- 11μ near 1μ wide
- 34μ long, near 1μ wide
- 11μ
- 10μ
- 11μ
- 43μ
- 0μ

Vassil .08 mg transit: continued 7-18-97

Fibers:

- 25 μ long
- 25 μ long, near 1 μ wide
- 14 μ
- 55 μ
- 15 μ
- 15 μ
- 10 μ
- 10 μ
- 12 μ
- 13 μ
- 25 μ

- 13 μ long
- 28 μ long
- 20 μ long
- 16 μ
- 17 μ
- 10 μ
- 10 μ
- 14 μ
- 13 μ
- 18 μ
- 10 μ
- 21 μ
- 20 μ
- 13 μ - near 1 μ wide
- 11 μ
- 11 μ
- 10 μ
- 12 μ
- 18 μ, near 1 μ wide
- 33 μ long
- 20 μ
- 11 μ
- 13 μ
- 11 μ
- 15 μ
- 20 μ

20 μ long
16 μ long, near 1 μ wide
10 μ long
16 μ long
13 μ long, near 1 μ wide
18 μ
11 μ
12 μ - near 1 μ wide
13 μ long
15 μ
10 μ
13 μ
13 μ
26 μ
10 μ
13 μ
10 μ long
11 μ long
12 μ
13 μ
10 μ
11 μ
14 μ
20 μ
12 μ
10 μ
17 μ - near 1 μ wide
12 μ long
13 μ
15 μ
10 μ
12 μ
10 μ - near 1 μ wide
11 μ
13 μ
13 μ
15 μ
16 μ
11 μ - near 1 μ wide
10 μ
30 μ
12 μ
39 μ - near 1 μ wide

roll 5 - picture 12 - norm[illegible]
13 - cross-[illegible]
22 μ long, 2 μ wide

17μ long
10μ long
10μ
13μ
13μ
10μ
11μ
25μ
35μ
17μ
20μ
11μ
18μ
23μ
11μ
21μ
10μ
10μ
12μ
14μ
16μ
35μ
12μ
20μ
11μ
12μ

ree

7-21 K. Wright 1

Vansil .08mg. pass 1 continued.

Fiber-like objects ≤ 1μ wide:

(≥ 10μ long)

22μ long
10μ
10μ
19μ
12μ
20μ
11μ
35μ
13μ
10μ
10μ
16μ near 1μ wide
11μ - near 1μ wide
18μ
23μ
20μ
11μ
19μ
16μ
20μ
10μ
16μ
10μ
12μ
39μ
14μ
12μ
10μ
~~12μ~~
10μ
12μ - near 1μ wide
14μ
15μ
10μ
12μ - near 1μ wide
12μ
15μ - near 1μ wide
13μ

Vanil (Continued from pg. 51):

15μ long
11μ
19μ
10μ
12μ
20μ - near 1μ wide
15μ
14μ
17μ
15μ
16μ
15μ
~~14μ~~ 20μ
24μ
13μ
14μ
13μ
11μ
15μ
15μ
12μ
10μ
15μ
17μ
14μ
18μ
10μ
16μ - near 1μ ~~long~~ wide
15μ - near 1μ wide
12μ
12μ
20μ
13μ
10μ
11μ
13μ
18μ
17μ
19μ
18μ
20μ
25μ

7-22-'97

Vansil (continued) .08mg sample

23μ long
11μ
12μ
21μ - near 1μ wide
12μ
13μ
17μ
17μ
10μ
10μ
12μ
20μ
32μ
18μ
17μ - near 1μ wide
28μ
10μ
10μ
11μ
11μ
15μ
10μ
22μ
10μ
10μ
19μ - near 1μ wide
16μ
25μ
25μ
12μ
10μ
10μ
20μ
12μ
21μ
10μ
10μ
12μ
10μ
18μ
12 - near 1μ wide
3μ

10μ long
20μ long
13μ long

. object 31μ long, 3μ wide
roll 5 picture 14 - cross nickles
15 - normal light

nu

7-2

Vansil .08mg continued pass 1

less than 1µ wide:

18µ long
13µ long
12µ
11µ
25µ
19µ
10µ
23µ
20µ
11µ
10µ
24µ
22µ
40µ
17µ
20µ
15µ - near 1µ wide
20µ
25µ
21µ
10µ
10µ
12µ
11µ
14µ - near 1µ wide
10µ
13µ
15µ
15µ
25µ
11µ
11µ
10µ
13µ
10µ
23µ
10µ
15µ

38

7-23-19

12μ
22μ
10μ
15μ
15μ
10μ
17μ
14μ
12μ
40μ
12μ
31μ
15μ - near 1μ wide
10μ
11μ
18μ
21μ
15μ
10μ
11μ
23μ
18μ
12μ
12μ
37μ - near 1μ wide
20μ
11μ
17μ
11μ
12μ
10μ
15μ
11μ
10μ
10μ
15μ
17μ
21μ
11μ - near 1μ wide
23μ - near 1μ wide
10μ
11μ
10μ

• 4μ wide, 45μ long
roll 5 picture 16 - normal light
17 - cross-nickles

7-2?

16µ
14µ
31µ
26µ
16µ
10µ
18µ
19µ
11µ
28µ
20µ - near hemside
14µ
10µ
20µ
14µ
12µ
11µ
11µ
~~15~~
11µ
25µ

— Vansil .08mg sample pass 1 completed —

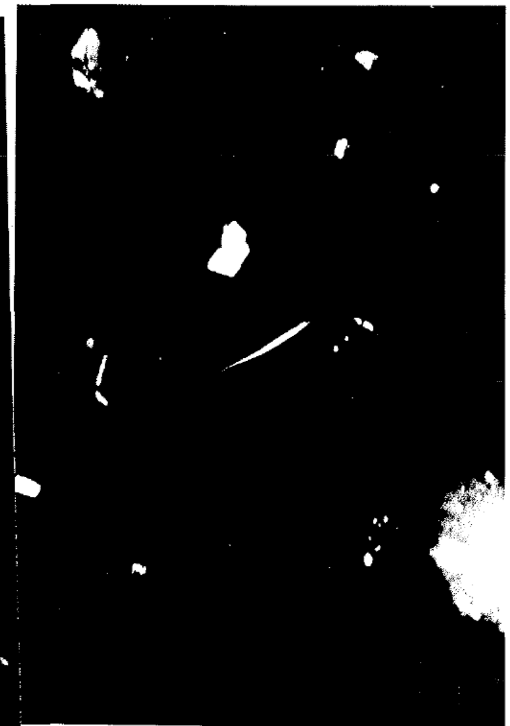
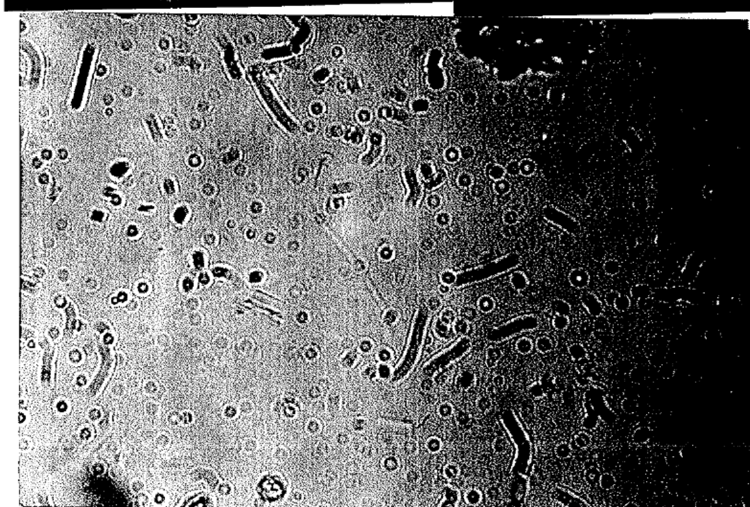
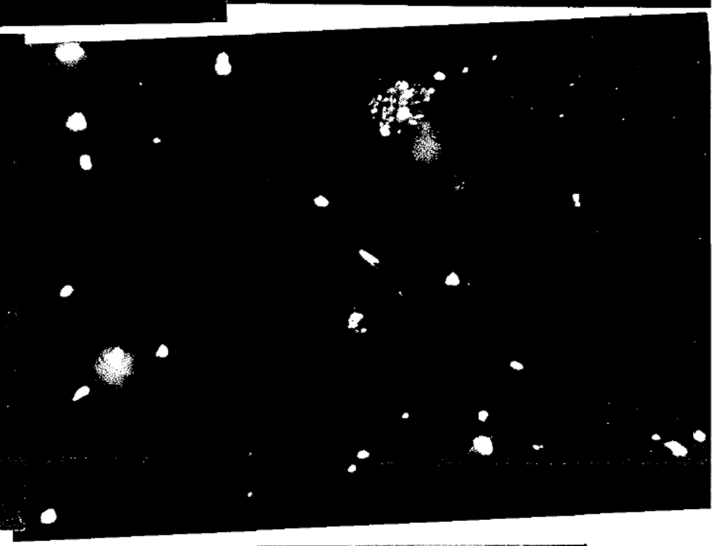
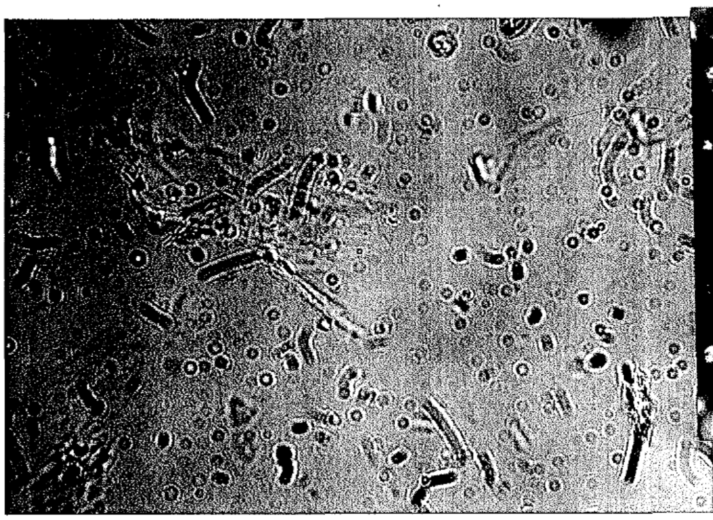
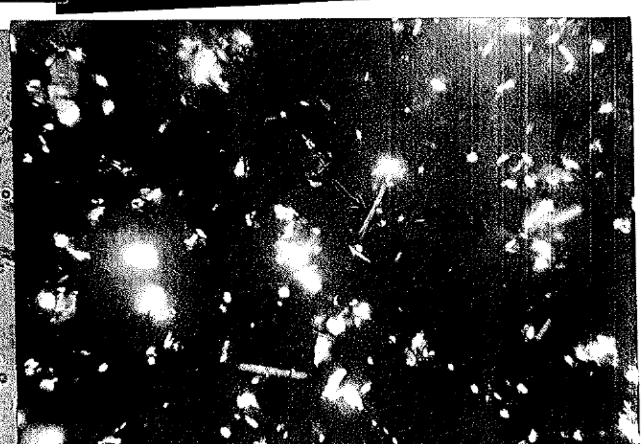
349 ~~331~~ cases

	length (µm)
min	10
max	55
mean	15.67
SD	6.7
ST Error of mean	0.36
median	13

one pass = .022 x total area
= .022 x Total mass on slide
= .022 x .08 mg = .00176 mg observed

$\frac{349}{1.76 \mu g}$ = $\boxed{198 \text{ fibers}/\mu g}$



MD 361-B 0.27mg
42x2

361-B 0.27mg
33x5um

MD 361-B 0.27mg
42x2

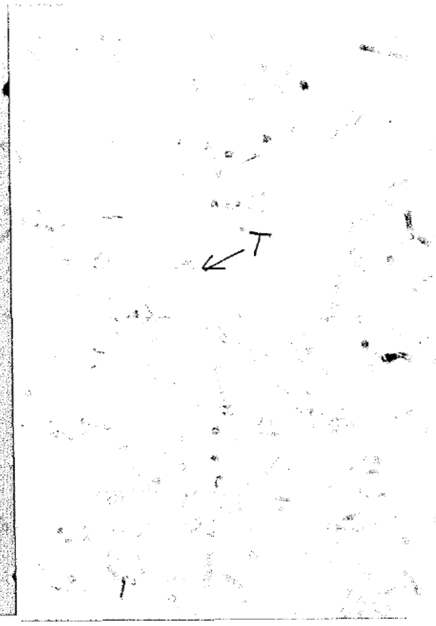
MD 361-B 0.27mg
42x2

MD 361-B 0.27mg
42x2

7-3-1997
Notebook pg. 31
Westal
Picture 21

22um

33x5
361-B 0.27mg
33x5um


T

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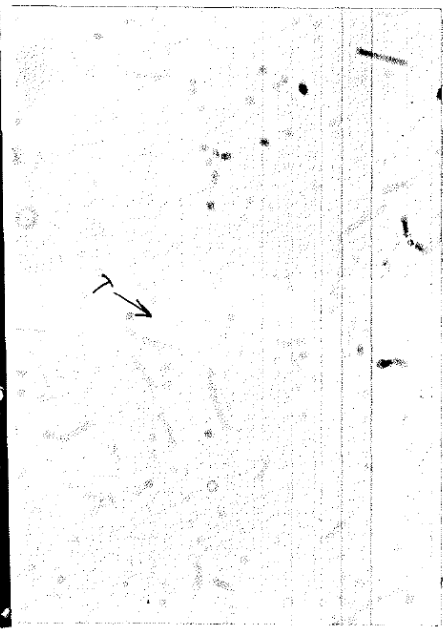
T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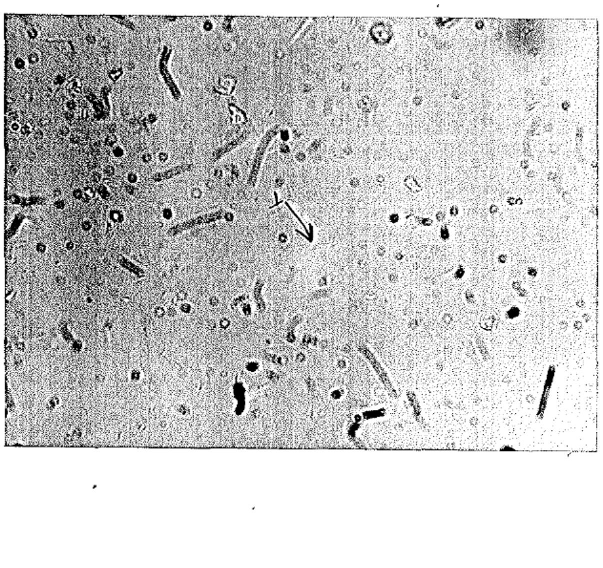
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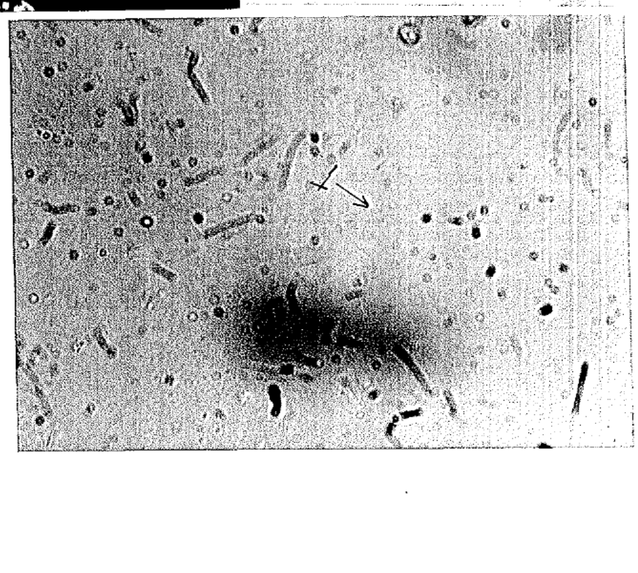

T

7-2-1997
Notebook pg. 31
Westal
Picture 19
30µm

070797 000 NNNN 14.

7-2-1997
Notebook pg. 31
Westal
Picture 18
30µm

070797 000 NNNN 13.

7-7-1997
Notebook pg. 35
Westal
Picture 22
10µm

7-2-1997
Notebook pg. 29
Westal
picture 17
26µm

070797 000 NNNN 10.

6-19-1997 page 11
Westal
Picture 6

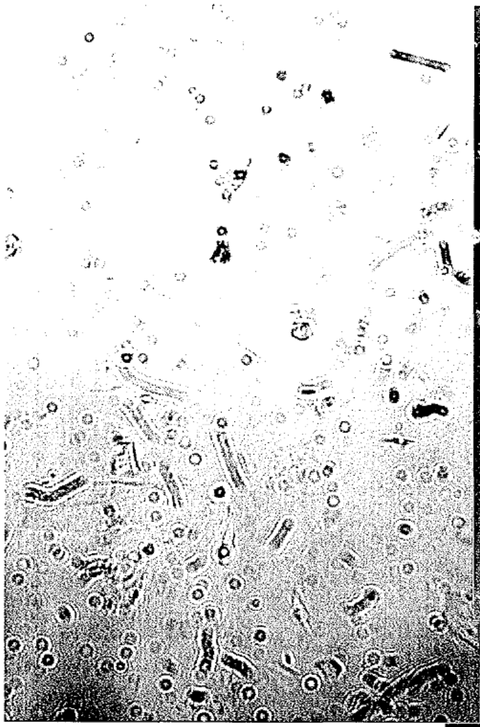
7-3-1997
Notebook pg. 31
Westal
Picture 20
37µm

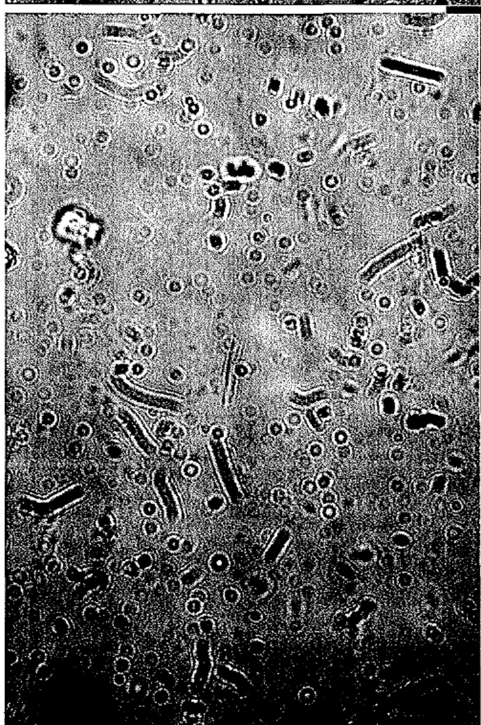
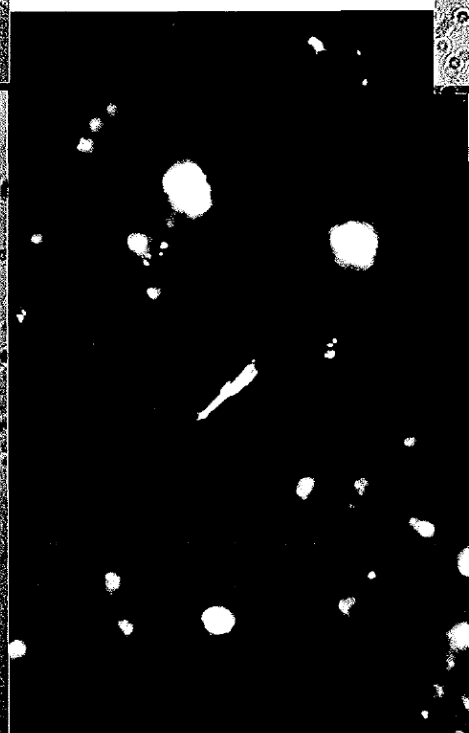
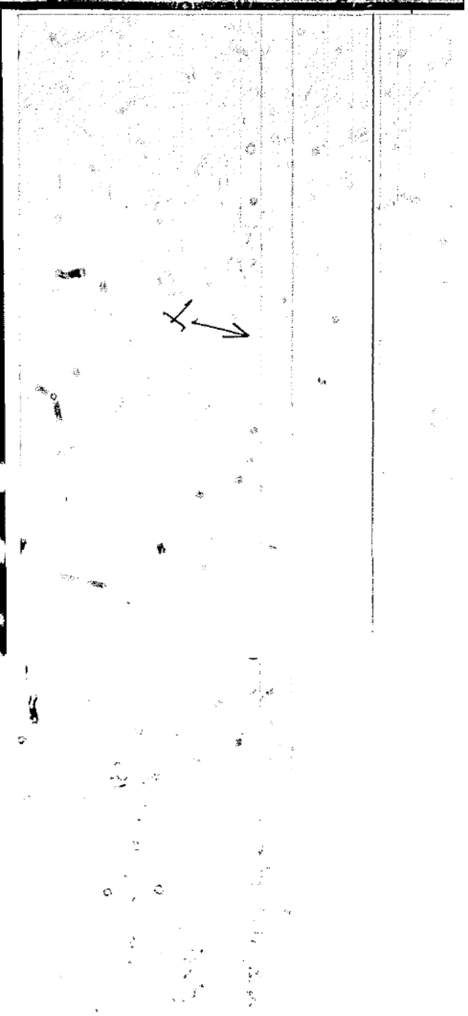
070797 000 NNNN 15.

7-2-1997
Notebook pg. 29
Westal
picture 11
26µm

7-2-1997
Notebook pg. 29
Westal
picture 17
26µm

070797 000 NNNN 11.




27 X 3

Westal

0.2mg sample

361A 0.21
55 x 1
also on roll 4.

Vanil
38 x 1.5 um
0.08mg

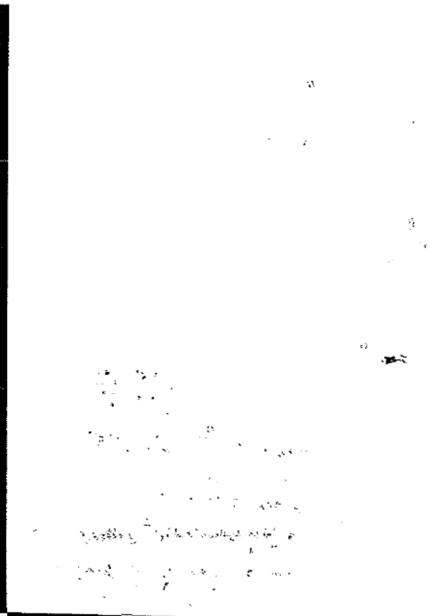
6-27-1991
Notebook pg. 13
Western Talc MD 360 A
Picture 7

22 X 2 u
Vanil
0.08mg

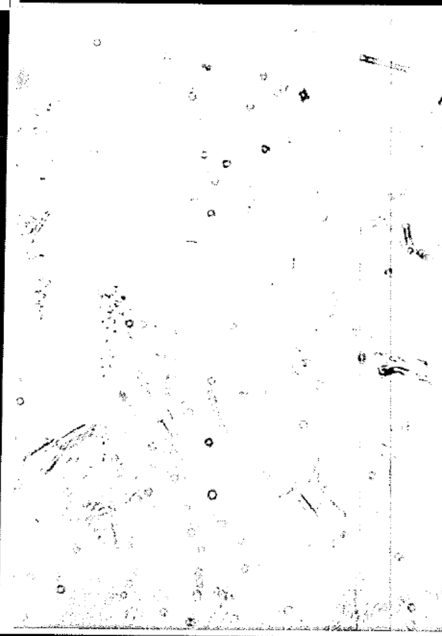
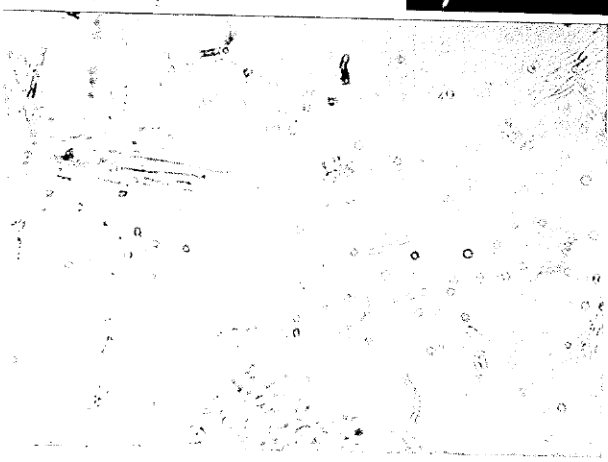
22 X 2 Vanil
0.08mg

30 x 1 um
360-C (106-53)
0.32mg sample

33 X 1 um
360-C (106-53 u)
0.32mg sample




360A 0.56 mg
29 X10 μ

29 X 10 μ
360 A - 0.56 mg
sample

30 X 6-7 μ
360 A 0.56 mg

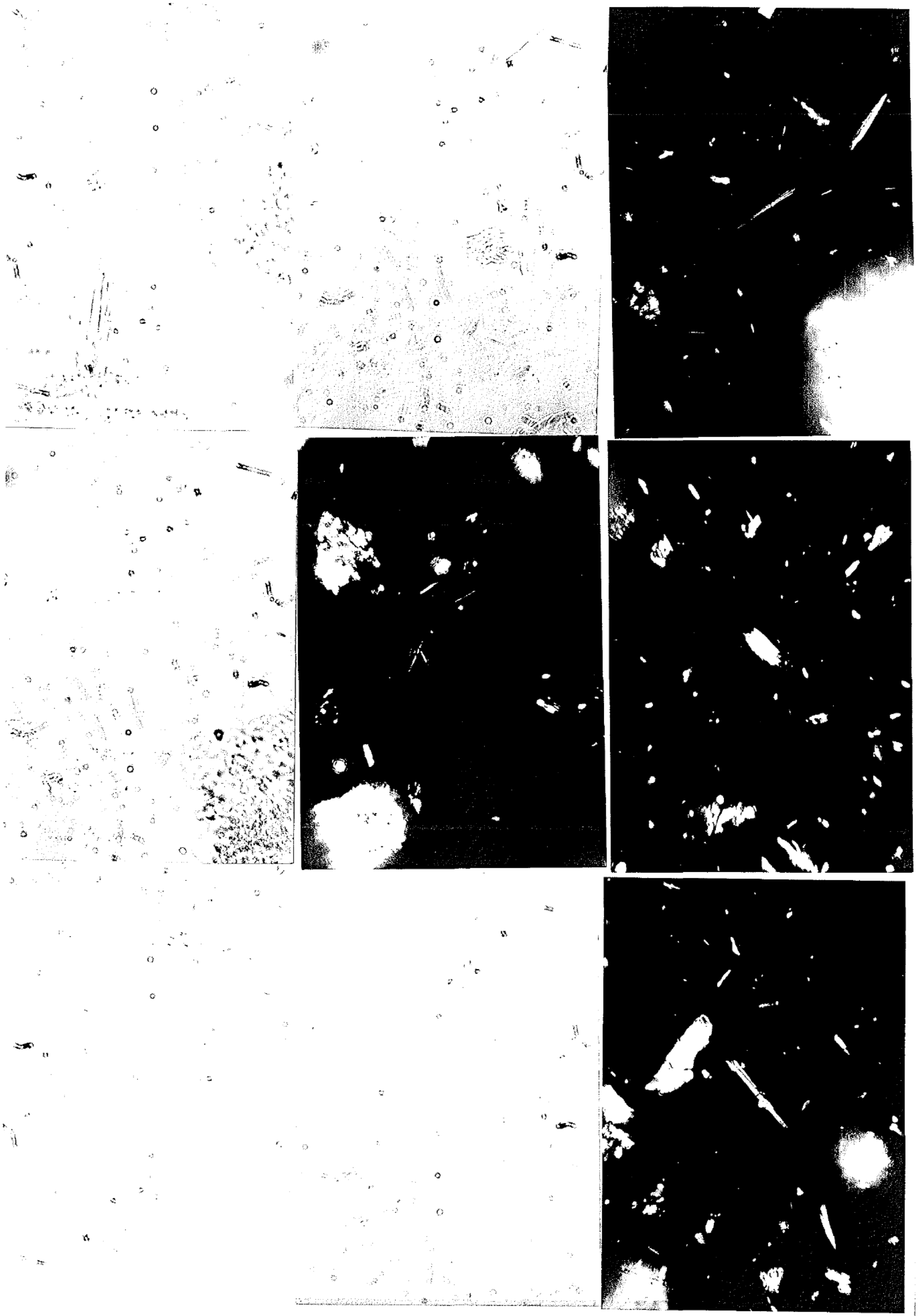
32 X 2-3 μ
360-A 0.56mg
sample

36 μ X 8-10
360 A 0.56 sample

31 X 1.3 μ
360 B 0.32mg

22 X10
360-C (106-53)
0.32mg

22 X10 μ
360-C
0.32 mg sample



Western talc
360-C
37 x 2 µm

Western talc
360-C
32 x 2

360-C 0.32 mg
29 x 9

29 x 9
360-C 0.32 mg

25 x 5 ?
360-B 0.32 sample

41 x 3 µ
360-C (106-53)
0.32 mg sample

41 x 3 µ
360-C (106-53)
0.32 mg sample

30 x 1 µm
360-C (106-53)
0.32 mg sample

29 x 10 µ
360 A
0.56 mg sample








~~25 x 4 um~~
71 x 2

360-C 0.32mg Sample

37 x 2 u
360-C 0.32 mg
Sample
picture 2

~~11 x 3~~
71 x 2
360-C .32 sample

360-C 0.32mg
Sample
37 ~~43~~ x 2um
picture 1

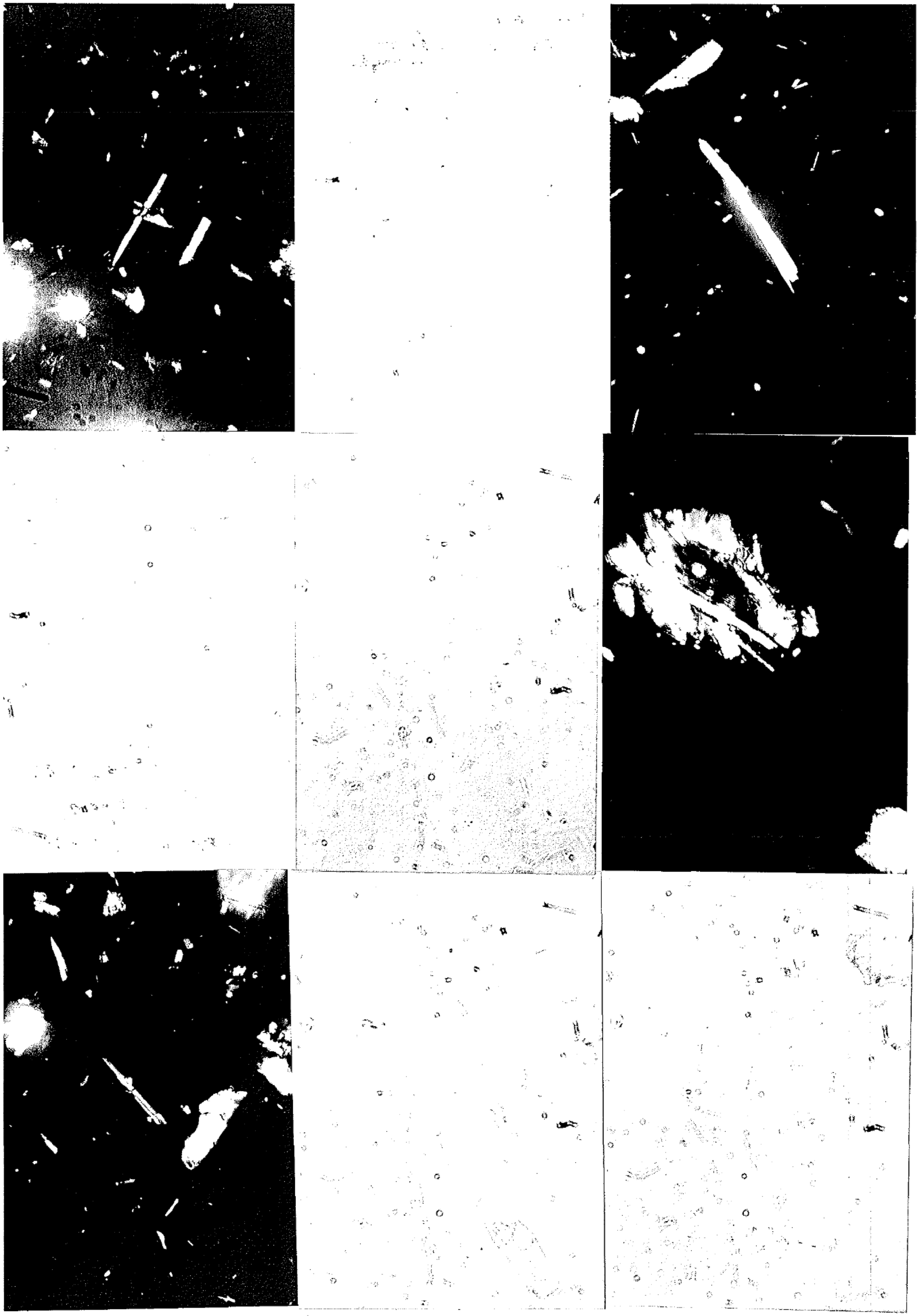
360-C 0.32 mg
~~29 x 9~~
35 x 3

26 x 3 um
360-C 0.32mg

37 x 2 u
360-C (106-53)
0.32 mg sample

25 x 4 u
360-B 0.32mg sample

25 x 4 u
360-B 0.32mg
sample



43 X 2 u
360-C 0.32 mg sample

71 X 2
360-C 0.32 mg Sample

Asbestos talc
360-C
37 X 2

Tremolite in (on?)
Talc
Largest is 56 x 3 um
360-B 0.32 mg sample

38 x 8 u
360-C (106-53)
0.32 mg sample

360-C (106-53)
68 x 5 μm
0.32 mg sample

360-C 106-53
0.32 mg
68 x 5 u

Tremolite in
Talc
Largest is 56 x 3 μ
360-B .32 mg sample

43 x 2 μm
360-C 0.32 mg Sample

38 x 1.5
Vansel

4x17µ
10x13
Walker

0.00008
0.08mg

0.1mg
Example

361A 0.21mg 1 Raven
2/4 lon, 1 anwide

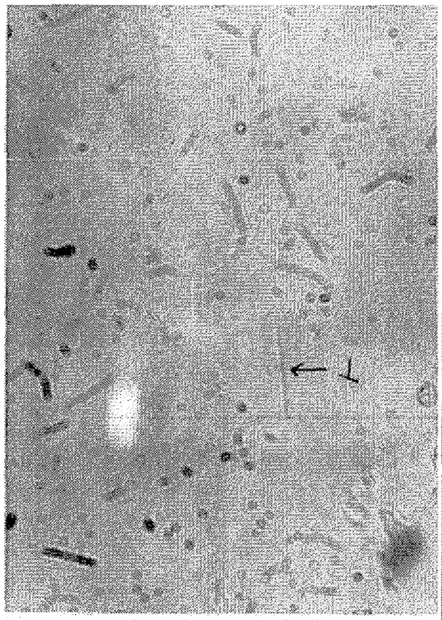
6-21-1991
Metrobook p9 [illegible]
10% lot
portraits

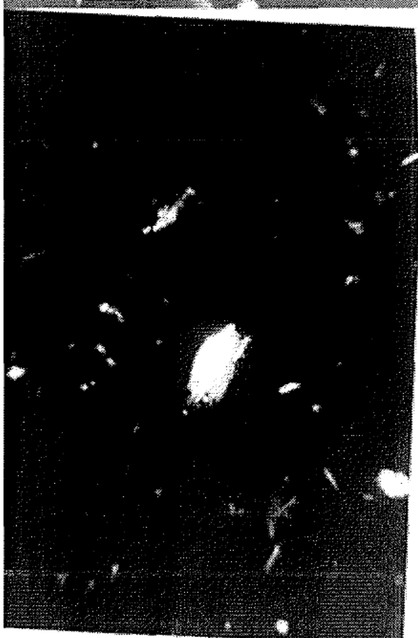
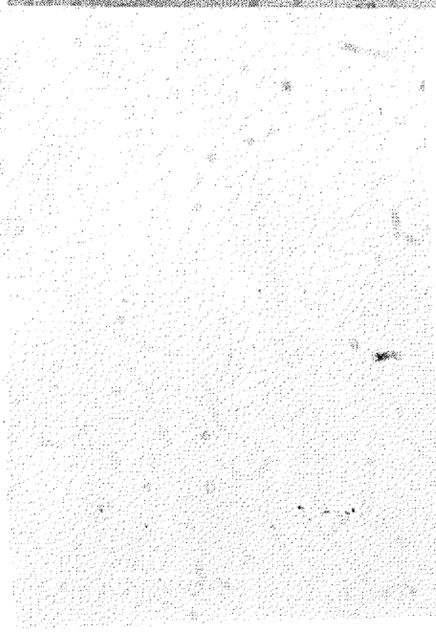
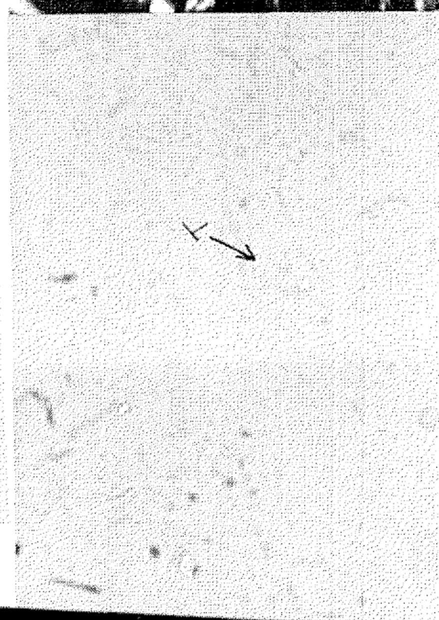
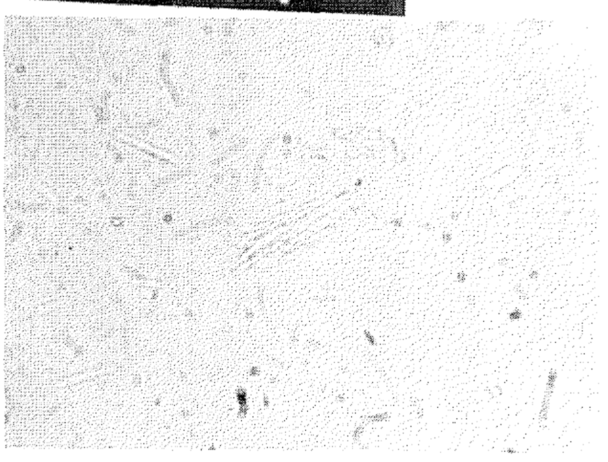
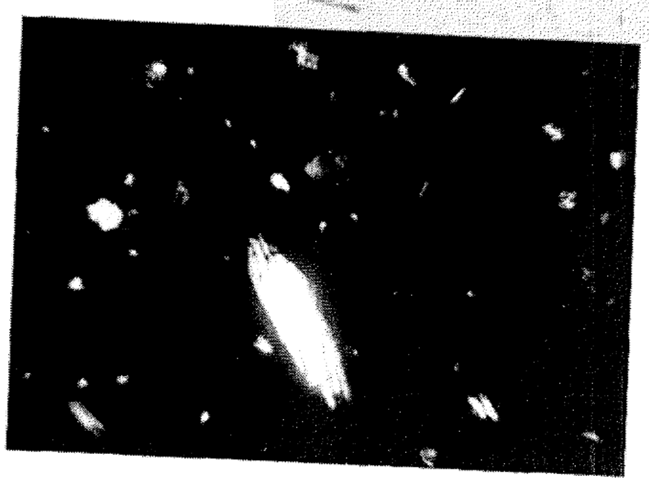
6-24-1991
Metrobook p9 13
Western Tele [illegible]
Pictures

361-B 0.27
33 x 5 µm

MD 361-B 0.27mg
42 x 2

30 x 6.7 µ
360-A 0.5mg

~~Tremolite in tale~~
~~not prominent is~~
~~56 x 3 μ~~

360-C 0.32mg

28 x 10 μ

~~Tremolite in talc~~
~~not prominent is~~
~~56 x 3 μ~~

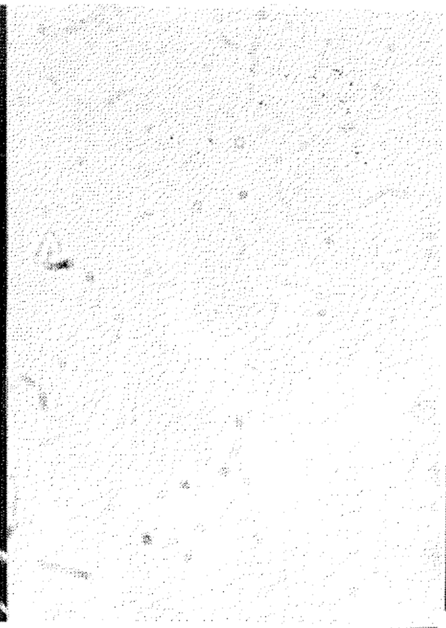
360-C 0.32mg

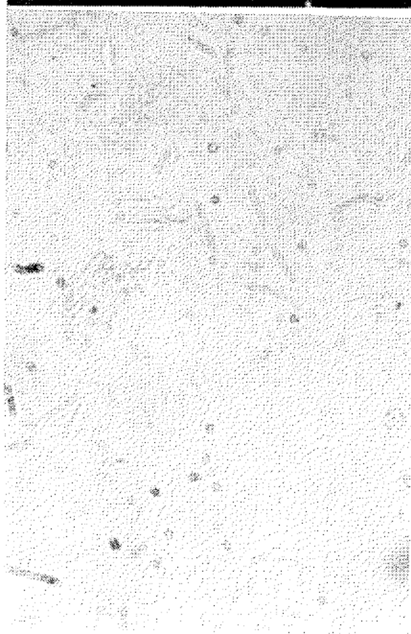
28 x 10

12 x 35 μ
360-C 0.32mg sample

Vansil 0.03mg
31 x 3 μ

361A
0 fibers
5.5μ long 1μ wide





360 A 0.50 mg sample

~~30 x 6~~ 24 x 10 u

30 x 20 u

360-c 0.32mg

0.56 mg sample

27 x 10 u

~~28 x 10~~

30 x 20

360-C 0.32mg

360-A 0.50 mg sample

~~30 x 6~~ 24 x 10 u

36 x 8-10 u

360A 0.56 mg

Sept 30

360-A 150-104 μ Tremolite very abundant >50%
fibrous talc
photo 1 - tremolite "bundle?" plain light 180 μm or larger
photo 2 - " " crossed nicols 50x obj
3 tremolite showing splintery cleavage 50X
4 " "
5. 1 again
6. 2 again
7. " "
8. intergrowth of tremolite + talc (~70/30)

360-B 105-104
9. large tremolite - talc forming ∥ c axis pl lt. 16X

estimate trem % ~10% most blocky, some ragged. fiber v. rare

10 50x possible f.b. X'd nicols
11. " "

360-C 105-104
25% tremolite? - blocky. ragged fiber - rare - elong. c.f.? common

12  fb' tremolite

361-A 105-104
no fb - trem. ~20% more unaltered than in 360?

361-B very little tremolite ~<5%

360-A 150-104
13. Tremolite 16X
14 " 50X
15. tremolite matt in talc 16X
16 50x plain lt
17 Tr + Ta Cont 50X X'd
18 " 50x pl
19.
20, 21 Tr + talc 50X, Xd nicols

Ekeenan9@rocketmail.com - afternoons   MW 10-12 TuTh - 11-2

RT Vanderbilt - Flotation Samples

MO365 Feed

936 Tailings + concentrate

Tailings - tremolite abundant
fibrous talc present but not abundant
some carbonate
talc containing tremolite also found

effective at removal of tremolite - not much removal of f talc

Concentrate - smaller grain size
fibrous talc very common - perhaps at a higher concentration than tailings.

902 - tailings + concentrate

Concentrate - ~~much~~ coarser than 936
- some fibrous talc, probably less

Tailings - seems to contain more FT than 936

911 - least fiber talc?

Relook:
all no tremolite but all contain trace
all fibrous talc -

Report of Investigations
Studies of Industrial Talc

January 26, 1998

BACKGROUND

In late April, 1997, I received five samples from Mr. John Kelse, R.T. Vanderbilt Company. . The samples were labeled MD-360-A, MD-360-B, MD-360-C, MD-361-A, and MD-361-B. For each sample there were two size fractions: *as received* and *Bico ground*. I was told samples labeled 360 were taken from outcrop and those labeled 361 were from ore stockpiles from talc deposits in California that were owned by R.T. Vanderbilt. The letter accompanying the samples requested that the samples be analyzed for the presence of asbestos. In addition, I had at some time earlier received two samples from Dr. C.S. Thompson that were reported to have come from Western Talc holdings of R.T. Vanderbilt in California, although their exact location is not known. These were labeled Westal 003 and Vansil Mg 6.30.70 (hereafter referred to as Westal and Vansil respectively). After a phone conversation with Mr. Kelse and Dr. Thompson, it was agreed that these two samples should be included in the analysis.

METHOD OF ANALYSIS

Samples

The five core samples labeled *as received* were sieved into three size fractions: 53-106 μm and 106-150 μm for examination by optical microscopy, and > 150-300 μm for examination by binocular microscopy. The *Bico ground* portion of the samples and the Westal and Vansil samples were examined as received by electron microscopy. Westal and Vansil were also examined by optical microscopy.

Microscopy

A few tenths of a milligram of material from each of the 53-106 μm size fraction of the core samples and from the Westal and Vansil samples as received were placed on glass slides. The weight of material was determined by difference. Each sample was then mixed with a drop or two of immersion oil of index of refraction 1.596, dispersed by stirring, and covered with a 15 mm cover slip. The preparations were first examined at low magnification to ensure a uniform distribution of material. The preparations were then either examined at approximately 500 X by using a 50 X objective with a numerical aperture of 0.85 and 10 X eyepieces (Westal and Vansil samples), or at 160 X by using a 16 X objective (drill cores). The limit of resolution of the 50 X objective is about 0.3 μm, but fibers with widths as small as 0.1 μm may be visible provided their index of refraction differs sufficiently from the oil. For the 16 X objective, the limit of resolution is about 0.5 μm. The limit of visibility is not known, but it is less than 0.5 μm. The preparations were scanned over a known area, and the lengths all fibers of amphibole (all n > 1.598) which were greater than 10 μm in length and had widths less than 1.0 μm were recorded. Throughout this report, particles with these dimensions are referred to as *fibers*. However, *fibers* are not

EXHIBIT
7-B Wylie
SH 9-18-09

necessarily particles that have attained their shape by growth (true mineral fibers); they may be cleavage fragments. The number of *fibers* of amphibole /microgram was calculated. In addition, all particles that appeared to be composed of groups of *fibers* were described, labeled as *composite particles*, and photographed. Approximately 1 mg of core sample in the size range 106-150 µm was dispersed in immersion oil with index of refraction of 1.600 and covered with a 2-cm cover slip. The entire preparation was scanned by using a 16 X objective. The general mineralogy of the samples and the relative abundances of tremolite were estimated from these observations. The morphology of the particles were examined with special respect to the presence or absence of bundles of tremolite fibers. Photographs were taken of representative particles. About a gram of material in the 150-300 µm size range was dispersed on a glass dish and examined with a binocular microscope for morphology.

Scanning Electron Microscopy;

Approximately 0.5 mg of material from Bico Ground portion of core samples and of Westal and Vansil were weighed and dispersed in distilled water with a small amount of soap. The mixture was sonicated for 5 minutes and filtered on to 0.1 µm Nucleopore filters. The preparation was flushed with water three times to remove all soap. The filters were dried and prepared for SEM examination. The preparations were scanned at 2500 X on a Scanning Electron Microscope equipped for Energy Dispersive X-ray Analysis. All particles meeting the criteria longer than 10 µm with width less than or equal to 1 µm (i.e., *fibers*) were examined by EDXA. A fiber was identified as tremolite only if the only abundant elements found were Si, Mg, and Ca in that order of abundance The number of tremolite *fibers*/ microgram was calculated by assuming that the mass of sample was distributed evenly over the filter, and therefore, area was proportional to mass. Photographs were taken of particles that appeared to be composite.

RESULTS

Mineralogy

The samples are composed of the minerals (in general order of increasing abundance) carbonate, tremolite, and talc. The proportion of tremolite in the core samples is highly variable. 360-A contains the highest percentage of tremolite, perhaps 30-40%. Sample 351-B contains the least, with less than 5% of the sample composed of tremolite. 360-C, 361-A and 360-A contain about 15-20% tremolite. These are visual estimates and should be used only to compare samples to each other. The morphologies of tremolite and talc are given below. Since it was not possible to distinguish obvious differences in morphology among the samples, they will be treated as a group of samples in the following description unless otherwise noted.

Talc: The talc is generally fine grained although a few coarse particles were present in most samples. Fibrous talc was found in all samples although in small amounts.

Tremolite: Tremolite varies widely in morphology. Most of the tremolite particles are prismatic to acicular. Blocky, equidimensional particles of tremolite are also present in all samples. They are especially characteristic of the largest tremolite particles. Particles with aspect ratios of 10:1 are common. (The morphology of this tremolite differs substantially from the tremolite in the New York State Gouvernor Talc District where blocky cleavage fragment is tremolite's most common form.) Much of the tremolite shows alteration to talc proceeding along planes parallel to the c-axis. In some cases this alteration has progressed to the point that the particles appear to be composite bundles of talc and tremolite fibers. Tremolite also occurs as acicular particles enclosed within talc plates. These tremolite particles have their c-axes parallel to the sheets of the Si-O tetrahedra in talc, but within this plane, they are not necessarily parallel to each other. There were a few particles that appeared to be asbestiform bundles of tremolite *fibers*. They showed splayed ends and an extinction pattern characteristic of fiber bundles. However, asbestiform tremolite is rare in all samples. None was observed in the examinationof the coarsest portion (150-300 μm) by binocular microscopy. Measurements obtained in the SEM portion of the study suggest that these bundles are composed of individual *fibers* that have widths equal to or greater than 0.4 μm. (see data below)

Size distribution of tremolite fibers

By optical microscopy, two samples were studied in sufficient detail to provide length distributions of optically visible fibers. These were Westal and Vansil. The statistics describing the length distribution are given below:

a. Table I. Size distribution of amphibole *fibers* as established by optical microscopy. (5ck)

	Westal	Vansil
number of *fibers*	577	349
min length (μm)	10	10
max length (μm)	60	55
mean length (μm)	16	16
S.D.	7.4	6.7
median length (μm)	13	13

Seventy-three *fibers* of tremolite were measured by SEM. The following statistics describe the size distribution:

b. Table II. Size distribution of tremolite *fibers* as established by SEM. The data below include *fibers* from all samples.

	Length (μm)	Width (μm)
min	6.7	0.38
max	23.08	1.15
mean	17.76	0.81
s.d	26.06	0.17
median	13.46	0.77

The concentration of *fiber* of amphibole/microgram as established by Optical Microscopy and of *fibers* of tremolite/microgram as established by SEM are given below:

c. Table III Concentration of *fibers*. All data are given in *fibers*/microgram.

Sample	Optical Microscopy *Fibers*/microgram	SEM *Fibers*/microgram
Westal	123	44
Vansil	198	147
MD360-A	-	21
MD360-B	-	29
MD360-C	-	79
MD361-A	-	<7[1]
MD361-B	-	191, 84

No data
10X objecti

The data above can be compared to similar data for FD14. Previous work on this material by C. Skinner and myself results in estimates of about 35 *fibers*/microgram of particles >10 and <1 µm in size. FD14 does not contain tremolite-asbestos so these *fibers* are cleavage fragments.

The percentage of sample by weight that the *fibers* of tremolite represent could not be measured directly. However, it can be approximated in two ways. First, the mass of the *fibers* in one microgram can be estimated from the SEM data by assuming width = thickness (unmeasured third dimension). Second, the mass of the potential composite particles can be estimated from the optical data by assuming width = ½ thickness. The relationship between thickness and width is based on the general observation that particle shape asymmetry increases with size. Composite particles include tremolite *fibers* encased in talc plates, bundles of small tremolite crystals that may or may not be asbestos and asbestiform *fiber* bundles. The % composite particles should be considered an upper limit on the amount of asbestiform *fiber* present rather than an estimate of its

[1]None was observed. This is the detection limit for this experiment.

actual abundance.

Table IV. Weight percent *fiber* (SEM data) and composite particles (OM data)

Sample	% *fiber* (SEM)	%Composite Particles (OM)
Westal	<0.1	-
Vansil	0.5	-
MD360-A	<0.1	0.3
MD 360-B	<0.1	0.8
MD360-C	0.2	0.2
MD361-A	<0.01[2]	0.3
MD 360-B	0.3	0.02

not observed 50x

CONCLUSIONS

. The tremolite that is present in the samples I studied occurs in a variety of habits that range from blocky to asbestiform. As used in this report, asbestiform refers to particles that appear to be composed of separate *fibers* that occur in bundles. The asbestiform *fiber* in these samples differs from commercial asbestos in that there does not appear to be *fiber* present that has widths less that 0.38 μm, and the median and average width of the *fiber* is about 0.8 μm, much wider than most asbestos. Amosite, crocidolite, chrysotile and tremolite-actinolite asbestos that have been mined commercially or designated as asbestos based on properties that are evident in hand sample, contain fiber with significantly narrow width. For example, in two samples of actinolite asbestos that I have measured by SEM 70% of the fibers longer than 5 μm in one and 90% of the fibers longer than 5 μm in the other had widths < 0.5 μm. In South African crocidolite 85% of the fibers longer than 5 μm as measured by SEM have widths less than 0.5 μm, and even South African amosite, noted for its wide widths, has a median width (SEM) of fibers longer than 5 μm less than 0.5 μm. Larger widths tend to make fibers brittle, and the tremolite fibers in these samples are probably easily broken during comminution.

The percentage of *fiber* as defined in this study is in all cases less than 1% and in more

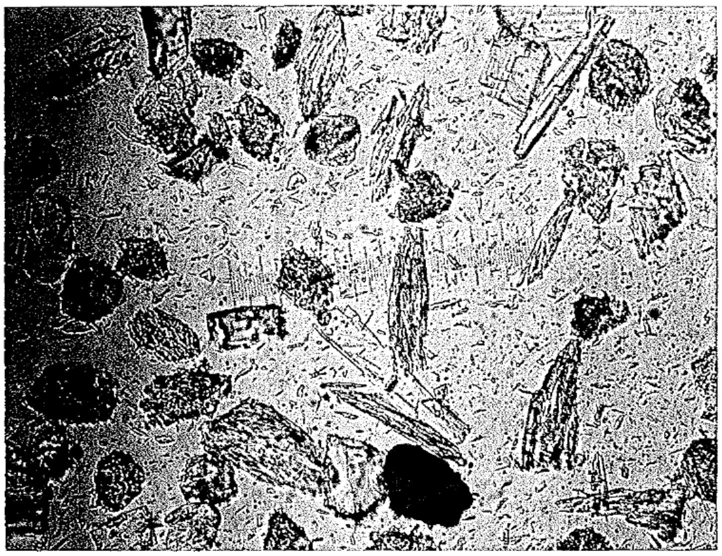
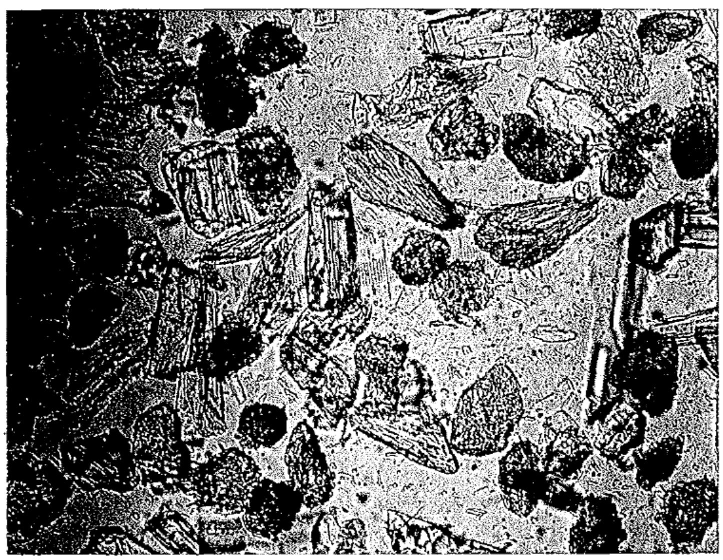
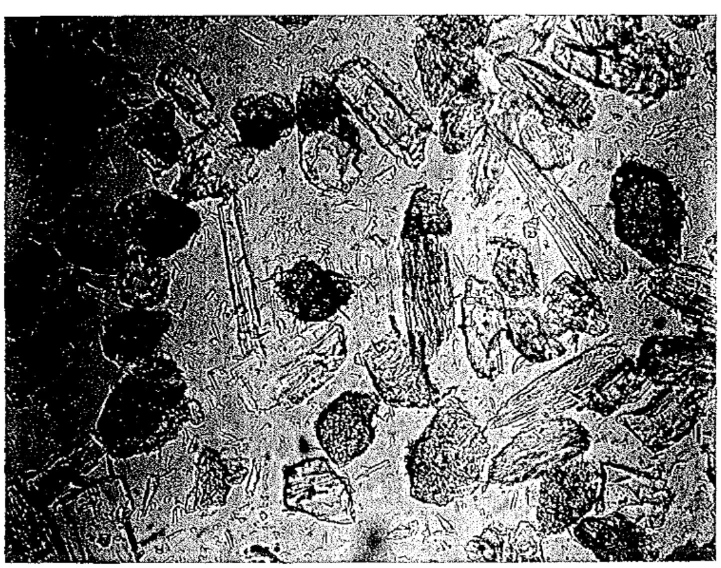
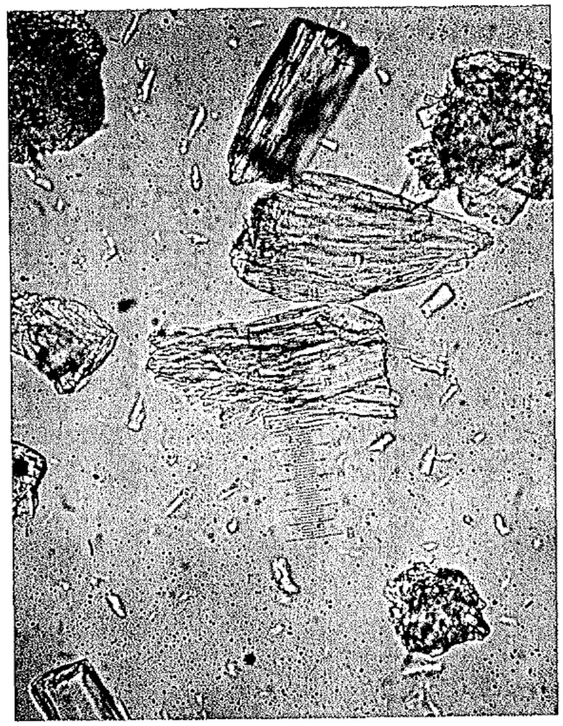
---

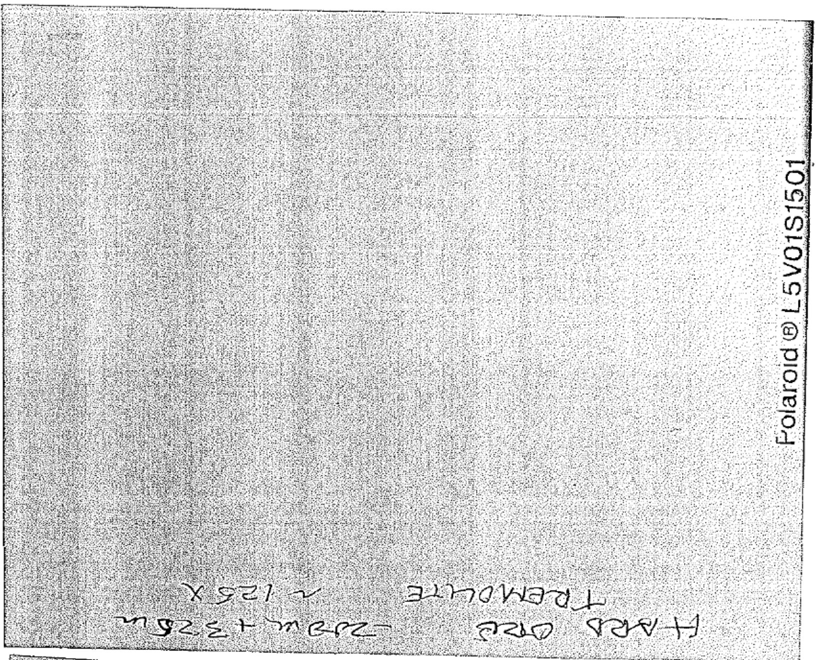
[2]Less the limit of detection.

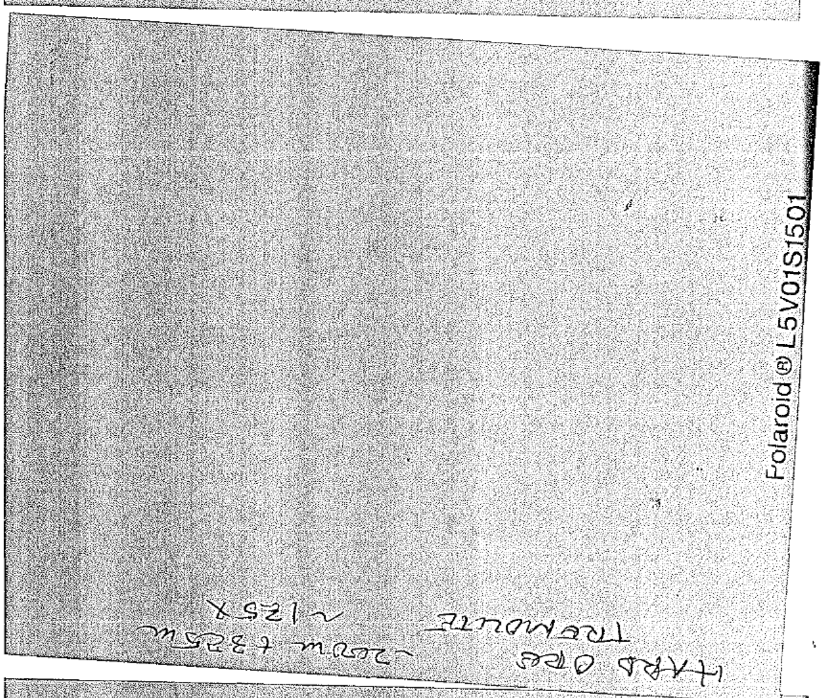
than half of the samples, it is less than 0.1%. Some of this *fiber* is probably cleavage fragment since FD14 in which there is no asbestiform tremolite contains tremolite cleavage fragment of these dimensions. Whatever it origin, the *fiber* is a trace component of the seven samples I examined.

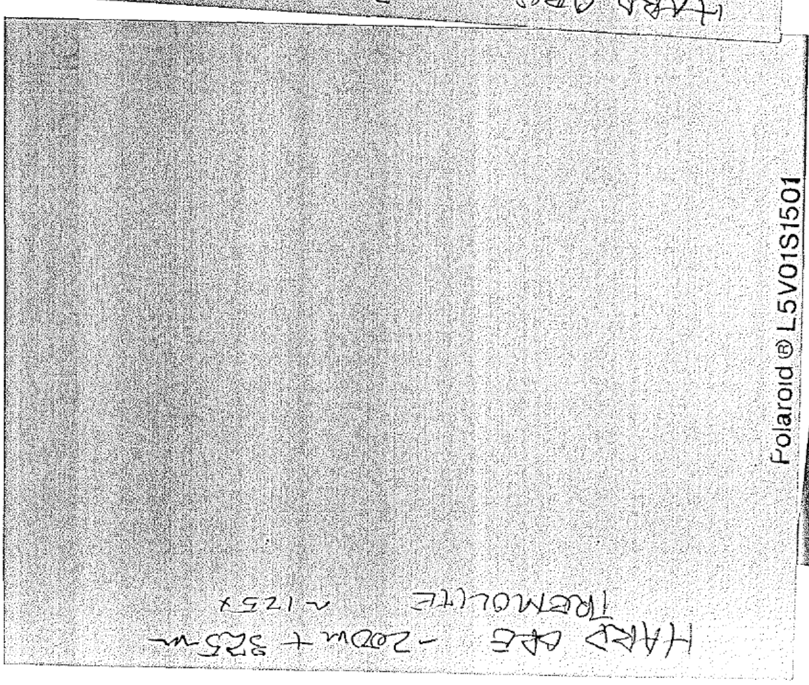
Ann G. Wylie, PhD Jan. 26, 1998

Ann G. Wylie, PhD Date



Polaroid ® L5V01S1501
HARD ORE -200u+325u
TREMOLITE ~125X


Polaroid ® L5V01S1501
HARD ORE -200u +325u
TREMOLITE ~125X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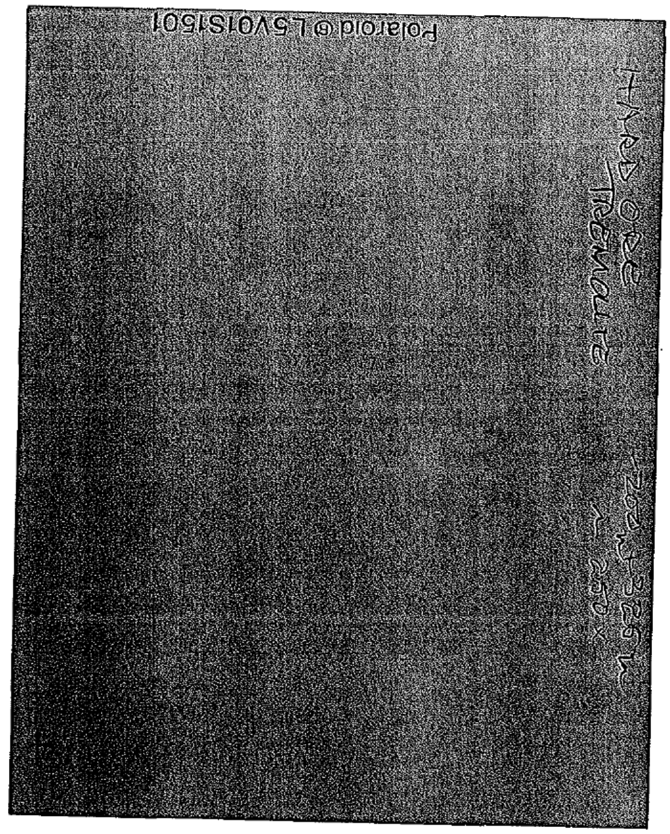
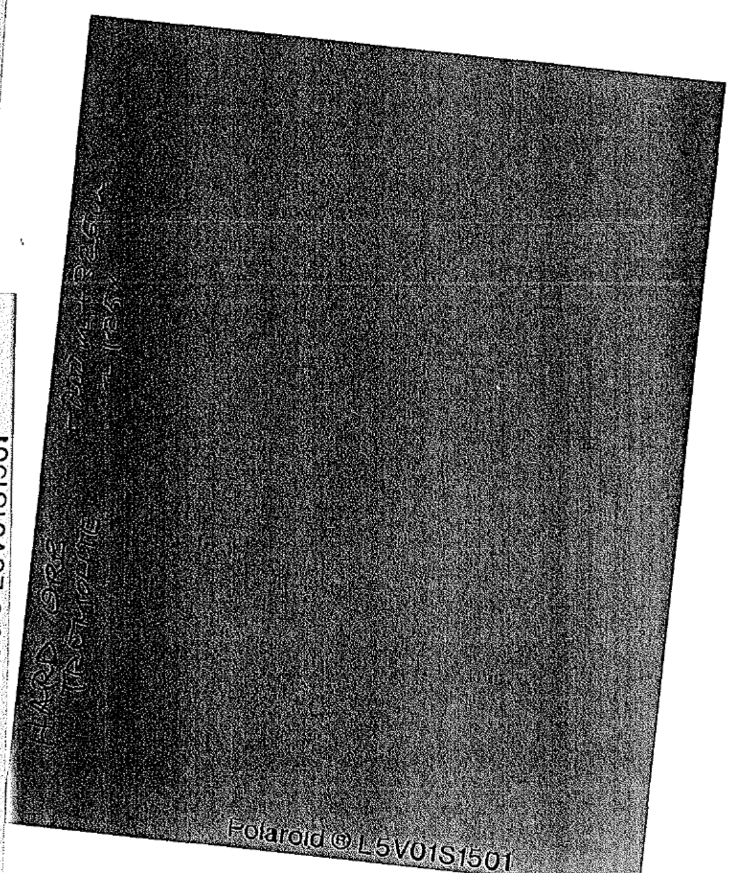
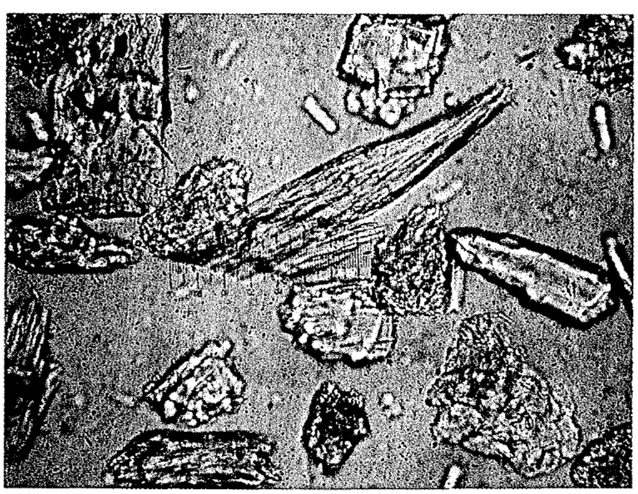
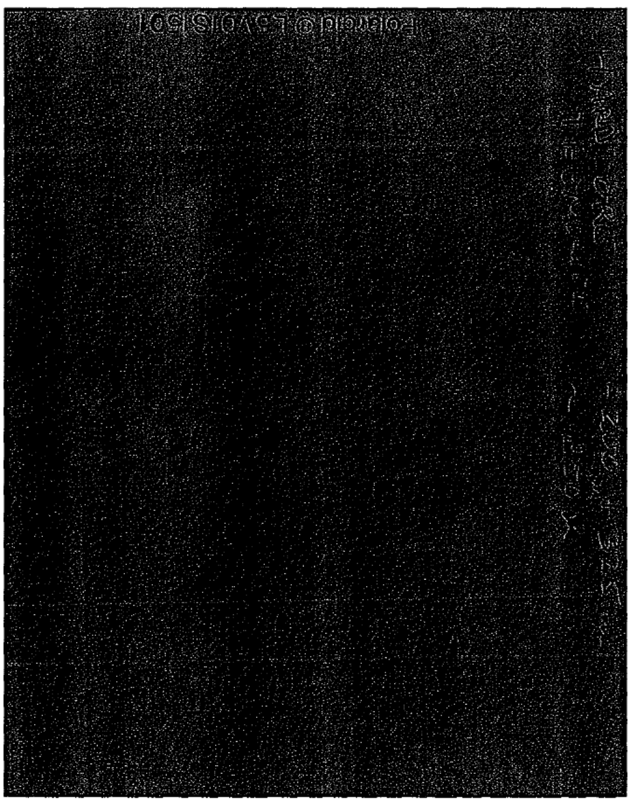
HARD ORE -200u + 325u
TREMOLITE ~125X


Polaroid ® L5V01S1501
HARD ORE -200u+325u
TREMOLITE ~250X


Polaroid ® L5V01S1501





R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS
30 WINFIELD STREET, P.O. BOX 5150. NORWALK, CONNECTICUT 06856-5150 • (203) 853-1400
Fax (203) 853-1452 • Internet Address: www.rtvanderbilt.com

November 10, 1997

Ann G. Wylie, Ph.D.
University of Maryland
Dept. of Geology
College Park, MD 20742

Dear Ann:

Enclosed please find the Western Talc tremolite concentrate we discussed along with a couple low magnification photos Slim took of this sample (pre-ground). Slim feels the "bundles" reflected are similar to those reflected in your photomicrographs. If so, this concentrate might more easily be used to explore the "brittleness" issue if it is felt that is worth pursuing.

The width issue would appear of greater significance. This will be further discussed on the 20th.

As always, your assistance on these matters is very much appreciated. Looking forward to seeing you on the 20th.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John W. Kelse
Corporate Industrial Hygienist
Manager, Corporate Risk Management

JWK/sk
enclosure
cc: C. S. Thompson, Ph.D.
D. M. Race, Esq.

EXHIBIT
#8 (Wylie)
JH 9-18-09

20

Photo #1 Feb 5, 1990
VANSIL MG
6·30·70
similar to westal 003. Contains a few percent tremolite - very acicular fibers - needles. AR > 20:1 common. No bundles observed. W < 1 µm l > 10 common.

Cyprus Minerals

Paramount - carbonate 2-5%
no tremolite detected - 1 mount

C-300 - carbonate
no tremolite detected - 1 mount

Talc Cth -

allamoo
Whittake
amphi

l
SiO_2
Al_2O_3
FeO
TiO_2
CaO
MgO
Na_2O
K_2O
F
Cl

assume H_2O = 2.

~~Oxygen = 23~~
Recalc

1/6/90 R.T. Vanderbilt

Westal 003

1.600
tremolite? - α ~1.600
elongated >1.600 <1.600 ?

anthophyllite α<1.600

Carbonate -

~~fine fract~~

1-26/90

1.600 photo #15 (filtering 16 on p.18)
Rz/PR tremolite w=1.5 l=30 50X T=312 (rolled) possibly crossed

filtered for SEM
s. wt + slide 3.94840
slide 3.94634
wt on filter .00206

no fiber
mostly -
very high
ar 10:1
common 20:1
common
most 7/1 wide

3h #P.16 - 50X

Avamco 1/12/90

fine fraction

4.10922
slide 4.10695
.00227

Coarse fraction
.0795 x 10^{-6} cm^3 fiber in mica
3.0 gm/cm^3
.2385 x 10^{-6} grams fiber = .0005% of 0.048 gm

fine
free fiber
~~.25~~ .00013 x 10^{-6} cm^3
3 gm/cm^3
.00039 x 10^{-6} gm = <0.0001% of 431 x 10^{-6} gm

fiber in mica
.020 x 10^{-6} cm^3
3 gm/cm
.060 x 10^{-6} gm = .01% of 431 x 10^{-6} gm

n>1.620
2V=40°

Coarse fraction 1239
4.1~~3022~~
4.06424
~~.06598~~
.04815

Coarse fraction - blocky amphibole actinolite (Hbl)
pyroxene? ls // ext n>1.620
mica
opaques
anthophyllite
photo #1 anth asb in mica 10X
photo #2
~ 2 amp. both cleav 16X
non fiber
photo #3 elongate amp - 50X
photo #4 - fiber fine fract 25X
#5 50X pln. light 100 X 1 (max)

traverses 16X entire slide examined
4 - whole slide covered
~~90X30~~ (
150X30 (16X) in mica
20 X 50 4X1 in mica
fine trans ~~////~~ // - 50X 7/48 examined
35X1
40X1
lg bundle in mica 140X30
trav 9 5/24 examined
25X ~~////~~ 20X.5 10X.5 100X30 (in mica)
10X.5 15X.5 10X.5
7X.25 30X.5 Total examined: 192

3
26
67
23
090

EXHIBIT
#9 (Wylie)
JH 9-18-09

Westal 003

th ~~w~~ = 1.5μ   50 X

l = 30μ

w ~~th~~ = 3.2 μ

Tremolite

EXHIBIT
#10 (Wylie)
JH 9-18-09

4

July 2, 1988
Sample 78-88 from John Kelse, RT Vanderbilt

oil 1.600
20% tremolite α > 1.600 c∧z = 16°, 18°, 18°, 20° 16°
fibrous talc n < 1.600 (some close)
Carbonate
non-fibrous talc

1.575
serpentine (n < 1.575)
no chrysotile seen

1.590 a few fibers γ > 1.590 but close
most ≤ 1.590

July 18, 1988
Rockville Crushed Stone, samples collected in (7-14-88)
Fairfax County with Charles J. Dusek, Fairfax
County Health Department, 10777 Main Street
Suite 100A Fairfax, Virginia 22030
Stream bed lining, boulders from RCS.
5 numbered samples.

#320 (86-88) 1.610 - 2 samples: one fibrous, one massive
α < 1.610
fibrous: variation of fiber width. some byssolite-like, others
asbestiform. Mixed material. Curvature, fiber
bundles present but rare. Oblique extinction
common c∧z = 16°, 17°, 16°, 16°
10: tremolite most likely
— optic orientation differ
on ... lattice, ...
... typical of
byssolite.

massive: α < 1.610 γ > 1.610
oblique extinction c∧z = 13° 16° 16.5°
prismatic cleavage fragments. many have aspect
ratios > 3:1 but lack asbestiform characteristics.
10: tremolite likely

321 87-88
1.600
...
pyr...
n >> 1.
325 91-88
trem...
...
32[illegible] 90-88
mo...
1.[illegible]
...
pri...
lih...
322 1.620, 1.
carbonate
chlorite
serpentine
amphibole
not...
323 - 89-88
white, ...
1.620 ≅ 1.
c∧z
...

Fibrous talc XRD samples
USNM 48277, 44866, 101899, RT Vt fibrous concentrate
As a group the following peaks were observed which do not conform to anthophyllite or talc

2θ	d	2θ	d	2θ	d
8.85		5.49	16.0946	8.806	10.0418
10.80		10.80		9.209	9.6025
29.07	3.0719	29.097	3.0689	10.767	8.2169
31.92	2.8035	31.933	2.8025	17.436	5.0823
30.45 (st)		30.457		17.692	5.0131
33.15 (st)		32.72		19.80	
		36.02		27.919	3.1956
RTV		38.938	2.3129	27.748?	3.2149 could be 3.231 Anth 20%
		49.479	1.8421	27.680?	3.2227 "
		59.407	1.5558	29.163	3.0620
				30.685	2.9135
		866		31.952	2.8009
				33.15	
				38.80	
				19.20	4.6234
				849	

2θ	d	2θ	d
10.806	8.1873		
8.8785	10.0654		
19.218	4.6183		
21.655	4.1037		
26.571	3.3546		
27.713	3.219	49.484	1.8419
29.1		49.601	1.8379
30.656	2.9162	49.889	1.8277
30.868	2.8968		
31.20			
31.70			
31.933	2.8025		
32.687	2.7396 could be anth		
33.15			
38.486	2.3391		
38.934	2.3132		
39.012	2.3078		
41.851	2.1585		
42.475	2.1282		
42.608	2.1218		
46.021	1.9721		
46.135	1.9675		
48.646	1.8717		
48.041	1.8775		

fiber concentrate CPS-1234
all γ < 1.600 except
trace of blocky tremolite
all γ < 1.5900 except tremolite
some γ < 1.5800 some γ > 1.5800, some = 1.580 0

2 – 3.5 ± .01
3.5 – 5 ± .02
5 – 6 ± .03
6 – 7 ± .04
16-401

9.21	5
8.33	70
5.03	5
4.67	20
4.49	35
4.14	5
3.97	5
3.66	
3.23	50
3.06	100
2.872	15
2.831	20
2.822	15
2.75	10
2.552	5
2.536	5
2.266	10
2.023	5
1.580	25

3.5-5 ±.02 ~~5-6 ±.03~~ 6-7 ±.04 16-401		8-10 ±.06 ~~anth~~ 9-455			~~Ftuns~~ RTV fiber concentrate 9.9875	Anth-asb NC. 748	Talc Mc Gouverneur x obs; ord +
		9.3	25	> 200	9.34 (1)	9.29	9.34 x +
9.21	5						
		8.9	30	020		8.94	
8.33	70			> 210	8.386 ? only Anth	(8.19)	
		8.26	55		8.17	(8.11)	
		7.48	8	?		–	
5.03	5	5.04	14	101, 011		–	
		4.90	10	111	4.741	4.93	
4.67	20			> 400, 201	4.676 ✓ mag		4.68 x +
		4.62	14		4.595	(4.612)	4.56 x +
		4.50	25	> 410, 211, 040	4.571	4.586 4.486	4.531 4.523
4.49	35					4.471	4.316
					4.253		4.298
4.14	5			> 420		(4.11)	
		4.13	20		4.190	(4.083)	4.125 + 4.082 +
3.97	5			301	4.1047		
		3.90	14	311, 031	4.026		3.85
3.66		3.65	35	321, 231, 430	3.498	3.62	3.43 x
3.23	50	3.24	60	421, 440	3.343 Q	3.218	3.287
3.06	100	3.05	100	610, 501	3.273 3.07	3.039	3.243
2.872	15	2.87	20	521	3.1176	2.868	3.115 *
		2.84	40	> 450, 260	3.044		3.061 3.040
2.831	20						
2.822	15			251		2.822	
2.75	10			> 441, 630		(2.741)	
		2.74	20			(2.731)	
		2.68	30	531, 351		(2.677)	2.632 x
		2.590	30	102, 161, 112		(2.669)	2.598 x
2.552	5			112, 621			
		2.540	40	621, 640		2.5398	
2.536	5			460, 202			
		2.434	13				2.480 x
		2.318	20			2.3109	2.336 x
		2.290	20				2.284 x
2.266	10			461, 412			
		2.252	14			2.2448	
		2.174	10				2.219 x
		2.142	30				2.103 x
		2.074	10				
		2.060	10				
2.023	5						
		1.991	16				1.994 x
		1.875	12				1.871 x
1.500	25	1.734	30				1.731 x

EXHIBIT
12 Wylie
SH 9-18-09

Report of Investigations
April 29, 1993

BACKGROUND

I received on April 8 from Dr. Arthur Langer the following samples labeled as indicated:

Sample 2. Scratch coat of slav behind the textured paint on the ceiling in living room.

Sample 3. Textured paint from ceiling in the living room.

Sample 4. Textured paint from ceiling in kitchen/dining room.

Sample 8. Textured paint from ceiling of small bedroom.

Sample 9. Textured paint from ceiling of back bedroom near bathroom.

Sample 10. Delaminated textured paint from ceiling of back bedroom (smooth side toward cement).

On April 26 I received an additional sample from Dr. Langer labeled 28310 and identified as a paint peel with the interior room surface indicated as the white surface and the scratch contact is "earthy gray".

ANALYSIS

All samples were examined by polarized light microscopy and immersion oil techniques and all but 23810 were examined by transmission electron microscopy. In the PLM analysis, the minerals were identified by their indices of refraction, birefringence, optic sign, optical class, cleavage with respect to optic directions, extinction angles, sign of elongation, color and habit. By TEM, the minerals were identified by morphology, chemical composition as determined qualitatively by energy dispersive x-ray analysis and electron diffraction patterns.

RESULTS

a) Optical Microscopy

Samples 3, 4, 8, and 9 and the white side of 28310 were found to contain tremolite, anthophyllite, vermiculite, glass (perlite) talc, and fibrous talc. No chrysotile was observed. The tremolite and the anthophyllite were in the form of cleavage fragments. There was no asbestos found in these samples.

Samples 2, 10, and the gray side of 28310 contained abundant carbonate and quartz. Samples 2 and 10 also contained most of the minerals found in samples 3,4,8, and 9 but in low abundances. The gray side of 23810 contained large masses of serpentine as well.

b) Transmission electron microscopy

Samples 3,4,8, and 9 were found to contain elongated particles made up of amphibole cleavage fragments and elongated fibers of talc and talc/amphibole intergrowths (fibrous talc). About 26 randomly chosen fibers with widths less than 1 micrometer and lengths greater than 5 micrometer were examined by EDS and electron diffraction. All had chemistry and electron diffraction patterns consistent with fibrous talc. No chrysotile was found in any of these samples.

Samples 2 and 10 contained small amounts of widely dispersed single fibers of chrysotile. Several fiber bundles were also observed. The chrysotile possessed the characteristic tubular morphology, was composed of Mg and Si, and exhibited a characteristic diffraction pattern. The content of fibrous talc and amphibole cleavage fragments was less in these samples than in the other 4.

CONCLUSIONS

The textured paint contains elongated cleavage fragments of tremolite and anthophyllite. It also contains fibrous talc. There is no asbestos in the textured paint.

The cementatious undercoating contains chrysotile asbestos.

Ann G. Wylie

Ann G. Wylie, PhD
April 30, 1993

Rt Vanderbilt Sample #19
Ceiling Textured Paint
Back Bedroom
Tremolite
2 fibrous talc ⟷ $\gamma > 1600$
$\gamma < 1.600$

glass $n < 1.560$

$1.580 - \gamma$ talc >
chrysotile < is all directions if present.
no chrysotile seen
anthophyllite cleavage fragment observed all $n > 1.580$
upon rotation, ∥ extinction maintained - quite common
anthophyllite more abundant than tremolite
glass
#4. ~~1.580~~ 1.578
tremolite dominates over anthophyllite - both present
as cleavage fragments
all fiber is birefringent. One bundle $\gamma \cong 1.578 - 1.580$ still,
not chrysotile. No chrysotile seen. All fiber
has $\alpha < 1.578$.
lots of glass.

#8 1.578
Vermiculite
anthophyllite > cleavage
tremolite
talc fiber
no chrysotile
glass
#2 layered
lower layer - quartz
calcite
mixed brown white (white could not be separated)
cellulose (water wet carbonate. Not ~~dust~~ contamination.
tremolite
anthophyllite no asbestos
talc fiber
quartz
calcite
glass

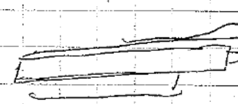
#3 1.578
glas
Verm
trem
fibr
Anth
no ch
no as

#10 calc
quar
glas
trem
anth
fibr
noc

Summary
Rod sh
fiber
glass

Dennis - Fax 202-887-4195

#3 1.578
glass
Vermiculite
tremolite
fibrous talc
anthophyllite
no chrysotile
no asbestos



#10 calcite abundant ? most abundant
quartz
glass
tremolite
anthophyllite
fibrous talc
no chrysotile

Summary -
Rod shaped amphibole not uncommon Asbestos fiber bundles with fibril width <1 µm not found.
Glass

April 26, 1993

~~RT~~ Vanderbilt Sullivan Case

Paint samples from Range
#2
chrysotile single fibers
Jeff saw some 10.
many <5
One matt seen (chrysotile)

(diff part) fibrous talc (not chrysotile)
chrysotile ubiquitous but
not very abundant <1%
seen mainly as single fibers
protruding from larger particles

distilled water + detergent
first soaked in ~~[illegible]~~ Kutzit
1) first ground
3) washed in acetone (molecular grade)
4) washed in distilled + deionized
5) water + detergent
6. dipped in C EM grid.
7. overcoat C.

centrifuged first supernatant used as solvent 24 hrs sonicated briefly 10 min

~~of~~ all

#3 lots of talc fibers
no chrysotile
more smaller particles than #2?
Several fibers ~ 0.5 μm in diameter ~5 μm in length
1) EDS - fibrous talc (slight Ca signature). .4 ← width
2) " " " .5
3) " " " ~1
4) " " ~.8
5) " " .3

#4 1) EDS .25 fibrous talc 35° tilt
2) .20 "
3.) .5 (bundle) "
4) .3 "
5) .3 "

no chrysotile observed.
Sample resembles #3.

8&9 together

1) 1µm EDS fibrous talc
2) .7 "
3) .8 "
4) .3 "
5) .4
6. .05 EDS "

10. chrysotile quite widespread
single fibers -
Electron diffraction - clean chrysotile .05 in width
picture of chrysotile matted mass taken
Chrysotile id'd by diffraction - tubular morphology
one extremely large bundle > 55µm in length, ~2µm in width
where

1) 12X .25(w) Talc/amph (Diff) EDS Mg Si
2) .4 " (Diff) EDS picture taken 76cm camera length
3) .6 " (Diff) EDS "
4) .3 Talc pattern (Diff)
5) Talc pattern (Diff)

Difficult to estimate chrysotile content. Not extremely abundant in terms of volume but abundance of large bundles hard to quantify. Only one seen - ~1% best guess. could be less.

#3 return to get diffraction patterns

W	l	Diff	EDS		
1) .5	10	Talc/amph	Mg+Si	(slight Ca)	
2) .6	30	Talc/amph	" "	—	
3) .3.4	12	Talc/amph	"	"	
4) .3	15	Talc/amph	" "	—	
5) .25	12	Talc/amph	" "	"	- picture taken Print out EDS from this fiber

Feb. 6, 1998

Ann,

Enclosed please find 7 samples from our ongoing talc flotation project. These represent samples from experimental runs utilizing different flotation blends (basically adjustments) run with larger volumes. We have characterized these samples for a variety of features but we now need to get an idea of how well (or how poorly) these adjustments influence fiber concentration.

For this I think we need only a general sense of basic fiber content (very little, the least amount, the most, similar to what I saw before, better or worse than that, etc.) without detailed quantification. That guidance will obviously help guide further adjustments.

I'd be happy with a phone call but our R&D group would like some brief written summary - perhaps I can generate that after speaking with you.

Please be sure to bill us for this request - I feel guilty enough constantly asking for your help.

John Kelse

EXHIBIT
#13 Wylie
JH 9-18-09

INTEROFFICE MEMORANDUM
Minerals Development Laboratory

DATE: February 6, 1998

TO: J.Kelse

FROM: P.A. Ciullo

SUBJECT: Talc Flotation Samples for Ann Wylie

I am forwarding to your attention the following seven samples from the flotation work at Mineral Processing Company. These are for fiber evaluation by Ann Wylie, as we discused:

MD 365- Feed	Feed Ore
MD 365-PDA-902-C	Concentrate
MD 365-PDA-902-T	Tailings
MD 365-R-911-C	Concentrate
MD 365-R-911-T	Tailings
MD 365-D-936-C	Concentrate
MD 365-D-936-T	Tailings

Please ask Ann to provide a brief written summary of her observations.

Let me know if there are any questions.

cc: R. Ohm
J.D. Lathrop

R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS
30 WINFIELD STREET, P.O. BOX 5150, NORWALK, CONNECTICUT 06856-5150 • (203) 853-1400
Fax (203) 853-1452 • Internet Address: www.rtvanderbilt.com

May 14, 1998

Ann G. Wylie, Ph.D.
University of Maryland
Department of Geology
College Park, MD 20742

Dear Ann:

John Kelse has been on the road and has tried to contact you. In his absence, he asked that I send you the enclosed samples. He will contact you to discuss the routine analysis upon his return, May 20th.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

Sue Kelly

Sue Kelly
Administrative Assistant
Corporate Risk Management

/sk
enclosure

16244 Batchellors Forest Road
Olney, Maryland 20832

John Kelse
R.T. Vanderbilt Company
30 Winfield Street
Norwalk, Connecticut 06856-5150

June 26, 1998

Dear John;

I examined the samples you sent to me on June 5 by polarized light microscopy. In this analysis, I tried to address the questions posed by P.A. Ciullo as outlined in his memo of June 5, 1998 as follows:.

1. From the average grade ore, what are the differences between the ground and unground fifth cleaner concentrate (MD 404-A and MD 401-A-12) ?

In the unground sample, I found only a very few separate talc fibers. Most of these would be best described as shard-like rather than true fiber. There is a tiny amount of true fiber talc. All that I saw of this latter type had very low indices of refraction, comparable to pure talc, not an intergrowth with amphibole. The talc fiber enclosed within the talc plates was also of extremely low indices of refraction. It is possible that it is analogous to talc plates on end and perhaps this is how this type of fiber forms.

In the unground sample, I could not see any fiber at all. The particles are truly tiny and are distinctly brown in color. I also saw diatoms, indicating that material was being added in the grinding process. I do not know the origin of the brown color. The bulk sample does not appear to be a different color so I am unsure if the color is due to grinding of something that was already present?? or if it was added during grinding along with the diatoms? The largest particles are tremolite. It appears to resist the grinding process somewhat. Because I could not see any fibrous talc, I guess that if fiber is liberated, it is quickly destroyed during grinding.

2. From the average grade ore, how does the material change from the 1st cleaner concentrate (MD 401-A-4) to the second cleaner concentrate (MD 401-A-6) to the fifth cleaner concentrate (MD 401-A-12)?

In the first cleaner concentrate (MD 401-A-4), there remain fibers of talc that have intermediate indices of refraction (intergrown with amphibole). They are not as abundant as in the Feed (MD-401-A-1) but they are present. In the second cleaner concentrate (MD 401-A-6), most of the fiber is gone. Some large particles made of low index of refraction fibrous talc (or talc plates on end?)s are still present. I saw only one "intermediate" index of refraction fiber in the mount I made so such fibers are very rare. The fifth cleaner concentrate was described above. Talc fiber and tremolite are uncommon to rare and all elongated particles of talc I observed had indices of refraction comparable to platy talc.

3. How do the feeds from Good (MD 401-G-1), Average (MD 401-A-1) and Poor (MD 401-P-1) ore compare ?

The differences among these three samples were not too great. P-1 appeared to have the highest percentage of fibrous talc bundles. G-1 contained more tremolite than P-1 and less fibrous talc bundles. A-1 and G-1 could not be differentiated with certainty.

4. How do the Fifth Cleaner concentrates from Average (MD 401-A -12), Good (MD 401-G-12) and Poor (MD 401-P 12) ore compare?

I could not be sure that I really could see any differences among these three samples. Perhaps I was predisposed based on the sample names to expect and see more fibrous talc in P-12. However, I am not confident that this sample is really different from the other two.

Recommendations: It appears to me that your concentration process removes fibrous talc and tremolite together. Therefore, small differences among samples are probably best seen by comparison of x-ray diffraction patterns. XRD is a bulk technique. If particle size and sample preparation are the same, since the minerals are essentially identical, then the height of the tremolite and/or anthophyllite peaks should tell you about the effectiveness of the concentration process. Optical microscopy is fine for general observations. It could also be used for more careful analysis but the cost effectiveness is not good since so much time is required to point count or employ some other counting technique to have a reliable abundance estimates, especially when the abundance of a mineral or particle type is small and sampling variance becomes a major source of error. In this case because your concentration process is tied to a reduction in tremolite, you can probably use XRD with an occasional look by OM to tell what is going on.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Professor

INTEROFFICE MEMORANDUM
Minerals Development Laboratory

DATE: 5/8/98

TO: J. Kelse

FROM: P.A. Ciullo

SUBJECT: Talc Flotation Samples for Ann Wylie

Enclosed are the following samples for Ann's comments as to fiber content:

MD 401-C-1	Feed
MD 401-C-2	Rougher Tailings
MD 401-C-3	Rougher Concentrate
MD 401-C-4	1st Cleaner Concentrate
MD 401-C-5	1st Cleaner Tailings
MD 401-C-6	2nd Cleaner Concentrate
MD 401-C-7	2nd Cleaner Tailings
MD 401-C-9	3rd Cleaner Tailings
MD 401-C-10	4th Cleaner Tailings
MD 401-C-11	5th Cleaner Tailings
MD 401-C-12	Final Unground Concentrate

cc: R. Ohm
J. Lathrop

John Kelse
R.T. Vanderbilt Company
30 winfield Street
Norwalk, Connecticut 06856-5150

May 28, 1998

Dear John;

I examined the 11 samples I received from you last week. I looked primarily at grain size, abundance of talc fiber and abundance of tremolite.

Rougher Tailings (2): This is primarily coarse-grained tremolite and coarse-grained talc fiber.
Rougher Concentrate (3): This is primarily fine-grained although there are coarse talc plates. There is very little tremolite but what there is is fairly fine-grained.. There is abundant fine-grained talc fiber.
Final Unground Concentrate (12): Primarily coarse-grained talc plates. There is a very small amount of tremolite (<1%?) and a very small amount of talc fiber (about the same as tremolite).
2nd cleaner Concentrate (6): This sample is very similar to 12: it is coarse-grained and contains very little tremolite. There is slightly more talc fiber than 12.
1st Cleaner concentrate (4): This is a mixture of coarse and fine particles. It contains very little tremolite but more small-sized talc fiber than 6 or 12.
1-5 cleaner tailings (5,7,9,10 11). All of these are dominated by small particles. 11 contains very little tremolite and also not too much talc fiber although more than sample 12. 10 contains more talc fiber and more tremolite than 11 and 9 contains more of both talc fiber and tremolite than 10. In 7, in addition to abundant talc fiber and tremolite, coarse talc particles compose part of the sample as do they in sample 5. Sample 7 and 5 are quite similar.

It appears that your initial separation removes most of the coarse-grained tremolite and some talc fiber. Successive treatments continue to reduce the amount of fine-grained tremolite and fibrous talc and probably other minerals as well, thereby increasing the average grain-size of the concentrate as the percentage of talc increases. While the final concentrate is not entirely free of fibrous talc or tremolite, they are probably present in amounts less than about 1%.

If you have any questions, please let me know.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie, PhD

MD 401-A-6 2nd cleaner concentrate

most fiber gone. a few large ~~bundles~~

packages of ~~brown~~ fibers, etc are still present

uncommon. Not as clean as 5th

but still ft is < 1%, perhaps < 0.1%

no high n fiber observed in one mount

P-12 - Poor ore grade

one very large ft ~~package~~ bundle

one small $^{1.600}$ Σn < 1.600

large bundles ////

//// mostly fine fiber

more chard-like pieces than P-12

perhaps more fiber

G-12

very little fiber

table plates - no fiber

slightly fewer chards than P-12

less fiber

differences not apparent

I would suggest x-ray

A12 - no fiber or very little -

very similar to P-12

indistinguishable

except ~~slightly~~ more fiber

MD 401-P-1

fiber in every field. 15-20% Tremolite
a few percent fibrous talc bundles

G1 more tremolite than P-1
less fibrous talc

A-1 lots of tremolite - most?
not much talc fiber

A-6 - $\uparrow$ 1.600 ~ 1.596 still contains fiber, essentially
$\leftrightarrow$ n << 1.600 all n < 1.600.

Substage setting - polarizer out, substage aux condensing lens out, black right substage set m I, to the right (east) (substage assembly low at least 1/2 turn . 10X -

1.600 oil

MD 401-A-12 - 5th cleaner Concentrate - unground

Fiber in talc all appears to be low n talc only (plates on end, perhaps) (ie talc → amphibole)

separate "perhaps" asbestiform talc uncommon

Small material shard-like talc (check to see if serpentine)

does this mean explanation for persistent quartz signal

MD 404-A 5th cleaner concentrate - fine ground

distinctly brownish in color

diatoms

no fiber visible

largest particles, (distinctly larger (10X or more) than talc particles, are tremolite.

MD401-A-4 First cleaner concentrate

some fibrous talc ~~bundles~~ perhaps - one

intermediate n 1)

n>1.600 n<1.600

talc

~60°

218 ~~148~~ ~~70~~ 0

124 ~~60~~ 64 ~600

2)

Most common

lower n higher n

n>1.600 n<1.600 high n>1.600

lo lower

very common ↓ <<1.600

uncommon

INTEROFFICE MEMORANDUM
Minerals Development Laboratory

TO: J. Kelse **DATE:** 6/5/98

FROM: P.A. Ciullo

SUBJECT: More Talc Flotation Samples for Ann Wylie

Enclosed are the following samples for Ann's examination:

From "Average" Grade Ore

MD 401-A-1	Feed
MD 401-A-4	1st Cleaner Concentrate
MD 401-A-5	1st Cleaner Tailings
MD 401-A-6	2nd Cleaner Concentrate
MD 401-A-7	2nd Cleaner Tailings
MD 401-A-12	5th Cleaner Concentrate, unground
MD 404-A	5th Cleaner Concentrate, fine ground

The purpose of this group is to verify the observations from the previous samples, which were based on composite ore - in particular, that most of the fiber is lost by the second cleaner concentrate. It would also be helpful if Ann could look for fibers growing through the talc plates in sample MD 401-A-12. If she finds them, her comments on any apparent disparity in the number of fibers in the ground vs unground fifth cleaner concentrate would be appreciated (i.e., are fibers that were trapped in talc plates liberated with fine grinding?).

From "Good" Grade Ore

MD 401-G-1	Feed
MD 401-G-12	5th Cleaner Concentrate, unground

These two samples are to simply compare fiber content in the "good" ore feed vs talc concentrate, and to look for fibers intergrown through talc plates.

From "Poor" Grade Ore

MD 401-P-1	Feed
MD 401-P-4	1st Cleaner Concentrate
MD 401-P-6	2nd Cleaner Concentrate
MD 401-P-12	5th Cleaner Concentrate, unground

These samples are to, again, assess whether or not most of the fiber is lost by the second cleaner concentrate, to compare fiber content in the "poor" ore feed vs talc concentrate, and to look for fibers intergrown through talc plates.

It would also be helpful if Ann could comment on the relative fiber content of the three feed samples.

cc: R. Ohm
J. Lathrop

R.T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

June 24, 1988

Ann G. Wylie, PhD
STEMicro Corporation
15817 Crabbs Branch Way
Rockville, MD 20855

Dear Dr. Wylie:

I have enclosed a sample of ceramic greenware containing our talc for the usual characterization (mineral ID, asbestos contact, etc.).

Also enclosed is a letter which reflects the situation involved in this analysis request. Essentially, its the same old stuff - asbestos equals whatever OSHA says it is - what can the Army do, etc...

The sample represents a cut from the material referenced (greenware sample "A"). I have forwarded literature concerning the basic issue to Army. Hopefully your analysis will place this particular analysis in perspective relative to definitional ambiguity and give them pause for thought.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John W. Kelse /sk

John W. Kelse
Corporate Industrial Hygienist
Manager, Occupational Health & Safety

JWK/sk
enclosure

EXHIBIT
#14 Wylie
JH 9-18-09

KAY'S CERAMICS
2704-C FLORIDA AVE.
NORFOLK, VA. 23513

TEL. 857-5600

June 21, 1988

MEMO TO JOHN KELSE, R. T. VANDERBILT CO. INC.

Subj: Casting slip sample

Enclosed in this envelope is a sample of N. C. Ceramic Supply Gare casting slip. This sample was poured at the same time as that of Sample "C" shown in the Fort Eustis Laboratory report.

We have not as yet received a reply to our letter of June 13th, however, we have received information indicating they are again letting Fort Story Arts and Crafts purchase greenware and casting slip from Pottery Arts. A letter to them on this subject is attached as Enclosure (1).

Will keep you informed as things develop.

Very truly yours,

Joe

JOE FETTY

Encl: (1) Copy of Kay's Ceramics letter of June 20, 1988 to CG,
Fort Eustis [redacted]

Copy to: [redacted]

KAY'S CERAMICS
2704-C FLORIDA AVE.
NORFOLK, VA. 23513

TEL. 857-5600

June 20, 1988

Commanding General
Department of the Army
U. S. Army Transportation Center
Fort Eustis, Va. 23604-5000

ATTN: Chief of Staff

Dear Sir:

It has come to my attention that Fort Story Arts and Crafts is again selling and casting greenware manufactured from casting slip which had been previously declared by Fort Eustis personnel to have contained 5% fibrous tremolite, which according to Enclosure (1) of my letter of May 28, 1988 was deemed by Fort Eustis peronnel to be ASBESTOS (See Form AEHA-8 dated 8 April 1988.)

It is therefore assumed that a letter of apology as requested in my letter of June 13, 1988 is in preparation and will be received by me shortly, or that Fort Eustis command personnel are operating on a double standard. To my knowledge there is still no casting slip available in the Tidewater area which does not contain tremolite talc. The percent would certainly vary from manufacturer to manufacturer depending upon the quantity of each ingredient used in their manufacturing process.

If my assumption that a letter of apology is in preparation no further action is necessary on your part. However, if my assumption is incorrect it is requested that we be advised by what standard has Pottery Arts Casting slip been approved for use and our casting slip (manufactured with idential ingredients) not so certified as also safe. If your "mission" is to protect the Army community from exposure to potentially hazardous materials it would appear that you are going about it in the wrong manner.

Very truly yours,

Esther P. Fetty

ESTHER P. FETTY (MRS.)
Owner

STEMICRO CORPORATION

15817 Crabbs Branch Way
Rockville, Maryland 20855
301/975-9798

July 6, 1988

Report of Analysis for
R.T. Vanderbilt Company

I. SAMPLES

On July 1, 1988 Stemicro received a sample with a letter enclosed from Mr. John Kelse identifying the sample as ceramic greenware sample "A" containing Vanderbilt Talc. A memo from Mr. Joe Fetty of Kay's Ceramics, Norfolk, Virginia, also enclosed with the sample, indicated that the sample was N.C. Ceramic Supply Gare casting slip and that it was poured at the same time as that of Sample "C" which had been analyzed by the Fort Eustis Laboratory. The letter from Mr. Kelse requested a mineralogical analysis for the presence of asbestos.

II. METHOD OF ANALYSIS

The sample was examined by polarized light microscopy. Subsamples were mounted in Cargille index of refraction liquids for determination of the index of refraction of the constituent minerals. Other properties used in the identification of the minerals including sign of elongation, extinction angle, birefringence, color, and the relationship between optic and cleavage directions. Mineral names are assigned by comparing these data to those given in standard optical mineralogy textbooks.

Once the minerals were identified, the determination of whether or not a mineral is asbestiform is based on morphology. A minerals is considered to be asbestiform if it meets the following criteria:

1) mean aspect ratios greater than 20:1 for particles longer than 5 micrometers in length,
2) very thin fibrils, usually less than 1 micrometer in width, and
3) two or more of the following:
   a) parallel fibers occurring in bundles,
   b) fiber bundles displaying splayed ends,
   c) fibers in the form of thin needles,
   d) matted masses of individual fibers, and
   e) fibers showing curvature.

All minerals that occur in the asbestiform habit more commonly occur in nature in a non-asbestiform variety. When crushed, non-asbestiform varieties form cleavage fragments. Cleavage fragments lack the properties of the asbestiform habit. The aspect ratio of cleavage fragments longer than 5 micrometers is generally less than 20:1 and stair-stepping along particle edges is commonly observed with the optical microscope.

III. RESULTS

Approximately 20% of the material is the mineral tremolite. None of the tremolite occurs in the asbestiform habit. The tremolite particles have aspect ratios that are typical of cleavage fragments of amphibole. Because of two parallel directions of cleavage these particles are frequently elongated. However, they lack the high aspect ratios (greater than 20:1) and fibrillar structure typical of asbestos. The tremolite particles frequently show stair-stepping along their edges typical of amphibole cleavage fragments.

About 1% of the material is composed of fibrous or asbestiform talc. This material exhibits all the properties listed above as characteristic of the asbestiform habit. However, fibrous talc is not regulated as asbestos by federal or state government. It can be easily distinguished from the amphibole asbestos minerals by its lower indices of refraction (less than 1.600) and from chrysotile by its higher indices of refraction (greater than 1.575 parallel to elongation). Some of this material has indices of refraction higher than that typical of talc (greater than 1.590) but still less than amphibole. This material is transitional between pure talc and pure amphibole.

Other minerals present in this sample include platy talc, carbonate and serpentine.

Ann G. Wylie

Ann G. Wylie, Phd

STEMICRO CORPORATION HAS INTERIM ACCREDITATION BY EPA # 3281

R.T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, NORWALK, CONNECTICUT 06855 • (203) 853-1400
CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

September 18, 1984

CONFIDENTIAL

Dr. Ann G. Wylie
Assistant Professor
Department of Geology
University of Maryland
College Park, Maryland 20742

Dear Ann:

As per our telephone conversation of September 17, 1984, I am enclosing a sample of our NYTAL 99 for your examination and mineralogic analysis. This analysis is to be used in the defense of our Texas law suits and has been requested by our attorneys. The retained shipment sample enclosed was identified as follows:

Date: 5/2/84
RTV Order No. 111-123
Grade: NYTAL 99
Customer: Aztec Ceramic
Car No.: CR 367023
Tons: 51 tons

Thank you for your help in this matter.

Sincerely,

C. S. Thompson, Manager
Minerals, Ceramics & Paper Department
Research & Development Division

CST:lag

enclosure

EXHIBIT
#15 Wylie
JH 9-18-09

THE ASBESTIFORM AND PRISMATIC MINERAL GROWTH HABIT AND THEIR RELATIONSHIP TO CANCER STUDIES

A PICTORIAL PRESENTATION

EXHIBIT
#16 Wylie
JH 9-18-09

March, 2004

The Asbestiform and Prismatic Mineral Growth Habit and Their Relationship to Cancer Studies

Kelly F. Bailey, CIH
Manager, Occupational Health
Vulcan Materials Company
Birmingham, Alabama

John Kelse
Corporate Industrial Hygienist
Manager, Risk Management Dept.
R. T. Vanderbilt Company
Norwalk, Connecticut

Ann G. Wylie, PhD
Asst. President and Chief of Staff
Professor of Geology
University of Maryland
College Park, Maryland

Richard J. Lee, PhD
President
R. J. Lee Group, Inc.
Monroeville, Pennsylvania

The recognition and regulation of asbestiform and prismatic minerals is of critical concern to the entire mining and aggregates industry, to individuals exposed to these materials and to the economic vitality of the United States.

CONTENTS

INTRODUCTION

It has long been recognized that the inhalation of excessive asbestos fibers, over time, is associated with significant pulmonary disease in humans. The link between asbestos, lung cancer and mesothelioma is well established. Asbestos is perhaps the most feared mineral risk and certainly is among the most publicized, litigated and studied.

Despite this attention, a clear understanding of what asbestos actually is remains a source of confusion to many. This is often demonstrated when commercial asbestos is not known "a priori" to exist in a dust exposure. Nowhere is this problem better demonstrated than the decades old confusion over the difference between asbestiform and prismatic crystal growth.

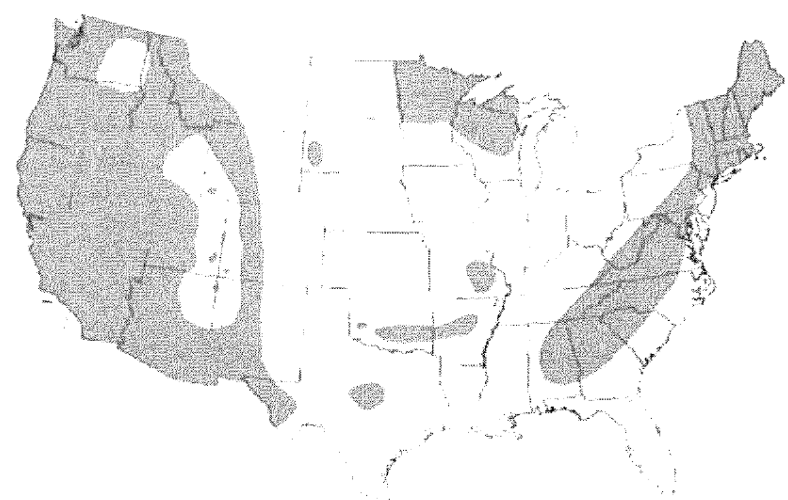
No federal regulatory agency treats elongated prismatic mineral particulates as asbestos, yet some in the regulatory and health community believe that they should. These individuals mistakenly believe that the essential difference between prismatic minerals and asbestos is not significant from both a mineralogic and biologic perspective.

This pictorial presentation demonstrates that important mineralogic and health differences do, in fact, exist. Health researchers who fail to understand these differences can assign and have attributed the carcinogenic effects of asbestos exposure to prismatic minerals. Because these common, prismatic rock-forming minerals make up so much of the earth's crust, it is important that this error be avoided.

WHY IS THIS DISTINCTION IMPORTANT?

The prismatic minerals are common hard rock forming minerals found throughout the earth's crust. Unlike asbestos, they are not at all rare.

The map below shows the general areas in the continental United States where igneous and metamorphic rocks are likely to be found on or near the surface. Amphiboles and serpentine, the two mineral groups that contain mineral species that may form asbestos, are restricted in their occurrence to these types of rock. When amphiboles and serpentine form part of the bedrock, they may also be found in the overlying soil. All the rock and soil in the shaded areas, however, do not contain amphibole and serpentine, and the occurrence of the asbestiform habits of these minerals in the shaded areas is even more restricted. The shaded areas do not mean that every rock or soil mass in that area contains these minerals, but it does mean that they are often present in these areas.



igneous or metamorphic rocks (1)

The composition of the rock also affects the likelihood of finding asbestos. Asbestos is more likely to form during the metamorphism of limestone, mafic and ultramafic rocks and alkali igneous rocks than during the metamorphism of other common rocks such as granite and sandstone. Furthermore, many of the amphiboles, particularly those that contain a significant amount of aluminum, never form asbestiform fibers. Therefore, while the prismatic habits of amphibole and serpentine are common throughout the shaded areas, asbestos occurrences are localized and uncommon.

The U.S. Bureau of Mines reports that the regulation of prismatic minerals as asbestos would significantly impact the mining of important mineral commodities such as gold, copper, iron, crushed stone, sand, gravel and talc. Downstream users of these mineral commodities such as construction, refractories, smelters, ceramics and paint manufacturers, would be affected as well (2).

Therefore, it is important that these prismatic minerals be properly assessed with respect to their health risk.

The goal of this document is to clearly and succinctly demonstrate that mineralogical and biological differences exist between asbestos and common prismatic minerals. To accomplish this objective, this presentation:

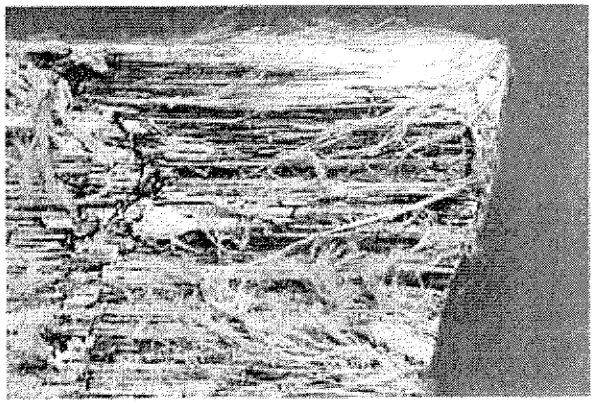
- **DESCRIBES THE MINERALOGICAL DIFFERENCES BETWEEN ASBESTIFORM AND PRISMATIC MINERALS.**

- **CLARIFIES THE MINERAL EXPOSURES CITED IN KEY HEALTH STUDIES.**

- **SUMMARIZES THE OUTCOME OF THIS COMPARISON.**

REFERENCE EXHIBIT 1

What is Asbestos?



In the *Glossary of Geology*, asbestos is defined as. . .

"A commercial term applied to a group of highly fibrous silicate minerals that readily separate into *long, thin, strong* fibers of sufficient flexibility to be woven. . ." (3).

This definition has been further expanded based on mineral-crystallographic studies over the last decade or so:

A. **ASBESTOS** - A collective mineralogic term that describes a variety of certain silicates belonging to the serpentine and amphibole mineral groups, which have crystallized in the asbestiform habit causing them to be easily separated into long, thin, flexible, strong fibers when crushed or processed. Included in the definition are: chrysotile, crocidolite, asbestiform grunerite (amosite), anthophyllite asbestos, tremolite asbestos and actinolite asbestos. The nomenclature and composition of amphibole minerals should conform with International Mineralogical Association recommendations (Leake, B.E., *Nomenclature of Amphiboles*, American Mineralogist, Vol. 82, 1019 - 1037, 1997).

B. **ASBESTOS FIBERS** - Asbestiform mineral fiber populations generally have the following characteristics when viewed by light microscopy:

1. Mean aspect ratios ranging from 20:1 to 100:1 or higher for fibers longer than 5 μm,

2. Very thin fibrils, usually less than 0.5 μm in width,

3. Parallel fibers occurring in bundles, and

4. One or more of the following:
   a) Fiber bundles displaying splayed ends,
   b) Matted masses of individual fibers,
   c) Fibers showing curvature

This definition represents the consensus of a group of mineral scientists, several of whom have published extensively in this area (see Appendix I).

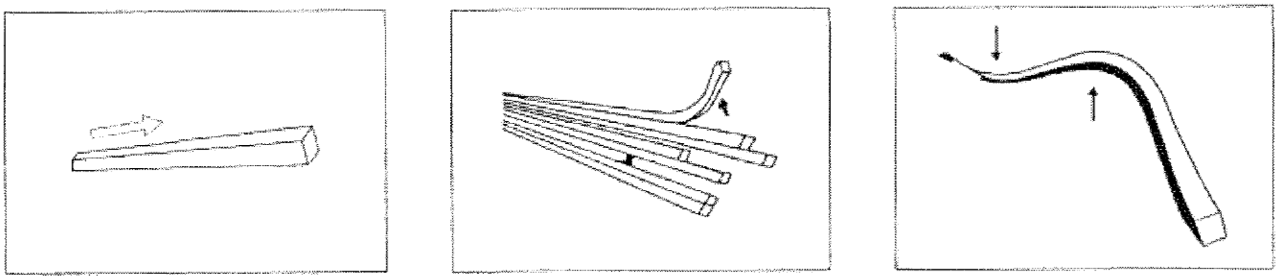
Morphological properties are difficult to apply to single particles when classifying them as a cleavage fragment or a fiber. Distinctions on morphology are most reliably made on populations. Furthermore, in air and water samples, in which particles are often less than 5 µm in length, the presence of asbestos should be verified in bulk material at the source before identification of particles as asbestos can be reliably made. Bulk materials display the full range of distinctive morphological characteristics, but in fibers collected from air and water, the range of morphological properties is more limited.

Asbestiform fibers normally exhibit anomalous optical properties that are distinctive. For example, under polarized light microscopy, asbestiform fibers may display parallel extinction in all orientations, they may display oblique extinction in some orientations at angles that are less than those characteristic of ordinary amphibole fragments in the same crystallographic orientation, they may have only two principal indices of refraction (as opposed to the expected three), or they may display orthorhombic optical properties when monoclinic optical properties are expected (79).

When asbestiform fibers are found in nature, there may be other habits of the same mineral intergrown such as the brittle, fibrous prismatic habit byssolite and fragments of the enclosing rock (cleavage fragments). Byssolite is characterized by wide, single glassy crystals usually > 1 µm in width. While asbestos is characterized by high tensile strength which results in difficulty on grinding with a mortar and pestle, byssolite and cleavage fragments will easily reduce to powder under the same circumstances (see page 16, Reference Exhibit #5).

Although asbestiform crystal growth is very rare in nature, under the right geologic conditions approximately 100 minerals may be formed in this manner - not just the six minerals we refer to as asbestos (76). Evidence on the carcinogenicity of asbestiform minerals that are not asbestos is mixed, but there is no compelling evidence that all asbestiform minerals are carcinogenic. Different minerals have different biodurabilities, surface chemistries, friabilities in vivo, and bioavailability differences that influence their biological activities (77). Asbestiform richterite, winchite and erionite are examples of fibers that appear to pose a risk similar to that of asbestos (74,78). In contrast, asbestiform talc (72) and minerals such as xonotlite (commonly found in an asbestiform habit but is water soluble) do not appear to pose the same risk.

ASBESTIFORM



In the asbestiform habit, fibers grow almost exclusively in one direction and exhibit narrow width (on the order of 0.1 μm). Fibers that are visible to the eye are bundles of individual crystal fibers known as "fibrils". In some deposits, there is a range in fibril width, sometimes extending up to as much as 0.5 μm. Asbestiform fibers wider than 1.0 μm are always bundles of fibrils. Asbestiform minerals have fibrils that are easily separated, although variability exists. In populations of asbestiform fibers, the distribution of particle widths will reflect single fibrils as well as bundles of fibrils. Under the light microscope, this "polyfilamentous" characteristic of fibers is evident, and **is the single most important morphological characteristic of the asbestiform habit**. Asbestiform fibers are flexible and exhibit high tensile strength. The flexibility may be accounted for by the very narrow widths of fibrils and perhaps by the ability of fibrils to slide past one another on bending.

Six minerals have been regulated as asbestos. These are listed below:

ASBESTIFORM VARIETY
(Asbestos, CAS No. 1332-21-4*)

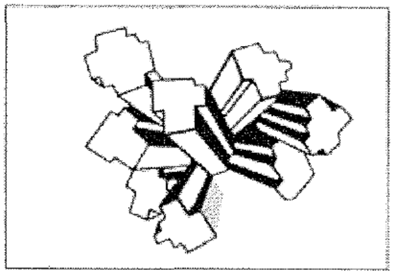
SERPENTINE GROUP	
chrysotile	(CAS No. 12001-29-5)
AMPHIBOLE GROUP	
crocidolite	(CAS No. 12001-28-4)
grunerite asbestos (amosite)	(CAS No. 12172-73-5*)
anthophyllite asbestos	(CAS No. 77536-67-5*)
tremolite asbestos	(CAS No. 77536-68-6*)
actinolite asbestos	(CAS No. 77536-66-4*)

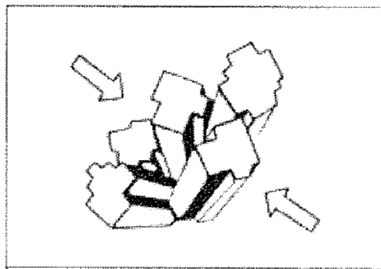
The presence of an asterisk (*) following a CAS Registry Number indicates that the registration is for a substance which CAS does not treat in its regular CA index processing as a unique chemical entity

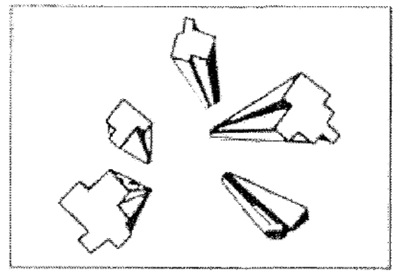
For asbestiform fibers to grow, there must be mineral rich fluids that are either associated with regional metamorphism or contact metamorphism around crystallizing igneous bodies. The vast majority of the occurrences of asbestos are small because, in addition to metamorphic fluids, there must be open spaces into which the fibers can grow, a condition restricted to the upper portions of the earth's crust in structurally specific environments such as faults, joints, the axes of folds, etc. Only rarely are large portions of a rock composed of asbestos.

The most common occurrence of asbestos is in cross-fiber or slip fiber veins. In the former, the fiber axes are perpendicular to the walls of narrow openings in the host rock; in the latter, they are parallel. Asbestos rarely occurs as mass fiber bundles in which fibrillar growth is in many directions. This growth pattern is not clearly related to planar structural features of the rock.

PRISMATIC







In the prismatic variety, mineral crystal growth tend not to grow with parallel alignment, but form multi-directional growth patterns instead. When pressure is applied, the crystals fracture easily, fragmenting into prismatic particles called cleavage fragments. Some particles or cleavage fragments are acicular or needle-shaped as a result of the tendency of amphibole minerals to cleave along two dimensions but not along the third. Stair-step cleavage along the edges of some particulates is common. Serpentines have a single cleavage direction and single crystals would form sheets when crushed. Serpentine rock, when crushed, will produce some elongated fragments.

Comminution of prismatic amphibole produces particles that, although generally elongated, have widths larger than asbestos fibers of the same length. These wide widths are characteristic of all amphibole cleavage fragments, even those that have developed higher aspect ratios due to well-developed parting. Byssollite, the most acicular, needle-like prismatic amphibole, will break perpendicular to the fiber axis during comminution because it is brittle, thereby producing particulates with low aspect ratios (See Reference Exhibit 5).

NON-ASBESTIFORM VARIETY

SERPENTINE GROUP	
antigorite	(CAS No. 12135-86-3)
AMPHIBOLE GROUP	
riebeckite	(CAS No. 17787-87-0)
grunerite	(CAS No. 14567-61-4)
anthophyllite	(CAS No. 17068-78-9)
tremolite	(CAS No. 14567-73-8)
actinolite	(CAS No. 13768-00-8)

REFERENCE EXHIBIT 2

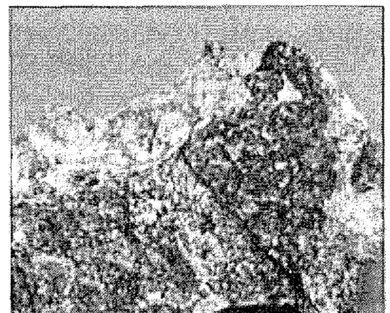
Macroscopic Raw Ore Comparisons

Each of these six minerals included in OSHA's asbestos standard occurs in both an asbestiform and a prismatic variety.

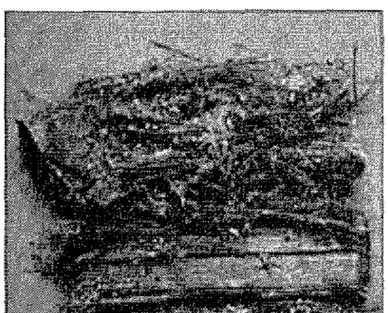
Three of the six minerals have been given a different name for each of their two forms. *Chrysotile* is the asbestiform variety of the serpentine minerals group. In this group *antigorite* is a common prismatic mineral. In the amphibole group, *crocidolite* is the asbestiform variety of *riebeckite*; *amosite* is the asbestiform variety of "cummingtonite"-grunerite.

Asbestiform / **Prismatic**

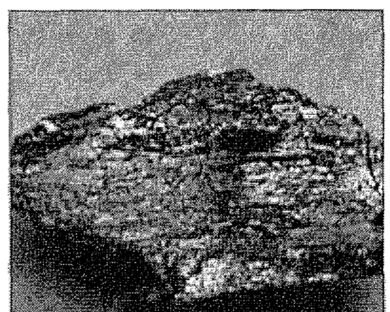
a. **chrysotile**



b. **antigorite**



c. **crocidolite**



d. **riebeckite**

e. **amosite**

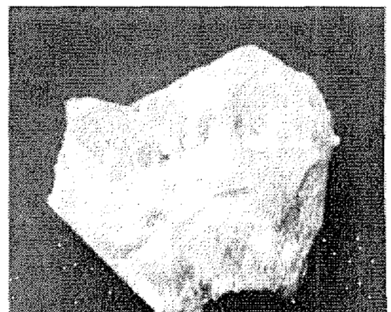
f. **cummingtonite-grunerite**

Macroscopic Raw Ore Comparisons

Asbestiform

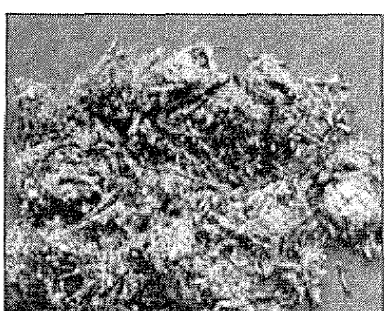

g. anthophyllite asbestos

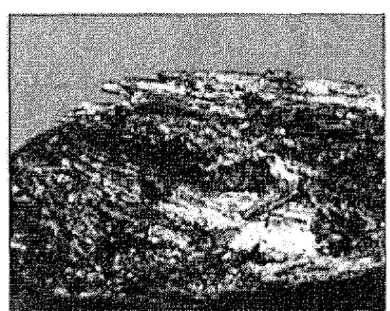
Prismatic


h. anthophyllite


i. tremolite asbestos


j. tremolite


k. actinolite asbestos


l. actinolite

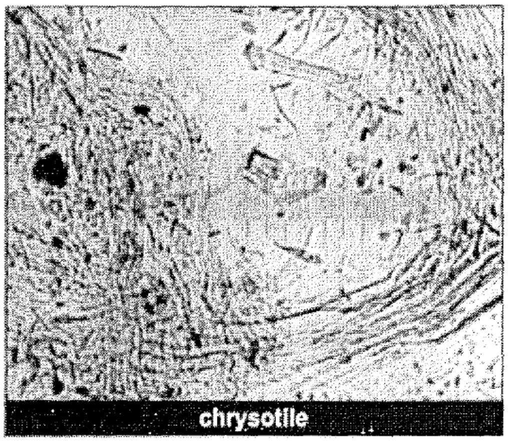
REFERENCE EXHIBIT 3

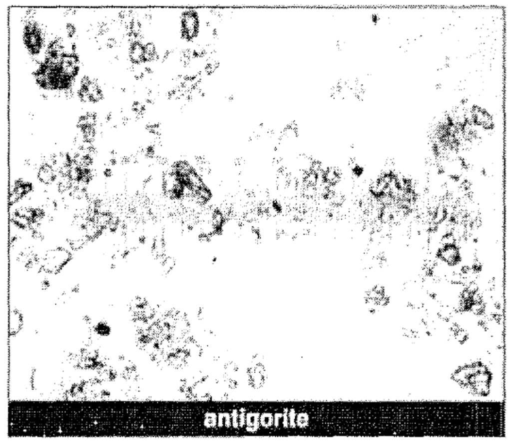
Light Microscopic Comparisons

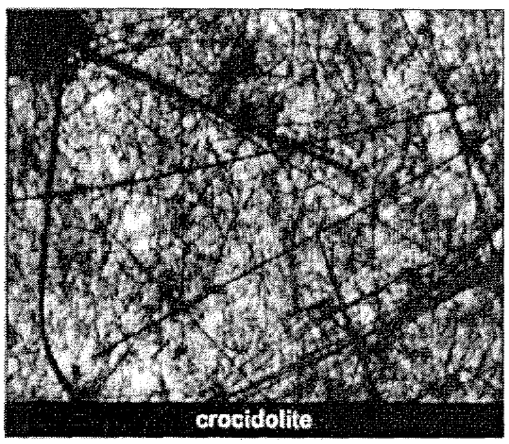
(2.75 µm/divisions)

Asbestiform

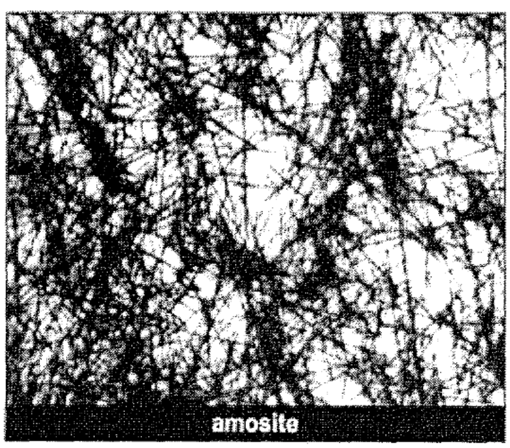
Prismatic

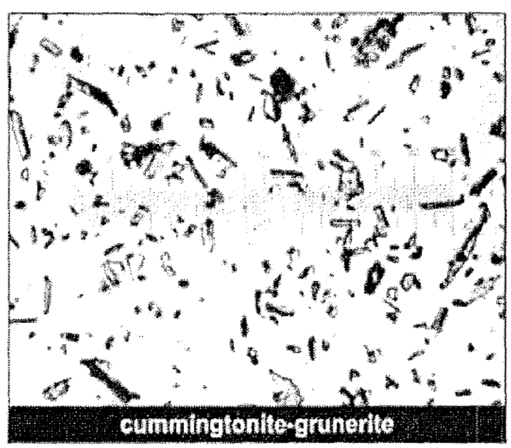
a.


b.


c.


d.

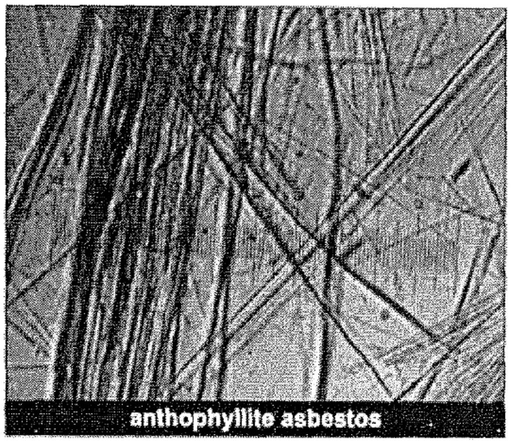

e.


f.


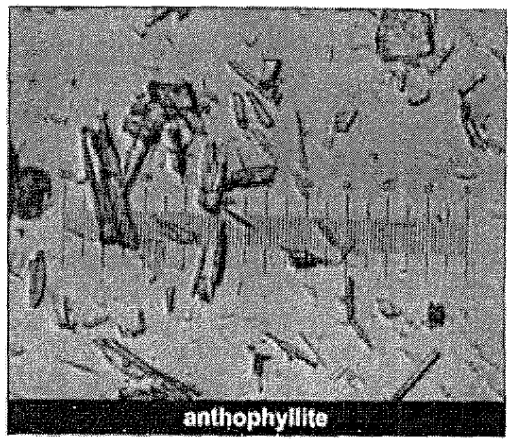
(2.75 µm/divisions)

Asbestiform

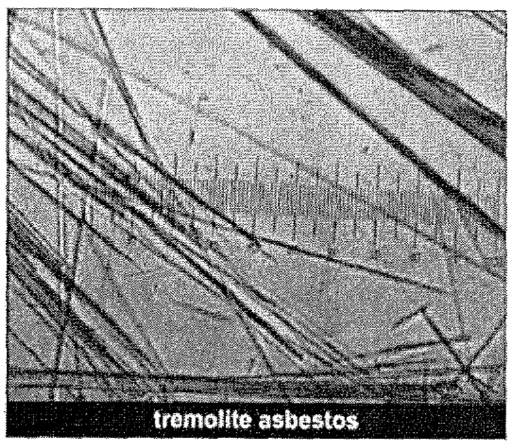
Prismatic



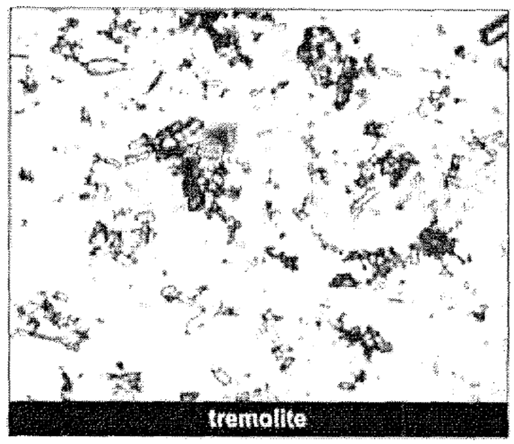
g. anthophyllite asbestos



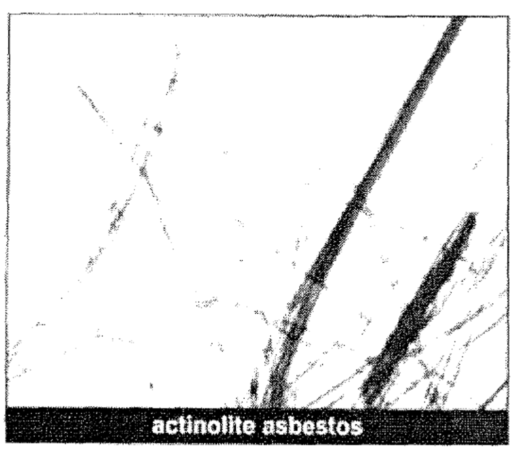
h. anthophyllite



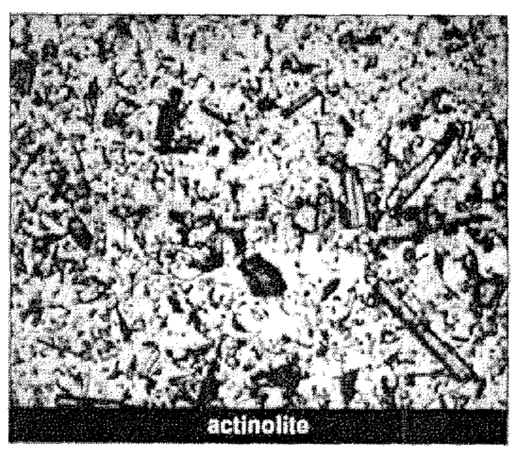
i. tremolite asbestos



j. tremolite



k. actinolite asbestos



l. actinolite

REFERENCE EXHIBIT 4

The Aspect Ratio

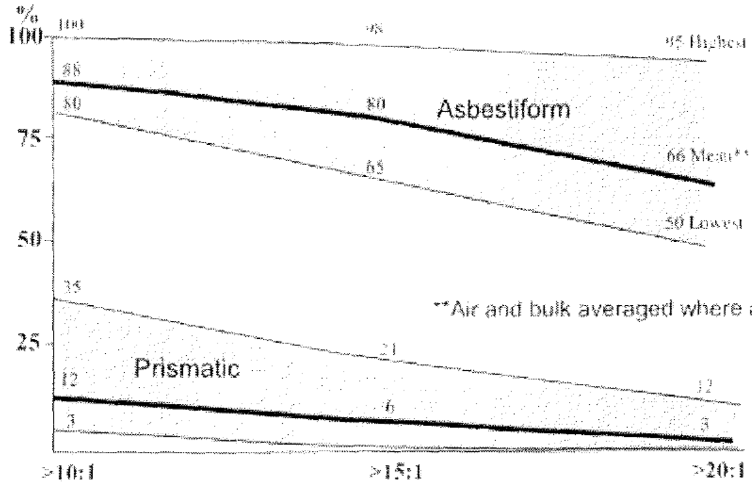
Existing regulatory standards for asbestos are based on a light microscopy analysis of airborne particles with a length-to-width ratio (aspect ratio) of 3:1 or greater and a length greater than 5 µm. This was arbitrarily set to obtain consistency among **asbestos** "fiber" counters. Unfortunately, this dimensionless parameter, adopted for asbestos quantification, has been misused by some as a means to "identify" asbestos. Since many other particles share these dimensions, it is improper to use the aspect ratio as a designator of asbestos.

However, the aspect ratio concept, when used with caution, can be useful in distinguishing the asbestiform or prismatic nature of a given dust population. Due to the tendency of asbestiform fiber bundles to separate into thinner and thinner fibers when pressure is applied (i.e., ground), the aspect ratio tends to remain high. In contrast, because prismatic minerals break or cleave in a more random fashion, few relatively long, thin particles are produced. Prismatic dust populations will, therefore, generally retain low aspect ratio characteristics. This fundamental difference can be observed under the light microscope and used as one analytical parameter to distinguish an asbestiform dust population from a prismatic dust population. It must be stressed, however, that this parameter is not a means to positively identify asbestos.

The following figure contrasts the typical aspect ratio difference between asbestiform dust populations and prismatic dust populations. Starting with all particles that exceed a 3:1 aspect ratio (> 5 µm length), the asbestiform dust population maintains an elevated percentage of high aspect ratio particles while the prismatic population does not.

COMPOSITE ASPECT RATIO DISTRIBUTION*
(from references 5 - 12)

*Aspect ratio for particles >5µm length and an aspect ratio of 3:1 or greater.



**Air and bulk averaged where applicable.

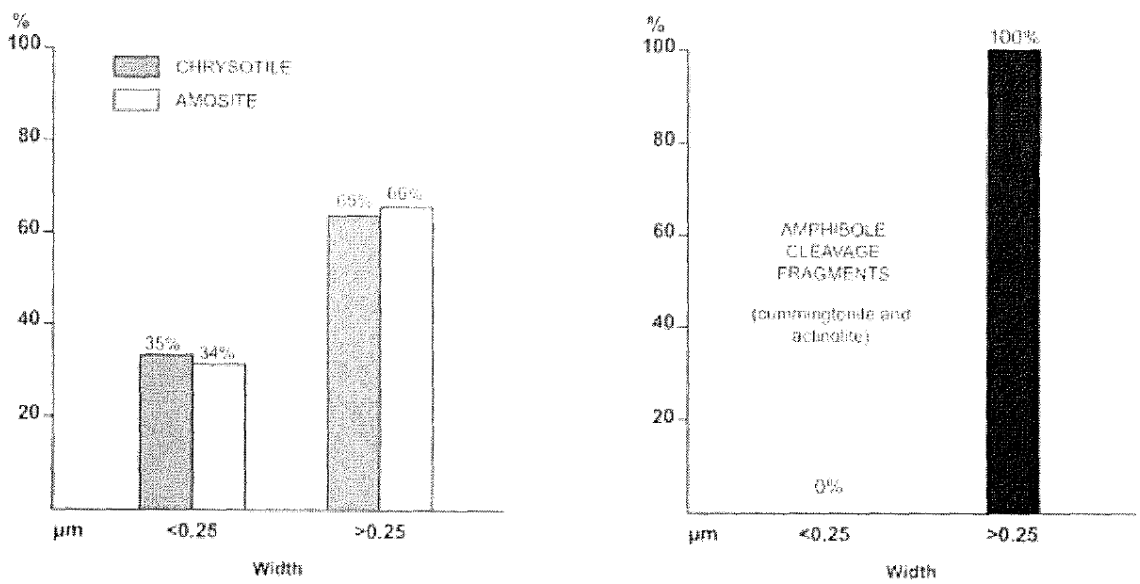
Example: Prismatic particles with an aspect ratio of 3:1 or greater (> 5 µm length), 6% on average exceed an aspect ratio of 15:1 while asbestiform particles, 80% on average exceed this ratio.

Particle Width

Distinctions between populations of cleavage fragments and asbestos fibers can be drawn by comparing the frequency of widths for particles longer than 5 µm. In cleavage fragment populations, width increases with length; in asbestos populations, width is almost independent of length. Cleavage fragments are rarely less than 0.5 µm in width and almost never less than 0.25 µm. A significant fraction of asbestos fibers, however, are less than 0.25 µm in width, and most asbestos populations have at least 50% of the fibers with widths equal to or less than 0.5 µm. (75)

Since asbestos fibrils separate easily, wide fibers composed of multiple fibrils are uncommon in airborne populations or in laboratory preparations that involve dispersal in water by using ultrasound. Nonetheless, there is a slight tendency for very long fibers to be composed of more than one fibril and therefore to be slightly wider than the shorter fibers. In the examination of bulk asbestos under the light microscope, however, it is not uncommon to encounter very wide bundles since sample preparation does not involve fibrillar separation by sonication. However, the composite nature (fibrillar structure) of fibers wider than 1 µm can almost always be seen by light and electron microscopy.

Asbestos populations do vary in their fibril size, the range in fibril size, and their resistance to separation. For example, amosite fibrils are slightly wider than crocidolite fibrils and single fibrils of chrysotile have uniform widths. Nonetheless, taken as a group, the width distribution of a given dust population can be used to gauge the asbestiform or prismatic nature of a mineral dust.

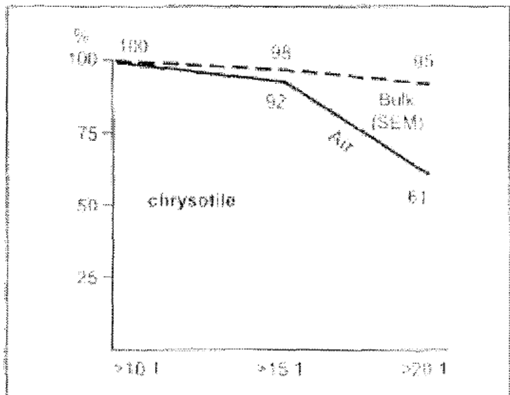


Average of 17 air samples. Width comparison by electron microscopy (STEM). All particles are 3:1 aspect ratio or greater, > 5 µm length (4).

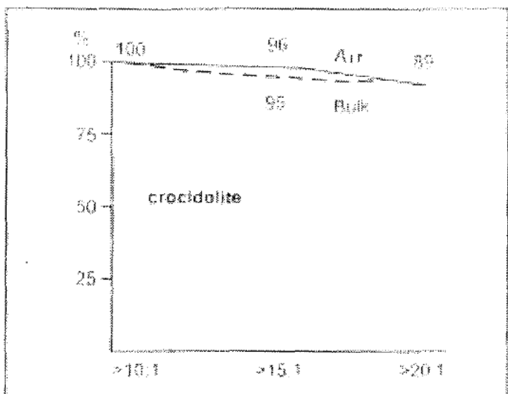
ASPECT RATIO COMPARISONS

Includes only particles with a 3:1 aspect ratio (a.r.) or greater and length > 5 μm.

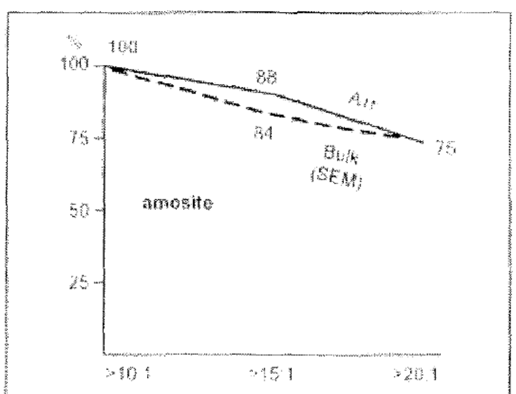
Asbestiform



a. a.r. References: 5,6

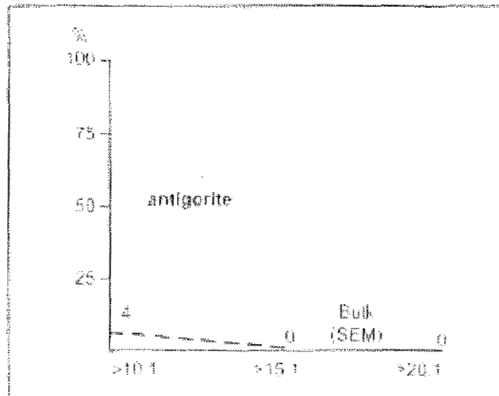


c. a.r. References: 5,7

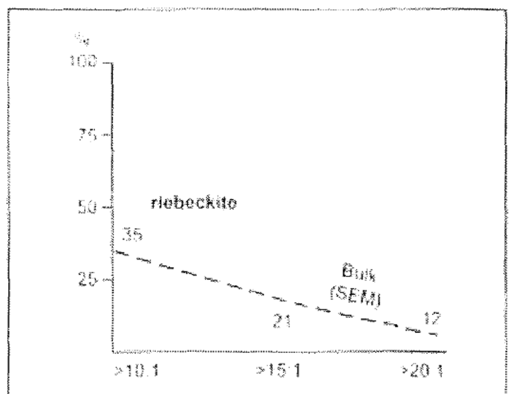


e. a.r. References: 5,7

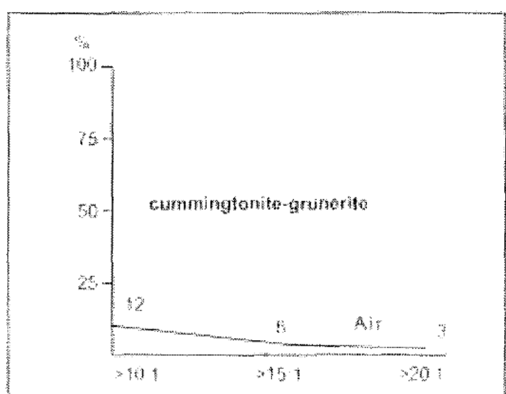
Prismatic



b. a.r. References: 5



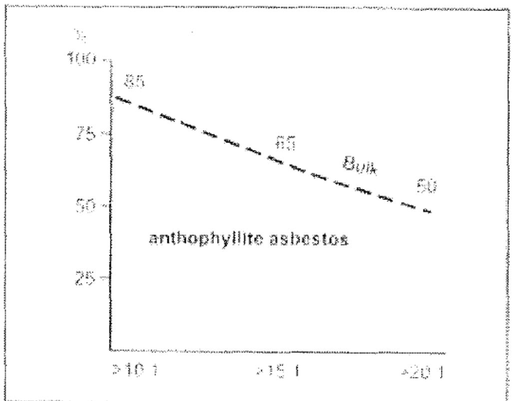
d. a.r. References: 8



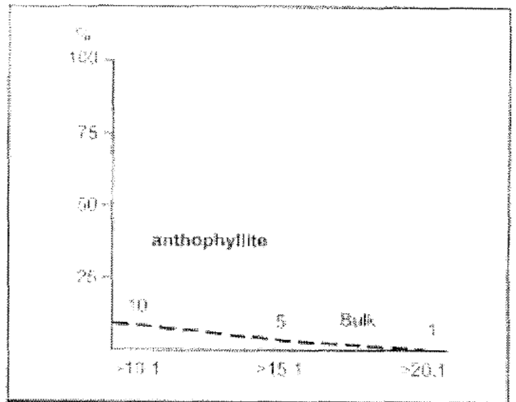
f. a.r. References: 9,10

Asbestiform

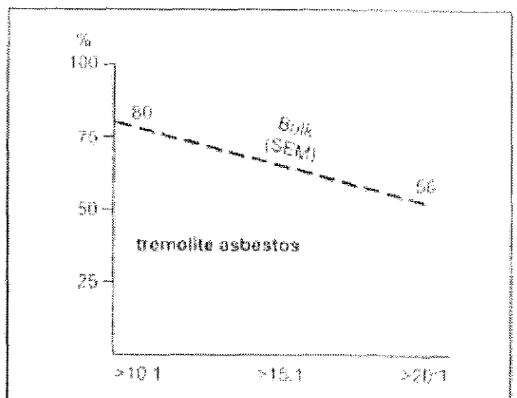
Prismatic



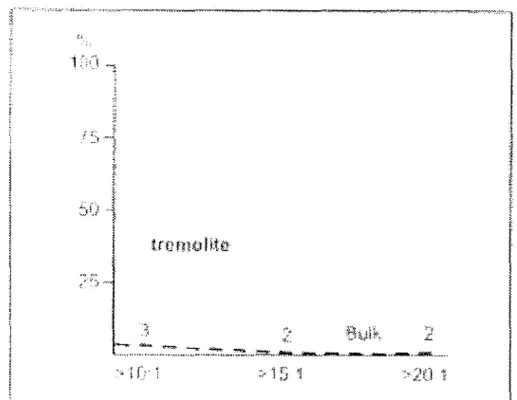
g. a.r. References: 11



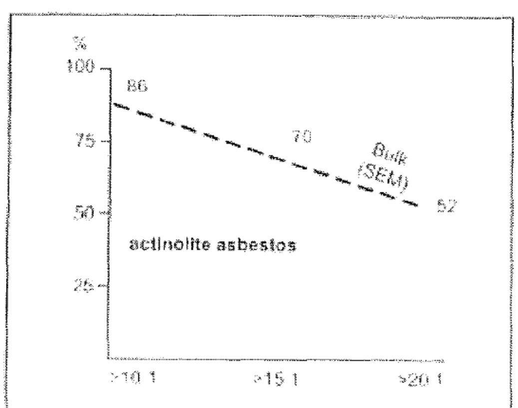
h. a.r. References: 11



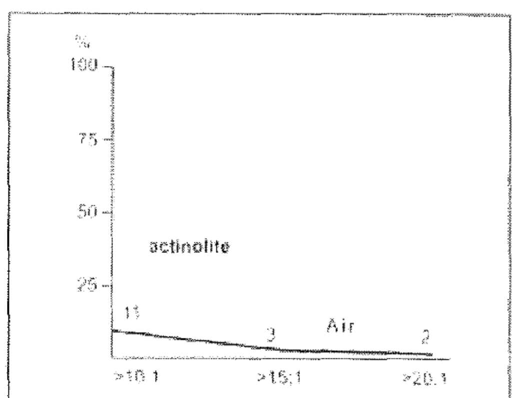
i. a.r. References: 12



j. a.r. References: 5



k. a.r. References: 8



l. a.r. References: 5

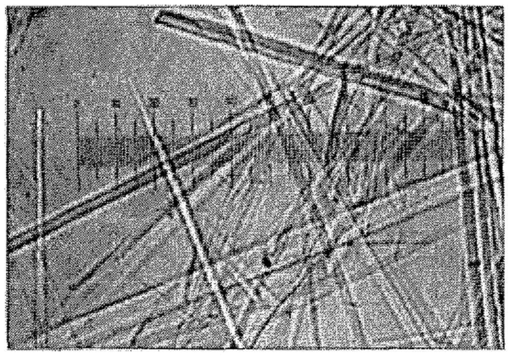
REFERENCE EXHIBIT 5

Byssolite
Unusual Needle-like Prismatic Mineral Growth

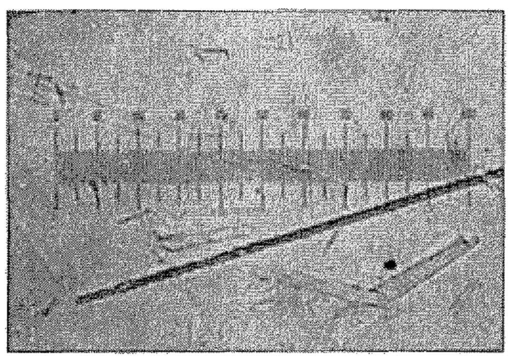
Although most prismatic particulates appear as described and pictured in prior exhibits, prismatic particles can appear in a very acicular or needle-like form. Although such particles do not exhibit characteristics unique to asbestos (fibrillar bundling, splayed terminations, extreme lengths, etc.), high length to width aspect ratios are possible. The Addison Italian and Dornie tremolite samples summarized in this pictorial exhibit (J and P respectively) reflect this rare particulate form. Byssolites, whose optical properties are often normal, sometimes exhibit their own distinctive optical property - a lack of optical extinction when oriented and viewed on the 010 crystallographic surface (79). This distinction, as well as a lack of other asbestiform morphological properties, allows one to distinguish the byssolite habit from the asbestiform habit.

Further comminution of these elongated prismatic particles, as illustrated to the right, demonstrates the essential difference in mineral habit. Prismatic minerals cleave to shorter prismatic particles, while asbestos continues to separate along crystal surfaces into smaller and smaller bundles of fibrils.

Comminution of Byssolite



Photomicrograph - 265 X (2 µm/Div.)



Minor Breaking
Photomicrograph - 265 X (2 µm/Div.)

Commercial Grind
Photomicrograph - 265 X (2 µm/Div.)

QUESTION

DOES THIS MINERALOGICAL (MORPHOLOGICAL) DIFFERENCE = BIOLOGICAL DIFFERENCE?

A Review of
Asbestiform and Prismatic Cancer Studies

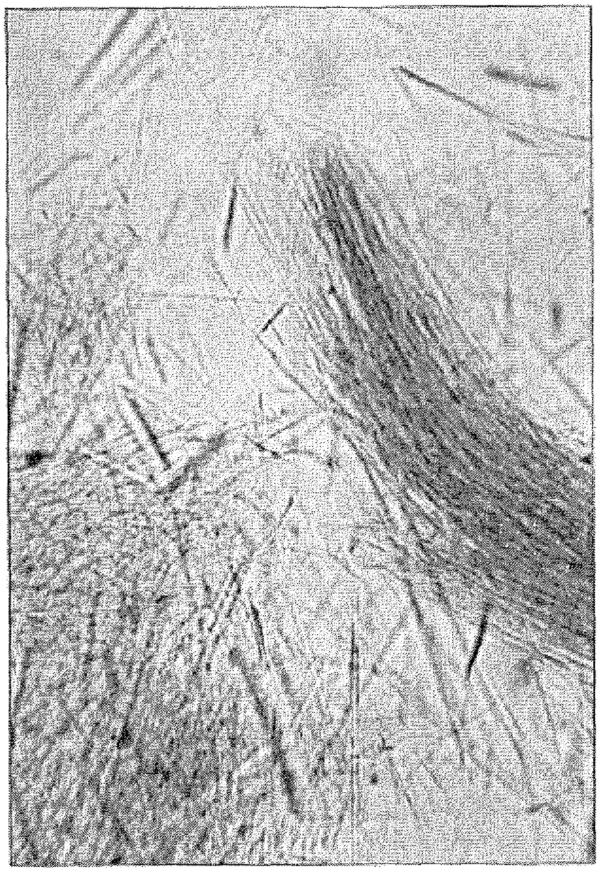
The following "EXPOSURE EXHIBITS" summarize human and animal studies relative to prismatic amphiboles. The majority of studies available in this area involve tremolite.

A large body of literature amply addresses the most commonly encountered, commercially exploited asbestos minerals (*chrysotile*, *crocidolite*, and *amosite*). For the purpose of this presentation, further health review of these asbestos minerals is not considered necessary.

These asbestiform exhibits sufficiently demonstrate previously described mineralogical distinctions and provide the most appropriate contrast to prismatic amphibole health studies.

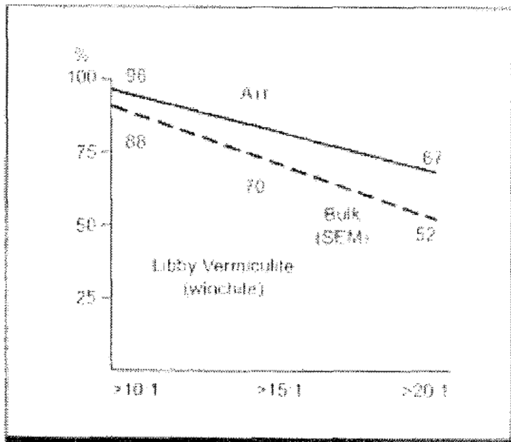
Asbestiform Winchite — Human Mortality Study

Light Microscopy: 320 X

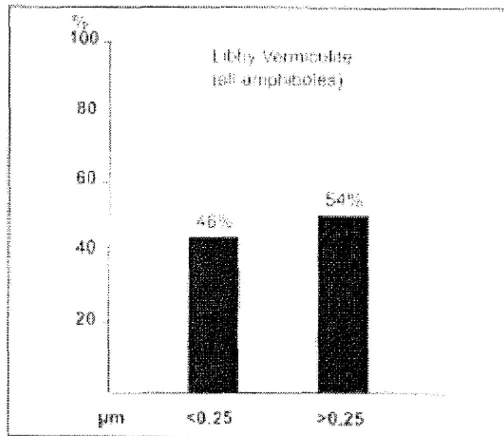


SEM: 1180 X

ORE: "The vermiculite ore as fed to the mill contained 4-6% amphibole in the tremolite series" (13). More recent analysis of the Libby ore reports the asbestiform amphibole to be winchite asbestos (formally called soda tremolite) (74).



Aspect Ratio Reference: 14,15



Width Reference: 16

ADDITIONAL MINERAL PARTICLE DATA:

Range of: Diameters = 0.1 - 0.2 μm
Length = 1 - 70 μm (62% > 5 μm)
Aspect Ratio = 3:1 - 100:1 (13)

For fibers > 0.45 μm in width and > 5 μm in length, collected on air filters, 96% had aspect ratios > 10:1, 67% had 20:1 or greater aspect ratios and 10% were 50:1 or greater. (15)

HEALTH STUDIES:

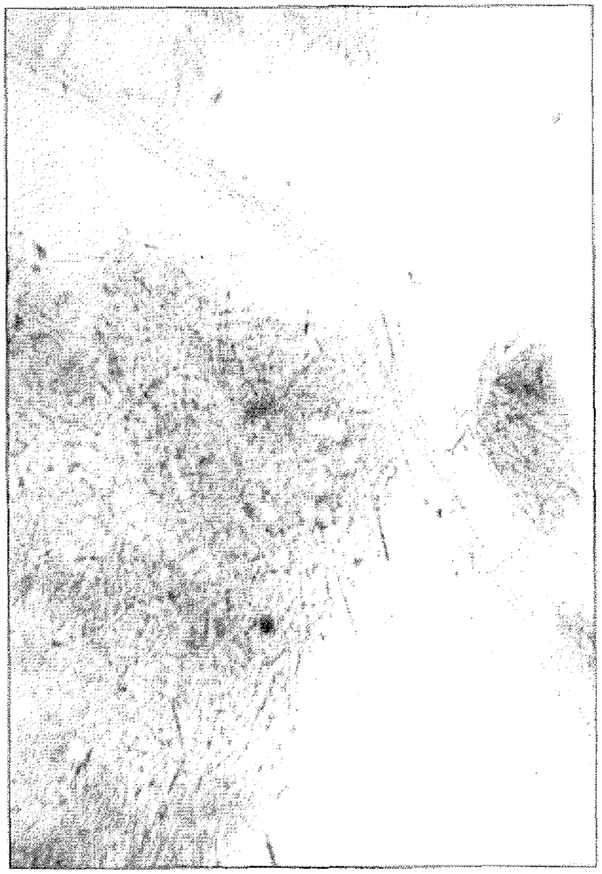
Authors: McDonald, J.C., et al (13) Pub. 1986
Cohort: 406 men, >1 yr. exposure, hired prior to 1963
Vital Status Cut Off: July 1, 1983 **SMR** (resp. cancer) - 245
Conclusion: "The cohort studied was not large but sufficient to show that workers in this mine experienced a serious hazard from lung cancer, pneumoconiosis, and mesothelioma."

Authors: Amandus, H.E., et al (15) Pub. 1987
Cohort: 575 men, >1 yr. exposure, hired prior to 1970
Vital Status Cut Off: December 31, 1981 **SMR** (resp. cancer) - 223
Conclusion: "Results indicated that mortality from nonmalignant respiratory disease and lung cancer was significantly increased."

OVERALL CONCLUSION: **Asbestiform winchite in this mining operation is reasonably linked to excess lung cancer and mesothelioma.**

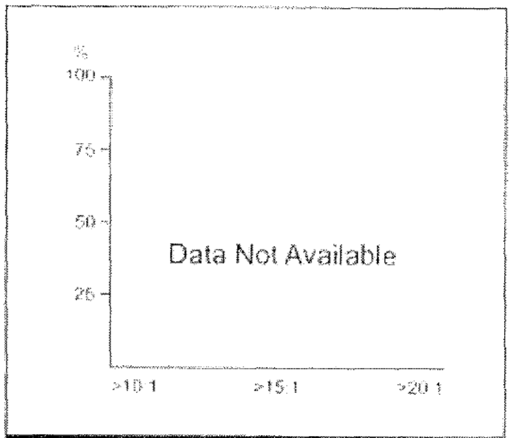
Asbestiform Tremolite — Human Mortality Study

Light Microscopy: 320 X

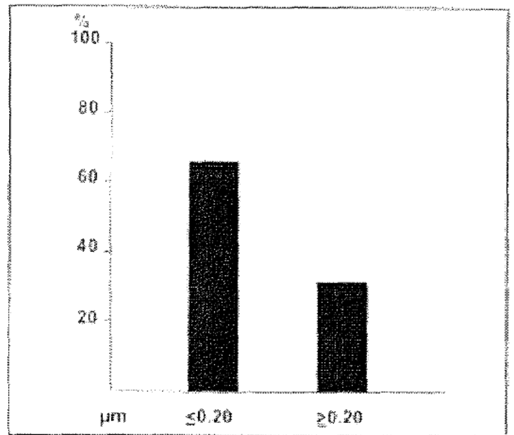


SEM: 1900X

ORE: "This tremolite is linked to whitewash used in Greek villages. The villages involved Milea, Metsovo, Anilio and Votonosi (Metsovo area in North Western Greece)" (18).



Aspect Ratio Reference:



Width Reference: 17

ADDITIONAL MINERAL PARTICLE DATA:

"These fine fibers were unlike the usual tremolite laths, they had aspect ratios in excess of 100:1; they were curvilinear; they had parallel extinction, and they formed polyfilamentous bundles of fibers" (18). Only 6.7% of fibers exceeded a 0.61 µm width. Fifty-three percent of all fibers were < 1.0 µm in length while 6% exceeded 5 µm in length (17).

HEALTH STUDIES:

Authors: Langer, A.M., et al (18) Pub. 1987
Cohort: Population of Metsovo in Northwestern Greece
Conclusion: Substantial incidence of mesothelioma in certain towns is linked to tremolite asbestos found in whitewash and stucco.

OVERALL CONCLUSION: **Asbestiform tremolite in whitewash has been linked to substantial incidences of mesothelioma.**

EXPOSURE EXHIBIT C *KOREAN TREMOLITE*

Asbestiform Tremolite — Animal Study

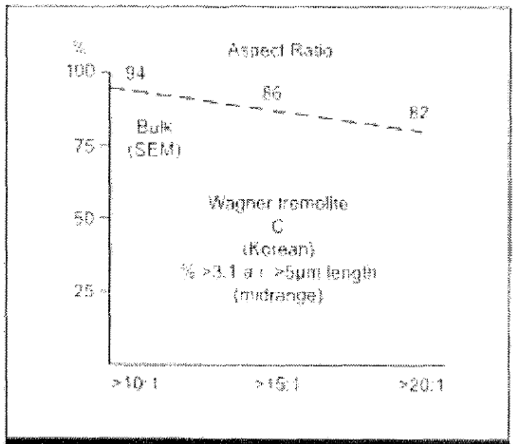
Light Microscopy: 320 X

SEM: 1900 X

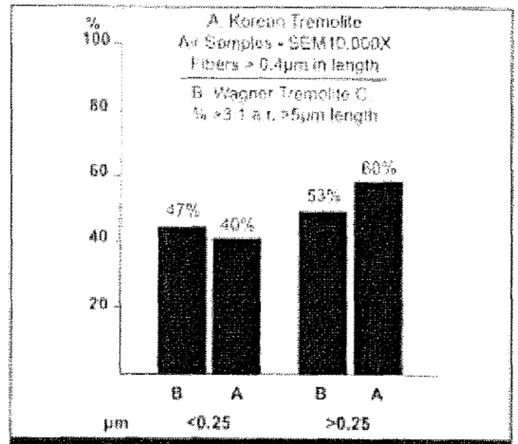
SAMPLE: Reported as commercial asbestos originating from S. Korea. Contains by mass approx. 95% asbestiform tremolite. It is reported this same material was used in three separate animal studies (19).

ADDITIONAL MINERAL PARTICLE INFORMATION

"In the optical microscopy and SEM examinations, the asbestos tremolites were found to be typical of that form in displaying polyfilamentous fiber bundles, curved fibers, fibers with splayed ends, and long, thin, parallel-sided fibers. Most of the fibers showed straight extinction when observed with polarized light under crossed polarizers, indicating the presence of multiple twinning of the crystals." "Samples did contain some elongated fragments of tremolite with oblique extinction, stepped ends, and nonparallel sides indicating that they were cleavage fragments." (20)



Aspect Ratio Reference: 22,23



Width Reference: 21, 22, 23

ANIMAL STUDIES:

Authors: Wagner, J.C., et al (22) Pub. 1982
Test Animals: Sprague-Dawley rats, 6-10 weeks old when injected.
Test Type: Pleural injection
Protocol: A single 20 milligram injection into the right pleural cavity of 48 rats. "The sample was prepared by milling in a small agate mill and ultrasonic dispersion, large particles being removed by sedimentation in water."
Findings: "Sample C produced 14 mesotheliomas in 47 rats."

Authors: Davis, J.M., et al (21) Pub. 1985
Test Animals: SPF male Wistar rats
Test Type: Inhalation and interperitoneal injection
Protocol: For inhalation, 48 rats were exposed for 7 hours each day, 5 days per week, over a 12 month period, to approx. 10 mg of respirable dust per cubic meter of air. For interperitoneal injection, a 25 mg dose of tremolite was collected from the inhalation chamber and injected (in saline) into the peritoneal cavities of rats.
Findings: For the inhalation study, a total of 16 carcinomas and 2 mesotheliomas occurred in 39 animals. None were observed in controls. For the interperitoneal study, a total of 27 animals out of 29 examined were found to have mesothelioma tumors. Mean survival time was 352 days.

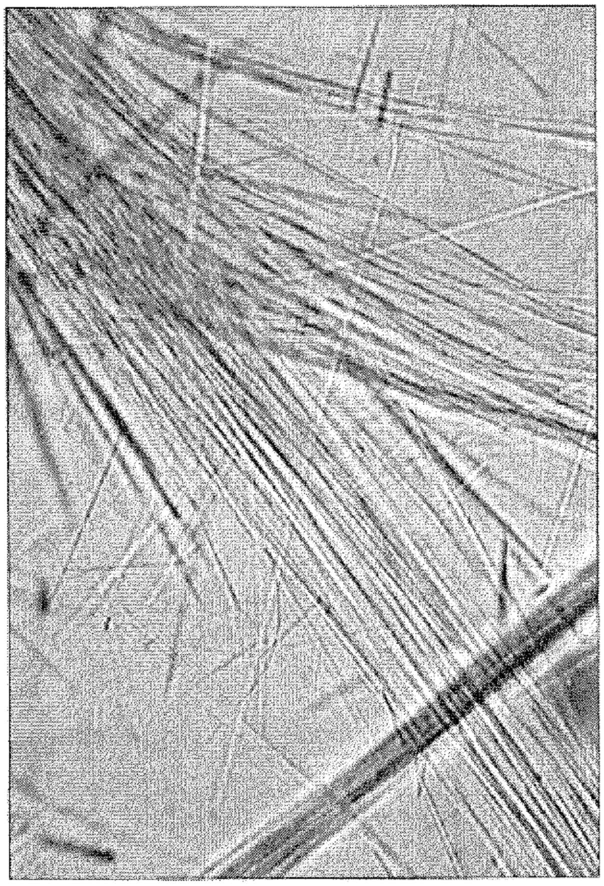
Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 32 mesothelioma deaths out of 33 animals were observed with a median survival time of 428 days.

OVERALL CONCLUSION: **This asbestiform tremolite produced a strong carcinogenic response in the test animals.**

EXPOSURE EXHIBIT D *ADDISON/DAVIS-TREMOLITE (Jamestown)*

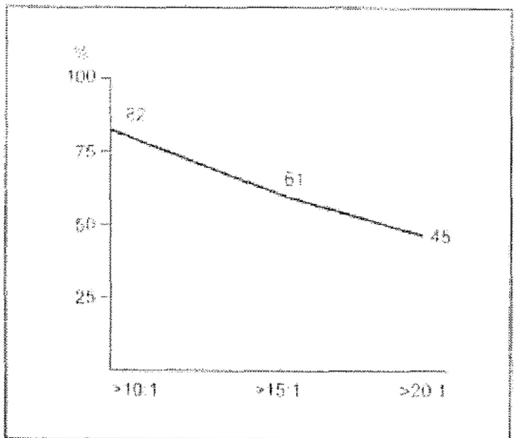
Asbestiform Tremolite — Animal Study

Light Microscopy: 320 X

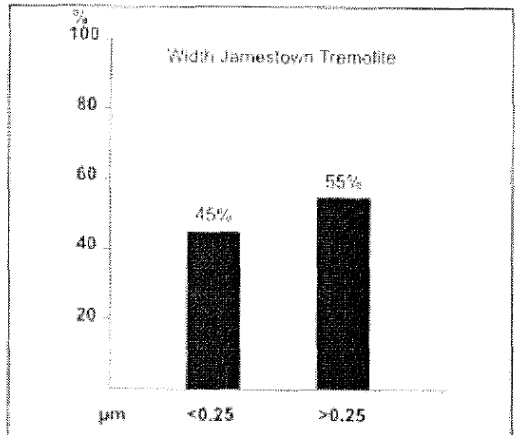


SEM: 1900 X

SAMPLE: "Fine white tremolite asbestos, Jamestown, California" (20). (Above photomicrographs were taken from bulk material.)



Aspect Ratio Reference: 23



Width Reference: 23

ADDITIONAL MINERAL PARTICLE DATA:

"In the optical microscopy and SEM examinations, the asbestos tremolites were found to be typical of that form in displaying polyfilamentous fiber bundles, curved fibers, fibers with splayed ends, and long, thin, parallel-sided fibers. Most of the fibers showed straight extinction when observed with polarized light under crossed polarizers, indicating the presence of multiple twinning of the crystals." "Samples did contain some elongated fragments of tremolite with oblique extinction, stepped ends, and nonparallel sides indicating that they were cleavage fragments." (20)

ANIMAL STUDIES

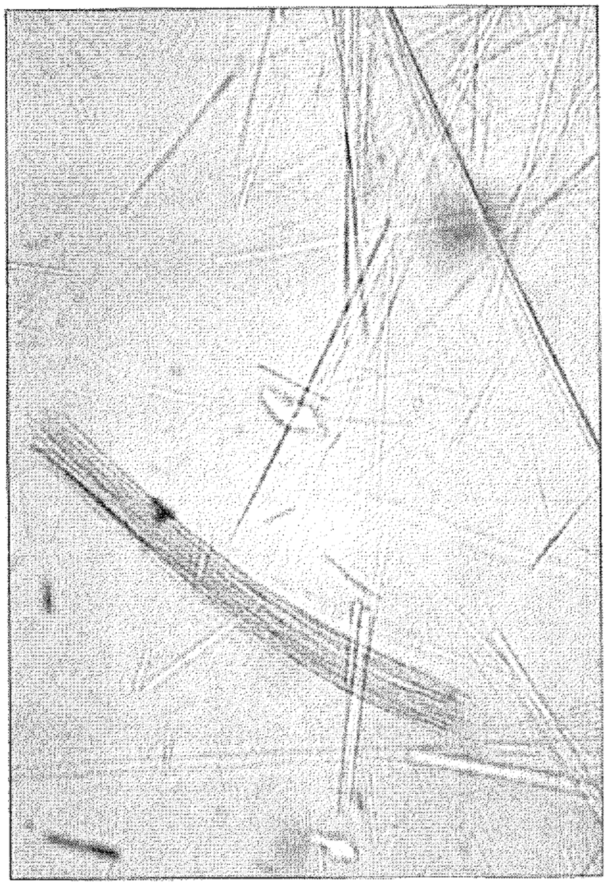
Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 36 mesothelioma deaths out of 36 animals were observed with a median survival time of 301 days.

OVERALL CONCLUSION: **This asbestiform tremolite produced a strong carcinogenic response in the test animals.**

EXPOSURE EXHIBIT E ADDISON/DAVIS-TREMOLITE (Swansea)

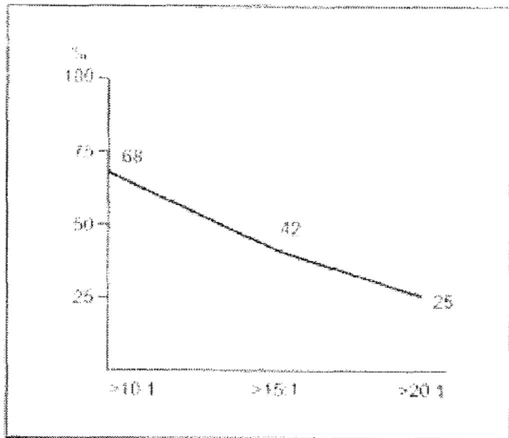
Asbestiform Tremolite — Animal Study

Light Microscopy: 320 X

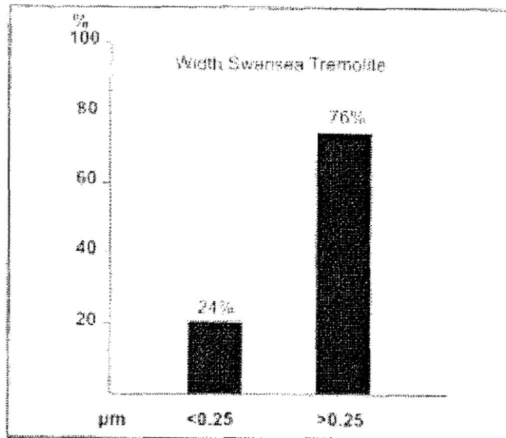


SEM: 1900 X

SAMPLE: "Fine white tremolite asbestos, Swansea Laboratory" (20). (Above photomicrographs were taken from bulk material.)



Aspect Ratio Reference: 23



Width Reference: 23

ADDITIONAL MINERAL PARTICLE DATA:

"In the optical microscopy and SEM examinations, the asbestos tremolites were found to be typical of that form in displaying polyfilamentous fiber bundles, curved fibers, fibers with splayed ends, and long, thin, parallel-sided fibers. Most of the fibers showed straight extinction when observed with polarized light under crossed polarizers, indicating the presence of multiple twinning of the crystals." "Samples did contain some elongated fragments of tremolite with oblique extinction, stepped ends, and nonparallel sides indicating that they were cleavage fragments." (20)

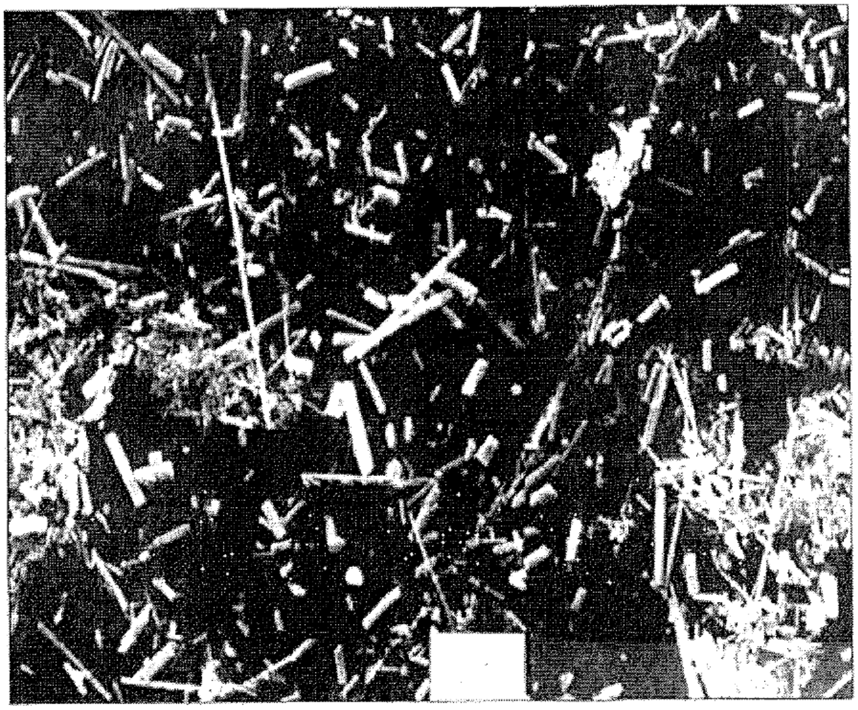
ANIMAL STUDIES

Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 35 mesothelioma deaths out of 36 animals were observed with a median survival time of 365 days.

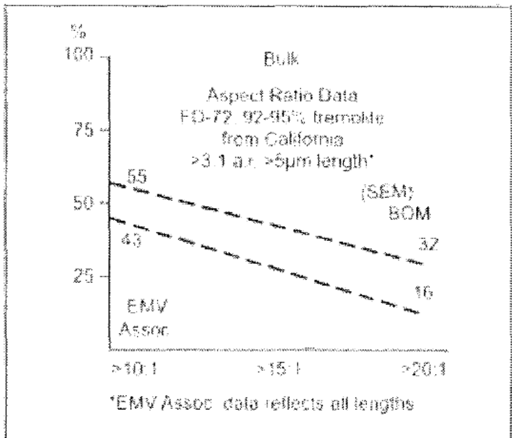
OVERALL CONCLUSION: **This asbestiform tremolite produced a strong carcinogenic response in the test animals.**

Asbestiform Tremolite — Animal Study

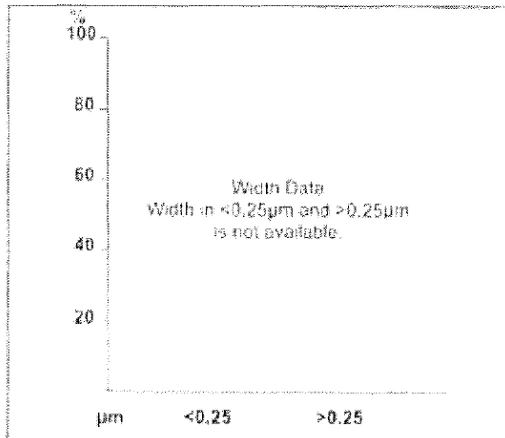
SEM: 1250 X



SAMPLE: FD-72 was supplied to Dr. Smith from Dr. Merle Stanton and indirectly from Johns-Manville. This material, reportedly from California, is described as asbestiform and may have been used by Dr. Stanton in his work (tremolite 1 and 2).



Aspect Ratio Reference: 12, 24



ADDITIONAL MINERAL PARTICLE DATA:

The sample preparation of FD-72 is unclear, although a portion of this sample was provided to the Bureau of Mines (BOM) for characterization. The sample was dispersed in water, ultrasonically agitated and filtered through a nucleopore filter for SEM preparation. Petrographic preparation required no such processing. There is some question as to how exact the BOM samples are to Dr. Smith's analysis (EMV Assoc), but major differences are not indicated. For FD-72, 9 particles with a length of >10 µm were observed in 200 total particles by SEM.

ANIMAL STUDIES

Authors: Smith, W.E., et al (25) Pub. 1979
Test Animals: Male LUG: LAK hamsters, injected at 2 months of age.
Test Type: Intrapleural injection
Protocol: Single intrapleural injection of two dosages (10 and 25 mg). The sample was suspended in saline and sterilized by autoclave. The occurrence of tumors (unspecified) was noted at necropsies for a starting group of 50 animals per dose. After short-term sacrifice of some animals and the loss of others through acute enteritis, the occurrence of tumors was noted in nonsurvivors up to 600 days.
Findings: Four tumors out of 13 animals were found at the 10 mg dose, and 13 out of 20 animals were found at the 25 mg dose.

OVERALL CONCLUSION: **Asbestiform tremolite produced pleural tumors.**

EXPOSURE EXHIBIT G — *STANTON-TREMOLITE 1 AND 2*

Asbestiform Tremolite — Animal Study

Light Microscopy: 320 X

SEM: 1800 X

SAMPLE: The exact origin of this tremolite asbestos from California, provided to Dr. Stanton by Johns-Manville, is unknown (26). "Both of these samples were from the same lot of asbestos and were in the optimal range of size for carcinogenesis" (27).

Aspect Ratio and Width Data

Aspect ratio and width data has not been developed due to concerns over the reliability of transcribing data presented in the literature (28). These difficulties result from questions over the accuracy (reproducibility) of size distribution data (especially for asbestiform samples — see discussion below). Size-data, however, does reflect a broad size distribution with many very long and very narrow fibers (i.e., < 0.25 width, > 20:1 aspect ratios).

ADDITIONAL MINERAL PARTICLE DATA:

Obtaining accurate dimensional data for these tremolite samples was difficult as reported by the investigators on page 965 of their report: "Of special interest are the data on the amphibole asbestoses: amosite, tremolite and crocidolite, though estimates of the dimensions of the asbestoses are especially liable to error." And on page 973: "In preparations of amphibole asbestos (which included the crocidolites and tremolites), we observed that both clumping and fragmentation of the particles were greater than those in other minerals, and estimates of particle size distribution in that the asbestiform characteristic of fiber bundles (reported as clumping), and the splitting of these bundles (reported as fragmentation), was the reason for the difficulty in obtaining accurate fiber size distributions.

ANIMAL STUDIES

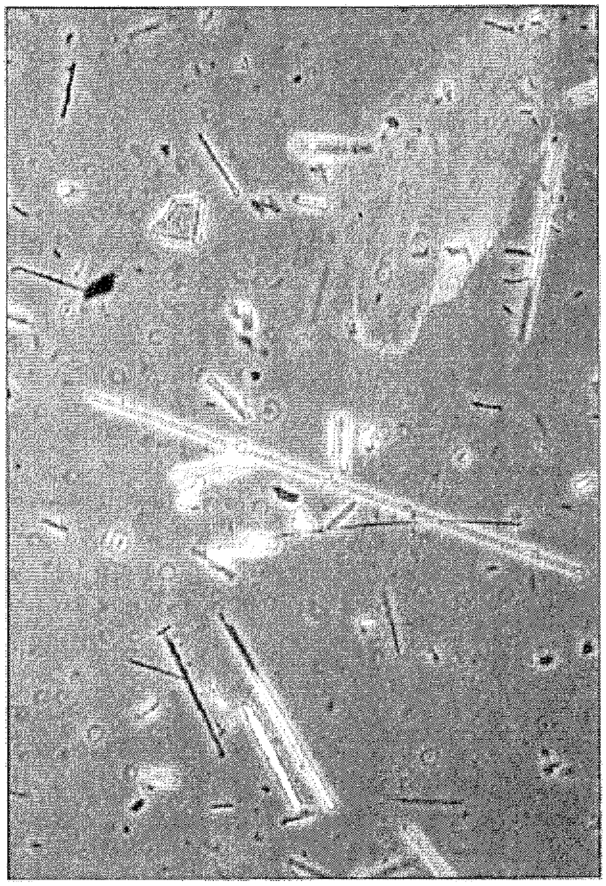
Authors: Stanton, M.F., et al. (27) Pub. 1981
Test Animals: 20-week-old, outbred female Osborne-Mendal rats
Test Type: Pleural implantation
Protocol: A standard 40 mg dose of each tremolite asbestos sample was uniformly dispersed in hardened gelatin and applied by open thoracotomy directed to the left pleural surface. The animals were followed for 2 years, at which time the survivors were sacrificed and the tissue examined for pleural sarcomas.
Findings: Exposure to these tremolite asbestos samples resulted in tumor incidences in 22 out of 28 animals for Sample 1 and 21 out of 28 animals in Sample 2.

OVERALL CONCLUSION: **These asbestiform tremolites resulted in a significant carcinogenic response in the study population.**

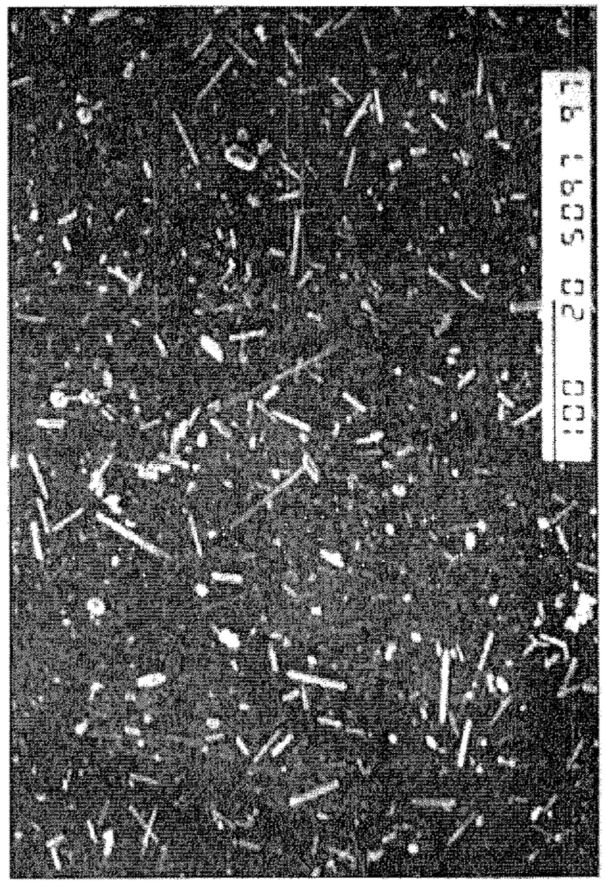
EXPOSURE EXHIBIT H *COOK/COFFIN — FERROACTINOLITE*

Asbestiform Ferroactinolite — Animal Study

Light Microscopy: 400 X



SEM: 200 X



SAMPLE: "Test fibers were prepared from loose surface iron-formation rocks" (29).

NOTE: Although the reference photo-micrograph reflects actinolite asbestos, ferroactinolite is not a designated asbestos mineral. It appears, however, to be asbestiform.

	Ferroactinolite Prior to Placement in the Animals				Ferroactinolite After Placement in the Animals		
					Mean After		
	Mean	Median	Range		1 Month	4 Months	12 Months
Length	3.18	1.50	0.3 - 52.3	Length	2.10	2.00	1.77
Width	0.41	0.24	0.03 - 5.23	Width	0.19	0.17	0.11
Aspect Ratio	9.0	6.0	3.0 - 130.0	Aspect Ratio	17.1	22.3	30.1

ADDITIONAL MINERAL PARTICLE DATA:

"The estimated mineral particle content by volume was as follows: ferroactinolite fibers (50%), sheet silicate plates (20%), magnetite (5%), ferroactinolite and hornblende fragments (20%), and other minerals (5%)" (29). "Examination by transmission electron microscopy of low temperature ashed whole lung specimens of animals killed sequentially, indicated that the mineralogical characteristics of both ferroactinolite and amosite fibers changed in time. Longitudinal splitting of the fibers resulted in a greater number of thinner fibers with increased aspect ratio." "The ferroactinolite splitting reaction is more rapid and results in the formation of thinner and more numerous fibers than the amosite splitting reaction" (30).

ANIMAL STUDIES

Authors: Cook, P.M., Coffin, D.L., et al (29-30) 1982
Test Animals: Male Fischer - 344 rats
Test Type: Intratracheal instillation and intrapleural injection
Protocol: The intratracheal instillation experiment involved twelve week injections of 0.5 and 0.25 mg each in groups of 561 and 139 rats (ferroactinolite and amosite, respectively). For study of early pathological sequences and for the evaluation of clearance and fate of mineral fibers by electron microscopy, the animals were killed at various intervals up to 1 year, while others were allowed to live out their lives. The intrapleural injection experiment involved a single injection of 20 mg in groups of 135 and 137 rats. Animals were allowed to live out their lives.
Findings: "The data demonstrates that ferroactinolite produced neoplastic lesions through both routes of inoculation. On the basis of mass dose by intratracheal instillation on cogenic potency, it was greater for the ferroactinolite, whereas, by intrapleural inoculation, potency was greater for amosite, however, the difference was not statistically significant."

OVERALL CONCLUSION: **This study demonstrates a carcinogenic effect to asbestiform ferroactinolite.**

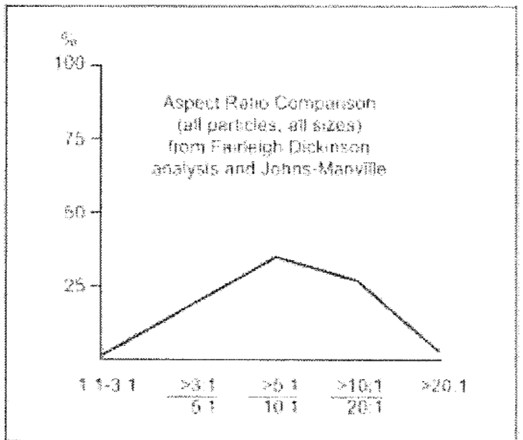
EXPOSURE EXHIBIT I

SMITH-TREMOLITE FD-31

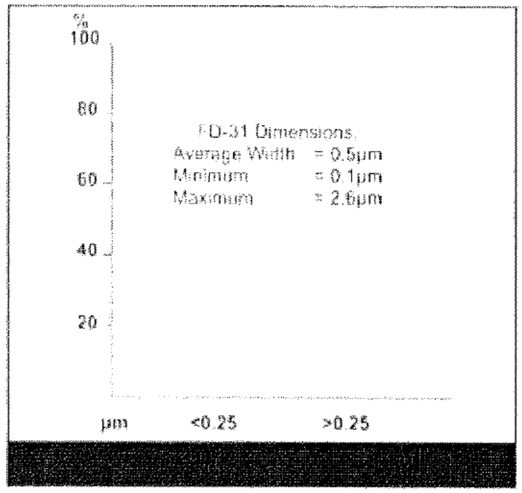
Asbestiform or Highly Fibrous Tremolite — Animal Study

SEM: 1250 X

SAMPLE: FD-31 was provided through Johns-Manville Corp. from a tremolitic talc in the Western United States (JM Sample 4368-31-3). The exact origin of this sample is unknown. This sample is generally considered a mineralogical curiosity.



Aspect Ratio Reference: 31



ADDITIONAL MINERAL PARTICLE DATA:

The exact origin and preparation of this sample is unclear. Subsequent analysis of this sample suggests that: "The particle distribution in the sample is not typical of cleavage fragments of tremolite. The particles in Sample 31 appear to be composed of true fibers whose shape was attained by growth rather than cleavage." "Particles with a 20:1 aspect ratio are quite common." "There is at least one particle which appears to be a bundle of fibers although the photograph is too fuzzy to be absolutely sure,. . ." "This sample is probably not true asbestos, and would be more appropriately characterized as a stiff fibrous variety of amphibole, which is probably byssollite" (32).

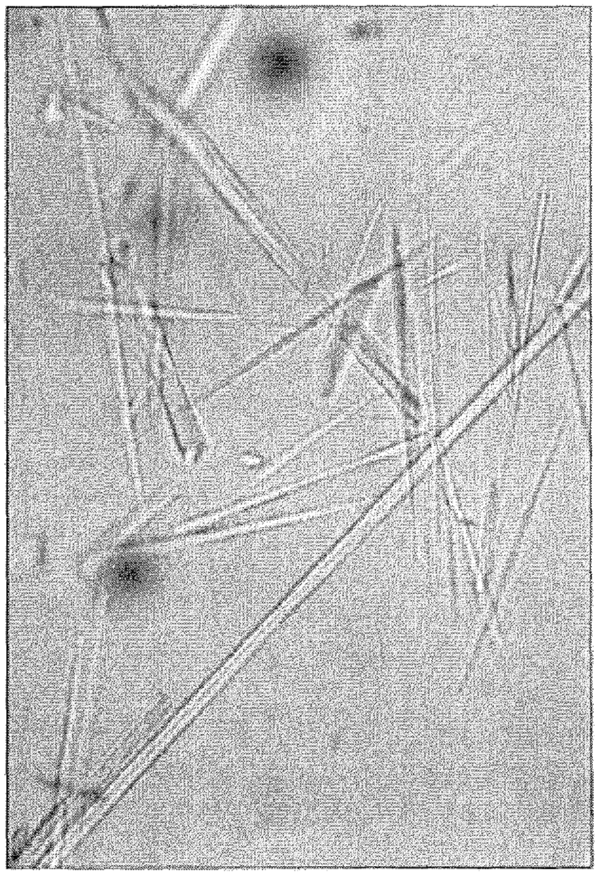
ANIMAL STUDIES

Authors: Smith, W.E., et al (25) Pub. 1979
Test Animals: Male LUG:LAK hamsters, injected at 2 months of age.
Test Type: Intrapleural injection
Protocol: Single intrapleural injection of two dosages (10 and 25 mg). The sample was suspended in saline and sterilized by autoclave. The occurrence of tumors (unspecified) was noted at necropsies for a starting group of 50 animals per dose. After short-term sacrifice of some animals and the loss of others through acute enteritis, the occurrence of tumors was noted in nonsurvivors up to 600 days.
Findings: Three tumors out of 41 animals were found at the 10 mg dose, and 12 out of 28 animals were found at the 25 mg dose.

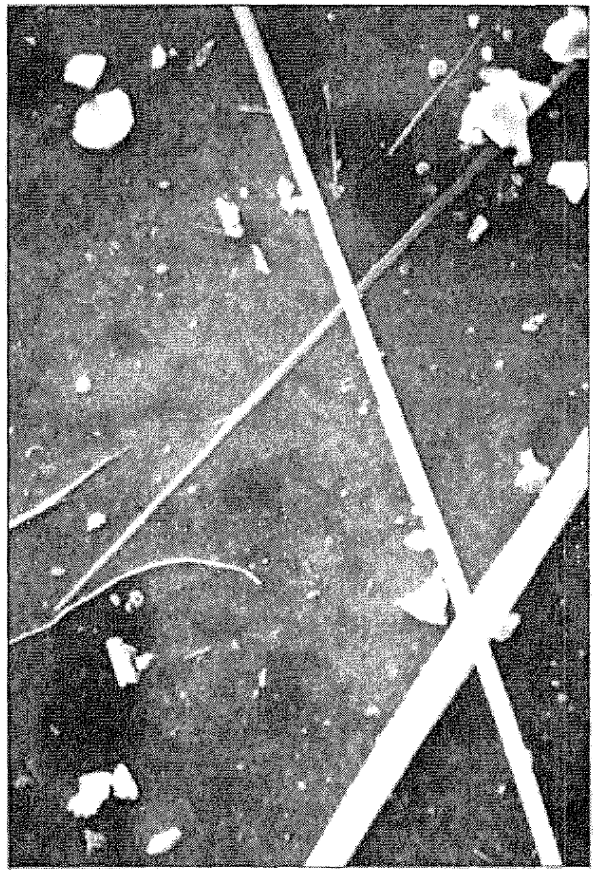
OVERALL CONCLUSION: **A highly fibrous, possibly asbestiform tremolite (or byssollite) produced pleural tumors.**

Prismatic Tremolite with Asbestiform Subpopulation — Animal Study

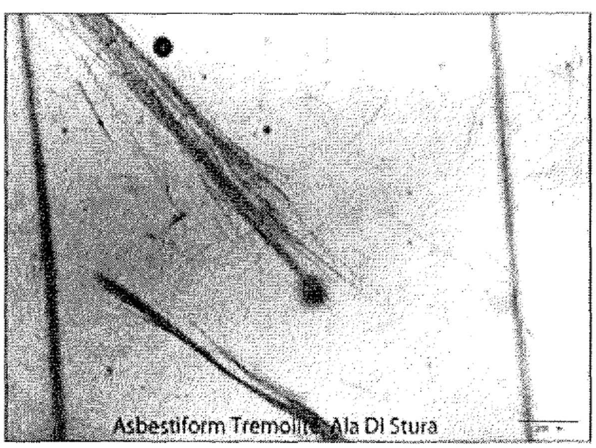
Light Microscopy: 320 X



SEM: 1800 X

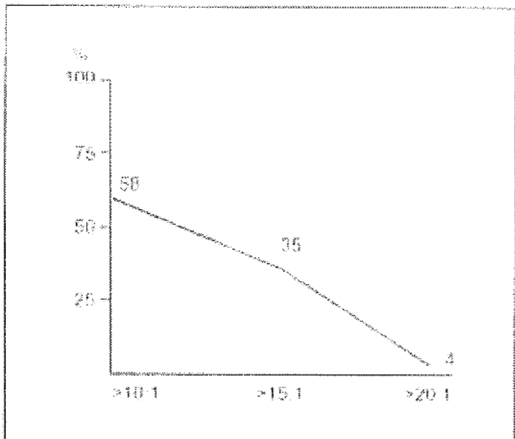


BULK MATERIAL

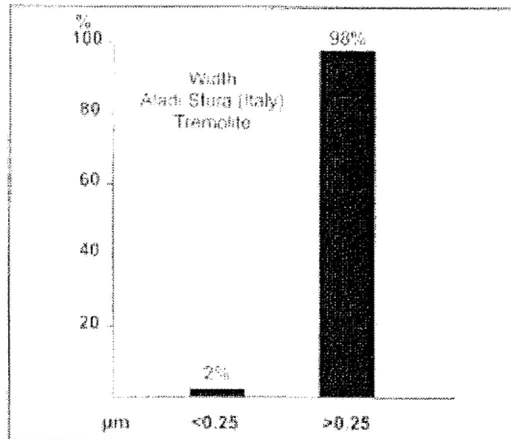


SAMPLE: The sample "consisted of large bundles of very long (often >5cm) needle-like fibers which were flexible and very elastic but quite brittle." "The tremolite from Italy contained mostly cleavage fragments, but some very long, thin fibers were observed." "The overall impression gained from dense SEM preparations, as shown in this paper, is that the Italian tremolite specimen did contain a certain amount of what observers would consider asbestiform fibers" (20).

Minerals have been characterized and verified as tremolite by x-ray diffractometry, optical microscopy, scanning electron microscopy and energy dispersive x-ray spectroscopy.



Aspect Ratio Reference: 23



Width Reference: 23

ANIMAL STUDIES

Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 24 mesothelioma deaths out of 36 animals were observed with a median survival time of 755 days (contrasted to much shorter survival time for samples containing many tremolite asbestos fibers).

OVERALL CONCLUSION: **Sample suggests the asbestiform subpopulation influenced late tumor development.**

Prismatic Grunerite — Human Mortality Study

Light Microscopy: 320 X

SEM: 1200 X

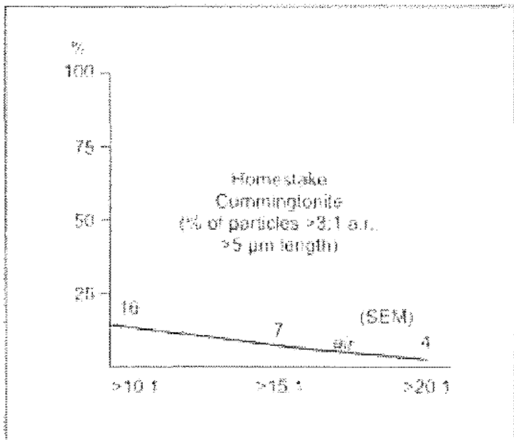
ORE: The ore is a cummingtonite-grunerite (CG), quartz deposit mined for its gold in Lead, S. Dakota (33).

ADDITIONAL MINERAL PARTICLE DATA:

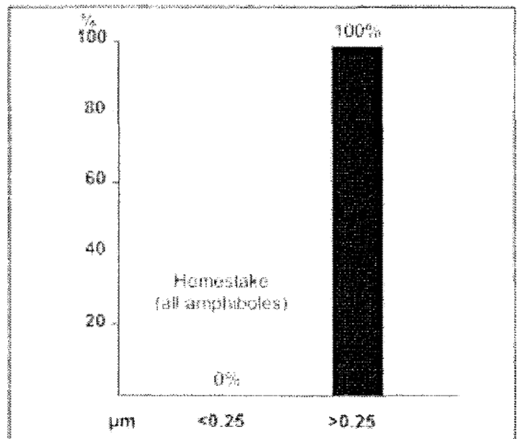
266 Fibers examined with aspect ratio of > 2:1 (air)

Minimum Width =	0.3 µm	Minimum Length =	0.9 µm
Mean Width =	1.1µm	Mean Length =	4.6 µm
Maximum Width =	4.8 µm	Maximum Length =	17.5 µm

"Eighty-four percent of the airborne fibers were identified as amphiboles." "Sixty-nine percent of the amphiboles were characterized as CG, 15% as tremolite-actinolite, with the remaining 16% identified as fibrous hornblende minerals" (33). Note: tremolite-actinolite is reported as an atypical heterogeneous occurrence.



Aspect Ratio Reference: 14



Width Reference: 34

HEALTH STUDIES

Authors: McDonald, J.C., et al (35) Pub. 1978
Cohort: 1,321 men, worked > 21 years (in Co. Veteran's Assoc.)
Vital Status Cut Off: 1973
SMR (respiratory cancer): 103
Conclusion: "There was no convincing evidence of an increase in respiratory cancer." Relative to a high mortality from silicosis - "It is difficult to believe that deaths with so wide a distribution could systematically have blocked the appearance of respiratory cancer."

Authors: Brown, D.P., et al (33) Pub. 1986
Cohort: 3,328 men, > 1 year experience underground work between 1940 and 1965
Vital Status Cut Off: June 1, 1977
SMR (respiratory cancer): 100
Conclusion: "No association as measured by length of employment underground, by dose (total dust x time), or by latency was apparent with lung cancer mortality.

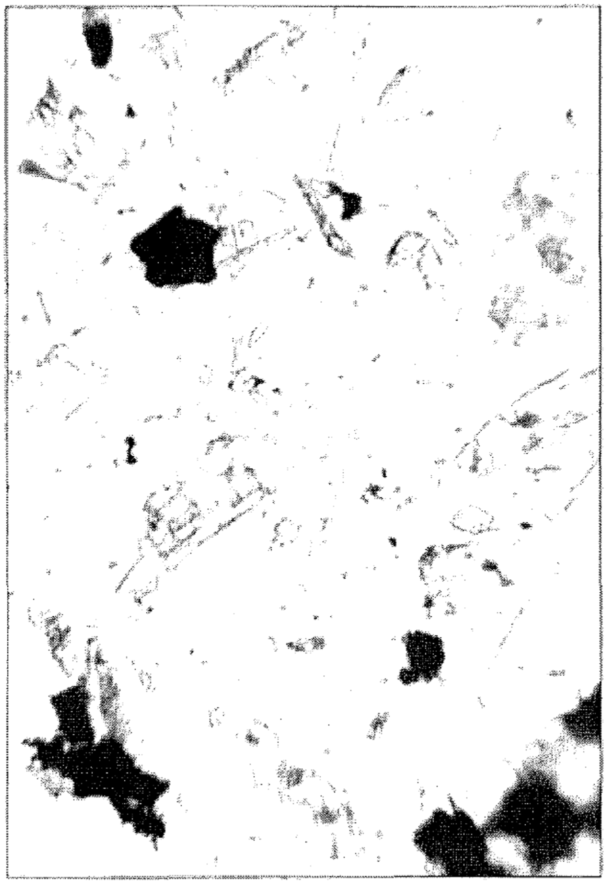
Authors: Steenland, K. et al (67) Pub. 1995
Cohort: 3,328 men, >1 year experience underground between 1940 and 1965
Vital Status Cut Off: Dec. 12, 1990
SMR (respiratory cancer): 115 (CI 94-136)
Conclusion: "Neither exposure to prismatic amphiboles nor silica was likely to be responsible for the observed excess of lung cancer, at least not in a way related to quantitative exposure to dust." "There was only one death from asbestosis in this cohort -- it would therefore appear that the prismatic fibers in this mine did not cause any marked excess of either asbestosis or lung cancer."

OVERALL CONCLUSION: **Prismatic amphibole exposure in this mining operation is not linked to excess lung cancer or mesotheliomas.**

EXPOSURE EXHIBIT L — *EAST MESABI RANGE TACONITE*

Prismatic Grunerite — Human Mortality Study

Light Microscopy: 320 X



SEM: 1200 X

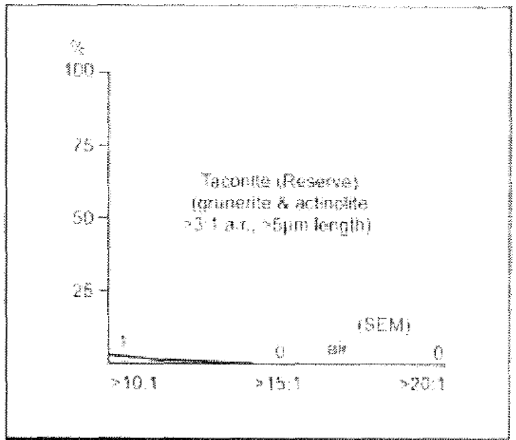
ORE: Minnesota taconite contains cummingtonite-grunerite, actinolite and hornblende amphiboles. Trace amounts of riebeckite also occur (36).

ADDITIONAL MINERAL PARTICLE DATA:

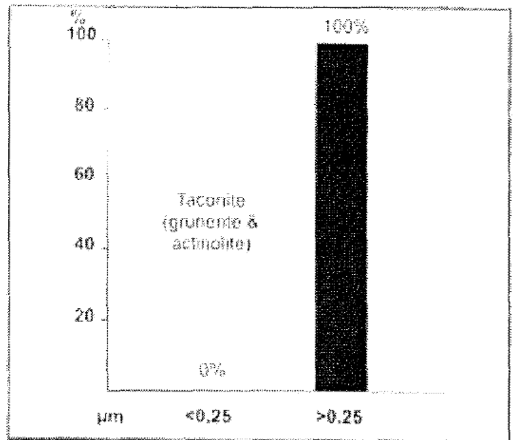
464 Fibers characterized with aspect ratio of > 2:1 (air)

Minimum Width =	0.25 μm	Minimum Length =	1.0 μm
Mean Width =	1.2 μm	Mean Length =	5.5 μm
Maximum Width =	5.0 μm	Maximum Length =	32.4 μm

"Zoltai and Stout (1976) in a report prepared for the Minnesota Pollution Control Agency, concluded that the cleavage fragments of cummingtonite-grunerite found in the Peter Mitchell Pit (Reserve Mining) should not be referred to as asbestiform" (37). "The fibers of taconite are short in length, the vast majority being less than 10 μm" (14).



Aspect Ratio Reference: 14



Width Reference: 14

HEALTH STUDIES

Authors: Higgins, I.T.T., et al (38) Pub. 1983 (Reserve Mining Co.)
Cohort: 5,751 men, worked > 1 year, 1952 to 1976
Vital Status Cut Off: July 1, 1976
SMR (respiratory cancer): 84 (full cohort), 102 (> 15 years latency)
Conclusion: "This study does not suggest any increase in cancer mortality from taconite exposure."

Authors: Cooper, W.C., et al (39) Pub. 1988 (Erie & Minntac Miners)
Cohort: 3,444, worked > 3 months 1947 to January 1, 1959
Vital Status Cut Off: 1983
SMR (respiratory cancer): 61 (full cohort), 57 (> 20 years latency)
Conclusion: "Respiratory tract cancer deaths were 39% fewer than expected (U.S. comparison) and 15% fewer than expected for Minnesota white men. Even when analysis was limited to deaths 20 or more years after first exposure, which provided ample opportunity for the leading edge of any excess in latent tumors to appear, there was no excess.

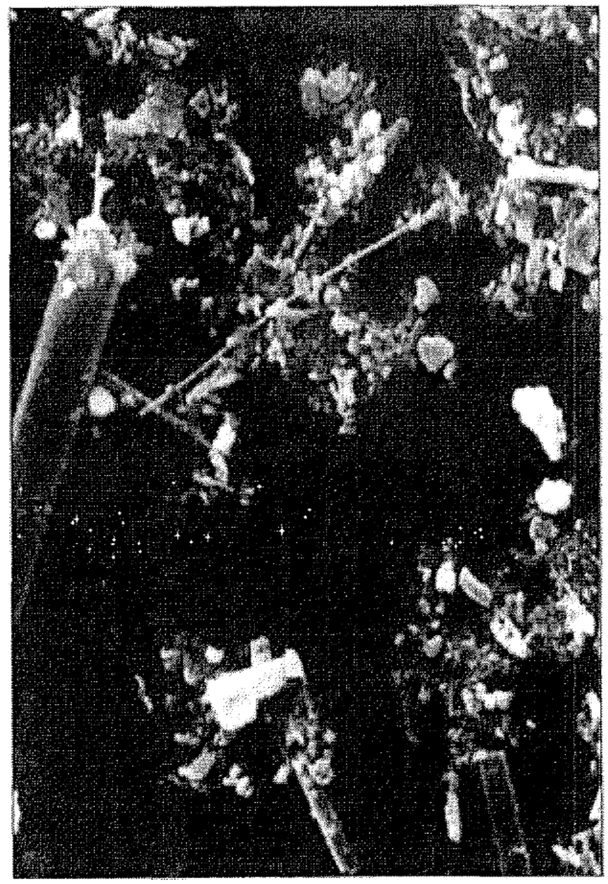
Authors: Cooper, W. C. et al (68) Pub. 1992 (Erie & Minntac Miners)
Cohort: 3,341 men, worked >3 months 1947 to Jan. 1, 1959
Vital Status Cut Off: Dec. 1988 (update - minimum 30 yr. observation period)
SMR (respiratory cancer): 67 (full cohort)
Conclusion: "no evidence to support any association between exposure to quartz or elongated cleavage fragments of amphibole with lung cancer, nonmalignant respiratory disease or any other specific disease."

OVERALL CONCLUSION: **Prismatic amphibole exposure in this mining operation is not linked to excess lung cancer.**

Prismatic Tremolite — Human Mortality Studies and Animal Studies

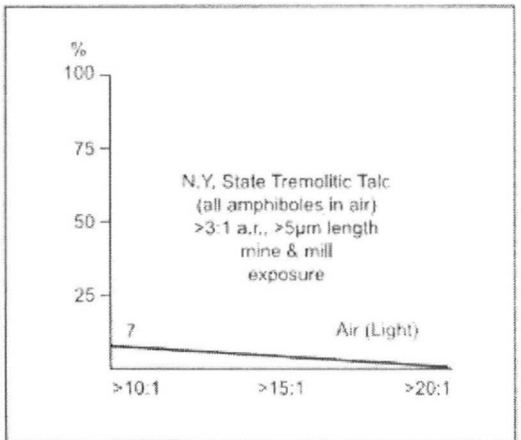
Light Microscopy: 320 X

SEM: 1250 X

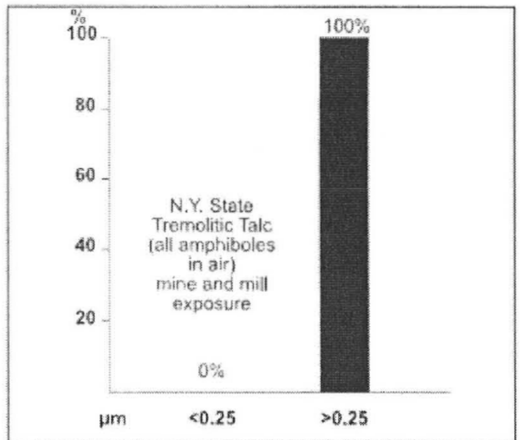


ORE: As mined and milled at the R. T. Vanderbilt Co., Gouverneur N.Y. mine: mainly talc (20-40%), and tremolite (40-60%) with minor antigorite and anthophyllite. Quartz trace, if detected at all (40).

Also contains minor but observable rod-like mixed talc/amphibole and ribbon-like talc fiber. (69).



Aspect Ratio Reference: 40



Width Reference: 40

ADDITIONAL MINERAL PARTICLE DATA:

R. T. Vanderbilt Mine: NIOSH reported upwards of 70% amphibole asbestos based upon % of all 3:1 aspect ratio or greater particles in air (41). However, the mining company states that **all** of the tremolite and anthophyllite in its talc products appear only in the prismatic habit (42,43). Varying in concentration from one grade to another, fibers of the mineral talc and to a much smaller extent "transitional" particles (talc evolving from anthophyllite) may also be found in this ore deposit. Some of these fibers do exhibit gross morphological characteristics consistent with an asbestiform habit. Such fibers, however, are rare and possess certain physical-chemical properties very different from amphibole asbestos (i.e. harshness, surface properties, etc.). Once fibrous talc is recognized in the analysis, the absence of asbestos in this material is consistently confirmed (40,44-49).

Stanton-Tremolitic Talc Samples 6 and 7: These talcs were positively identified as N.Y. State tremolitic talcs (50), and described as "refined raw materials for commercial products" (27). Sample 6 contained some very elongated particles which are likely to be talc fibers (see discussion above). These fibers did satisfy Stanton's critical dimension range (< 0.25 μm width, > 8 μm length). Sample 7 was reported as containing no particles in this dimensional range but is likely to be another fraction of the same sample.

Smith-Tremolitic Talc FD-14: This sample was supplied by the R. T. Vanderbilt Company and represents a high fiber product grade known as IT-3X (as sold). Analysis reported 50% tremolite, 10% antigorite, 35% talc (of which 25% was fibrous), 2-5% chlorite. Median particle length was 8.5 μm. Diameters (2,000X): < 1 μm = 20%, 1-2 μm = 36%, 2-4 μm = 32%, 4-6 μm = 8%, 6-8 μm = 2%, 10 μm = 2% (51). Tremolite varied considerably in their size lengths, ranging from 1 μm to 40-50 μm. "Talc fiber is abundant in the specimens, occurring as finely fibrous material with high aspect ratio. The talc fibers are also mineral mixtures, structurally talc and a magnesium amphibole. These minerals are also mixtures compositionally. The tremolite contained within the talc occurs as cleavage fragments and is not asbestiform on any level of examination" (45). (Reference includes specific analysis of International Talc-3X product.) In this animal study, this sample was used without comminution or separation.

HEALTH STUDIES (R. T. Vanderbilt Company, Inc.)

Authors: Brown, D.P., Wagoner, J.K., (NIOSH) (41) Pub. 1980
Cohort: 398 men, any work period between 1947-1959
Vital Status Cut Off: 1979 **SMR (resp. cancer):** 270
Conclusion: "Exposures to asbestiform tremolite and anthophyllite stand out as the prime suspect etiologic factors associated with the observed increase in bronchogenic cancer. . ." No confirmed mesotheliomas.
Critique: Amphibole asbestos is not involved. Excess lung cancer was not reasonably shown to be casually associated with the dust exposure (52-58).

Authors: Stille, W.T., Tabershaw, I.R. (59) Pub. 1982
Cohort: 708 men, any work period between 1947-1977
Vital Status Cut Off: 1978 **SMR (resp. cancer):** 157
Conclusion: "Elevated mortalities but no significant increases in number of deaths from lung cancer. . ." ". . .workers with exposures in other jobs prior to work at the TMX were found to have excessive mortality from lung cancer. . ."
Critique: Inadequate latency analysis, small cohort and missing data (i.e., smoking) (60).

Authors: Lamm, S.H., et al (61) Pub. 1988
Cohort: 705, worked any time between 1947-1977
Vital Status Cut Off: 1978 **SMR (resp. cancer):** 220
Conclusion: "This increase in lung cancer mortality. . .has been shown to be concentrated in short term employees (in contrast with nonmalignant respiratory disease). This increase. . . is most likely due to risk acquired elsewhere, such as prior employments, or to differences in smoking experience or other behavioral characteristics." "The risk did not appear to be associated with either the magnitude or the duration of exposure of GTC and was not different from that of workers at talc plants where ores did not contain tremolite or anthophyllite."
Critique: "The findings of these analyses. . . are based on assumptions, small numbers and short latency" (62).

Authors: Brown, D. P. et al (NIOSH) (70) Pub. 1990. Health Hazard Evaluation Report: Update of original NIOSH 1980 study
Cohort: 710, worked any time between 1947-1978
Vital Status Cut Off: 1983 **SMR (resp. cancer):** 207
Conclusion: "Workplace exposures at GTC are, in part, associated with these excesses in mortality. Possible confounding factors, such as cigarette smoking and other occupational exposures from employment elsewhere, may have contributed to these risks as well."
Critique: "When stratified by smoking, the odds ratios decreased with tenure and the trend analysis were significant. In short, the analysis showed a strong association between lung cancer and cigarette smoking, and there appeared to be an inverse relationship between exposure and the development of lung cancer." (71).

Authors: Gamble, J., et al (71) Pub. 1993
Cohort: Case control applied to above NIOSH Cohort **SMR (resp. cancer):** 207
Conclusion: "When stratified by smoking status, risk of lung cancer decreased with talc tenure and remained negative when excluding cases with <20 years latency and short-term workers. These data suggest that non-talc exposures are not confounding risk factors (for lung cancer) while smoking is, and that temporal and exposure-response relationships are consistent with a smoking etiology but not an occupational etiology for lung cancer."
Critique: No dust data and disagreement over whether the elevated smoking rates would or would not account for all the excess.

Authors: Honda, Y. et al (73) Pub. 2002
Cohort: 818 men, worked any time between 1947-1998 (Retrospective Mortality study update with exposure estimation study)
Vital Status Cut Off: January 1, 1990 **SMR (resp. cancer):** 254

Conclusion: "The results of this study are similar to those of earlier investigations. The cohort giving rise to the lung cancer was seen among subjects unexposed to GTC talc. These features suggest that some of the apparent increase is due to exposure to tobacco smoke. Mill workers and mine workers had similar estimated cumulative dust exposures, yet the excess of lung cancer was considerably stronger among miners than among millers. This indicates that GTC talc dust, per se, did not produce the excess. Most important, the presence of an inverse relationship between estimated cumulative exposure and lung cancer is inconsistent with the hypothesis that GTC talc dust is a carcinogen. The results of experimental animal studies also do not provide any support for this hypothesis."

ANIMAL STUDIES

Authors: Stanton, M.F., et al (27) Pub. 1981
Test Animals: 20-week-old outbred female Osborne-Mendal rats
Test Type: Pleural implantation
Protocol: A standard 40 mg dose of each sample was uniformly dispersed in hardened gelatin and applied by open thoracotomy directly to the left pleural surface. The animals (30-90 for each experiment) were followed for 2 years, at which time all surviving animals were sacrificed and the tissues examined for pleural sarcomas.
Findings: Exposure to these tremolitic talc samples resulted in no incidence of tumors. Similarly tested tremolite asbestos reflected a high tumor rate (see Exposure Exhibit G).

Authors: Smith, W. E., et al (25) Pub. 1979
Test Animals: Male LUG:LAK hamsters, injected at 2 months of age
Test Type: Intrapleural injection
Protocol: Single intrapleural injection of two dosages (10 and 25 mg). The sample was suspended in saline and sterilized by autoclave. The occurrence of tumors (unspecified) was noted at necropsies for a starting group of 50 animals per dose. After short term sacrifice of some animals and the loss of others through acute enteritis, the occurrence of tumors was noted in nonsurvivors up to 600 days.
Findings: No tumor development was noted. In contrast, tremolite asbestos similarly tested did produce tumors (see Exposure Exhibit F).

CELL STUDIES

Authors: Wylie, A. G., et al (72) Pub. 1997
Study: In vivo cytotoxicity and proliferative potential in HTE & RPM cells contrasting asbestos fibers to similar dose talc and transitional fibers (concentrate) from RTV talc.
Conclusion: "Our experiments also show that fibrous talc does not cause proliferation of HTE cells or cytotoxicity equivalent to asbestos in either cell type despite the fact that talc samples contain durable mineral fibers with dimensions similar to asbestos. These results are consistent with the findings of Stanton, et al (1981) who found no significant increases in pleural sarcomas in rats after implantation of materials containing fibrous talc."

OVERALL CONCLUSION: **Human Studies - A definite link between prismatic tremolite and respiratory cancer in the R. T. Vanderbilt Company talc mining population has not been demonstrated.**

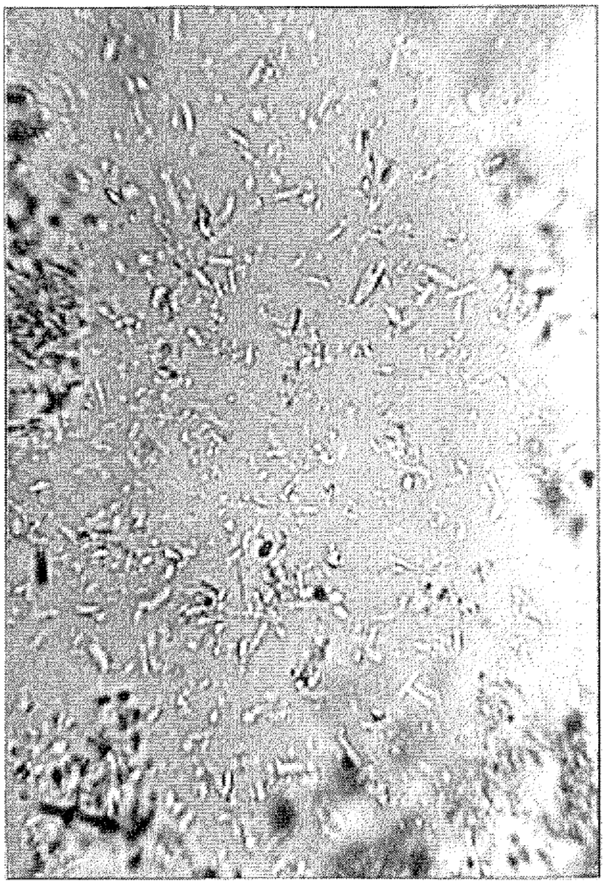
Animal Studies - N. Y. State tremolitic talc containing a high prismatic tremolite content produced no carcinogenic response in rats or hamsters.

EXPOSURE EXHIBIT N

SMITH-TREMOLITE FD-275-1 AND MCCONNELL TREMOLITE 275

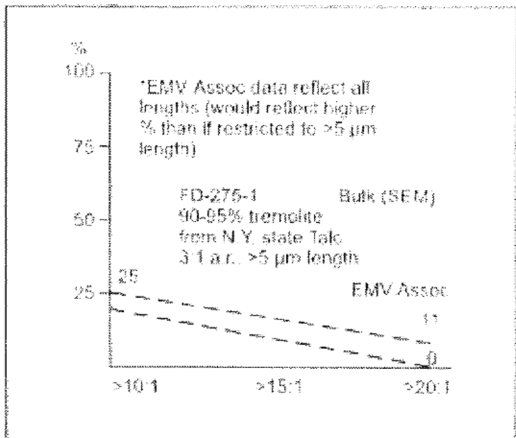
Prismatic Tremolite — Animal Studies

Light Microscopy: 320 X

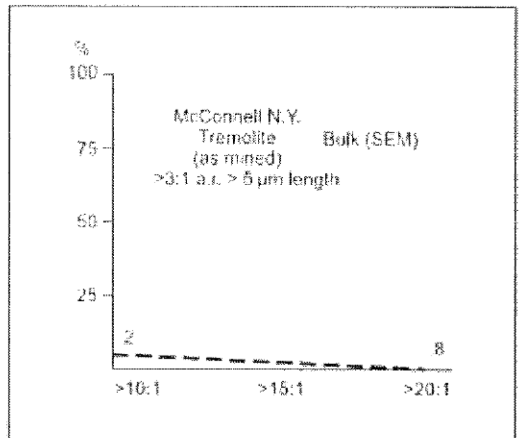


SEM: 1250 X

SAMPLE: Both FD-275-1 and 275 originated from N.Y. State tremolitic talc ore. Both samples represent tremolite concentrates from this ore.



Aspect Ratio Reference: 24



Aspect Ratio Reference: 24

ADDITIONAL MINERAL PARTICLE DATA:

Tremolite 275 was selected from N.Y. tremolitic talc ore from an area rich in tremolite. This ore was provided to the Bureau of Mines (BOM) for mineral and elemental particle size characterization as well as use in an animal feeding study by Dr. E. McConnell (sample contained approximately 70% tremolite with the remainder talc and antigorite). Also, an aliquot of this sample was further processed to obtain a higher tremolite concentrate for use in another animal study by Dr. William Smith (approximately 95% tremolite).

The processing of FD-275-1 involved crushing, milling, separation via sedimentation and filtering to obtain only the respirable fraction. Particle size characterization of FD-275-1 was undertaken by Dr. Smith (via EMV Assoc. Inc.), and by the BOM.

For FD-275-1, no particles with a width < 1 µm and length of > 10 µm were observed (200 particles via SEM). For FD-275 (McConnell tremolite), a mean width of 3.4 µm for particles > 6 µm in length was recorded (for amosite similarly sized mean width = 0.4 µm).

ANIMAL STUDIES

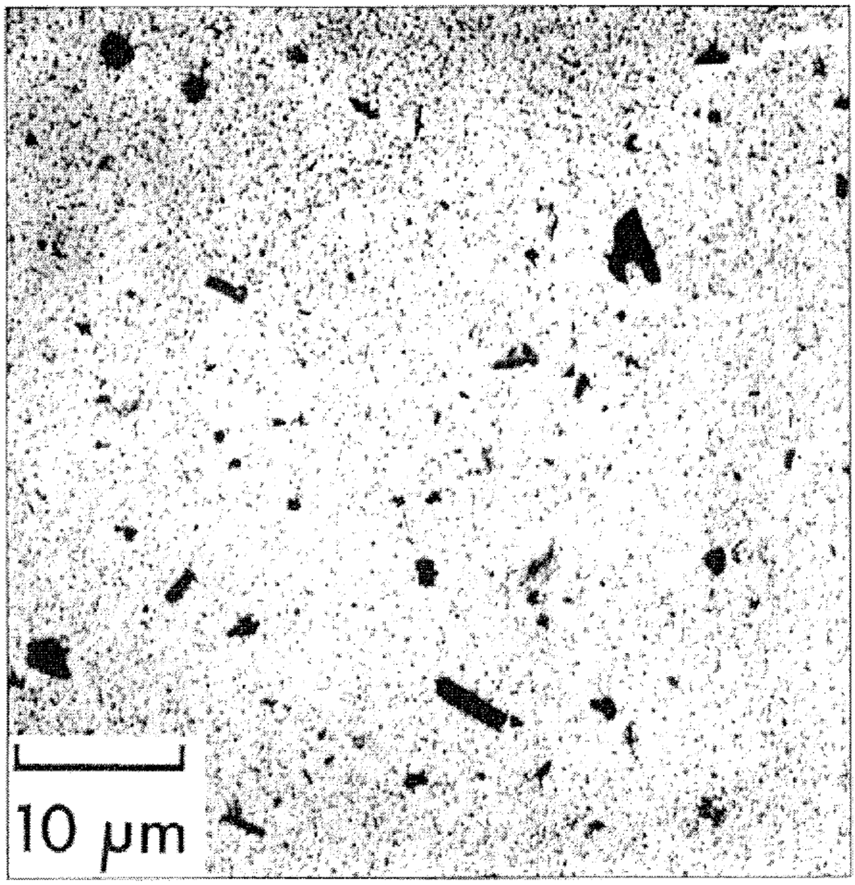
Authors: Smith, W.E., et al (25) Pub. 1979
Test Animals: Male LUG:LAK Hamsters **Test Type:** Intrapleural injection
Protocol: Single intrapleural injection of two dosages (10 and 25 mg). The occurrence of tumors (unspecified) was noted at necropsies for a starting group of 50 animals per dose. After short term sacrifice of some animals and the loss of others through acute enteritis, the occurrence of tumors was noted in nonsurvivors up to 600 days.
Findings: No tumor development was noted. In contrast, tremolite asbestos similarly tested did produce tumors (see Exposure Exhibit F).

Authors: McConnell, E.E., et al (64) Pub. 1983
Test Animals: Male and female Fischer 344 rats **Test Type:** Ingestion
Protocol: Prismatic tremolite and amosite were administered alone and in combination at a concentration of 1% in the daily diet of rats. Rats were sacrificed when exhibiting specified symptoms, or when less than 10% of the test group survived. Group size varied from 100 to 250 animals.
Findings: No toxic or neoplastic lesions were observed in the target organs - gastrointestinal tract, or mesothelioma for either the tremolite or the amosite.

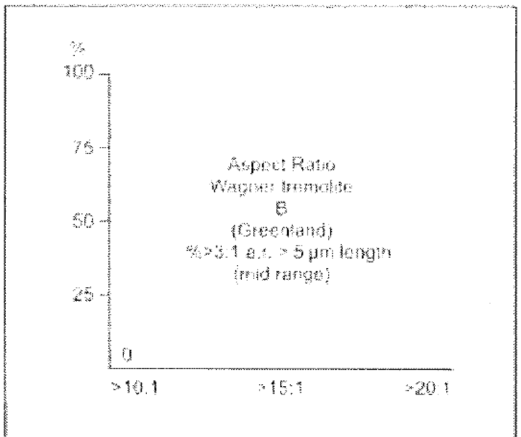
OVERALL CONCLUSION: **A concentrate of N.Y. State tremolite prismatic produced no pleural tumors in hamsters and no gastrointestinal tract neoplastic lesions in rats.**

EXPOSURE EXHIBIT O *WAGNER-TREMOLITE (Greenland)*

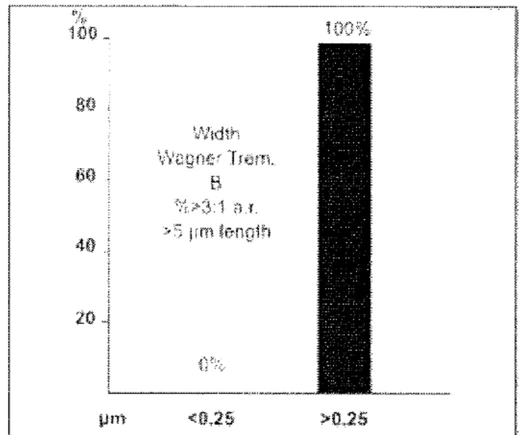
Prismatic Tremolite — Animal Study



SAMPLE: Prepared from a rock specimen from Greenland. Referenced as tremolite "B" (22).



Aspect Ratio Reference: 22



Width Reference: 22

ADDITIONAL MINERAL PARTICLE DATA:

100% of particles > 5 µm have diameters > 1.0 µm
100% of particles are less than 10 µm long
100% of particles > 5 µm length have aspect ratios < 10:1 (22)

ANIMAL STUDIES

Authors: Wagner, J.C., et al (22) Pub. 1982
Test Animals: Sprague-Dawley rats 6-10 weeks old when injected
Test Type: Pleural injection
Protocol: A single 20 mg injection into the right pleural cavity of 48 rats was applied. "The sample was prepared by milling in a small agate mill and ultrasonic dispersion, large particles being removed by sedimentation in water." The sample was sterilized by autoclave and introduced in saline solution. All animals were allowed to live out their lives or necropsied when moribund for tumors (unspecified-reported as "mesotheliomas").
Findings: No tumors were noted in 48 rats. One sample of tremolite asbestos was tested under the same protocol (see Exposure Exhibit C).

OVERALL CONCLUSION: **Prismatic tremolite produced no tumors in the test animals.**

EXPOSURE EXHIBIT P ADDISON/DAVIS-TREMOLITE (Dornie)

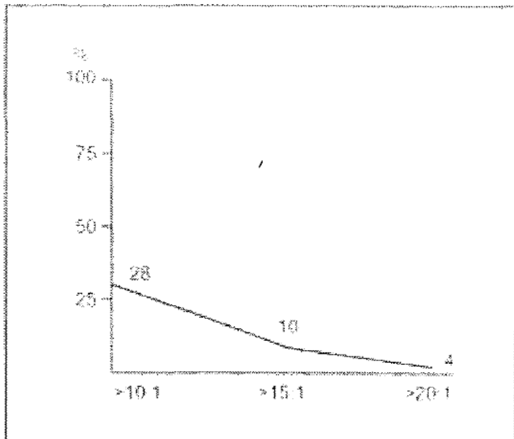
Prismatic Tremolite — Animal Study

Light Microscopy: 320 X

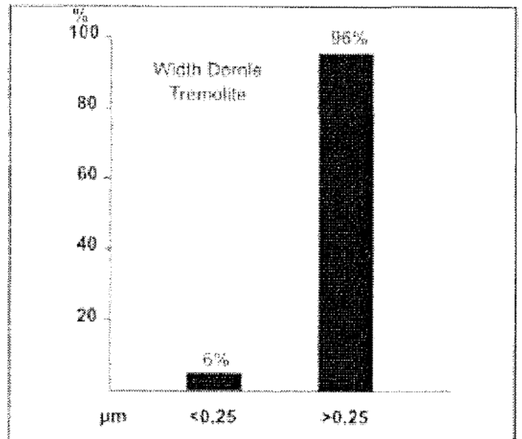
SEM: 190 X

SAMPLE: Like the tremolite from Italy (see exhibit J), this sample "contains mostly cleavage fragments, but some very long, thin fibers were also observed." There are more fibers longer than 8 µm in this sample than in the Italian sample, but most were >1 µm in diameter. A small amphibole asbestiform subpopulation may also exist in this sample as it does in the Italian sample (though this is less clear). "The material contains several populations of varying habits of a member of the tremolite-actinolite solid solution series." (65). Both this sample and the Italian sample are not typical of tremolite prismatic cleavage fragment populations. Both exhibit the presence of byssolite in the samples.

Minerals were characterized and verified as a tremolite by x-ray diffractometry, optical microscopy, scanning electron microscopy and energy dispersive x-ray spectroscopy.



Aspect Ratio Reference: 23



Width Reference: 23

ANIMAL STUDIES

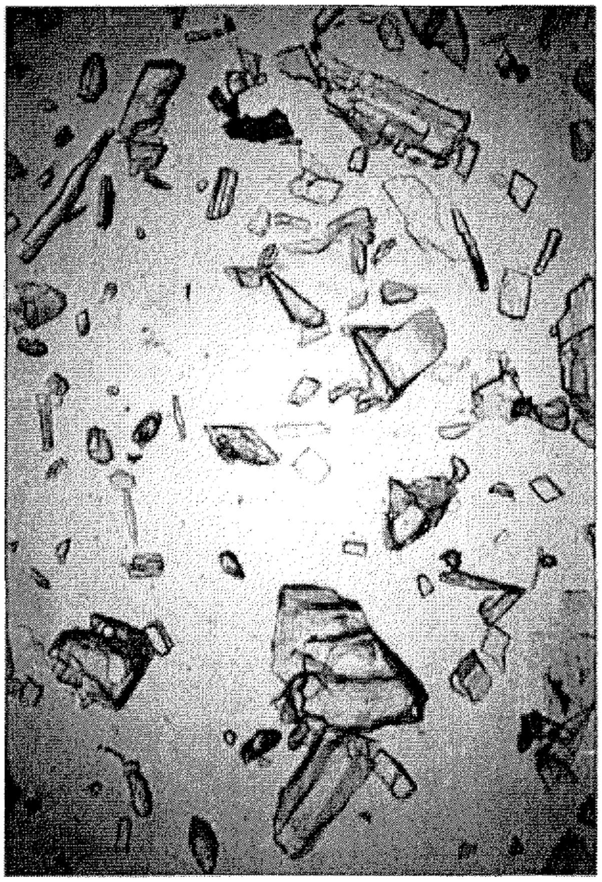
Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 4 mesothelioma deaths out of 33 animals were observed with no median survival time published (too few tumors for median survival times to be calculated). It is important to note - as stated in the study - "The intraperitoneal injection test is extremely sensitive, and it is usually considered that, with a 10 mg dose, any dust that produced tumors in fewer than 10% of the experimental group is unlikely to show evidence of carcinogenicity following administration by the more natural route of inhalation - the material from Dornie is probably to be considered harmless to human beings."

OVERALL CONCLUSION: **This predominantly prismatic tremolite produced no significant carcinogenic response in the test animals and is likely harmless to humans.**

EXPOSURE EXHIBIT Q *ADDISON/DAVIS-TREMOLITE (Shinness)*

Prismatic Tremolite — Animal Study

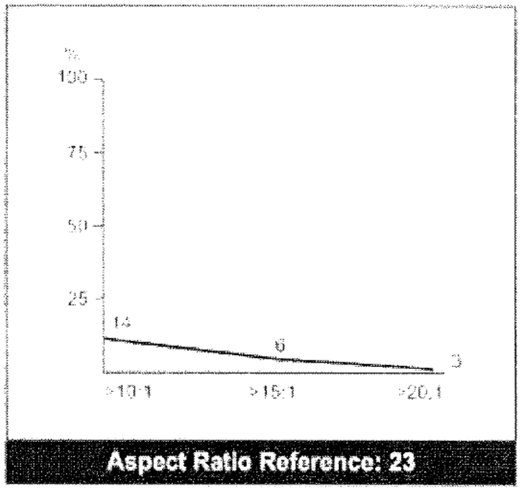
Light Microscopy: 45 X

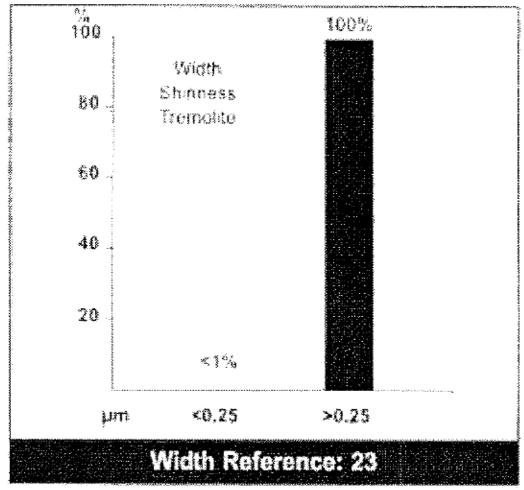


SEM: 1800 X

SAMPLE: "The Shinness tremolite dust was almost exclusively composed of cleavage fragments, only a small portion of which had an aspect ratio greater than 3:1."

Minerals were characterized and verified as tremolite by x-ray diffractometry, optical microscopy, scanning electron microscopy and energy dispersive x-ray spectroscopy.





ADDITIONAL MINERAL PARTICLE DATA:

"In the optical microscopy and SEM examinations, the asbestos tremolites were found to be typical of that form in displaying polyfilamentous fiber bundles, curved fibers, fibers with splayed ends, and long, thin, parallel-sided fibers. Most of the fibers showed straight extinction when observed with polarized light under crossed polarizers, indicating the presence of multiple twinning of the crystals." "Samples did contain some elongated fragments of tremolite with oblique extinction, stepped ends, and nonparallel sides indicating that they were cleavage fragments." (20)

ANIMAL STUDIES

Authors: Davis, J.M.G., Addison, J. (20) Pub. 1991
Test Animals: AF/Han strain rats
Test Type: Peritoneal injection
Protocol: Fractions of this sample were obtained by generating an airborne dust cloud in an experimental chamber (Timbrell dust dispensers) with fine fractions collected using a vertical elutriator. A single 10 mg dose was injected into the peritoneal cavities of the animals. All animals lived out of their full life span or were killed when moribund.
Findings: 2 mesothelioma deaths out of 36 animals were observed (well below background for test method). There were too few tumors for median survival times to be calculated. Authors state: "Human exposure to a material such as that obtained from Shinness Scotland, whether as a pure mineral dust or as a contaminant of other products, will almost certainly produce no hazard."

OVERALL CONCLUSION: **This prismatic tremolite produced no carcinogenic response in the test animals.**

Prismatic Actinolite - Animal Study

No photograph available.

SAMPLE: Origin of sample unknown.

DIMENSIONAL DATA: Not provided by author.

ANIMAL STUDIES:
Authors: Pott, F. et al (66) Pub. 1974
Test Animals: Wistar rats
Test Type: Peritoneum injection.
Protocol: Assorted fibrous dust (chrysotile, anthophyllite asbestos, actinolite asbestos, wollastonite, glass fibers, gypsum, etc.) and granular dust (prismatic actinolite, biotite, talc, etc.) were intraperitoneally injected (up to 12.5 mg/ml) into varying test groups of 40 rats at various dosages.
Findings: The "fibrous" dusts (with some exceptions such as gypsum, slag wool, and wollastonite), induced varying tumor development while the granular dusts reflected little to no tumors (prismatic actinolite - no tumors). "Very low doses between 0.05 and 0.5 mg asbestos led to tumor incidences of about 20% to 80%."

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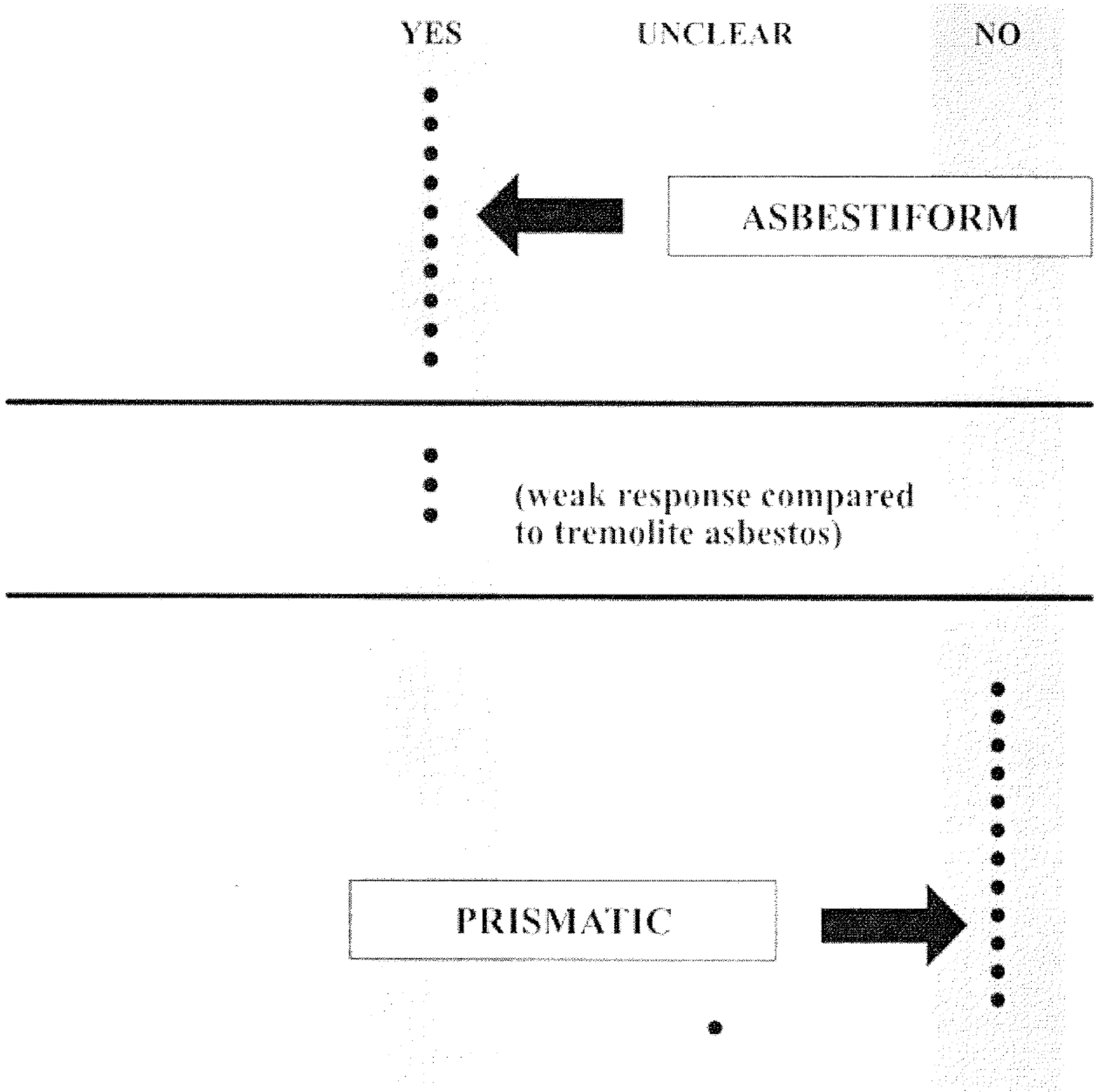
SUMMARY
MINERAL HABIT AND CARCINOGENICITY

CLEAR AMPHIBOLE ASBESTOS EXPOSURES (amphibole asbestos)	Libby Vermiculite (H) Greek Tremolite (H) Smith FD-72 (A) Stanton Tremolite #1 (A) Stanton Tremolite #2 (A) Wagner Korean Tremolite (A) Davis Korean Tremolite (A) Addison/Davis Jamestown Tremolite (A) Addison/Davis Korean Tremolite (A) Addison/Davis Swansea Tremolite (A)
PREDOMINANTLY ASBESTIFORM AND/OR HIGHLY FIBROUS	Cook/Coffin-Ferroactinolite (asbestiform) (A) Smith FD-31 (unique Tremolite/Byssolite) (A) Addison/Davis Italian Tremolite (highly fibrous with asbestos subpopulation) (A)
COMMON PRISMATIC AMPHIBOLE EXPOSURES	Homestake (C-G) (H) Mesabi Range-Taconite (C-G, trace Actinolite) (H) Smith FD-14 (Tremolitic Talc) (A) Smith FD-275 (conc. Tremolite) (A) McConnell Tremolite (conc. Tremolite) (A) Stanton Talc #6 (Tremolitic Talc) (A) Stanton Talc #7 (Tremolitic Talc) (A) Pott-Granular Actinolite (A) Wagner California Tremolite (A) Wagner Greenland Tremolite (A) Addison/Davis Dornie Tremolite (A) Addison/Davis Shinness Tremolite (A) N.Y. State Tremolitic Talc (neg. for animals) (H)

(H) = Human Studies
(A) = Animal Studies
C-G = Cummingtonite-grunerite

CARCINOGENIC RESPONSE



CONCLUSION

Difference Exists Mineralogically

AND

Biologically

In 1992, after many years of scientific review, the Occupational Safety and Health Administration (OSHA) specifically excluded elongated prismatic cleavage fragments from the scope of their asbestos standard. OSHA's decision to recognize the key mineralogic and biologic distinctions reviewed in this pictorial presentation was instrumental in that decision.

Because this matter involves scientific issues ranging from geology, mineralogy and health, the authors believe it is important that these complex relationships be explained as simply as possible. This matter remains a source of confusion to many and the consequences of misunderstanding can be immense.

Sustaining confusion is an unfortunate array of overly broad asbestos analytical protocols and definitions now being applied in mixed dust environments. To address analytical ambiguities, appendix II is provided.

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APPENDIX I

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APPENDIX II

Analytical Issues

INTRODUCTION:

As shown in this pictorial presentation, the properties of asbestos are unique. These properties include very long, thin, fibrillar fiber bundles that are flexible and strong. The ability of excessive exposure to asbestos to cause serious pulmonary disease has been extensively studied and documented.

Analytical procedures designed to identify and quantify asbestos must incorporate the unique characteristics of asbestos as fully as possible if the method is to be as specific to asbestos as possible. Minimizing mischaracterization (false positives and negatives) defines the value of any analytical protocol and is a key element to meaningful measurement of risk.

The most common analytical approach used for airborne asbestos fiber quantification is phase contrast microscopy (PCM). PCM methods typically measure airborne elongated particulate with a length to width ratio of at least 3 to 1 and a length 5 µm or greater (e.g. NIOSH 7400). Since there is little reason to measure airborne elongated particulates other than for asbestos, this relatively cheap, simple to apply method, is most often used to collect and count asbestos fibers. Although PCM will count all asbestos fibers observable under light microscopy (400X), it unfortunately also counts elongated prismatic cleavage fragments, insect legs and any other elongated particulate collected on the air monitoring filter that meet the simple dimensional counting criteria. Consequently, the simple PCM method works well in an environment where commercial asbestos is known to be the predominate elongated particle in the air being sampled. In mixed dust environments, however, the PCM method must be enhanced to measure asbestos from the other particulate in the sample more selectively.

Fiber counting criteria employed in microscopy methods are often mistakenly viewed as the *definition* of an asbestos fiber. The fiber counting criteria employed in most PCM methods are, in fact, merely arbitrary parameters used to promote consistency in fiber counting. The 5 µm minimum length, and the 3:1 minimum aspect ratio criteria, originated in England's asbestos textile mills as a means to improve reproducibility of commercial asbestos fiber measurements. These counting parameters were **not** deemed to be the dimensions that corresponded to a specific health risk (Holmes, 1965).

The PCM method is unable to detect fibers below approximately 0.2 µm in width and has always been viewed as an ***index of exposure*** versus an absolute measure of all fibers present in a sample. It is also unable to characterize the mineral composition or crystal structure of the particles examined. Again, in an environment where it is known that the primary elongated particle present is commercial asbestos, these limitations become less important. In environments where there are mixed dusts and where asbestos may or may not be present, the PCM method, with its simple counting criteria, becomes wholly inadequate.

This inadequacy is clearly demonstrated in the 1986 OSHA asbestos standard preamble discussion of its quantitative risk analysis and its decision to exclude studies of Canadian asbestos miners. The asbestos miners were excluded because the fiber count dose-response relationship observed differed significantly from the fiber count dose-response observed for other asbestos exposed populations under review by OSHA.

OSHA found that the miners had been exposed to similar or higher "fiber" concentrations than textile or other commercial asbestos exposed populations but showed significantly less adverse health effects. The asbestos "fiber" exposure was based solely on 3 to 1 aspect ratio or greater, 5 µm or longer, light microscopy fiber counts.

In Canadian asbestos mines, asbestos often represents no more than 5% of the ore being mined with the remaining host rock predominantly being the prismatic serpentine mineral, antigorite. The apparent "asbestos" fiber count in this mixed mineral dust environment therefore included antigorite cleavage fragments as well as chrysotile fibers. Inclusion in the fiber count of elongated prismatic fragments which have never been shown to produce asbestos-like disease, significantly inflated the asbestos dose reported without a corresponding increase in response.

Had prismatic cleavage fragments been properly identified and excluded from the asbestos fiber count, the asbestos risk observed for the Canadian asbestos miners may well have been comparable to that observed among the commercial asbestos exposed groups that were used in the OSHA risk analysis. In this example, analytical methods that failed to address what is and is not asbestos clearly impacted risk assessment (Wylie and Bailey, 1992).

Sub-light microscopic methods such as transmission electron microscopy (TEM) and scanning electron microscopy (SEM) present another analytical confounder when improperly applied. In contrast to the limitations of PCM, electron microscopic analytical methods such as TEM are capable of detecting asbestos fibers well below the resolution limit of the light microscope, identifying mineral type and can address crystal growth distinctions important to proper asbestos identification.

Despite the elevated costs associated with electron microscopic analyses, the desire to identify and quantify lower and lower asbestos levels in building materials and in asbestos abatement projects has contributed significantly to the proliferation of TEM laboratories across the country. These types of samples are typically limited to chrysotile, undergo highly prescriptive analytical protocols and require little to no mineralogical expertise in the analysis. For all its sophistication and sensitivity, electron microscopy presents a different set of analytical variables that will affect risk assessments when its results are improperly interpreted or improperly compared to health exposure standards.

The health literature on asbestos exposed populations overwhelmingly involves exposure to commercial asbestos. Asbestos exposure levels reported in epidemiological studies used to establish exposure limits have been obtained through light microscopy methods. Permissible exposure standards for airborne asbestos are based upon this light microscopy ***index of exposure***. Efforts to use electron microscopic analytical data for risk assessment purposes must include a means to correlate results to what would be observable under light microscopy.

Unfortunately, the difference between asbestos fibers observed under the light microscope and asbestos fibers observed by electron microscopy is highly variable. This variability is influenced by asbestos type, how the fibers become airborne and the nature of fiber bundle separation in each exposure setting. "One size fits all" correlations are difficult (if not impossible) to reliably establish. Electron microscopy views only a very tiny fraction of the sample being studied and is therefore a poor quantification tool. Unless coupled with other investigation techniques, electron microscopy does not adequately address populations of particles in a sample. In an unknown or mixed dust environment, this is an important indicator of the asbestiform or prismatic nature of a given exposure.

Electron microscopy methods are unquestionably the best analytical tool for asbestos identification, but not for quantification unless coupled with other methodologies. The health significance of asbestos fibers observed only through electron microscopy and not correlated to PCM-observable exposure levels, is unknown at this time. The authors are not aware of any studies of asbestos-related disease where the asbestos exposure was not readily observable under light microscopy.

SOLUTIONS:

While the strengths and weaknesses of every asbestos analytical approach has not been addressed, most analysts would agree that there is no perfect, single asbestos analytical methodology. Certainly each approach is made more reliable in the hands of experienced, knowledgeable analysts. Effectively combining different analytical tools in a tiered approach can overcome individual method weaknesses, control costs and yield highly reliable results.

The following analytical guides reflect asbestos analytical approaches considered most reliable for asbestos identification and quantification. In each case, the unique characteristics of asbestos fibers and asbestos fiber populations are used to the fullest extent possible.

In the case of PCM, for example, dimensional fiber counting criteria that are more specific to asbestos are recommended as a more sensitive screening technique if standard PCM counts exceed established asbestos fiber permissible exposure limits. This additional PCM step significantly improves PCM as an inexpensive, easy to apply asbestos screening tool and assists the investigator in deciding if more specific, more costly analysis is warranted.

A polarized light microscopy method for bulk analysis is also provided. This method is designed with more guidance into what is and is not asbestos and, in the hands of a skilled analyst with mineral expertise, can be more informative than electron microscopic analysis.

The effective utilization of any asbestos analytical methodology, used singularly or in combination with others, does require a clear understanding of what asbestos is and what it is not. Methodologies that do not or can not recognize these distinctions should not be used.

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Differential PCM Fiber Counting Methodology for Air Samples

BACKGROUND:

In environments where the presence of asbestos is unknown or may be present as a mixed dust, the NIOSH 7400 PCM membrane analytical method must be supplemented with differential counting criteria to assist in determining what proportion of the dust is asbestiform and what part is not. This need for differential counting was recognized by the Occupational Safety and Health Administration (OSHA) in its final asbestos standard published in 1994 (Fed Reg. Vol. 59, No. 153, pp. 41073 - 41079 - Aug. 1994).

There is also concern among some researchers that abandonment of the traditional fiber counting criteria (fibers with a minimum length of 5 µm and a length to width aspect ratio of at least three to one) would forsake the historical database that has been created over many decades. The simplistic counting criteria alone, derived from an effort to improve analytical consistency in commercial asbestos textile exposure samples in the 1960s, is totally inappropriate for noncommercial asbestos exposure environments. Recognizing the fundamental morphological differences between asbestiform and prismatic particle populations, the method must address those differences.

METHOD SUMMARY:

To satisfy historical preservation of exposure trends, the NIOSH 7400 method must be performed. Where the fiber count reaches or exceeds 0.1 fiber/cc (or the current exposure limit), supplemental measurements that allow a better characterization of the asbestiform nature of the sample must be done. These measurements will necessitate the use of a modified Walton Beckett graticule that assists in the measurement of those 3:1 or greater aspect ratio and 5 µm and longer particles that are equal to and longer than 10 µm and less than or equal to 0.5 µm in width. All fiber bundles need to be counted. This modified graticule is shown in Figure 1.

If the population of fibers has 50 % equal to or longer than 10 µm or if 50% of the fibers are equal to or less than 0.5 µm in width (unless a bundle), then the exposure can be considered to be asbestiform.

Samples that reflect an asbestiform nature must have PCM observable fibers (widths between 0.15 and 0.5 µm or bundles) analyzed by electron microscopy. Analysis by electron microscopy will evaluate morphology, chemistry and crystal structure if using TEM. The percentage PCM fibers that are regulated asbestiform fibers is then calculated and compared to the permissible exposure limit. The procedure is shown diagrammatically in Figure 2.

Mineralogical expertise is needed for those samples requiring electron microscopy and the standards for classifying amphibole minerals must conform to the International Mineralogical Association recommendations (Leake, B.E., Nomenclature of Amphiboles. American Mineralogist. Vol. 82, 1019 - 1037, 1997).

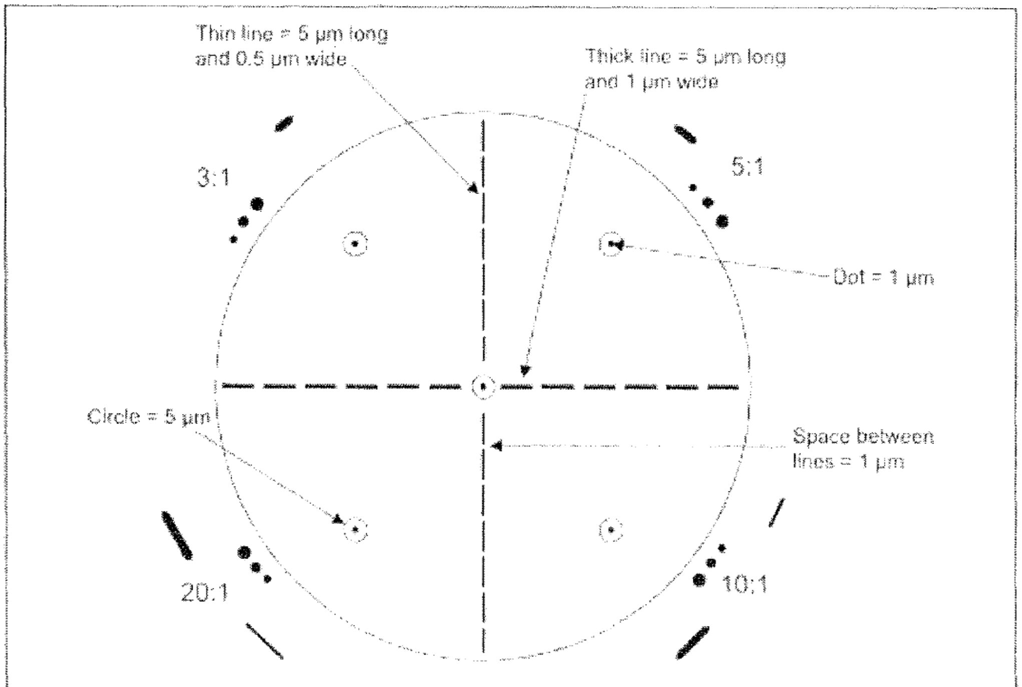

Figure 1: Modified Walton Beckett Graticule (RIB Graticule)

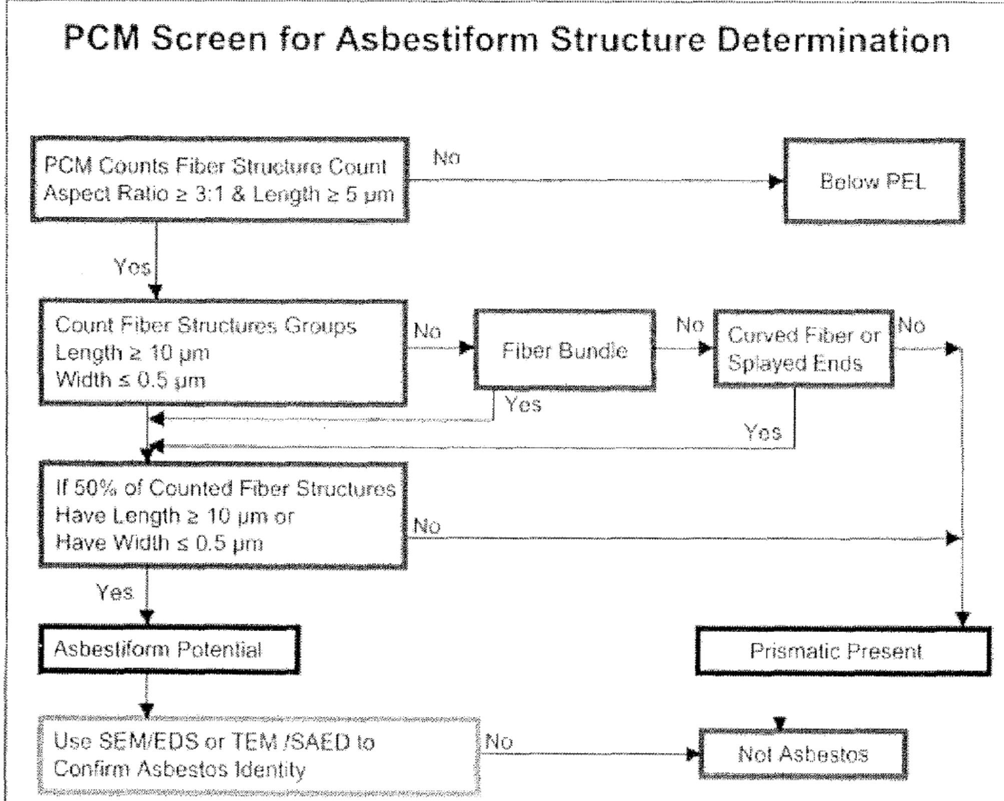

Figure 2: PCM Discriminate Counting and Analysis Procedure

Standard Method of Testing for Asbestos Containing Materials by Polarized Light Microscopy

1. SCOPE

1.1 The method describes the procedures for the determination of the presence or absence of six types of asbestos: chrysotile-asbestos, grunerite-asbestos (amosite), crocidolite (riebeckite-asbestos), anthophyllite-asbestos, tremolite-asbestos and actinolite-asbestos and for the determination of a quantitative estimate of the percent of asbestos. This method may be applied to bulk materials other than building materials, but the accuracy of the method under these circumstances is not characterized. For non-building materials, there may be more interference with a greater possibility for false positives or fibers may be dispersed below the resolution of the light microscope, yielding a higher possibility of false negatives. When the content of asbestos in a sample is close to the 1% level, other more precise methods of quantification may be necessary if it is important to determine whether or not asbestos content is more or less than 1% by weight. This distinction may be important because the EPA defines asbestos-containing materials as those materials containing greater than 1% asbestos (Ref. 2 and 3).

2. APPLICABLE DOCUMENTS

2.1 U.S. Environmental Protection Agency, "Interim Method for the Determination of Asbestos in Bulk Insulation Samples," EPA 600/M4-82-020, Dec. 1982.

2.2 U.S. Environmental Protection Agency, "Guidance for Controlling Asbestos-Containing Materials in Buildings," EPA 560/5-85-024, 1985.

2.3 U.S. Environmental Protection Agency, "Asbestos-Containing Materials in School Buildings: Guidance for Asbestos-Analytical Programs," EPA 560/13-80-017A, 1980 (under revision).

2.4 ASTM STD 834, Definitions for Asbestos and Other Health-related Silicates, B. Levadie, ed., ASTM, 1916 Race Street, Philadelphia, PA 19103, 1984.

3. TERMINOLOGY

3.1 Asbestos: A commercial term applied to a group of highly fibrous silicate minerals that readily separate into long, thin, strong fibers of sufficient flexibility to be woven, are heat resistant and chemically inert, and possess a electric insulation properties, and therefore, are suitable for uses (as in yarn, cloth, paper, paint, brake linings, tiles, insulation, cement, fillers, and filters) where incombustible, nonconducting, or chemically resistant material is required. Federal regulation of asbestos is restricted to chrysotile-asbestos, grunerite-asbestos (amosite), crocidolite (riebeckite-asbestos), anthophyllite-asbestos, tremolite-asbestos and actinolite-asbestos.

3.2 Asbestiform: said of a mineral that is like asbestos, i.e., crystallizes with the habit of asbestos. Some asbestiform minerals may lack the properties which make asbestos commercially valuable such as long fiber length and high tensile strength. All asbestos exhibits a fibrillar structure, i.e., parallel growth of fibrils in bundles. Under the light microscope, the asbestiform habit is generally recognized by the following characteristics:

3.2.1. mean aspect ratios ranging from 20:1 to 100:1 or higher for fibers longer than 5 µm.
3.2.2. very thin fibrils, usually less than 0.5 µm in width, and
3.2.3. two or more of the following:
   a. parallel fibers occurring in bundles
   b. fiber bundles displaying splayed ends
   c. matted masses of individual fibers, and
   d. fibers showing curvature

3.3 Fiber: an elongated single crystal or similarly elongated polycrystalline aggregate.

3.4 Fibril: the smallest unit fiber in a bundle of fibers characteristic of the asbestiform habit.

4. SUMMARY OF THE METHOD

4.1 Bulk samples of building materials taken for asbestos identification are first examined with a low-power binocular microscope for homogeneity, the presence or absence of fibrous constituents, preliminary fiber identification, and an estimate of fiber content. Possible identification of fibers or the confirmation of the absence of fibers is made by analysis of subsamples with the polarized light microscope.

5. SIGNIFICANCE AND USE

5.1 This method of testing is applicable to building materials including insulation, ceiling tiles, surface coatings, asbestos board, pipe coverings, etc. It is not recommended for floor tiles. However, if fibers can be liberated from a non-friable matrix, they can be identified by this method.

5.2 If the estimate of the percentage of asbestos in a sample is close to the 1% by weight level, other methods of quantification may be necessary if it is important to determine whether or not asbestos content is more or less than 1% by weight. This distinction may be important because the EPA defines asbestos-containing materials as those materials containing greater than 1% by weight asbestos (Ref. 2 and 3).

5.3 The details of the methods used to determine the optical properties of minerals are not included in this method. The method assumes that the analyst is proficient in making these measurements.

6. INTERFERENCES

6.1 Cellulose may have approximately the same index of refraction as chrysotile-asbestos. For this reason, it is frequently confused with chrysotile. However, cellulose fibers frequently pinch and swell along their length, exhibit internal cellular structure, and lack splayed ends: they are not composed of bundles of smaller fibers.

6.2 Cleavage fragments of many natural minerals including amphiboles, talc, gypsum, wollastonite and vermiculite may appear as elongated anisotropic particles. The aspect ratio of these particles may be as great as 20:1. Therefore, aspect ratio alone is not sufficient for the identification of asbestos. Other properties of the asbestiform habit, such as curved fibers, fiber bundles exhibiting splayed ends, and fibers with aspect ratios in excess of 20:1 must be observed in order to be sure asbestiform material is present in the sample. However, these properties need not be characteristic of every fiber or fiber bundle in the sample. Therefore, once asbestos is known to be present, other properties such as index of refraction and aspect ratio can be used to identify asbestos and determine which particles will be counted in making a quantitative estimate of the amount of asbestos in the sample.

6.3 Sprayed-on binder materials may coat fibers and affect color or obscure optical characteristics. Fine particles of other materials may also adhere to fibers. Occasionally, procedures other than those described in this test method may be helpful if the analyst is unable to observe fibers clearly. Some of these are described in Reference 1.

6.4 Vermiculite may be confused with chrysotile because it has a similar index of refraction and, while it is not fibrous, its extinction characteristics under crossed polars may give the impression that the particles are composed of masses of matted fibers. The problem is compounded by the fact that chrysotile and vermiculite are a common mixture in sprayed-on coatings.

6.5 Certain materials may be found in construction materials, which are fibrous or asbestiform but which are not asbestos. Those include but are not limited to fibrous talc, fibrous brucite (nemalite), zeolites and dawsonite.

6.6 Man-made fibers such as carbon, aluminum oxide, polyamides (nylon), polyester (Dacron) and polyolefins (polyethylene), and rayon are occasionally encountered in building materials.

6.7 Fibrous glass including both mineral wool and fiberglass is very common in building materials. Its isotropic character makes it readily distinguishable from asbestos.

6.8 Animal hair is occasionally encountered.

6.9 Heat and acid treatment may alter the index of refraction of asbestos and change its color. Heat can cause chrysotile and amosite to turn brown and may raise the indices of refraction significantly.

6.10 Moisture can interfere with the determination of optical properties. Wet samples should be dried at a temperature less than 150°C before examination.

7. EQUIPMENT

7.1 A magnifying glass or a low power binocular microscope, approximately 10-45x, with built-in or separate light source

7.2 Forceps, dissecting needles and probes

7.3 Glassine paper or clean glass plate

7.4 Polarized light microscope complete with a port for wave retardation plate, 360 degree graduated rotating stage, substage condenser, lamp and lamp iris

7.5 Objective lenses: low power (10x); high power (40-50x). Medium power (20-25x) and very low power (2-4x) lenses are optional.

7.6 Dispersion staining objective lens (optional)

7.7 Ocular lens: 8x minimum

7.8 Eyepiece reticle: cross hair

7.9 Compensator (wave retardation plate): 550 nanometer (first-order red or gypsum)

7.10 Microscope slides

7.11 Coverslips

7.12 Mortar and pestle, agate or porcelain

8. REAGENTS

8.1 Index of refraction liquids: N_D = 1.490-1.720 in increments of 0.002 or 0.004.

8.2 Index of refraction liquids for dispersion staining: high dispersion series, N_D = 1.550, 1.605, and 1.680. (Optional. Required only if dispersion staining will be used to measure the index of refraction.)

8.3 Reference materials:

8.3.1 Asbestos Materials

a. Commercial asbestos, including amosite, chrysotile, crocidolite, and anthophyllite asbestos. (UICC Asbestos Reference Sample Set available from UICC MRC Pneumoconiosis Unit, Llandough Hospital, Penarth, Glamorgan, CF6 1XW UX and commercial distributors.)

b. Tremolite-asbestos: available from commercial distributors, such as Ward's Natural Science Establishment, Inc., P.O. Box 92912, Rochester, New York, 14692-9012.

c. Actinolite-asbestos: source to be determined (very rare; not used commercially).

8.3.2 Suggested Matrix and Non-asbestos materials.

a. Cellulose

b. Vermiculite: source to be determined.

c. Non-asbestiform amphiboles: available from commercial distributors, such as Ward's Natural Science Establishment, Inc., P.O. Box 92912, Rochester, New York 14692-9012.

d. Other silicates, such as fibrous talc, wollastonite, gypsum, nemalite (brucite): available from commercial distributors, such as Ward's Natural Science Establishment, Inc., P.O. Box 92912, Rochester, New York 14692-9012.

e. Synthetic fibers, such as fiberglass and mineral wool.

9. PRECAUTIONS

9.1 This method involves the analysis of material (asbestos), which may be hazardous if inhaled. It does not address the safety problems associated with its use. In addition, it should be noted that some immersion oils manufactured prior to 1978 might contain Polychlorinated Biphenols (PCB). PCB's have been identified as hazardous materials. It is the responsibility of whoever uses this method to establish appropriate safety and health practices to ensure that asbestos is not inhaled and exposure to PCB does not occur.

10. SAMPLING

10.1 Samples should be taken in the manner prescribed in Reference 2. Information on design of sampling and analysis programs may be found in Reference 3. If there are any questions about the representative nature of the sample, another sample should be requested before proceeding with the analysis.

11. GENERAL METHOD DESCRIPTION

11.1 Bulk samples of building materials are first examined with a low power binocular microscope or magnifying glass for homogeneity, the presence or absence of fibrous constituents, preliminary fiber identification and an estimate of fiber content.

11.2 Positive identification of fibers or the confirmation of the absence of fibers is made by analysis of subsamples with the polarized light microscope according to the outline presented in Table I. The optical properties of six types of asbestos are given in Table II. The use of plane polarized light allows the determination of index of refraction parallel to elongation. Morphology and color are observed. Orientation of the two polarizers such that their vibration directions are perpendicular (crossed polars) allows the distinction between anisotropic and isotropic materials to be made. It also allows observation of the birefringence and extinction characteristics of anisotropic particles. When a compensator is inserted into the optical path, the sign of elongation of the particle can be determined. Also, the fibrillar structure of asbestos is most evident under crossed polars.

11.3 Identification of the fibrous constituents is facilitated by comparison of the unknowns to materials in the reference collection.

11.4 A quantitative estimate of the amount of asbestos present is derived from the combination of the estimate made from slide preparations and the estimate of total fiber made from examination of the bulk sample.

12. SAMPLE PREPARATION

12.1 For initial observation, the sample should be placed on a clean glass plate or glassine paper and placed under the binocular microscope or examined with a magnifying glass. Color, the presence or absence of fibers, and homogeneity should be observed and recorded. If only an occasional fiber is observed, one or two should be isolated with forceps and prepared for examination by polarized light microscopy. A preliminary estimate of total fiber content can be made at this time.

12.2 Subsamples for polarized light microscopy are usually best prepared by using forceps to sample at several places from the bulk material. These subsamples are immersed in a refractive index liquid on a microscope slide, teased apart and covered with a cover glass. At a minimum, two slide preparations should be made.

12.3 If the material is obviously layered or comprised of two or more materials that differ in color or texture, slide preparations of each component should be made.

12.4 If the sample is not readily friable or if the sample consists of a coarse-grained matrix, a mortar and pestle can sometimes be used to crush the sample.

12.5 Other methods of sample preparation for homogenization and to remove interferences, such as milling, acid and sodium metaphosphate treatment and ashing, are not normally necessary. They are described in Reference 1.

13. IDENTIFICATION OF ASBESTOS

13.1 Positive identification of asbestos requires the determination of the following optical properties: morphology, color and pleochroism, index of refraction parallel to elongation, birefringence, extinction characteristics and sign of elongation. Techniques for determining these properties are described in References 4 through 8. Characteristics of the asbestiform habit (morphology) are described in References 9 and 10. The sign of elongation is determined by use of a compensator and crossed polars. Index of refraction may be determined by the Becke line method (Reference 4) or by dispersion staining (Reference 8). The optical properties are given in Table II. General optical properties of silicates other than asbestos are found in References 4-7.

14. QUANTIFICATION OF ASBESTOS CONTENT

14.1 A quantitative estimate of the amount of asbestos present is most readily obtained by visual comparison of the bulk sample and slide preparations to other slide preparations and bulk samples with known amounts of asbestos present in them. Reference samples containing known amounts of asbestos will be available in the future from the National Institute of Standards and Technology, Office of Standard Reference Materials. Until these standards are available, laboratories should make their own standards for training and intra-laboratory comparison.

14.2 Point counting of slide preparations is not generally recommended. Point counting only produces accurate quantitative data when the material has uniform thickness. In practice, the thickness of asbestos-containing materials placed on a glass slide for petrographic analysis is often highly variable, rendering quantitative volume estimates inaccurate. However, the method recommended by the EPA for determining the amount of asbestos uses point counting techniques. It is described in Reference 1.

14.3 Estimates of the quantity of asbestos obtained by the method described in 14.1 above are neither volume nor weight-percent estimates. They are based on estimating the projected area from observation of the distribution of particles over the two-dimensional surface of the glass slide and on an observation of the bulk material. A basis for correcting to a weight or volume percent basis has not been established. However, the error introduced by assuming that the estimates are equivalent to weight percent is probably within the precision of the visual estimate techniques.

15. DATA PRESENTATION

15.1 The following information should be reported for each sample: color, presence or absence of asbestos, type or types of asbestos present, estimate of the area percentage of each type of asbestos present, area percentage of other fibrous materials present, and identity of other fibrous materials if known.

15.2 If the sample submitted for analysis is inhomogeneous and subsamples of the components were analyzed separately, the data for each subsample should be recorded separately. However, the separate components should be combined in proportion to their abundances and a single analysis should be provided for the sample as a whole.

15.3 Example Sample Analysis Sheet

Analysis of Asbestos in Bulk Materials

Sample Identification

Analyst:

Date

Macroscopic Examination

1. Size and Condition of Sample:
2. Texture: (occurrence of fibrous and other components)
3. Color:
4. Homogeneity:
5. Comments

Microscopic Examination

1. Number and Size of Subsamples:
2. Preparation: (incl. Grinding, ashing, acid washing, ...)
3. Method of estimation if other than visual estimation
4. Standards used for quantitation (if any)
5. Index of refraction of the immersion medium

Sample Identification

Analysis of fibrous component

	Component 1	Component 2
a. Morphology		
b. Color		
c. Birefringence		
d. Extinction characteristics		
e. Indices of refraction (dispersion characteristics)		
f. Sign of elongation		
g. Estimated range (percent area) of fibrous component		

Comments: (Describe any unusual characteristics or problems with analysis and if possible, briefly describe non-fibrous matrix components.)

Sample Summary

Sample Identification:

Conclusions

1. Asbestos present: yes no
2. Fibrous-nonasbestos component present yes no
3. Number of distinct fibrous components:
4. Types of fibers
5. Estimated range (percent area) of each fiber type
6. (Optional information on nonfibrous components).

16. QUALITY ASSURANCE

16.1 Laboratories performing this test method should have demonstrated proficiency in the method. This would include adequate training of the analyst, an internal quality assurance program and participation in the EPA's Bulk Sample Analysis Quality Assurance Program or the National Institute of Standards and Technology Laboratory Accreditation Program for the Analysis of Asbestos. The laboratory should have a complete set of reference materials.

16.2 In order to obtain the accuracy indicated in 17.3, it is suggested that the analyst have completed a college-level course in mineralogy, had formal training in polarized light microscopy and its application to crystalline materials including instruction in the measurement of the index of refraction by the immersion method through Becke line technique and/or dispersion staining, and have experience analyzing asbestos samples. If this training is lacking, two years of participation in the EPA's Bulk Sample Analysis Quality Assurance Program with a 100% success rate is a good indication of proficiency in the application of this method.

16.3 An internal quality assurance program should involve blind samples and replicate analyses. It is also necessary to analyze blank samples to check for contamination of immersion oils, probes, slides and general sample preparation.

16.4 A record of the sample analyses should be kept that includes all the sample and analysis data. An example analysis recording form can be found in section 15.3. While the format of the record is not required, all the information detailed in the sample should be recorded for each sample.

17. PRECISION AND BIAS

17.1 The upper detection limit is 100%. The lower detection limit is less than 1%.

17.2 A preliminary evaluation of a method similar to that outlined in this document is found in Reference 11.

17.3 If used by a properly trained and experienced analyst, the accuracy in the determination of the presence or absence of greater than 1% asbestos is greater than 99%. If the analyst does not have the training specified in 16.2, the accuracy may be considerably reduced.

17.4 The error associated with the quantitative estimate of weight or area percent asbestos may be quite large. When the percentage of asbestos in the bulk sample is small, the error in the estimate may exceed 100% relative. Relative errors are particularly large in estimates near 1%. When the percentage of asbestos is large, however, the error is significantly reduced and may be as low as 10% relative or less. The precision and accuracy of the quantitative estimate are highly dependent on the training and experience of the analyst.

REFERENCES

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10. Zussman, Jack, "The Mineralogy of Asbestos," in Asbestos: Properties, Applications, and Hazards, John Wiley and Sons, 1979, pp. 45-67.

11. U.S. Environmental Protection Agency, "Bulk Sample Analysis for Asbestos Content: Evaluation of the Tentative Method." EPA 600/4-82-021, May 1982.

TABLE I: Flow Chart for Qualitative Analysis of Bulk Samples by Polarized Light Microscopy

Polarized light microscopy qualitative analysis: For each type of material identified by examination of sample at low magnification, mount spatially dispersed sample in 1.550 RI liquid. (If using dispersion staining, mount in 1.550 ND.) View at approximately 100x with both plane polarized light and crossed polars. More than one fiber type may be present.

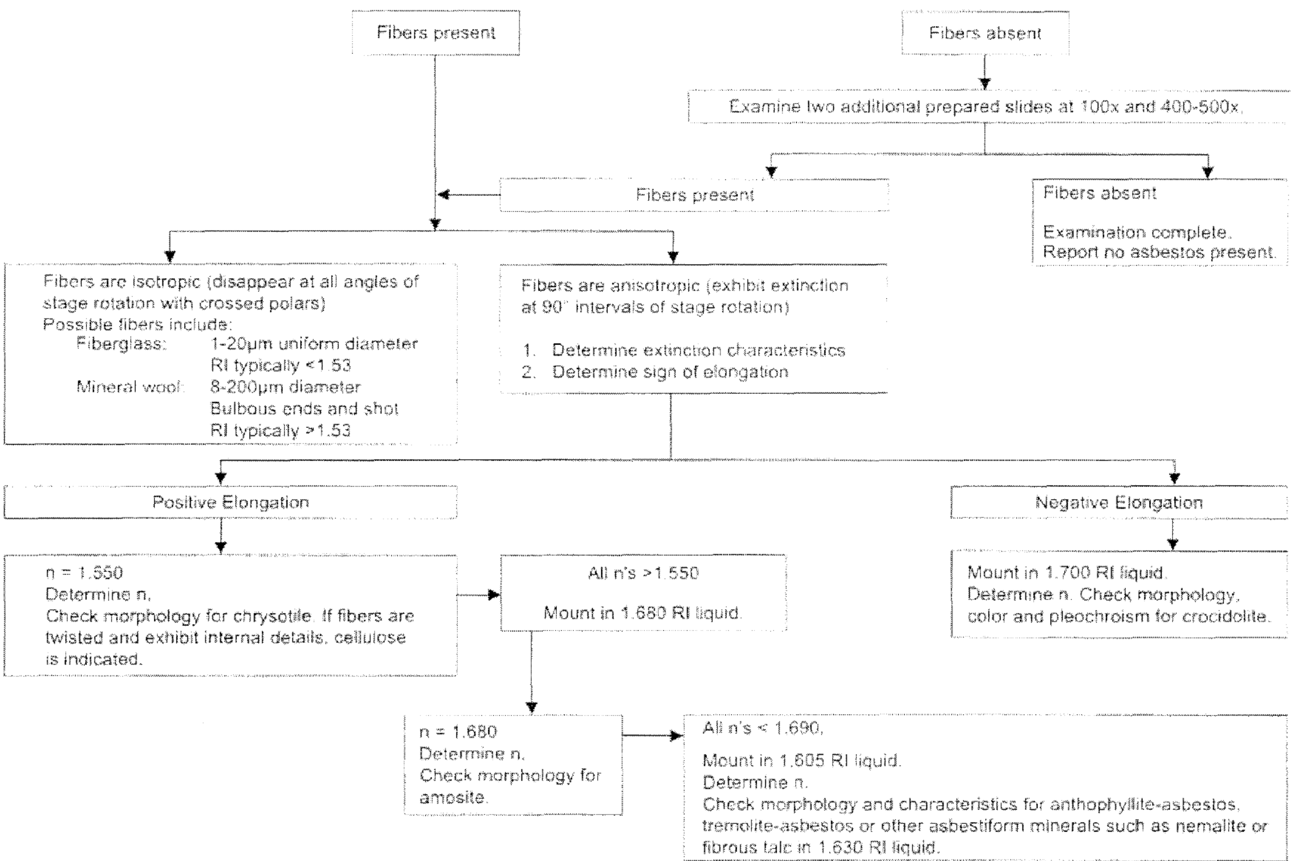

TABLE II

Mineral	Morphology and Color	Refractive Indices (Approximate Values)		Birefringence	Extinction	Sign of Elongation
		Parallel to Elongation	Perpendicular to Elongation			
Chrysotile-asbestos	Wavy fibers with "kinks" common. Large fiber bundles may show splayed ends. Colorless and nonpleochroic. Very common in building materials.	1.55	1.54	0.002-0.014	Parallel	Positive (length slow)
Cummingtonite-grunerite-asbestos (Amosite)	Straight fibers and fiber bundles. Only long fibers show curvature. Fiber bundles usually show splayed ends. Colorless to brown; may be weakly pleochroic. Common in building materials.	1.70	1.57	0.02-0.03	Parallel	Positive (length slow)
Crocidolite	Straight and curved fibers showing splayed ends are common. Blue color characteristic. Pleochroism marked. Uncommon in building materials.	1.70	1.71	0.014-0.016 Interference colors may be masked by blue color	Parallel	Negative (length fast)
Anthophyllite-Asbestos	Straight fibers and fiber bundles showing splayed ends. Colorless to light brown. Pleochroism absent. Rare in building materials.	1.63	1.61	0.013-0.028	Parallel	Positive (length slow)
Tremolite-asbestos and actinolite asbestos	Straight and curved fibers and fiber bundles. Large bundles show splayed ends. Tremolite is colorless. Actinolite is green and weakly to moderately pleochroic. Both actinolite and tremolite are extremely rare in building materials.	1.62-1.64 (tremolite) 1.64-1.68 (actinolite)	1.60-1.62 (tremolite) 1.62-1.67 (actinolite)	0.02-0.03	Parallel in most fibers. Narrow fibers may show oblique extinction ($c\wedge Z$ up to 20°) in some samples	Positive (length slow)

Yale University

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Campus address:
Kline Geology Laboratory
210 Whitney Avenue
Telephone: 203 432-3114
Fax: 203 432-3134

To:John Kelse
Vanderbilt Corp.
30 Winfield St.
Norwlk, CT 06855

From: H. Catherine W. Skinner
Department of Geology and Geophysics
Yale University
Box 208109
New Haven, CT 06520-81909

HCW Skinner

Re: Bill for Services related to Talc Sample Analysis

Date:May 17, 1995

Billable hours for Howard Snyder
February 20 hours
March 14.5 hours
April 7 hours
TOTAL 41.5 hours @ $12 $498.00

Consultation and supervision
H.C.W.Skinner $600.00

Supplies/Copying/Fax etc. 102.00

GRAND TOTAL $1200.00

PLEASE REMIT TO HCWS AT ADDRESS ABOVE, THANK YOU.

O.K.
J. Kelse

EXHIBIT
#17 Wylie
JH 9-18-09

RT-DOCS/Compel-03225

VOICE DATE	INVOICE NUMBER	DESCRIPTION	INVOICE AMOUNT	DISCOUNT	NET AMOUNT
3/02/94	FEB-1994	FEBRUARY SERVICES	1,792.49	.00	1,792.49

DATE 3/03/94 VENDOR NO. 12948 **TOTAL** 1,792.49

R. T. VANDERBILT COMPANY, Inc.

NO. 166004

166004

CITIBANK, N.A.
399 Park Avenue
New York, N.Y. 10043

R. T. VANDERBILT COMPANY, INC.
30 WINFIELD STREET
NORWALK, CT 06856

NO. 166004

5144
1-8
210

DATE 3/03/94

PAY ****1,792.49***** DOLLARS

TO THE ORDER OF

AMOUNT
****1,792.49

H.CATHERINE W.SKINNER,PHD

VOID AFTER 90 DAYS FROM DATE OF CHECK

R. T. VANDERBILT COMPANY, Inc.

G. L. Fiederlein
Authorized Signature

A. Merola
Authorized Signature

⑈0000166004⑈ ⑆021000089⑆ 0535918б⑈

RT-DOCS/Compel-03223

INVOICE DATE	INVOICE NUMBER	DESCRIPTION	INVOICE AMOUNT	DISCOUNT	NET AMOUNT
1/31/95	MARCH-1994	MARCH SERVICES	383.98	.00	383.98

DATE 2/09/95 VENDOR NO. 12948 **TOTAL** 383.98

R. T. VANDERBILT COMPANY, Inc. NO. 173969

173969

CITIBANK N.A. [illegible]

R. T. VANDERBILT COMPANY, INC.
30 WINFIELD STREET
NORWALK, CT 06856

NO. 173969

5144
1-[illegible]
21

DATE 2/09/95

PAY
TO THE ORDER OF

******383.98****** DOLLARS

******383.98

H.CATHERINE W.SKINNER,PHD

VOID AFTER 90 DAYS FROM DATE OF CHECK

R. T. VANDERBILT COMPANY, Inc.

G. L. Fiederlein
Authorized Signature

A. Merola
Authorized Signature

⑈0000173969⑈ ⑆021000089⑆ 0535918 6⑈

RT-DOCS/Compel-03222

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Ann Wylie
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Brooke Mossman
Dept. of Pathology
University of Vermont
Burlington, VT 05405-0068
802-656-8892

EXHIBIT
18 Wylie
JH 9-18-09

August 30, 1994

Dear Ann/Brooke,

I have received the FAX from John Kelse re our Project"SAMPLE CHARACTERIZATION / IN VITRO TESTING" and taking the lead as he suggested let me recommend some dates for a telephone conference call:
Monday September 19 : 3 PM
Tuesday September 20: 3 PM
Wednesday September 21: 3 PM

I believe you two received some data from me on the results of SEM characterization back in May, and Ann recently sent her optical analysis data. Brooke: if you could review and briefly summarize the biological data for Ann and me we would all have in front of us the basis for a good discussion.
The main points I think we should address in the conversation relate to comparing the TALC SAMPLES with the chrysotile/ crocidolite samples and how they compare with previous research on these or other TALC samples. Therefore, although we need adequate details on methodology, it is how to integrate the results between us that we need to decide.
Measurement Methods, statistical significance and other relatively boring but important basic information will set the stage for the conclusions. I think the general results are known. What specifics can be identifed that makes this research a contribution?
I, for one, want very much to have a paper produced from all these efforts. If you are in agreement, what journal might be appropriate?
I leave tomorrow for 2 weeks at the International Mineralogical Association meetings (in Pisa, ITALY !) and will return on Sept. 14.

Very much look forward to our conversation. If the dates/times are not appropriate make a suggestion for later in September.
Many thanks.

Yours,
Cathy
H.Catherine W. Skinner
Tel # 203-432-3787 FAX #203-432-9819
[redacted]

FAX RECEIVED
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:E: 8:10
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** TOTAL PAGE.001 **

Ann:

Enclosed please find Catherine's most recent breakdown. On her ID you will recall she sets up her "windows" and determines anthophyllite strictly on iron. Slim has questions/problems with that and I know he wants to discuss these "window" parameters (reliability of) relative to the anthophyllite determination. On her "unknowns", we suggested she change that designation to "Not Determined" (too small - can't obtain data - etc.)

On the iron-anthophyllite-mixed fiber issue see CPS 183-4 particle #238 (page 9). This "anthophyllite" is the only particle of these dimensions (long/narrow). We asked that that fiber be revisited with multiple chemistry and (if possible because its on a filter) obtain multiple SAED patterns to see if its mixed or not. What SAED patterns Catherine showed us on anthophyllite "fiber" had the "triplet" imprint (i.e. Dagenhart).

Catherine seems to have problems with this "mixed" concept and the diffraction patterns. She talks of one mineral particle overlaying another particle for the "mixed" pattern - not that these phases are intergrown or layered and nonseparable, etc. These discussions, of course, are over my head and you and Slim need to talk further about this.

In any event, we would like to start putting this data together. Although Catherine's summary distribution is still per "x" number particles versus weight, the surface areas are calculated. Slim and I will try to call next Friday pm.

Note: We met Howard Snyder (grad student doing the work). Howard seems quite impressive - competent, etc. If you discuss these matters with Catherine you may wish to talk to Howard directly. After he spoke with Slim I suspect he may have a better grasp on al this than Catherine herself. Note also that the chrysotile was sized.

JWK/sk
enclosure
cc: C. S. Thompson, Ph.D. (with enclosure)

SAMPLES

o FD-14: Records reflect the origin of this sample to be from International Talc, 1965. This is a product sample (Asbestine 3X) obtained by William Smith, M.D. from a distributor (Whittiker, Clarke and Daniels) for use in rodent pleural implant studies. This material is considered similar to an Arnold Pit mine sample and RTV talc products today (also mined from the Arnold Pit - open pit).

o NYTAL 300: This sample is a product sample from 1992 obtained from the Glidden Paint Company (Reading, PA plant). This is a common RTV talc grade derived from either the Arnold Pit, mine #1 (underground) or a blend of ores from both mines.

o CPS-183-4: This is a fiber concentrate sample prepared for experimental purposes in the mid 1970's from hand picked specimens of mine #3 underground ore. Mine #3 was mined by International Talc principally to obtain high talc fiber ore. This high fiber ore was typically blended with granular ore to obtain desired product characteristics (i.e. oil absorption). RTV purchased the assets of International Talc in 1974 and continued to mine ore from mine #3 until 1977. The mine was then closed and the production of high fiber grade products terminated. This concentrate represents the highest fiber concentrate we could produce in our lab - it is not representative of any product ever sold.

o S-157: This is a high fiber grade talc which was sold as a product by International Talc (to 1974) and by RTV (1975-77). The "fiber" component in this sample came from mine #3 (described above), and the granular portion likely from the Arnold Pit or granular ore from mine #3. RTV labeled this product Fibertal 2, International labeled it Fiber #2. This particular sample is from 1975.

Mine Status

RTV

o Underground mine #1, 1948 to present (talc fiber very rare when found at all).

o Arnold Pit - open pit adjacent to mine #1 operated by RTV 1974 to present (talc fiber rare but more common than mine #1).

o Mine #3, 1974 to 1977 (talc fiber high).

International Talc

o Arnold Pit, operated prior to 1974 (much smaller open pit than currently mined).

o Mine #3 - Talcville (approximately 10 miles from Arnold Pit), operated prior to RTV purchase in 1974).

UNIVERSITY OF MARYLAND
DIVISION OF AGRICULTURE AND LIFE SCIENCES
COLLEGE PARK
20742

DEPARTMENT OF
GEOLOGY
301-454-3548

August 25, 1982

Mr. George MacDonald
Rollins Burdick Hunter of Illinois, Inc.
10 South Riverside Plaza
Chicago, Illinois 60606

Dear Mr. MacDonald;

Using polarized light microscopy and dispersion staining, I have examined the sample you sent to me identified as tremolitic talc. I have identified the following minerals in this sample: platy talc, tremolite, fibrous talc and anthophyllite. Of these, tremolite and anthophyllite can occur in nature in an asbestiform habit and are then called asbestos. The characteristics of this habit which are visible using the optical misroscope are:

1. fiber bundles exhibiting splayed ends
2. parallel extinction (The non-asbestiform varieties may exhibit oblique extinction.)
3. curved fibers
4. extreme elongation often in excess of 100:1

The tremolite and anthophyllite present as major constituents of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments. Most of the cleavage fragments are elongated and many have aspect ratios in excess of 3:1. According to our existing federal government regulations these cleavage fragments can be called fibers. However, this is not mineralogically valid. I observed no anthophyllite or tremolite asbestos fibers in the sample I examined.

There are, however, true mineral fibers in the sample. I have identified them as fibrous talc. They are distinguished from the amphiboles tremolite and anthophyllite on the basis of their index of refraction. The maximum index of refraction of fibrous talc does not exceed 1.596. All of the fibers I observed in this sample had indices of refraction equal to or less than 1.596. This value is much too low for tremolite or anthophyllite asbestos. Fibrous talc is thought to form from anthophyllite. It also exhibits the characteristics listed above for the asbestiform habit. Although I did not observe any in the sample portion I examined, there may be a few fibers which fall somewhere between anthophyllite-asbestos and fibrous talc present from this locality. The abundance of this material is vanishingly small and is should be considered as occuring in trace quantities only.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Associate Professor

EXHIBIT
#19 Wylie
5H 9-18-09

1983

UNIVERSITY OF MARYLAND
DIVISION OF AGRICULTURE AND LIFE SCIENCES
COLLEGE PARK
20742

DEPARTMENT OF
GEOLOGY
454-3548

March 8, 1983

EXHIBIT
#20 Wylie
JH 9-18-09

Mr. Guy Driver
P.O. Box 84
Winston Salem, North Carolina 27102

Dear Mr. Driver;

With a view toward testifying in the case of Poindexter vs R. T. Vanderbilt, I have examined two samples labeled Nytal 300 and Nytal 400 which were sent to me by Mr. Al Harvey. The methods I used to examine these samples are polarized light microscopy, Becke line technique and dispersion staining. I have identified the following minerals in these samples: platy talc, tremolite, fibrous talc and anthophyllite. Of these, tremolite and anthophyllite can occur in nature in an asbestiform habit and are then called asbestos. The characteristics of this habit which are visible using the optical microscope are:

1. fiber bundles exhibiting splayed ends
2. Parallel extinction, a characteristic of asbestos only when the ordinary varieties exhibit oblique extinction such as for tremolite
3. curved fibers
4. extreme elongation, often in excess of 100:1

The tremolite and anthophyllite present as major constituents of these samples do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments. Most of these cleavage fragments are elongated and many have aspect ratios in excess of 3:1. Rarely, particles with aspect ratios of up to 20:1 were observed. According to our existing federal government regulations these cleavage fragments can be called fibers of asbestos. However, this is not mineralogically valid. I observed no anthophyllite or tremolite asbestos fibers in the samples I examined.

There are, however, true mineral fibers in the samples. I have identified them as fibrous talc. They are distinguished from the amphiboles tremolite and anthophyllite on the basis of their index of refraction. The maximum index of refraction of fibrous talc does not exceed 1.600 for λ = 589nm. Almost all of the fibers I observed in these samples had indices of refraction less than 1.600. This value is much too low for tremolite or anthophyllite asbestos. Fibrous talc is thought to form from anthophyllite and/or tremolite. It also exhibits the characteristics listed above for the asbestiform habit. In the samples I examined, there were a few fibers which fall somewhere between anthophyllite-asbestos and fibrous talc. The abundance of this intermediate material is vanishingly small and occurs in trace quantities only (< 0.01%).

RECEIVED

MAR 10 1983

W.C.S.&R.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Associate Professor

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

301-454-3548

December 4, 1983

Report of Investigation

I. SAMPLES

Two samples were received from Mr. N.v.d. Burgh. They were sent at the request of Mr. J.L. Spoormaker of R.T. Vanderbilt Company. The two samples are labeled IT-325 and IT-FT.

II. METHOD OF ANALYSIS

The samples were examined by polarized light microscopy and Cargille index of refraction liquids. Scanning electron microscopy with energy dispersive x-ray analysis was not used because four of the major components of the material: talc, serpentine, anthophyllite, and talc-amphibole, cannot be distinguished readily by this method. The habits of talc, talc-amphibole and anthophyllite in some cases are similar. Chemically, they vary only in their Mg:Si ratio, a quantity which is not easily measured quantitatively by energy dispersive x-ray analysis, and qualitative analysis in not definitive. X-ray diffraction was not used because mineral habit cannot be evaluated by x-ray diffraction and minerals which occur in small quantities cannot be detected by it. Optical microscopy allows the determination of many optical properties including the measurement of the indices of refraction while simultaneously observing habit.

III. RESULTS

A. Elongated minerals

Four minerals occur in the samples in an elongated form. Of these, the most abundant is tremolite, followed by fibrous talc. Anthophyllite and talc-amphibole occur in very small quantities. The optical properties, habits, and central stop dispersion staining colors which can be observed in Cargille immersion oil, $n_D = 1.604$*, are given for all four.

* Throughout this report, all indices of refraction are given for $\lambda = 5893$ A°, the Fraunhofer D line.

EXHIBIT
#21 Wylie
JH 9-18-09

WES000410

1. Tremolite

Deer, Howie and Zussman (1966)** give the optical properties of tremolite as follows:

$$\alpha = 1.599 - 1.688$$
$$\beta = 1.612 - 1.697$$
$$\gamma = 1.622 - 1.705$$
$$c\wedge Z = 21 - 10°$$

α, γ and $c\wedge Z$ were measured from the tremolite found in IT-FT and IT-325 as follows:

$$\alpha = 1.598 \pm 0.002$$
$$\gamma = 1.622 \pm 0.002$$
$$c\wedge Z = 19°$$

Tremolite can be distinguished from the other elongated minerals in these samples by its oblique extinction, indices of refraction and shape.

Most tremolite particles will show oblique extinction but only a few will show the characteristic maximum angle ($c\wedge Z = 19°$). Those for which the extinction angle is maximum will also have the highest birefringence (highest order interference colors under crossed nicols), and will have indices of refraction α and γ. Most tremolite particles will lie parallel to {110} and will have indices of refraction of α' and γ'. These particles will also have oblique extinction but their extinction angles are less than 19 degrees. Most have extinction angles between 10 and 15 degrees. Tremolite viewed on {100} will show parallel extinction. Indices of refraction β and γ are characteristic of this orientation. By tapping the cover slip and causing the particles to roll, an observor can view the particle in a different orientation. In this way, it is possible to distinguish tremolite, which has parallel extinction in only one orientation, from anthophyllite, which has parallel extinotion in all orientations.

When these samples are put in Cargille immersion oil $n_D = 1.604$ and are viewed through a central stop dispersion staining objective, the tremolite will appear yellow to golden yellow when the elongation direction of the particle is parallel to the privileged direction of the lower polarizer. They will be blue, blue magenta or magenta when the elongation direction is perpendicular to the polarizer's privileged direction. The colors reflect the variability of the magnitude of γ' parallel to elongation and of the magnitude of α' to β perpendicular to elongation. This variability is due to differences in crystallographic orientation among the particles.

The principle indices of refraction appear to be quite constant throughout the material. They are among the lowest given for tremolite generally. This suggests that this tremolite is essentially iron-free. It should have a chemical formula close to that of the Mg end member: $Ca_2Mg_5Si_8O_{22}(OH)_2$.

** Deer, Howie and Zussman (1966) are used throughout as the source for standard optical data. Their data do not differ significantly from Kerr (1966), Heinrich (1972) Winchell and Winchell (1951) or Bloss (1962).

Figure 1. The particles labeled "T" are tremolite particles. Their aspect ratios are typical of the tremolite found in the samples. The length of the bar is 45 microns.

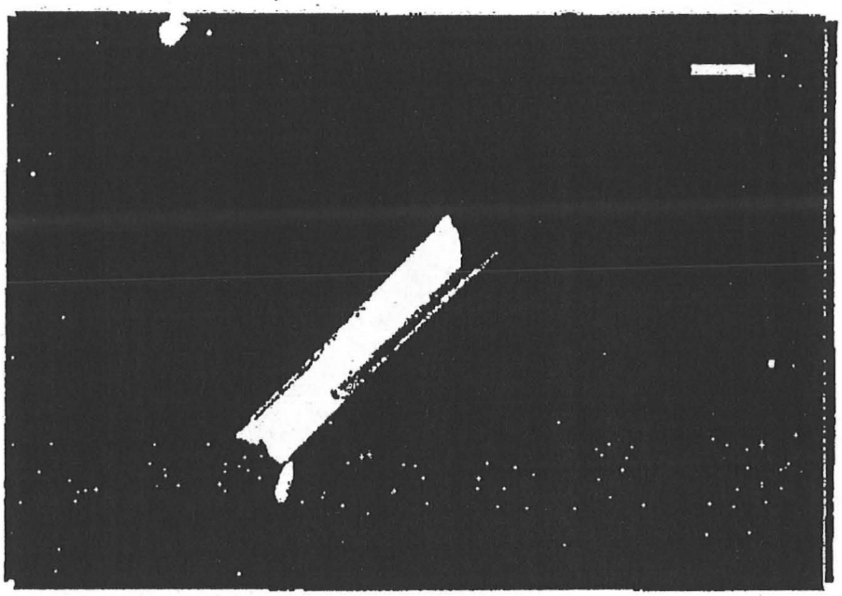

Figure 2. Tremolite showing the cleavage of a highly acicular cleavage fragment. Tremolite particles with high aspect ratios are very rare in these materials. The aspect ratio of the whole particle is characteristic of tremolite. The length of the bar is 10 microns.

Tremolite (continued)

The tremolite particles have shapes which are typical of amphibole cleavage fragments. (Figure 1) Their aspect ratios (length:width) range from 1:1 to 20:1; most are in the range 3:1 to 10:1. Rarely, a long thin cleavage fragment will be found. Figure 2 illustrates the formation of such a particle. That this long thin particle is not a fiber but rather a cleavage fragment is suggested by the fact that it is in optical continuity with the large, blocky particle from which it is being cleaved. None of the tremolite particles show any characteristics of the asbestiform habit; they do not grow in bundles, show flexibility through curvature, nor occur with the high aspect ratios typical of asbestos.

2. Fibrous talc

Deer, Howie and Zussman (1966) give the optical properties of talc as follows:

$$\alpha = 1.539 - 1.550$$
$$\beta = 1.589 - 1.594$$
$$\gamma = 1.589 - 1.600$$

There are both platy and fibrous talc present in IT-FT and IT-325. The optical properties of the fibrous talc were measured as follows:

$$\alpha = 1.538 - 1.550 \pm 0.002$$
$$\beta \cong \gamma$$
$$\gamma = 1.578 - 1.600 \pm 0.002$$
$$\text{elongation direction } \wedge Z = 0 - 20^\circ$$

Fibrous talc can be distinguished from the other elongated minerals present in these samples on the basis of indices of refraction, extinction angle and habit.

For talc, all indices of refraction are less than 1.600. Therefore, in immersion oil $n_D = 1.604$, when the direction of elongation is parallel to the privileged direction of the polarizer and the particles are observed through a central stop dispersion staining objective, the talc fibers will appear blue, bluegreen or blue white. The color variation reflects the variability of α. When viewed with the elongation direction perpendicular to the polarizer's privileged direction, the talc particles may exhibit essentially the same dispersion staining colors as they do parallel to their length when β is parallel to the privileged direction of the polarizer ($\beta \cong \gamma$); they will appear white if it is α or α' which is parallel to the privileged direction of the polarizer.

The wide range of the indices of refraction which were measured from the fibrous talc suggests that its chemical composition is not constant. It may be the presence of small quantitites of Ca and/or excess water which are responsible for the variability.

Fibrous talc occurs in two different habits in these samples. The first type can be called asbestiform (Type I). These particles are clearly made up of bundles of fibers which are obviously flexible (Figure 3).

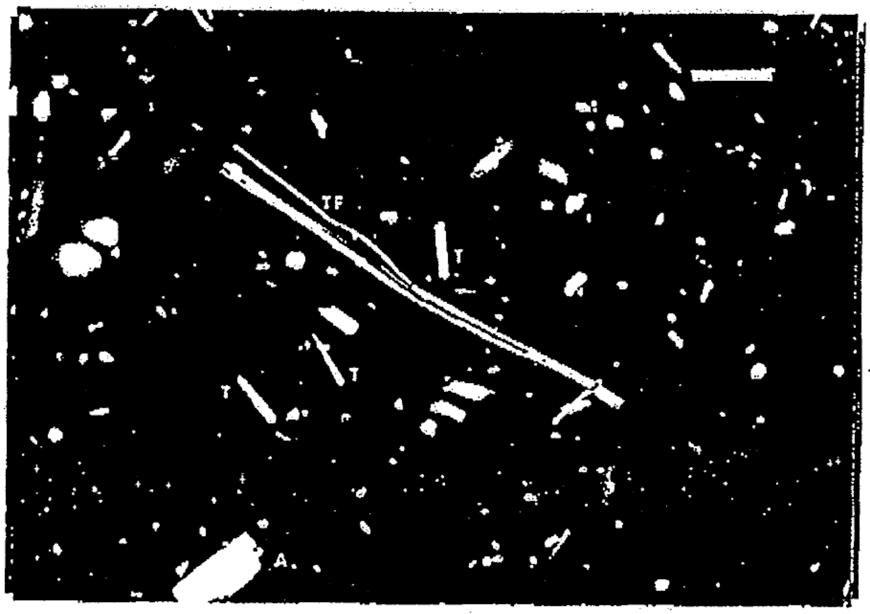

Figure 3. A typical asbestiform Type I talc fiber is labeled "TF". Tremolite cleavage fragments are labeled "T". The particle in the lower left labeled "A" is a prismatic anthophyllite cleavage fragment. The asbestiform habit contrasts sharply with that of the prismatic cleavage fragments. The length of the bar is 30 microns.

Fibrous Talc (continued)

These asbestiform talc fibers have high birefringence and two indices of refraction: γ' perpendicular to elongation and α' parallel to elongation. γ' and α' of the asbestiform talce are lower than the corresponding indices of Type II talc fibers. Type II talc fibers can be described as ribbon-like. In one orientation, these particles appear as wide, low birefringent particles (they may be almost isotropic). The indices of refraction γ and β occur in this orientation and oblique extinction of up to 3 degrees may be observed. Aspect ratios vary from 3:1 to 15:1; most are from 5:1 to 10:1. (Figure 4a) These particles may also be seen in another orientation where they have higher birefringence, indices of refraction α and γ, parallel extinction and aspect ratios that range up to 20:1 or 30:1. (Figure 4b) Some of the Type II fibrous talc particles may exhibit splayed ends (Figure 5), and appear to be marginally asbestiform.

3. Anthophyllite

Deer, Howie and Zussman (1966) give the indices of refraction and extinction angle of anthophyllite as follows:

$$\alpha = 1.596 - 1.694$$
$$\beta = 1.605 - 1.710$$
$$\gamma = 1.615 - 1.722$$
$$c \wedge Z = 0°$$

α, β and γ were measured from the anthophyllite found in IT-FT and IT-325 as follows:

$$\alpha \geqq 1.594 \pm 0.002$$
$$\beta \geqq 1.604 \pm 0.002$$
$$\gamma \geqq 1.614 \pm 0.002$$
$$c \wedge Z = 0°$$

Prismatic anthophyllite can be distinguished from tremolite by its parallel extinction in all orientations. Also, its birefringence is slightly less than that of tremolite and its largest index (γ) is somewhat less than γ of tremolite. Acicular anthophyllite can be distinguished from talc and talc-amphibole only on the basis of index of refraction. In Cargille oil $n_D = 1.604$, its dispersion staining colors will be golden to golden magenta when the direction of elongation is parallel to the privileged direction of the polarizer. They will be blue magenta to bright blue green when the privileged direction of the lower polarizer is perpendicular to the direction of elongation. The indices of refraction of the anthophyllite present in these samples are very low. Low indices of refraction are characteristic of anthophyllite which is essentially iron-free.

The anthophyllite particles are generally more acicular than the tremolite particles (Figure 6). They frequently have aspect ratios of 20:1, and, when they have this shape, they can only be distinguished from

Figure 4. Two views of the same Type II fibrous talc particles (FT). The length of the bar is 45 microns.

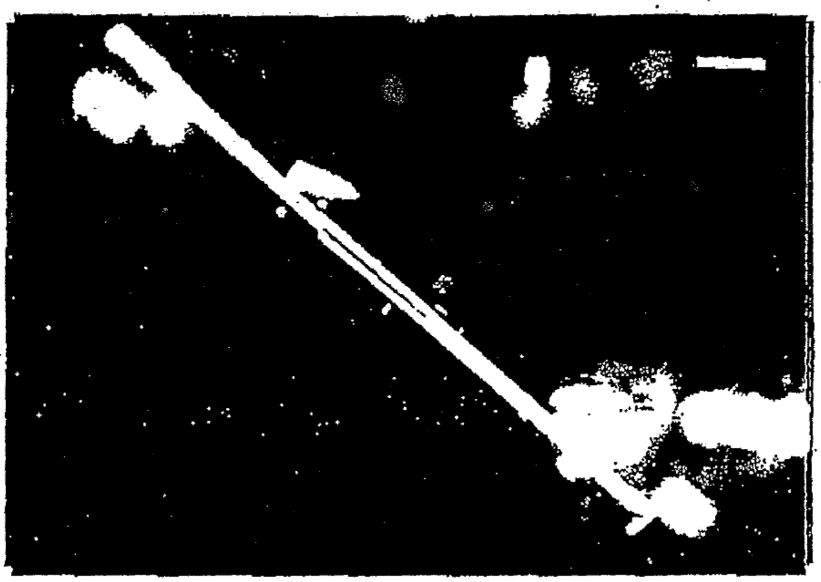

Figure 5. A Type II fibrous talc particle. At 90° to this, the ribbon-like habit of these fibers would be evident. The length of the bar is 10 microns.

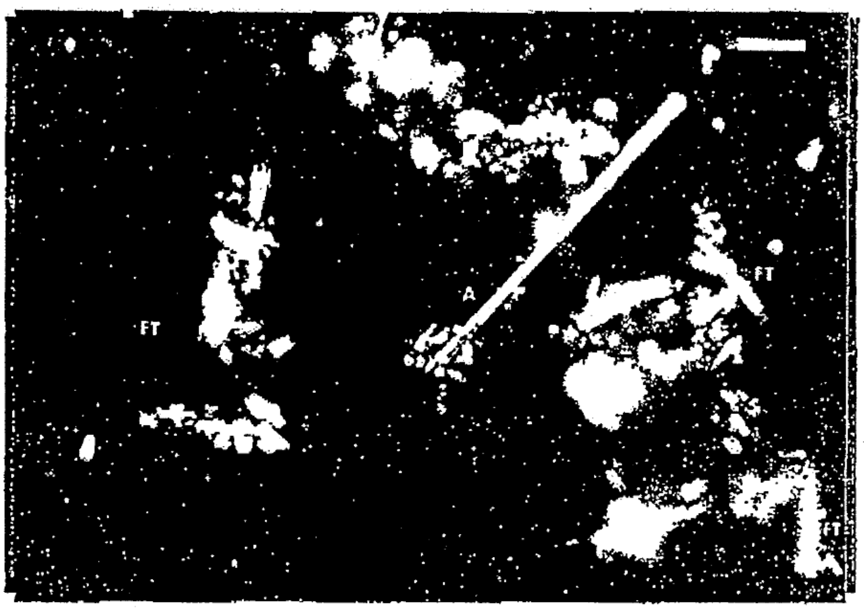

Figure 6. A high aspect ratio anthophyllite particle is labeled "A". Three fibrous talc particles are labeled "FT". The length of the bar is 10 microns.

talc-amphibole and talc by careful evaluation of the indices of refraction. Blocky anthophyllite particles are also present. (Figure 3) The habit of anthophyllite does not appear to be asbestiform. There is no indication of fiber bundle growth flexibility, or extreme aspect ratio. However, the high aspect ratio particles may be mineral fibers even though they are not asbestiform. But, because the material has been processed, fibers cannot be distinguished from cleavage fragments with high aspect ratio. Examination of the unprocessed ore would probably enable this distinction to be made.

4. Talc-amphibole

Present in these samples are elongated mineral particles which have optical properties which do not conform to any recognized mineral species. They are:

$$\alpha = 1.550 - 1.592$$
$$\beta = 1.590 - 1.600$$
$$\gamma = 1.590 - 1.608$$

elongation direction $\wedge Z = 0$

$(\gamma - \beta)$ appears to increase as α and γ increase. Therefore, at one extreme, $\gamma = 1.590$, $\alpha = 1.550$ and $(\gamma - \beta) = 0$. At the other, $\gamma = 1.608$, $\alpha = 1.592$ and $(\gamma - \beta) = 0.008$. Most of the talc-amphibole particles have parallel extinction.

This mineral resembles both talc and amphibole. When γ and β are close together, it is similar to talc but at least one index of refraction is too high for talc. When $(\gamma - \beta)$ is approximately the same as $(\beta - \alpha)$, the material resembles an amphibole but the indices of refraction are too low. In addition, electron diffraction of some fibrous talcs have shown a residual amphibole lattice may be present (Stemple and Brindley 1960). Therefore, the name talc-amphibole seems appropriate for this material. The extinction angle data suggest that the "amphibole" part of this mineral may be both an orthorhombic amphibole (anthophyllite?).

In Cargille immersion oil $n_D = 1.604$, the appearance of these particles will be highly variable due to the large variability of α and γ. When the direction of elongation is parallel to the privileged direction of the polarizer, and they are viewed with a central stop dispersion staining objective, the particles may appear reddish magenta, magenta, blue magenta, blue green or blue white. Perpendicular to the direction of elongation, they will be blue green, blue white or white.

and The habit of talc-amphibole appears to be variable. Some particles are ribbon-like, similar to the Type II fibrous talc; some are similar to anthophyllite; and some resemble the talc fibers shown in Figure 5 in which case they would be described as marginally asbestiform. Aspect ratios on the order of 20:1 are common. Some typical particles are shown in Figures 7 and 8.

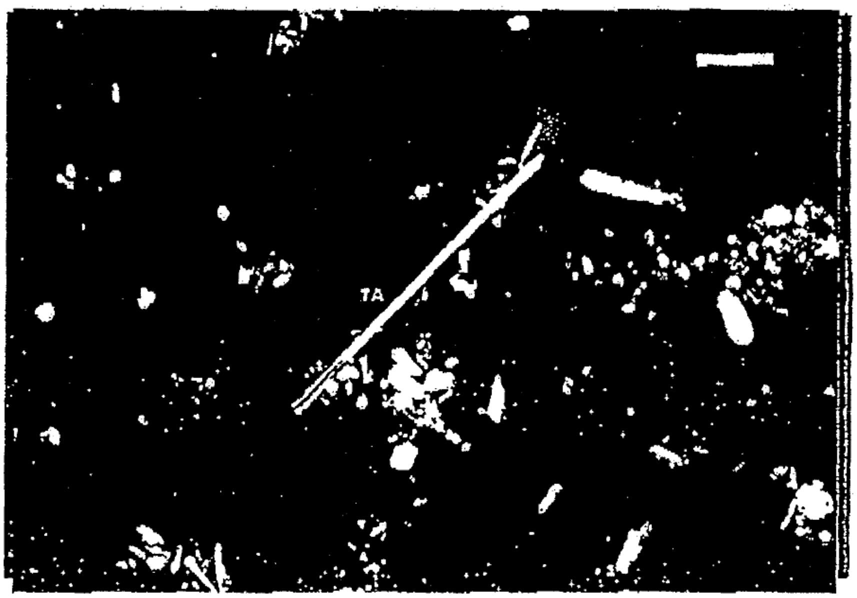

Figure 7. A talc-amphibole particle is labeled "TA". This particle was designated as talc-amphibole because α was measured as 1.578. The length of the bar is 30 microns.

B. Other minerals

In addition to the four minerals described above, serpentine, platy talc, and calcite were observed in the samples. None of the serpentine is chrysotile. All of it has a platy habit; it is probably antigorite. In Cargille immersion oil $n_D = 1.556$, it can be seen that the indices of refraction of the serpentine particles are close to the indices of refraction of this oil. None of the elongated mineral particles have an index of refraction parallel to elongation which is close to 1.556. For all the elongated minerals, the index of refraction which is parallel to the direction of elongation is greater than 1.556. Perpendicular to the direction of elongation, all amphibole particles have indices of refraction much greater than 1.556. Only fibrous talc may have α equal to 1.556. Still, fibrous talc should not be confused with chrysotile because fibrous talc has a high birefringence and a much larger γ.

CONCLUSIONS

Samples IT-IF and IT-325 are composed of essentially the same minerals. Four of these are elongated. Type I fibrous talc is clearly asbestiform. The talc-amphibole and fibrous talc Type II form acicular particles and there is evidence to suggest that they are marginally asbestiform. However, fiber bundles are rare and many of the particles may simply be acicular cleavage fragments like those shown in Figure 4. The anthophyllite is both acicular and prismatic, and the particles may be formed by growth or cleavage or both. However, the anthophyllite does not appear to be asbestiform. The tremolite particles are prismatic and blocky and are probably formed by cleavage alone. They are the most common elongated mineral particles in these samples. Type I fibrous talc and tremolite are readily distinguished from the other elongated minerals by their distinct habits. Type II fibrous talc, talc-amphibole and anthophyllite require precise determination of index of refraction data to make a positive identification. In fact, there is an apparent continuum between fibrous talc and anthophyllite in optical properties and habit. A similar series of minerals is present in anthophyllite-asbestos from Finland (UICC). There, however, fibrous talc is a minor constituent while anthophyllite is abundant. Here, fibrous talc is the common phase while talc-amphibole and anthophyllite occur in minor amounts.

Ann G. Wylie

Ann G. Wylie
Associate Professor

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REPORT OF LABORATORY ANALYSIS

I have examined the sample of Nytal 99 which Dr. C. S. Thompson of R.T. Vanderbilt sent to me in October, 1984. I used polarized light microscopy in conjunction with immersion oil techniques. The purpose of this examination was to identify the elongated minerals present in the sample and to determine if any of these particles are asbestos.

Mineral identification was based on the optical properties of the minerals which include: index of refraction, sign of elongation, extinction angle, birefringence, color, and the relationship between the optic and cleavage directions. The most abundant elongated mineral found in this sample is tremolite. The other elongated minerals which were identified include anthophyllite, talc, and an intermediate talc-amphibole.

No asbestos was identified in this sample. Asbestos fiber populations are composed of either chrysotile or a member of the amphibole family that occur as particulates that display some or all of the following characteristics: fiber bundles with splayed ends, curved fibers, aspect ratios in excess of 20:1 and widths less than 1 micrometer for fibers longer than 5 micrometers, and matted masses of individual fibers. None of these properties were observed on any of the amphibole particulates in this sample.

The elongated talc particles, although rare, display the characteristics common to asbestos. Splayed ends, curvature, and parallel growth in bundles are common characteristics of this population. Such material is referred to as "fibrous" or "asbestiform" talc.

The particles of tremolite and anthophyllite in this sample display the characteristics that are typical of cleavage fragments of amphiboles. Amphibole cleavage fragments lack the characteristics of asbestos. Individual particles longer than 5 micrometers typically do not exceed 20:1 in aspect ratio. Stair-stepping along the particle edges are common. Cleavage fragments never show curvature or occur as fiber bundles with splayed ends. While some of the particles of anthophyllite and the intermediate talc-amphibole have aspect ratios that are higher than those typical of tremolite, they do not display the characteristics of the asbestiform habit.

Ann G. Wylie

Ann G. Wylie, PhD
Associate Professor of Geology
Jan 25, 1985

EXHIBIT
#22 Wylie
JH 2-18-09

WES000397

AM H.

ANN GILBERT WYLIE, PH.D.
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4001

January 25, 1985

Mr. Dennis Race
Akin, Gump, Strauss, Hauer and Feld
1333 New Hampshire Avenue, N.W.
Suite 400
Washington, D.C. 20036

Dear Mr. Race,

I am enclosing a report on a sample of Nytal 99 which I received from Dr. C.S. Thompson of R.T. Vanderbilt in October, 1984. I have given this material to Dr. Phil Candela with the instructions that he analyse this material for the presence of asbestos. You should be receiving his report in the near future. I have also enclosed an invoice for this report and analysis.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOLOGY
COLLEGE PARK, MARYLAND 20742

EXHIBIT
23 Wylie
JH 9/8/89

August 14, 1985

301-454-3548

REPORT ON SAMPLE OF NYTAL 200

SAMPLES

On July 15, 1985 I received from Mr. Irwin Katz of Region II of the Environmental Protection Agency a sample labeled 67708 and identified as having come from a 50 lb. bag of Nytal 200 taken from the Amsterdam Color Works, Inc., 1546 Stillwell Avenue, Bronx, New York.

OBJECTIVES

The sample was examined to determine if chrysotile-asbestos or amphibole-asbestos was present in the material and to identify all fibrous constituents in the material.

METHODS

Subsamples were placed on glass slides, immersed in oils of known index of refraction and examined by polarized light microscopy. The following properties were evaluated: index of refraction, birefringence, color, extinction angle, extinction characteristics, sign of elongation and morphology.

RESULTS

The major minerals present in the material are talc, tremolite, serpentine, carbonate, and anthophyllite.

The serpentine is one of the platy varieties: antigorite or lizardite. No chrysotile-asbestos was observed.

Tremolite is abundant. However, no asbestiform tremolite was observed. Asbestiform tremolite and other asbestiform amphiboles are characterized by fiber bundles exhibiting splayed ends, longer than 5μm fibers with aspect ratios typically in excess of 20:1 and widths less than 1μm, flexible fibers, fiber bundles showing parallel extinction and/or matted masses of fibers. None of these properties were observed in any of the material identified as tremolite. The tremolite in this material occurs as cleavage fragments. Cleavage fragments typically have aspect ratios less than 20:1, show stair-step cleavage along the edges of some particles, exhibit oblique extinction and do not exhibit any of the asbestiform characteristics.

Anthophyllite is an uncommon constituent of the material. Like tremolite, it occurs as cleavage fragments and not as asbestos. It typically has aspect ratios which are greater than those of the tremolite particles.

There are two types of talc present in the material. Platy talc is abundant and is characterized by equidimensional colorless particles with very low birefringence. Fibrous talc is also present. Fibrous talc occurs as both needle-like particles and as asbestiform fiber bundles. Its indices of refraction are typically greater than those of platy talc; parallel to elongation the index of refraction ranges from 1.578 to 1.600. The high index of refraction in some particles and its asbestiform habit suggest that fibrous talc may have originated as a pseudomorph after amphibole. In some particles a residual of the amphibole lattice may be present as the work by Semple and Brindley (Ref. 1) and Virta (Ref. 2) indicates. However, the fact that the maximum value of the index of refraction parallel to elongation is not greater than 1.600 and that the minimum value of the index of refraction parallel to elongation given for anthophyllite in the literature is 1.614 (see Refs. 3-5) point clearly to the fact that the transformation to talc is almost complete. In fact, most of talc fibers have indices of refraction parallel to elongation which are quite typical of platy talc, i.e. $\leq$ 1.590.

A few particles were encountered whose index of refraction parallel to elongation fell between 1.600 and 1.610. These particles are quite rare. They comprise much less than 0.01% of the sample. They have high aspect ratio > 20:1 and are best classified as talc-amphibole. They do not appear to be asbestiform although they are clearly fibers.

In addition to the silicates described above, an unusual organic fiber also was observed. Its indices of refraction are less than 1.550, its birefringence is almost 0 and the fibers occur in groups of several fibers which range in length up to a centimeter. It was identified as an organic fiber because it does not resemble any mineral fiber I am familiar with and because the individual fibers appear to pinch and swell, a property common to cellulose.

References:

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Ann Wylie
Aug 14, 1985

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

February 13, 1987

Report of Investigation

Ann G. Wylie
Associate Professor

I. Samples

Two samples were received by mail from the House of Ceramics in Memphis, Tennessee on Monday, February 2, 1987. The samples were sent at the request of Mr. Dennis race who asked that I analyze the samples for asbestos. The samples were labeled Nytal 100 HR Talc and Pfizer CP 96-30 Talc.

II. Method of Analysis

The samples were examined by polarized light microscopy. Subsamples were mounted in Cargille index of refraction liquids for determination of index of refraction. Other properties used in the identification of the minerals include sign of elongation, extinction angle, birefringence, color and the relationship between optic and cleavage directions.. Mineral names were assigned by comparing these data to those given in standard optical mineralogy textbooks. Once the minerals were identified, the determination of whether or not the mineral was asbestos was based on morphology. A mineral is considered to be asbestiform if it meets the following criteria:

1) mean aspect ratios ranging from 20:1 to 100:1 or higher in particles longer than 5 μm,
2) very thin fibrills, usually less than 0.5 μm in width, and
3) two or more of the following:
   a) parallel fibers occurring in bundles,
   b) fiber bundles displaying splayed ends,
   c) fivers in the form of thin needles,
   d) matted masses of individual fibers, and
   e) fibers showing curvature.

To be asbestos, an asbestiform particle must be an amphibole or chrysotile. Cleavage fragments lack these properties. Cleavage fragment aspect ratios are generally less than 20:1 and stair-stepping along particle edges is common.

EXHIBIT
#24 Wylie
JH 9-18-09

College Park, Maryland. 20742 (301) 454-3548

III. Results

Pfizer CP 96-30 Talc

This sample contains talc and tremolite as major constituents. The tremolite is not asbestiform. It has none of the porperties characteristic of asbestos. Its characteristics are consistent with those of a population of cleavage fragments. Some of the talc particles are elongated, but the talc does not appear to be asbestiform. No asbestos was detected in this sample.

Nytal 100 HR Talc

This sample contains talc and tremolite and trace quantities of anthophyllite and a talc-amphibole mineral. The tremolite and anthophyllite are not asbestiform. Their characteristics are consistnet with those of a population of cleavage fragments. There are two types of talc present in the sample: platy and fibrous. Some of the fibrous talc has the characteristics of the asbestiform habit. However, because it is talc, it is not asbestos. The intermediate talc-amphibole particles are very rare. They have a higher aspect ratio than is typical for cleavage fragments. However, they do not dispaly the characteristics of the asbestiform habit. No asbestos was detected in this sample.

Ann G. Wylie
Feb 13, 1987

THE UNIVERSITY OF MARYLAND
COLLEGE PARK CAMPUS
Department of Geology

February 13, 1987

Report of Investigation

Ann G. Wylie
Associate Professor

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   a) parallel fibers occurring in bundles,
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   e) fibers showing curvature.

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OVERVIEW

TALC FIBER IN-VITRO STUDY

Company Objective

To test the biologic response of talc fiber samples against asbestos fiber samples. Because talc/transitional fibers are similar dimensionally and morphologically to asbestos fibers, it is important to know whether both pose similar risk in comparable concentrations (fibers per ug). If they do, the argument for particle morphology as the critical factor in asbestos and other fiber pathogenicity is advanced. If they do not, the role of other variables such as harshness and assorted surface properties in the pathogenicity of asbestos and other fibers of similar dimensions is advanced.

Basis of Concern

New York tremolite talcs (and other talcs) contain varying amounts of talc and/or transitional fiber (from none to as high as 20% - average <3%). Animal injection and implantation studies show no tumor induction with New York tremolitic talc. Epidemiologic studies have been interpreted in conflicting ways with more recent mortality reviews not linking observed lung cancers to dust exposure (smoking most plausible link via case/control study). No mesothelioma link has been demonstrated and current medical surveillance for long term employees with only this talc exposure do not show the onset or progression of interstitial fibrosis. Diffuse pleural plaques, however, are occasionally observed with no apparent functional impairment (i.e. PFT's), progression or malignancy. Dust levels are now and have in the past been generally maintained below the typically applied talc standard (2 mg/m^3 respirable dust). Talc exposures in other area mining operations (now closed) were very high in the past (>30 mg/m^3 respirable) - considerable "talcosis" has been observed among these workers and excess lung cancer has been suggested with no clear mesothelioma association. Many of those past talc exposures would likely have involved higher talc fiber exposures than currently encountered.

Question and Goal

Is the apparent absence of an "asbestos" like dust risk among RTV talc workers because there are too few talc or transitional fibers in the exposure or because talc or transitional fibers would not pose the same risk at an equal exposure (dose)?

Comment: In either case the handling of New York tremolite talcs do not appear to pose an asbestos risk (as typically viewed). However, if higher talc fiber concentrations could pose such a risk, it is important to know so that steps can be taken to assure current talc fiber levels in our talc products are not exceeded. Results of the in-vitro study will hopefully aid in that determination.

Characterization

Much interest exists in the area of talc fiber and transitional fiber characterization as it is an interesting mineralogical entity frequently confused as chrysotile or anthophyllite asbestos. From a risk stand point, however, characterization beyond dose (fibers per ug) and size distribution (for surface area and comparison to asbestos) may not be necessary for this study if at similar dose both talc fiber and asbestos appear similar in biologic response. In this case morphology would seem the parameter of greatest interest. If on the other hand, biologic response is different at a similar dose, more energetic characterization is advised to help explain the difference (i.e. surface properties - zeta potential - etc.).

Problem

Results from the in-vitro work may not be reliably translated to in-vivo biologic response. Some factors (such as harshness - ability to absorb water with related interface with cells in in-vivo conditions) may not be adequately addressed and results (in either direction) may be misleading. Typically, in-vitro "positive" results are followed by in-vivo experimentation for this reason. Such studies on the product as a whole have already been done with negative tumor results. Due to prohibitive costs, however, any "positive" results in-vitro with a fiber concentrate would be viewed as suggesting a potential. The company would interpret such results as a "warning" and assure talc fiber does not exceed current levels in its talc products as a precautionary measure.

John W. Kelse
Corporate Industrial Hygienist

Dear John and Slim;

I am enclosing a draft #3 of the paper which I have sent to Brooke and Cathy. A copy of the letter I sent to Cathy is enclosed. I am hopeful that this letter will end any further discussion about the major points. I always welcome clarifications and additions and suggestions for shortenings. I look forward to talking with you when I return on Tuesday afternoon, June 12.

Ann

EXHIBIT
26 Wylie
JH 9-18-09

RTV_WESTON 007943

June 19, 1995

Catherine Skinner, Ph.D.
Dept. of Geology and Geophysics
Yale University
210 Whitney Avenue
New Haven, CT 06520-8109

EXHIBIT
27 Wylie
JH 9-18-09

Dear Cathy:

First allow me to profusely apologize for being so difficult to contact. This is traditionally the time of year when I do most of my workplace monitoring and I am away (both mentally and physically) a great deal of time. When I was able to focus on other initiatives, I noted the flurry of memorandums and report drafts between you and Ann. Differences of opinion apparently persist. Since I am in no position to deal knowledgeably with these issues, I have encouraged Slim to become more involved. I believe that he has and has hopefully contacted you by now.

I am sorry to see this debate wage on for a variety of reasons. One includes knowledge that we must now finalize this paper. I have been reminded by our financial people that we are well past the projected completion date and budget. That is their diplomatic way of saying - "that's it, John". It would be nice to resolve the issues you raise for this particular paper but I suspect that will not be possible. I know you and Ann have discussed a possible second paper focusing more upon the sample characterization effort. If a second paper is pursued, I expect these issues would need to be resolved but, I am not sure they must be for this paper.

I feel comfortable with the third draft produced and I understand Slim does as well. It appears one of our main objectives can be addressed with the database as it currently stands - that indeed there is evidence that in at least one biological test, more than particulate dimension appears to be play a role. Whatever these particulates may be, this observation is extremely important to document. I don't believe the debate over Fe, particulates <5 μm in length and calculated (versus) BET surface area alters this basic observation. Given this and our budget limitations, I think we have little choice but to move forward with the third draft.

I believe Slim feels, as do I, that we must still explore the anthophyllite issue you raise. As I understand it, you are suggesting the existence of anthophyllite asbestos in some of these samples. Obviously, we can not let that rest until we know for sure whether that is or is not the case. If true, it will be the first this has been positively identified in such samples (it has been suggested from time to time but never satisfactory proven). Given this history, I know you understand why we are suspect and wish to carefully pursue all possible sources of error.

R. T. Vanderbilt Company, Inc.

Important as well is the fact that we have always sought only objective researchers to work with our assorted "talc" projects. By doing so we better ensure that factual evidence (which ever way it falls) will always prevail and that consensus among our consultants is eventually achieved. Happily, this has been our experience thus far. We feel confident this current divergence of views will ultimately also end in consensus for this reason.

Again, I am sorry we haven't connected. I plan to be in the office all this week so please call if you are in and wish to talk further about all this. I remain confused so I can use all the help I can get. It doesn't look like things will lighten up for me anytime soon but I am anxious to bring at least this phase of the project to a close.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John Kelse

John W. Kelse
Corporate Industrial Hygienist
Manager, Occupational Health & Safety

JWK/sk
cc: C. S. Thompson, Ph.D.

Ann,

Attached please find recent correspondence from Catherine and my response to her. Neither Slim nor I are thrilled about the extra work through her (we'd rather you were doing it) but diplomatically we really can't stop it. It appears Catherine is trying to resolve this mixed fiber issue in her own mind, so - with some uneasiness - I don't think we should stop her.

Slim concerns involve the use of iron (her "windows") and what limitations the high resolution work might have. I would like to get Slim on the phone with you on Friday to talk over some of these issues. We would like to hear your views on how much further we should take this particular project, etc.

There may also be a chance to get together around April 18-20. Slim and I will both be at a silica conference in Baltimore and I am sure we could escape for a few hours.

Also enclosed some comments from Dr. Wehner on the talc workshop. You might find them enjoyable (we ordered the workshop proceedings).

EXHIBIT
#28 Wylie
JH 9-18-09

Mail for Ann G. WYLIE - Wed Jun 14 11:48:08 1995 Page: 1

Date: Wed, 14 Jun 95 11:47 EDT
From: Ann_G_WYLIE@umail.umd.edu (aw32)
Subject: letter
To: skinnerhcw@climat.decnet.yale.edu

Dear Cathy;

I received your letter and agree we should schedule a conference call. I will contact Brooke. Perhaps it should occur after Brooke adds her parts so we can see the whole picture.

I do not know how to resolve our difference of opinion on the anthophyllite issue. While it is true that anthophyllite usually has Fe in it, it is not a necessary ingredient. Do you know that anthophyllite from Gouverneur contains Fe and if so, how much? However, there is no such data on talc/amphibole. I thought by phrasing it as I did, I would have included the estimate of anthophyllite based on Fe but I have left out the use of Fe as an estimate of talc/amphibole. Perhaps if you were to describe in more detail how much iron you detected, what were the limits of the cut-offs etc., not for publication but to Slim and me, we would have a better discussion of where and how to put this information in the paper in way that satisfies us both. Why don't you discuss this with Slim.

As to surface area, I used the numbers from the N2-BET to calculate the relative surface areas. I could not agree more with the need to address surface area. The only concern was what to do with the surface areas calculated from length and width measurements. That is what I took out. Since the relative surface areas from length/width measurements and N2-BET were about the same, the graph of cellular response vs surface areas would show the same relationships among the samples whichever surface area data were used. Therefore, since we know that length/width measurements excluded many particles and that becasue of this surface area calculations were not for the whole sample, I could not see what calculated surface areas would add. Is this a problem?

I will be in my office most mornings from now until the end of July with the exception of this Friday. After you have had a chance to talk to Slim, let's go around these problems again. I look for ward to hearing from you. Ann

EXHIBIT
#29 Wylie
JH 9/8/09

THE UNIVERSITY OF MARYLAND

COLLEGE PARK CAMPUS
Department of Geology

Dr. C.S. Thompson
R.T. Vanderbilt Company, Inc.
30 Winfield Street
Norwalk, Connecticut 06852

July 28, 1989

Dear ~~Dr. Thompson~~, Slim

I have examined the sample of Mouldene(S-158) which you sent to me on July 19, 1989. The material consists primarily of fibrous talc with small amounts of tremolite, anthophyllite, carbonate, quartz, platy talc and feldspar.

The fibrous talc occurs in fiber bundles with splayed ends and as what appear to be individual fibers. The indices of refraction of this material are highly variable,. Parallel to elongation, γ ranges from 1.594 to 1.576; however, most of the fibers and fiber bundles have γ's between 1.582 and 1.588. Perpendicular to elongation the indices of refraction are much more variable, ranging from 1.536 to 1.578. These values represent the range in α and β. In general, the more the fibers display the classical characteristics of asbestos, i.e., fiber bundles with splayed ends, small fibril width, curved fibers,etc., the lower are the indices of refraction within the ranges given above.

The anthophyllite does not display asbestiform characteristics. It is most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. These characteristics might be explained as an intergrowth of anthophyllite and talc. γ for anthophyllite is always greater than 1.600 while α was measured as 1.596.

Tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky, but an occasional particle has an aspect ratio in excess of 10:1. α for tremolite was measured as 1.600, and γ for tremolite is greater than 1.600.

Tremolite and anthophyllite are about equally abundant. Together they total 5-10% of the sample. A few percent of the sample is carbonate, a little less is quartz and feldspar occurs only in trace quantities.

If you have any questions, please let me know.

Sincerely yours,

Ann

Ann G. Wylie

EXHIBIT
#30 Wylie
JH 9-18-09

College Park, Maryland, 20742 (301) 454-3548

EXHIBIT
#3 / Wylie
SH 9-18-09

AUTHOR: PLEASE COMPLETE

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TOXICOLOGY AND APPLIED PHARMACOLOGY 147, 000–000 (1997)
ARTICLE NO. TO978276

Mineralogical Features Associated with Cytotoxic and Proliferative Effects of Fibrous Talc and Asbestos on Rodent Tracheal Epithelial and Pleural Mesothelial Cells

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Received May 12, 1997; accepted August 11, 1997

Mineralogical Features Associated with Cytotoxic and Proliferative Effects of Fibrous Talc and Asbestos on Rodent Tracheal Epithelial and Pleural Mesothelial Cells. Wylie, A. G., Skinner, H. C. W., Marsh, J., Snyder, H., Garzione, C., Hodkinson, D., Winters, R. and Mossman, B. T. (1997). *Toxicol. Appl. Pharmacol.* 147, 000–000.

Inhalation of asbestos fibers causes cell damage and increases in cell proliferation in various cell types of the lung and pleura *in vivo*. By using a colony-forming efficiency (CFE) assay, the cytotoxicity and proliferative potential of three mineral samples containing various proportions of fibrous talc were compared to NIEHS samples of crocidolite and chrysotile asbestos in cell types giving rise to tracheobronchial carcinomas, i.e., hamster tracheal epithelial (HTE) cells, and mesotheliomas, i.e., rat pleural mesothelial (RPM) cells. Characterization of mineralogical composition, surface area, and size distributions as well as proportions of fibers in all mineral samples allowed examination of data by various dose parameters including equal weight concentrations, numbers of fibers >5 μm in length, and equivalent surface areas. Exposure to samples of asbestos caused increased numbers of colonies of HTE cells, an indication of proliferative potential, but fibrous talc did not. RPMs did not exhibit increased CFE in response to either asbestos or talc samples. Decreased numbers of colonies, an indication of cytotoxicity, were observed in both cell types and were more striking at lower weight concentrations of asbestos in comparison to talc samples. However, all samples of fibrous minerals produced comparable dose–response effects when dose was measured as numbers of fibers greater than 5 μm or surface area. The unique proliferative response of HTE cells to asbestos could not be explained by differences in fiber dimensions or surface areas, indicating an important role of mineralogical composition rather than size of fibers. © 1997 Academic Press

Occupational exposures to mineral fibers such as asbestos are associated with the development of pulmonary and pleural disease (Mossman and Gee, 1989; Mossman *et al.*, 1990; Guthrie and Mossman, 1993). Although various types of asbestos are biologically active in a number of *in vivo* and *in vitro* bioassays, the properties of fibers important in reactivity with cells and tissues are unclear (Guthrie and Mossman, 1993; Mossman and Begin, 1989). It is generally agreed that length and width or aspect ratio are important variables for predicting the carcinogenicity and fibrogenicity of durable fibers (Davis *et al.*, 1986; Stanton *et al.*, 1981). However, the mineralogical composition and structural features of fibers and particles may also play a role in pathogenicity (Oehlert, 1991; Wylie *et al.*, 1987; Skinner *et al.*, 1988; Wylie *et al.*, 1993). These properties govern surface properties as well as durability of fibers in the lungs and pleura, factors that may be critical in the development of lung cancer and mesothelioma. (Mossman and Gee, 1989; Mossman *et al.*, 1990; Guthrie and Mossman, 1993; Health Effects Institute, 1991).

Asbestos types, in contrast to a number of other fibrous and nonfibrous nonpathogenic materials, cause both cell proliferation and cytotoxicity in a dose-related fashion in several cell types (reviewed in Health Effects Institute, 1991). These biological responses may reflect the disease potential of various fiber types, as cell injury and hyperplasia are early events in rodent inhalation models of asbestosis and carcinogenesis (Mossman and Gee, 1989; Mossman *et al.*, 1990; Guthrie and Mossman, 1993; Health Effects Institute, 1991). In this study, we compared the cytotoxicity and proliferative potential of three New York talc samples to crocidolite and chrysotile asbestos in cell types affected in asbestos-induced tumors, i.e., hamster tracheal epithelial (HTE) cells, which can give rise to tracheobronchial neoplasms, and rat pleural mesothelial (RPM) cells, cells affected in the development of mesothelioma. In studies here, we used an established colony-forming efficiency (CFE) assay that documents both increases in cell proliferation and cell survival, as measured by increases in numbers of colonies, at low concentrations of minerals, and growth inhibition, as indicated by decreases in colony formation or size at high concentration of minerals, to compare responses to well-characterized samples of asbestos and fibrous talc in HTE and RPM cells. An additional advantage of this bioassay is that it employs cells from the lung and pleura and measures responses

0041-008X/97 $25.00

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to minerals over a 7-day time period of exposure as opposed to shorter time frames used (<24 hr) in most other *in vitro* assays in the literature (reviewed in Health Effects Institute, 1991. In the CFE assay, nonfibrous particles such as glass beads are proliferative or cytotoxic to HTE cells at ≥100-fold concentrations when compared to asbestos at equal weight concentrations (Mossman and Sesko, 1990; Marsh *et al.*, 1994; Timblin *et al.*, 1995).

The three talc samples used here differ somewhat in their mineralogy, both in the types of minerals and in their relative abundances. However, all three contain varying proportions of fibrous talc which is similar dimensionally and morphologically to asbestos. We thus hypothesized that factors other than length and width of fibers would govern the reactivity of minerals in the *in vitro* assays used here. The experiments were undertaken to explore the questions: (1) Do fibrous talc and asbestos fibers cause similar biological responses in epithelial and mesothelial cells? (2) Is reactivity to mineral samples dose related? and (3) Are responses in various cell types related only to numbers and sizes of fibers in each preparation or does mineralogy, including chemical composition, surface properties, and mineral structure, play a role?.

METHODS

Sources of Mineral Samples

Three samples from the New York State Gouverneur Mining District, FD14, S157, and CPS183, and two asbestos samples, NIEHS chrysotile (Plastibest 20) and NIEHS crocidolite, were used in this study. The asbestos samples are essentially monomineralic and have been studied in detail (Campbell *et al.*, 1980). The general geology and mineralogy of the Gouverneur District are described by Engle (1962) and Ross *et al.* (1968). FD14 is a commercial talc, S157 was once produced from this district as a fiber talc product, and CPS183 is a laboratory separated concentrate of fibrous talc. Fibrous talc is a general term that includes fibers composed entirely of the mineral talc as well as fibers that are composed of both talc and amphibole (probably anthophyllite) intergrown on a submicrometer scale (Stemple and Brindley, 1960; Virta, 1985). The index of refraction of the fibers increases as the amphibole component increases (Veblen and Wylie, 1993). Fibrous talc is present in trace amounts in many commercial talc deposits, but it is a major component of most talc products from the Gouverneur Talc District. All samples were characterized by scanning electron microscopy (SEM), optical microscopy (OM), and x-ray diffraction (XRD); CPS183 and NIEHS crocidolite were also studied by TEM as this technique is more sensitive for the detection of smaller, thinner particles.

Characterization of Minerals

The samples were studied by XRD and SEM at Yale University in order to establish the overall mineralogy, mineral abundances, and the number of fibers per microgram. They were examined by OM at the Laboratory for Mineral Deposits Research, University of Maryland, in order to determine the mineralogy, mineral abundances, and number of fibers per microgram of the samples, and by transmission electron microscopy (TEM) at AMA Laboratories, Beltsville, Maryland (under the direction of the Laboratory for Mineral Deposits Research) for the purpose of determining the detailed size distribution of fibrous talc and especially to examine the content of fibers 0.1 μm in width and smaller. The protocols followed in each laboratory are described below. For purposes of this paper, "particles" refers to particles of all aspect ratios. "Fiber" refers to particles that have an aspect ratio (length/width) of at least five and to bundles of such fibers. "Fibers" (unless otherwise specified) include true mineral fibers (very high aspect ratio particles whose shapes were attained during mineral formation) as well as elongated cleavage fragments (shape produced during comminution).

X-ray diffraction. Samples mixed with an internal standard and spun to minimize preferred orientation were analyzed by using a SCINTAG Pad V automated diffractometer. Identification of minerals was based on comparison of the X-ray pattern with standard patterns.

Optical microscopy. A known weight of sample was dispersed in water and then passed through a 22-gauge needle 8× and sonicated 4 min before mounting on slides. A drop of immersion oil n_D = 1.598 was placed over the dried sample. For all samples except chrysotile (N = 2 mixtures), at least five separate mixtures were prepared from each sample and at least two slides were made from each mixture. One-hundred fibers were counted from each slide. All fibers longer than 5 μm and all particles that appeared to be composed of bundles of fibers were categorized by length and width and by index of refraction according to the following characteristics: all indices of refraction greater than 1.598 (amphibole), index of refraction parallel to elongation greater than 1.598 and index of refraction perpendicular to elongation less than 1.598 (fibers composed of talc and a significant amount of amphibole, and referred to as talc/amphibole), or all indices of refraction less than 1.598 (fibers dominated by the mineral talc). The number of fiber per microgram was calculated by assuming that particle distributions were representative and directly proportional to the area of the filter.

Scanning electron microscopy. A known weight of sample was dispersed in water, passed through a 22-gauge syringe needle 8×, and deposited onto a 0.45-μm cellulose filter. Replicate preparations were made for each sample and analyzed independently to test for homogeneity. The filters were examined with a JEOL JXA 8600 SEM equipped with EDXA. Particles that were at least 1 μm in length and 0.12 μm in width could be detected. Mineral identification was automated by predetermining the relative percentages of Na, Ca, K, Mg, Al, Si, Mn, and Fe in mineral standards and comparing them to the elemental compositions determined on the sample particles (Petruk and Skinner, 1997). The number of particles per microgram of sample was calculated by assuming that the particle distributions were representative and directly proportional to the area of the filter.

Transmission electron microscopy. A known weight of sample was dispersed in water, flushed with a 22-gauge syringe needle 8×, and then sonicated for 4 min. The solutions were then diluted and filtered through a 0.22-μm cellulose acetate filter. The samples were analyzed on a JEOL 100 CX II electron microscope at 19,000× magnification. Over 300 fibers from each sample were measured.

Surface area measurements. All five samples were tested for single point N_2-BET surface areas by J. W. Anderson of R. T. Vanderbilt Corporation. The tests were repeated 4× for each sample. Data were expressed as square millimeters per gram of sample.

Cell culture and addition of fibers to bioassay. A HTE cell line previously isolated and characterized by Mossman *et al.* (1980) was maintained at passages from 38 to 50 and cultured routinely in Ham's F12 medium (Gibco, Grand Island, NY) containing penicillin and streptomycin (both at 100 U/ml) and 10% newborn calf serum (Gibco). This cell line is diploid and possesses features, i.e., mucin secretion and cilia, of differentiated epithelial cells. Primary cultures of RPM cells were isolated by scraping the parietal pleural of two weanling male Fischer 344 rats (Janssen *et al.*, 1994) and were maintained for up to eight passages in Ham's F12-DMEM containing antibiotics (as above), 10% fetal calf serum (Gibco), hydrocortisone (100 ng/ml), insulin (2.5 μg/ml), transferrin (2.5 μg/ml), and selenium (2.5 ng/ml).

Mineral samples presterilized in a dry oven overnight at 130°C were added to Hanks' balanced salt solution (HBSS) before titration 8× through a 22-gauge syringe needle and addition to cultures in 2% serum-containing medium.

A CFE assay was also used as a sensitive test for cytotoxicity and cell proliferation (Mossman and Sesko, 1990; Marsh *et al.*, 1994; Timblin *et al.*, 1995). HTE (400 cells/60 mm dish) and RPM (2000/60 mm dish) were plated for 24 hr before addition of dusts to medium containing 2% serum as described

TABLE 1
Characterization of Talc and Asbestos Samples

Sample	Mineralogy (% of sample)
	Mineral composition
FD14	Talc (37), tremolite (35), serpentine (15), other (<2), unknown (12)[a]
S157	Talc (60), tremolite (12), unknown (21), other (4), anthophyllite (3), quartz (1)
CPS183	Talc (50), quartz (12), unknown (28), tremolite (4), other (4), anthophyllite (3)
NIEHS crocidolite	Riebeckite (100)
NIEHS chrysotile	Chrysotile (100)
	Mineralogy of fibers >5 µm
FD14	Talc (62), amphibole (24),[b] talc/amphibole (14)
S157	Talc (84), amphibole (11), talc/amphibole (5)
CPS183	Talc (99), amphibole (1), talc/amphibole (<1)
NIEHS crocidolite	Crocidolite (100)
NIEHS chrysotile	Chrysotile (100)

Sample	Surface area (mm^2/gm)	Fibers/µg	Fibers ≥ 5 µm/µg
	Surface area and fibers/µg[c]		
FD14	6.2 ± 0.2[d]	2.5×10^3	0.8×10^3
S157	4.9 ± 0.2	1.1×10^4	4.8×10^3
CPS183	4.9 ± 0.4	1.1×10^4	9.2×10^3
NIEHS crocidolite	10.3 ± 1.3	5.3×10^5	3.8×10^5
NIEHS chrysotile	25.4 ± 0.5	5.3×10^4	3.4×10^4

[a] Primarily magnesium silicates (talc and talc/amphibole) with SEM/EDXA spectra too low for conclusive identification.

[b] The most abundant amphibole is tremolite. a very small amount of anthophyllite may be included.

[c] Data are based on SEM measurements. Chrysotile values are low due to its poor visibility on the SEM. Standard error of measurement is estimated to be 20%.

[d] Mean ± standard error of measurement of four individual measurements per group.

above. Minerals were then added, and untreated and mineral-exposed cultures were maintained for 7 days before examination. At this time, plates were rinsed in HBSS and fixed in methanol and stained with 10% Giemsa stain, and total colonies greater than 50 cells per plate were counted by using a blind code (Mossman and Sesko, 1990; Marsh *et al.*, 1994; Timblin *et al.*, 1995). Duplicate experiments were performed for each bioassay with $N = 3$–4 dishes per group per experiment. Statistical analyses of all data were performed by using analysis of variance and trend analysis.

RESULTS

Mineralogy

The overall mineralogical composition, the mineral composition of the fibers, the number of fibers per microgram, and the surface area measurement of the samples used in our studies are given in Table 1. FD14 is composed of platy talc, true mineral fibers of talc and talc/amphibole, cleavage fragments of tremolite, platy serpentine (chrysotile absent), and trace amounts of other minerals. Fibers make up approximately 11% of the particles identified by SEM. They are mostly talc followed by amphibole cleavage fragments and talc/amphibole. S157 is composed of platy talc, true mineral fibers of talc and talc/amphibole, tremolite and anthophyllite cleavage fragments, and quartz. Fibers make up about 37% of the particles, and they are mostly talc with smaller amounts of amphibole cleavage fragments and talc/amphibole. CPS183 is composed of true mineral fibers of talc and a very small amount of talc/amphibole, cleavage fragments of tremolite and anthophyllite, and quartz. Fifty-nine percent of the particles are fibers, and they are almost all fibers of talc. The three talc samples represent a range in the amount of fiber present (both in portion of sample and in number of fibers/µg) and in the mineralogy of the fibrous portion, primarily in the content of amphibole both as a separate phase and as a component of fibrous talc. NIEHS crocidolite and NIEHS chrysotile are essentially monomineralic populations of true mineral fibers of riebeckite and chrysotile, respectively. The very small widths result in many more fibers per microgram than are found in the talc samples.

Surface Area

The specific surface areas (mm^2/g) of talc samples are smaller than asbestos samples and roughly comparable to each other. The larger surface area of FD14 compared to the other talc samples is probably due to the presence of more abundant small platy talc particles that have two almost equivalent dimensions and one that is very much smaller, producing a large surface area/mass ratio. The greater surface area of chrysotile with respect to crocidolite can be attributed to its lower density and small fibril width and perhaps in part to the straw-like structure of the chrysotile fibers if N_2 penetrates the hollow center of the chrysotile tubes. Since the surface reactivity of different minerals affects the surface adsorption of N_2, some of the variation among samples may be related to mineralogy as well.

Size Distributions of Fibers in Mineral Preparations

Figure 1 shows the frequency of length and width for all fibers in units of fibers/microgram and the frequency of width for only those fibers greater than or equal to 5 µm in length as established by SEM and OM. The abundance of narrow crocidolite fibers accounts for the fact that the NIEHS crocidolite contains more fibers per microgram than any other sample (Table 1). CPS183 and S157 are very similar in many respects. They are composed of similar numbers of fibers per microgram, but there are slightly more longer fibers and fewer long, wide fibers in CPS183. FD14 contains the smallest number of fibers per microgram and the highest proportion of the widest fibers. In general, talc fibers are narrower than amphibole cleavage fragments and the differences in the sizes of the fibers among the talc samples in part reflect the differences in the abundance of amphibole cleavage fragments vs fibrous talc. As

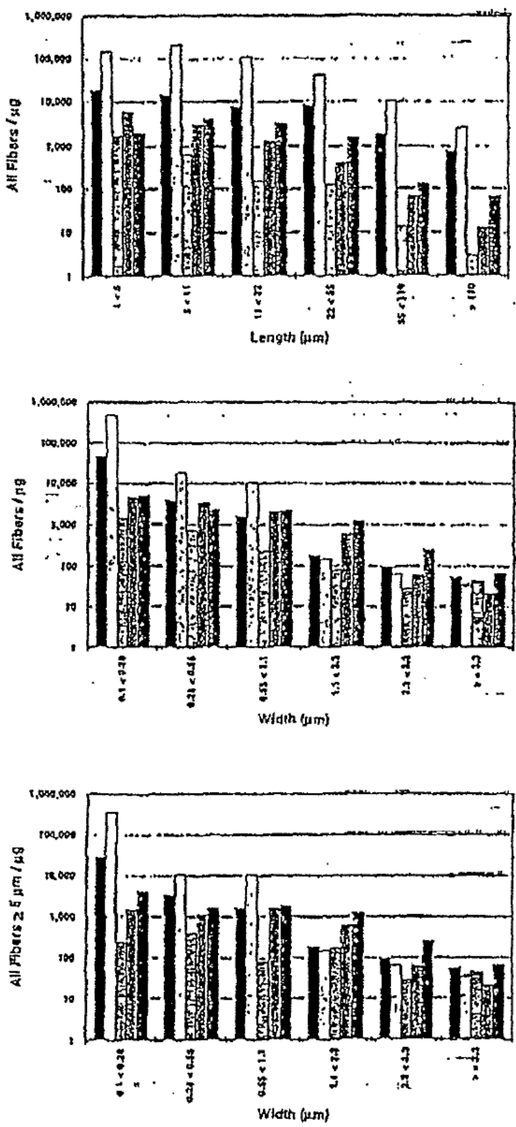

FIG. 1. The frequencies of length and width in units of fibers per microgram are shown for the three talc samples and two NIEHS asbestos samples. Also shown is the frequency of width (fibers/µg) for those fibers longer than 5 µm. (■) Chrysotile; (□) crocidolite; (▢) FD14; (▥) S157; (▦) CPS183.

the amphibole content increases from CPS183 to S157 to FD14, the total fiber content goes down, and, on average, the fibers decrease in length and increase in width. No distinction between the size distributions of talc and talc/amphibole fibers were documented.

Table 2 gives the percentage of fibers in length–width categories for CPS183 and NIEHS crocidolite asbestos as measured by TEM. These data enable a direct comparison between the dimensions of fibrous talc and crocidolite that is not restricted by the 0.1-µm width limit in the SEM data. These two true mineral fiber populations are quite similar, differing most notably in the higher proportion of wide (>0.5 µm) fibers and slightly lower proportion of long (>20 µm) fibers in fibrous talc.

CFE Assays

Combined data from duplicate experiments with HTE and RPM cells are presented in Figs. 2 and 3, respectively. CFE data are expressed as a ratio of the number of colonies in mineral-exposed cultures in comparison to control colonies × 100 at various concentrations of minerals on a weight basis (µg/cm^2) as is typically found in the literature (Mossman *et al.*, 1990; Health Effects Institute, 1991). In HTE cells, both asbestos types showed an elevated number of colonies ($p < 0.05$) at lowest concentrations indicating increased cell proliferation and/or survival in response to asbestos fibers and confirming earlier studies (Mossman and Sesko, 1990; Marsh *et al.*, 1994). Significant decreases ($P < 0.05$) in CFE, an indication of toxicity or growth inhibition, were observed at concentrations of asbestos of 0.5 µg/cm^2 and greater. In contrast, RPM cells did not exhibit proliferative effects in response to either asbestos type, but statistically significant ($p < 0.05$) decreases in CFE were observed at concentrations of asbestos fibers greater than 0.05 µg/cm^2. In both cell types, the talc samples were less cytotoxic than asbestos. CPS183 was the most toxic talc sample, followed by S157 and FD14. In contrast to the other mineral samples, S157 and FD14 did not exhibit significant linear trends in cytotoxicity with increasing dosages in HTE cells. F3

Figures 4 and 5 show the same cellular response data as Figs. 2 and 3, but dose is calculated based on the number of F4-F5

TABLE 2
Percentage of Fibers by Length and Width (µm) as Determined by Transmission Electron Microscopy

Length	Width: 0.01–0.1	>0.1–0.25	>0.25–0.5	>0.5–1.0	>1.0
CPS183					
<1	2.9	1.6	—	—	—
>1–2	4.1	14.1	0.5	—	—
>2–5	2.5	23.0	6.8	1.6	—
>5–10	0.9	9.8	4.3	4.5	0.5
>10–20	0.5	7.3	3.2	2.3	2.5
>20–50	0.2	1.8	2.7	1.4	2.0
>50–100	—	—	—	—	0.2
NIEHS crocidolite					
<1	0.3	0.3	—	—	—
>1–2	1.1	9.5	0.3	—	—
>2–5	4.6	31.6	2.9	—	—
>5–10	1.4	18.1	3.7	0.6	—
>10–20	1.7	10.7	3.2	0.3	—
>20–50	0.6	2.9	1.4	1.1	—
>50–100	—	1.7	1.4	0.6	—

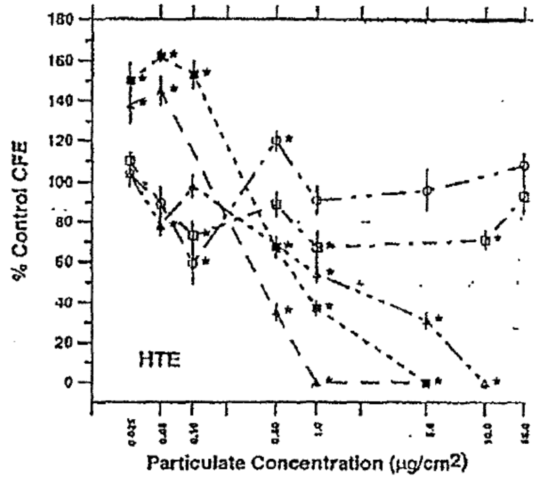

FIG. 2. Colony-forming efficiency (CFE) of HTE cells at various weight concentrations of samples. Standard error in CFE is indicated on symbol. *$p <$ 0.05 in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

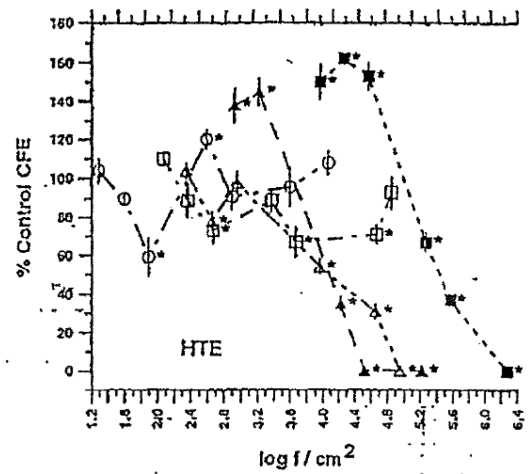

FIG. 4. Colony-forming efficiency (CFE) assays in HTE cells expressed as a function of fibers ≥5 μm in length per cm² (f/cm²). The symbol width is equal to or greater than estimated error. The standard error in CFE is indicated on the symbols. *$p < 0.05$ in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

fibers greater than or equal to 5 μm/cm² (fibers/cm²) rather than total sample weight per square centimeter. The data are taken from the SEM characterizations, but the comparisons would be the same if OM or TEM data were used. Doses of total sample per square centimeter administered to the cultures covered such a wide range that there were equivalent doses of fibers per square centimeter in almost all length/width categories for all samples. Therefore, even though crocidolite and chrysotile contained many more fibers per microgram than the talc samples, the same number of fibers per centimeter were administered in low doses of asbestos and high doses of talc (μg/cm²).

As shown in Fig. 4, the enhanced responses of HTE cells to asbestos appear to be a function of mineralogy and not fiber

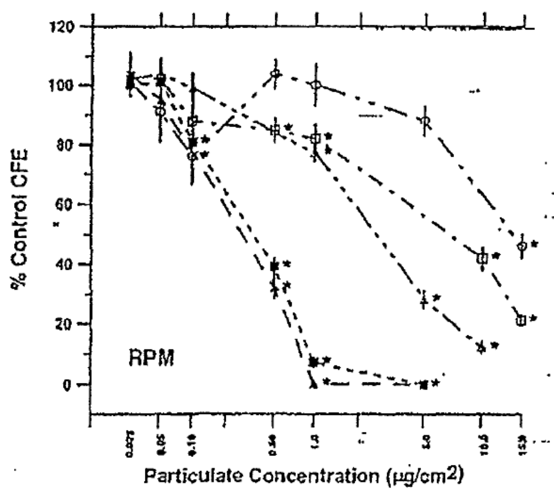

FIG. 3. Colony-forming efficiency (CFE) of RPM cells at various weight concentrations of samples. The standard error in CFE is indicated on the symbols. *$p < 0.05$ in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

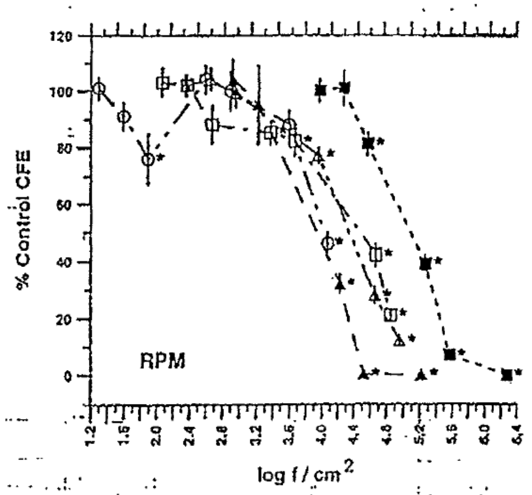

FIG. 5. Colony-forming efficiency (CFE) assays in RPM cells expressed as a function of fibers ≥5 μm in length and length:width ≥ 5:1 per cm² (f/cm²). The symbol width is equal to or greater than estimated error. The standard error in CFE is indicated on the symbols. *$p < 0.05$ in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

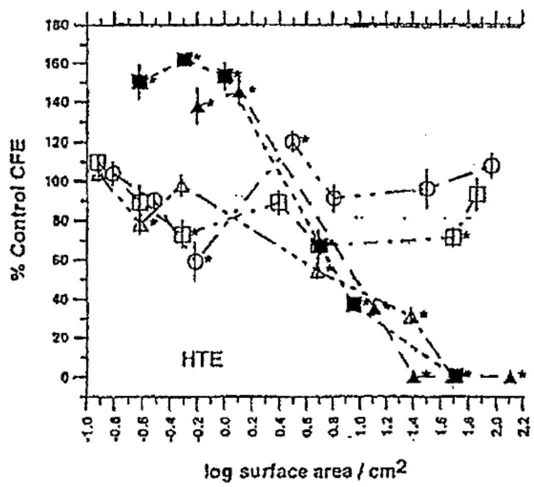

FIG. 6. Colony-forming efficiency (CFE) assays in HTE cells expressed as a function of surface areas of mineral samples (mm^2/cm^2). The symbol width is equal to or greater than one standard error. The standard error in CFE is indicated on the symbols. $*p < 0.05$ in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

concentration. The same concentrations of fibers greater than 5 μm of chrysotile and crocidolite that cause proliferation in HTE cells result in no effects when comparable concentrations of FD14 fibers are used, insignificant cytotoxicity with S157 fibers, and significant cytotoxicity with CPS183 fibers. It therefore seems likely that characteristics of the samples that are related to their mineralogy contribute to proliferation and/or cell growth inhibition.

As shown in Fig. 5, the response of RPM cells appears to be independent of the mineralogy of the samples. Neglecting the slight cytotoxic response of FD14 at low concentrations, the minimum concentrations of fibers per square centimeter necessary to cause significant decreases in CFE is between 10^3 and 10^4 fibers per square centimeter for all samples. In changing the size definition of a fiber (e.g., >8, ≤0.25 μm; >20 μm, all widths; all lengths, w < 0.28 μm), we found that the effective dose changed but the relationships among the samples did not (data not shown).

F6-F7 Figures 6 and 7 show CFE data in HTE and RPM cells, respectively, as a function of surface area. It is evident that surface area per se cannot explain cellular responses to minerals in HTE or RPM cells. Despite the fact that crocidolite and chrysotile have much larger surface areas per microgram, the range in the amount of sample administered resulted in similar doses between the asbestos and talc samples.

DISCUSSION

Asbestos is a term applied to a group of minerals that possess similar physical properties because of their habit of growth. However, different types of asbestos differ in their mineralogy and fiber size, which in turn may vary in preparations obtained from different geographic locations and sometimes even from the same locality (Guthrie and Mossman, 1993). The two most widely studied types of asbestos are the serpentine mineral chrysotile ($Mg_3Si_2O_5(OH)_4$), the most common type of asbestos in the Northern hemisphere and in commercial usage historically, and the asbestiform variety of the amphibole riebeckite, crocidolite ($Na_2Fe_3^{2+}Fe_2^{3+}Si_8O_{22}(OH)_2$), a high-iron-containing asbestos mined in parts of South Africa and Western Australia. Although crocidolite is implicated as more potent in the induction of mesothelioma, both chrysotile and crocidolite are linked occupationally to the development of lung cancer and asbestosis (Mossman and Gee, 1989; Mossman *et al.*, 1990, 1996; Guthrie and Mossman, 1993; Health Effects Institute, 1991).

How asbestos causes lung disease is uncertain, but acute toxicity, measured by a variety of techniques which have detected increases in membrane permeability, necrosis, release of oxygen-free radicals, exfoliation, and cell death (reviewed in Mossman and Begin, 1989) has been observed in a variety of cells exposed to high concentrations of fibers. At lower concentrations, both crocidolite and chrysotile asbestos cause cell proliferation in HTE cells and organ cultures, phenomena not observed with various synthetic fibers or nonfibrous analogs of asbestos (Marsh and Mossman, 1988; Woodworth *et al.*, 1983). These biological responses to asbestos may be important in the induction of neoplasms as cell injury may cause exfoliation and compensatory hyperplasia of surrounding cell types which are more sensitive to genetic damage. As suggested by Ames and Gold (1990), mitogenesis may facilitate mutagenesis and contribute to tumor development. In addition, cell proliferation is

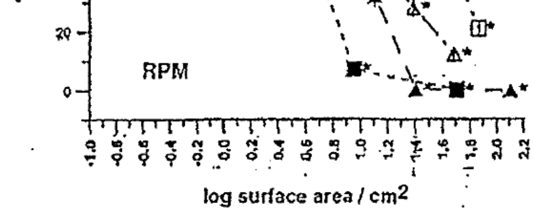

FIG. 7. Colony-forming efficiency (CFE) assays in RPM cells expressed as a function of surface areas of mineral samples (mm^2/cm^2). The symbol width is equal to or greater than one standard error. The standard error in CFE is indicated on the symbols. $*p < 0.05$ in comparison to untreated controls. (▲) Chrysotile; (■) crocidolite; (○) FD14; (□) S157; (△) CPS183.

an important component of tumor promotion and progression, and asbestos is a documented tumor promoter in epithelial cells of the respiratory tract (reviewed in Mossman *et al.*, 1990, 1996; Health Effects Institute, 1991).

Our results with asbestos samples are interesting in that HTE cells are unique in exhibiting increased CFE, in comparison to untreated and talc-exposed cells. Moreover, both cell types were more sensitive to the cytotoxic effects of equal weight dose amounts of asbestos in comparison to talc. The lack of response of RPM cells to the proliferative effects of asbestos may reflect the fact that single cells, as opposed to confluent monolayers (Marsh and Mossman, 1988; Woodworth *et al.*, 1983), were exposed to fibers here. For example, when added to confluent, growth-arrested RPM cells, crocidolite causes cell proliferation as measured by dual fluorescence techniques with an antibody to 5-bromodeoxyuridine (BrdU) and the DNA dye YOYO (Goldberg *et al.*, 1997). Moreover, increased numbers of both pleural mesothelial and bronchial epithelial cells incorporating BrdU are observed after inhalation of NIEHS crocidolite or chrysotile by rats (BeruBe *et al.*, 1996). As suggested by Gerwin *et al.* (1987), mesothelial cells may require growth factors, either produced endogenously or produced by other cell types, for proliferative responses to asbestos, and the small numbers of cells used in the CFE bioassay may not be sufficient for amounts of cytokines needed here.

Our experiments also show that fibrous talc does not cause proliferation of HTE cells or cytotoxicity equivalent to asbestos in either cell type despite the fact that talc samples contain durable mineral fibers with dimensions similar to asbestos. These results are consistent with the findings of Stanton *et al.* (1981) who found no significant increases in pleural sarcomas in rats after implantation of materials containing fibrous talc. Moreover, Smith and colleagues report no sarcomas in hamsters after implantation of FD14 (1979), and other rodent studies in which talcs of various types have been administered by inhalation or injection also have not shown an increased incidence of mesotheliomas or carcinomas (Stenback and Rowland, 1978; Wehner *et al.*, 1977). Epidemiological studies also indicate that talc in a number of occupational settings is less pathogenic than asbestos in the development of lung cancer, and the reports indicating excess lung cancer mortality may underestimate smoking habits, an important confounder, and exposure to commercial asbestos (reviewed in IARC, 1987a,b; Ross *et al.*, 1993). In essence, data have not proven that talc is a human carcinogen as small numbers of cohorts have been studied, smoking histories are poorly documented, and workers were often exposed to other dusts, including asbestos, that may cause lung disease.

Increases in cytotoxicity over time with CPS183, as opposed to the other talc samples, in both cell types also suggest the importance of mineralogic differences as the size distributions of CPS183 and S157 are similar. Since CPS183 fibers are mainly talc, while S157 contains more talc/amphibole and amphibole, mineralogical variability may affect the responses of cells to cytotoxic effects of talc. Nonfibrous particles such as quartz may also play a role in cytotoxicity of the talc samples since CPS183 higher number of quartz particles, a mineral known to be cytolytic (Mossman and Begin, 1989).

Data presented here lend increased uncertainty to the concept that long thin fibers [length >8 μm, width <0.25 μm, i.e., the Stanton hypothesis (Stanton *et al.*, 1981)] are the predominant factors predicting tumorigenicity and fibrogenicity (Mossman *et al.*, 1990; Health Effects Institute, 1991). In his elegant and comprehensive studies, Stanton and colleagues implanted two samples of fibrous talc (No. 6 and No. 7 samples) into rats. One of us (AW) examined talc No. 6 and found it to be similar in mineralogy, size distribution, and morphology to FD14, and little is known about No. 7 except that it was obtained from the Gouverneur District. Neither talc produced significant excesses in pleural sarcomas despite the fact that the dose of fibers >8 μm in length and <0.25 μm in width in sample No. 6 was large enough to predict a tumor probability of $>50\%$.

In summary, intrapleural injection studies in rats, epidemiologic investigations, and our *in vitro* work with fibrous talc here suggest caution in generalizing that durable fibers >5 μm or with aspect ratios approximating Stanton criteria are always more bioreactive and pathogenic. Our work is significant in that it supports reanalysis of the Stanton data by Wylie *et al.* (1987) and others (Oehlert, 1991; Nolan and Langer, 1993) and provides data implicating the importance of mineral type, rather than fiber length per se, in determining cellular outcomes associated with pathogenicity of mineral dusts.

ACKNOWLEDGMENTS

Work was supported in part by a grant from NIEHS (R01ES06499) to BTM and from R. T. Vanderbilt Company to AGW and CS. We thank Dr. Cynthia Timblin for her input into interpretation of CFE data.

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R. T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, P.O. BOX 5150, NORWALK, CONNECTICUT 06856-5150 • (203) 853-1400
FAX (203) 853-1452 • CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

April 24, 1995

Ann Wylie, Ph.D.
University of Maryland
Department of Geology
College Park, MD 20742

Re: IT 325 Talc Analysis for Asbestos Content

Dear Ann:

This brief letter will confirm my call of April 12, 1995 concerning the captioned analysis.

This sample shall be sent by U. S. Gypsum via Charlie Byers (312-606-4383). I asked Charlie to send their analysis with the sample. Charges for this analysis (apply whatever approach you feel is reasonable given the report you see) should be sent to my attention. Please forward your findings to Charlie Byers at U.S. Gypsum with a copy to me.

As always, we appreciate your willingness to assist with these sporadic inquires and emergencies.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John W. Kelse / sk

John W. Kelse
Corporate Industrial Hygienist
Manager, Occupational Health & Safety

JWK/sk

cc: Charlie Byers - U.S. Gypsum (Fax 312-606-3906)

EXHIBIT
#32 Wylie
JH 9-18-09

USG Corporation
Research Center
700 North Highway 45
Libertyville, IL 60048-1296
708 362-9797

USG

April 26, 1995

Ann Wylie, Ph.D.
University of Maryland
Dept. of Geology
College Park, MD 20742

Dear Dr. Wylie:

At the request of Dr. Charlie Byers, I am forwarding my report on finding tremolite asbestos in International 325 talc, as well as a split sample of the 325 talc that I analyzed. Dr. Byers indicated that John Kelse of R.T. Vanderbilt Company, Inc. requested that you analyze the sample.

Sincerely,

Arthur W. Struss

Arthur W. Struss, Ph.D.

UNIVERSITY OF MARYLAND AT COLLEGE PARK

DEPARTMENT OF GEOLOGY

Mr. Charles Byers
United States Gypsum
125 S. Franklin Street
Chicago, Illinois 60606-4678

June 16, 1995

Dear Mr. Byers;

I have reviewed the report, dated March 20, 1995 and written by A. W. Struss on International Talc 325 from R.T. Vanderbilt. I have also examined a portion of the sample labeled International Talc 325 that you sent to me.

Mr. Struss's report has accurately identified tremolite and fibrous talc as the elongated minerals in the sample. He has also correctly concluded that while lizardite is present in the sample, chrysotile asbestos is not. I also agree that tremolite particles that are longer than 5 micrometers, narrower than 3 micrometers with a length to width ratio of at least 5 are present in the sample. However, I do not agree that these dimensions make these particles asbestos. Mr. Struss has applied criteria that are advocated by NIOSH for asbestos fiber counting on air filters. It is not really a definition but a set of criteria for counting asbestos to obtain an exposure index and as such it is inappropriate to apply to air filters unless asbestos is known to be present. In other words, this definitions tells the analyst which asbestos particles to count on air filters, but it does not tell him which ones are asbestos. Furthermore, since the NIOSH fiber counting criteria were designed for air filters, I would not apply them to bulk samples under any conditions.

When examining a bulk sample for the presence of amphibole asbestos by optical microscopy, I look for the following characteristics of a <u>population</u> of amphibole particles: 1) Mean aspect ratio of 20:1 or greater for fibers longer than 5 micrometers, 2) very thin fibrils, usually less than 0.5 micrometers in width, and 3) parallel fibers occurring in bundles. If amphibole is present that does not display these properties, then it is not asbestiform. I have not yet found a sample of amphibole asbestos (identified by its hand specimen characteristics) that does not display these properties under the microscope (although I have found chrysotile that does not). I have enclosed a paper I wrote several years ago describing the differences between amphibole asbestos and cleavage fragments which gives the basis for the criteria I have summarized above.

I hope these comments are useful to you and help resolve the issue of Talc 325. I did not found asbestos in the sample and I believe your analyst will concur that the tremolite present in Talc 325 does not exhibit the properties I have described for the asbestiform habit.

Sincerely yours,

Ann G. Wylie

Ann G. Wylie
Professor

cc: J. Kelse

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF ALAMEDA

ERIC WESTON, :
Plaintiff, :
vs. : No. RG08426405
ASBESTOS CORPORATION LIMITED, :
et al., :
Defendants. :

VIDEOTAPED DEPOSITION OF ANN WYLIE, Ph.D.

Hyattsville, Maryland
Friday, September 18, 2009
1:41 p.m.

Job No. 1-164409
Pages: 1 - 177
Reported by: Janet A. Hamilton, RDR

VIDEOTAPED DEPOSITION OF ANN WYLIE, Ph.D., held at the office of:

University of Maryland University College
Inn and Conference Center
3501 University Boulevard East
Hyattsville, Maryland 20783

Pursuant to Notice, before Janet A. Hamilton, Registered Diplomate Reporter and Notary Public in and for the State of Maryland.

A P P E A R A N C E S

ON BEHALF OF THE PLAINTIFF:
DENISE ABRAMS, ESQUIRE
KAZAN, McCLAIN, LYONS, GREENWOOD & HARLEY, PLC
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510-302-1000

ON BEHALF OF THE DEFENDANT:
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ALSO PRESENT:
AKIM GRAHAM,
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I N D E X

E X H I B I T S
(Attached to the transcript)

E X H I B I T S (continued)

E X H I B I T S (continued)

P R O C E E D I N G S

THE VIDEOGRAPHER: Here begins video tape number one in the deposition of Dr. Ann Wylie in the matter of Eric Weston versus Asbestos Corporation, Limited, et al., in the Superior Court of the State of California, in and for the County of Alameda, case number RG08426405. Today's date is September 18th, 2009. The time on the video monitor is 1:41 p.m., and the video operator today is Akim Graham. This video deposition is taking place at 3501 University Boulevard in Hyattsville, Maryland.

Counsel, please voice identify yourselves and state whom you represent.

MS. ABRAMS: Denise Abrams for the plaintiff.

MR. RADCLIFFE: My name is Tom Radcliffe. I represent R. T. Vanderbilt. I'd like to make a statement on the record that this is a deposition taking place pursuant to a subpoena issued by a Maryland court in Maryland and that Ms. Abrams is here, she is not admitted in Maryland as far as I know, and as far as I know she's not been admitted pro hac vice, and there is no Maryland counsel for plaintiffs.

MS. ABRAMS: And for the record this is subject to an out-of-state commission which was granted, and we have a California -- it's pursuant to California rules and the, the order from the Maryland court allowing for the deposition of

a, pursuant to a California subpoena taking place, and I would like to attach for the record as Exhibit 1 our, a number of documents together including the Notice of Taking Deposition, Notice of Video Tape Deposition, Requests to file Foreign Subpoena For Production of Documents, Amended Notice of Taking Deposition and Notice of Video Tape Deposition, the commissions for these depositions, the return of service and the court's order granting the deposition, and I will attach all of this as Exhibit 1.

MR. RADCLIFFE: I do not agree that we're here pursuant to the California rules. We are here pursuant to the Maryland rules. It says so on the face of the subpoena.

MS. ABRAMS: Well, with that I think we'll go forward.

THE VIDEOGRAPHER: The court reporter today is Jan Hamilton of LAD Reporting Company. Would the reporter please swear in the witness.

ANN WYLIE, Ph.D.

a witness herein, being duly sworn, testified as follows:

EXAMINATION

BY MS. ABRAMS:

Q. Good afternoon, Dr. Wylie. We're here to take your deposition in a matter that's pending in California. My name is Denise Abrams. I represent a plaintiff Eric Weston who is -- his case is about to start trial. I would like to note for the record that you were noticed to us in this case as an expert witness, and that notice was withdrawn. So you understand that you are not here to give expert testimony, but you are here pursuant to a Notice of Deposition for your percipient knowledge and information about matters that occurred some years ago, and that's what we'll be asking you questions about. Okay?

A. Okay.

Q. Could you please state your name for the record?

A. Ann Wylie.

Q. Is that Dr. Wylie?

A. It is.

Q. And are you a medical doctor or doctor of philosophy?

A. Doctor of philosophy.

Q. And briefly did you get -- where did you get your Ph.D.?

A. Columbia University, New York.

Q. What is your current address?

A. My home address or my business address?

Q. Whatever you prefer.

A. My business address is 1132 Main Administration

Building, University of Maryland, College Park, Maryland.

Q. Now, I know that you have in the past been in the Geology Department at Maryland, but what is your current occupation or title at Maryland?

A. I am professor of geology, but I'm Vice President For Administrative Affairs.

Q. How long have you been Vice President of Administrative Affairs?

A. I was appointed as interim in November of 2009 and, 2008, and permanently in April 2009.

Q. Did you have any administrative positions for the University prior to that?

A. Yes.

Q. What were those positions?

A. Before that I was assistant president, chief of staff. Before that I was associate provost. Before that I was interim associate dean, and I've been interim department chair, director of graduate studies, director of undergraduate studies in the Department of Geology.

Q. What year was the appointment to, as associate provost, if you recall?

A. About ten years ago.

Q. Do you -- at that point when you were appointed associate provost did you still teach in the Geology Department?

A. Yes.

Q. At any point from then until now did you stop teaching in the Geology Department?

A. I haven't been giving courses for a while.

Q. What do you mean by a while?

A. Well, past five or ten years, past five years, past eight years probably.

Q. Do you still have graduate students?

A. Not at the moment.

Q. And when was the last time you had a grad student?

A. Probably the last student graduated in 2006. I'm not very good on dates, but, so I'll give you my best estimate.

Q. When was the last time you actually -- well, strike that. You've done your own research projects as a geologist for the, in the Geology Department; correct?

A. Yes.

Q. Do you have ongoing research at the moment?

A. No.

Q. When was the last time you had ongoing research?

A. It ended in about 2006.

Q. And I know that in the past -- well, strike that. R. T. Vanderbilt has produced to us records of correspondence with you, reports that you have done in the past for them with respect to various products and minerals that are of interest

to them or a part of their product line. When was the last time you did any kind of work for them in that capacity?

MR. RADCLIFFE: I object to the form, to the predicate, vague, ambiguous. Go ahead.

THE WITNESS: I don't remember.

BY MS. ABRAMS:

Q. Was it more than five years ago?

A. Yes.

Q. And I know you did testify for them as an expert witness in 2007, but aside from that have you done any expert testifying for them?

A. I didn't testify for them in 2007.

Q. I understood that you gave a deposition in the Franklin case?

A. I did, but I wasn't there representing R. T. Vanderbilt.

Q. So you weren't there as their expert witness?

A. I don't really -- you know, technicalities. I was asked to give a deposition about some samples that I had received, and I had previously put an affidavit out about that, and they -- I agreed to go and give that, and I think both sides were interested in hearing that. So that's why I went.

Q. So you didn't understand at that point that you had been listed by R. T. Vanderbilt as an expert, their expert in

the case?
A. I don't really remember.
Q. Do you know if you were paid for your --
A. I was not --
Q. -- for testifying?
A. -- no.
Q. Other than that testimony have you testified in court regarding any matters with respect to R. T. Vanderbilt?
A. Define court.
Q. Either a -- well, let's start with civil court.
A. About 30 years ago I appeared in some administrative court to talk about, not about any product from Vanderbilt, not, nothing from their materials, but just in general about asbestos and some work I had done with the Bureau of Mines.
Q. Were you working for the Bureau of Mines at the time?
A. I -- no. I was at the, employed by the University of Maryland.
Q. So was that about your understanding of the definition of asbestos?
A. Yeah.
Q. Do you have any idea where that was?
A. Florida somewhere.
Q. Other than that do you recall any other administrative or civil testimony?

A. I was never in a court otherwise.
Q. Thankfully, right? We had requested and served a subpoena on you to bring any, a number of materials relevant to our case, and I'm going to show you the exhibit which is part of Exhibit 1 which is -- let me just take it out of Exhibit 1. That will be better.
In the document requests to file foreign subpoena for production of documents there's an attachment A, and I'd like to ask you to look at attachment A and ask you if you had reviewed that having been served with this --
A. I have, yes.
Q. -- subpoena? And did you, in fact, look for any and all materials listed on this document?
A. I did.
Q. So I'd like to just go through this with you one by one and -- well, strike that. You didn't bring anything with you today; correct?
A. I brought everything.
Q. Okay. Well, I was not handed any materials. Let's see what this is. There's an invoice for 222 pages at a dollar a page. Does that -- does the University charge a dollar a page for copying?
A. Mm-hmm. My office does.
MR. RADCLIFFE: There's actually I believe 222 pages there since two pages were added after the invoice was

generated.
MR. ABRAMS: Okay. Why don't we go off the record for a minute, and I'll take a look at this material. Thank you.
THE VIDEOGRAPHER: Going off the record. The time is 1:52 p.m.
(Discussion off the record.)
(Wylie Deposition Exhibit No. 1 was marked for identification.)
THE VIDEOGRAPHER: Back on the record. The time is 2:01 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, you handed me, which I unfortunately put a little bit out of order, 222 pages of records, and is it correct that these are all of the documents that you believe are responsive to the attachment A request?
A. Everything I could find.
Q. And is it your testimony that you have looked in every place that you could think of?
A. I looked in all of my files.
Q. I would -- we'll mark this entire set of records -- find a Post-It -- for, to the deposition, but I think I'll go through them one by one at some point, and we'll remark specific items, but we'll mark this whole set as Exhibit 2.
Where exactly did you look for these materials?

A. In my geology office.
Q. So you still maintain an office in the Geology Department?
A. I do.
Q. With respect to item 1 on the attachment, all documents relating to all tests and analysis performed on talc mined or supplied by Vanderbilt and/or International Talc. Would you, could you look through these documents and tell me which of these you believe relate to tests and analysis performed on talc mined or supplied by Vanderbilt or International Talc?
A. All of them, but there's -- there's all of them except the bills and the correspondence, everything that's there.
Q. Do you -- did you ever perform to your knowledge analyses for a company called International Talc?
A. No.
Q. So all of the materials in here are analyses you did with respect to R. T. Vanderbilt; correct?
A. That's correct.
Q. Do you recall when the first time you ever did any work for R. T. Vanderbilt was?
A. 1980.
Q. Do you know when you first -- so it wasn't in the 1970s so far as you know?

A. Well, I joined the faculty in '72. I, you know I don't really truthfully remember. I didn't -- I'm just guessing. '80 plus or minus two years.
Q. Had you ever heard of International Talc?
A. Had I ever heard of it when?
Q. Had you ever heard of International Talc?
A. Oh, yes, uh-huh.
Q. And did you know of International Talc in the 1970s when you joined the faculty?
A. No.
Q. So that's something you learned from work with R. T. Vanderbilt?
MR. RADCLIFFE: Objection. Assumes facts not in evidence.
Q. Or how did you learn about International Talc?
A. I was working with the Bureau of Mines, and I learned about it through the Bureau of Mines.
Q. What was it -- why did you learn about International Talc through the Bureau of Mines?
A. The Bureau of Mines was interested in asbestos, definitions of asbestos and mined products that had been confused with asbestos, and they had a, they had an interest in that, and they supported research on those topics.
Q. When you first joined the Bureau of Mines in 1972, do you know whether the Bureau of Mines was researching in

those, in the early '70s whether or not International Talc had asbestos in its talc?
A. I didn't join the Bureau of Mines in 1972. The rest of the string of your questions, could we go through that bit by bit?
Q. When did you join the Bureau of Mines?
A. I didn't join the Bureau of Mines. I never -- I worked for the Bureau of Mines during a one semester sabbatical or as a faculty member, whatever, whatever on loan, but I never worked for them. I worked, I have been employed continuously for the University of Maryland since 1972 full time position. I had one semester that I took off and I worked intermittently with the Bureau of Mines for that semester.
Q. Is that the time that you learned about International Talc?
A. You know, I really don't remember. I mean the Bureau of Mines, I probably became involved in the, with the Bureau of Mines in 1974 and began work with them which continued for 10 or 15 years. So sometime during that period.
Q. International Talc was bought by R.T. Vanderbilt in 1974. Do you recall whether you knew about International Talc prior to the, their purchase?
A. I -- no -- no, I had no idea. I didn't even know that they bought them. I wasn't -- no.

MR. RADCLIFFE: Let me assert an objection to that question that it misstates the evidence, and it assumes facts not in evidence.
Dr. Wylie, sometimes you're answering immediately. If you would just wait a heartbeat --
THE WITNESS: Okay. Well, then --
MR. RADCLIFFE: -- in case I have an objection.
BY MS. ABRAMS:
Q. So what do you recall in the 1970s about asbestos and International Talc?
A. Nothing.
Q. Well, you mentioned I believe in your answer that you learned about International Talc from the Bureau of Mines and it had something to do with asbestos.
A. No. I'm sorry. That's not correct. International Talc is a company, and Vanderbilt is a company, and what I was interested in were the talc deposits in the Gouverneur nor talc district in New York.
Q. Can you -- so at some point you were interested in whether or not the talc deposits in Gouverneur contained asbestos?
A. We -- the Bureau of Mines was interested in the definition of asbestos, and its application to the non-asbestiform varieties of the minerals that had been listed by the federal government in the asbestos regulations.

Q. Did they hire you as a consultant on that issue?
A. The bureau of mines?
Q. Correct.
A. They supported my work through grants.
Q. And what work did you do on grants from the Bureau of Mines in that capacity specific to Gouverneur?
A. I had a research project that was funded by the National Institute of Environmental Health Sciences that that agency was interested in obtaining reference samples of a variety of minerals, let's see, maybe five, one of which was non-asbestiform variety of the mineral tremolite and the other ones were commercial asbestos. The non-asbestiform variety of tremolite was a sample donated to the Bureau of Mines from the Gouverneur talc district.
Q. Was that donated by someone at R. T. Vanderbilt?
A. I really don't know.
Q. Where did you see that sample?
A. At the Bureau of Mines.
Q. Was that when it was at the University of Maryland --
A. It was.
Q. -- temporarily?
A. Mm-hmm.
Q. Did you do something with that sample?
A. We characterized it.

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Q. Did you have to crush it or do something like that to --
A. It came crushed.
Q. Do you know who crushed it?
A. The Bureau of Mines.
Q. Do you know who worked on that at the Bureau of Mines?
A. No.
Q. Do you have a record of your findings?
A. It's published.
Q. And what's the paper?
A. It's Campbell, et al., Characterization -- it's in my -- well, I don't remember the name exactly -- Characterization of -- for the NIEHS Animal Feed Study. It's an information circular I think, or report of investigation, sorry. It's a US Bureau of Mines report of investigation.
Q. You had a research grant. Do you remember how much that was for?
A. No.
Q. So what it was at that point you had seen one piece of ore from the Gouverneur that you analyzed in that, in that study?
A. I had seen this crushed samples of tremolite.
Q. Was that the first time that you had any information about the particular ore in Gouverneur?

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A. I think yes, mm-hmm.
Q. And do you know where that specifically was from, what mine that was from?
A. No.
Q. Do you have any -- in the papers that you brought today in Exhibit 2 did you bring any analyses of that material?
A. No.
Q. Do you know if those exist?
A. I don't know. Probably.
Q. Where would they be?
A. They're the property of the University of Maryland, and they'd be in our files somewhere.
Q. Would they be in your personal files or somewhere in the Geology Department or --
A. Somewhere in the Geology Department.
Q. So that's -- outside of your own files you didn't do a search; correct?
A. No.
Q. That's correct?
A. That's correct. I did not do a search. Yes.
Q. Would the sample that you looked at also exist at somewhere in the Geology Department at the University of Maryland?
A. I think so.

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Q. Do you retain samples that you look at for the most part?
A. Yes.
Q. Where do they keep samples?
A. I keep them in my lab.
Q. You still have a lab?
MR. RADCLIFFE: The question was at the University of Maryland.
THE WITNESS: At the University of Maryland. They are in my laboratory at the University of Maryland.
BY MS. ABRAMS:
Q. I understood. Do you still maintain a lab in the Geology Department at Maryland?
A. Yes.
Q. Is that your own lab or do you share the lab?
A. I share the lab.
Q. How many professors share the lab? Strike that. Does the Geology Department only have one lab or are there multiple labs?
A. Multiple labs.
Q. How many professors share your lab?
A. I have a graduate student working in the lab who's advised by another faculty, but I'm on his dissertation committee.
Q. Would, would all of the materials that you have

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examined in the past since you joined the faculty be housed in your lab?
A. I can't attest to every sample being there.
Q. What -- well, for the most part do you retain the samples in your lab?
A. Generally speaking, yes.
Q. After you finish examining a sample what do you do with it generally?
A. I put it in a drawer.
Q. What -- if it's a crushed material, is there some kind of packaging that it usually goes into?
A. It's contained in something when it's arrived if it's crushed or I put it in a bottle.
Q. So do you, if it comes in a baggie, do you keep it in a baggie? Do you put it --
A. Usually.
Q. Okay. And do you have a form, a format for -- well, strike that. Do you maintain asbestos in your lab of any kind?
A. Yes.
Q. Do you -- how do you package asbestos material?
A. It's in my, it's in my lab. It's in drawers. It's in containers. It's in, you know, as samples.
Q. Do you also keep asbestos material in baggies or in bottles depending on what they come in?

A. Usually yes, mm-hmm.
Q. So if you have -- strike that. And with respect to your deposition today, did you bring any physical samples?
A. I did.
Q. And where are those?
Thank you for sharing.
MR. RADCLIFFE: Whoops.
BY MS. ABRAMS:
Q. Is there anything else that you brought today other than the documents and the bottles that we have in front of us?
A. No.
Q. Okay. And when did you first show that material to Mr. Radcliffe?
A. About an hour before I came in here.
Q. Did you make him aware that you had upwards of 30 samples with you. That you were bringing with you?
A. I showed him the bag. We didn't discuss the quantity.
Q. Prior to today did anyone at the Dehay law firm know that you were going to produce physical samples today?
A. I don't know.
Q. Did you tell them?
A. They didn't ask. Well, other than I told them, I think I told you, that I had fulfilled the terms of the court

order.
Q. So with respect to category 1, and Dr. Wylie, I will just tell you that I was told that this 1:30 today was the only time that you were available within the next three weeks. Is that a correct statement?
A. That's a correct statement.
Q. Okay.
MR. RADCLIFFE: I think it was 1:00. I think I pushed it back to 1:30. That was my delay from 1:00 to 1:30.
MS. ABRAMS: I was never told that either.
BY MS. ABRAMS:
Q. The second category is -- strike that. Can you tell me what is in this bag that is responsive to the subpoena?
A. All physical samples of talc mined or supplied by Vanderbilt and/or International Talc in my possession or control, all physical samples of Mouldene talc in my position (sic) or control, all physical samples of talc identified by you as Mouldene in my July 28th, 1989, letter to Dr. C. S. Thompson.
Q. So I'm going to show you a bottle which is, which says talc fiber No. 3 mine ore pure fiber portion CPS 183-3, ask you to look at that.
A. Mm-hmm.
Q. And can you tell me, do you have any idea when you received that?

A. No.
Q. Is there any -- do you have any information in your lab about when you received that?
MR. RADCLIFFE: You mean other than the documents we've produced?
MS. ABRAMS: Can you read the question back?
(The reporter read back the previous question.)
THE WITNESS: All the information that I had on all of the samples and all the information that I was asked to bring are in the documents that I provided to you.
BY MS. ABRAMS:
Q. Do you have in the documents an identifying document for every one of the samples that you produced, to your knowledge?
A. I'm not -- I would say most of them, most of them.
Q. Now, could you look at the material inside that little bottle, please, and tell me if that is a, is that what you examined to your knowledge when you examine that sample or is that what's left over from the --
A. This is a --
(The reporter requested clarification.)
THE REPORTER: "Left over from" --
MS. ABRAMS: The examination.
THE WITNESS: This is a sample of the material that I have that I'm giving to you. I didn't give you the entire

sample.
BY MS. ABRAMS:
Q. And why is that?
A. Because I could see no reason to do that, that I retain them. They're part of my scientific record. I'm not going to give you the entire thing.
Q. How much of that particular material do you have?
A. I don't remember.
Q. When you analyzed that particular material in that bottle, how much material did you need to analyze?
A. About one one-thousandth of what's in this little bottle.
Q. So you looked at a very minute portion of what is in that bottle in order to derive your findings for the material in that bottle?
A. That's correct.
Q. Correct? And is, would that be the case for all the samples that you looked at?
A. Not necessarily. In some of the analyses that were more comprehensive, were done with electron microscopy I may have made multiple preparations. When I'm trying to quantify abundances, then I needed to have multiple preparations, so I would make multiple one one-thousandths of those.
Q. Well, for example, would the material in that bottle that you produced for us be sufficient for any kind of testing

that you might do to do these multiple preparations?
A. **Yes.**
Q. So is it fair to say that for all of the testing that you've done on any of these samples that you have produced today you looked at an amount less than what's in the bottle in front of you?
A. **I would say that's generally correct.**
Q. Well, when wouldn't that be a correct statement?
A. **You know, I -- it's just generally correct. I can't, you know, if you would define one place where I did a whole bunch of analyses and I put, and I had a small amount less -- left and I gave you a smaller amount I can't, but generally correct, generally correct.**
Q. You -- is it correct that you don't keep with each one of these samples that you have in your lab a chain of custody declaration or some information on the chain of custody?
A. **No, I don't.**
Q. So you, for these, for every bottle that you have in the bag, other than you opened a drawer and took the material out and put it in a bottle and labeled it, you have no other information on where it came from other than what's in the documents?
A. **Other than what's in these documents, no, I don't.**
Q. And you have no information, for example, if any of

these samples through reading the documents came from R. T. Vanderbilt, you have no idea how they got the samples; correct?
A. **No, I have no idea.**
Q. Do you know, have you personally examined any of the material in these bottles in the last ten years?
A. **I don't think so.**
Q. Do you know if your students, any of your students have examined any of these materials in the last ten years?
A. **Let me, let me go back. Ten years. I have a, had a student whose name is William Greenwood, and I'm not exactly sure what year he graduated. It could have been 2001. I can't remember. He would have been the last person to have looked at that.**
Q. Did he ever publish any peer reviewed publications regarding any of the materials in the samples?
A. **He has a Master's thesis in the -- that's not peer reviewed.**
Q. Was it ever published anywhere?
A. **It's in our library.**
Q. So it's a University of Maryland --
A. **Publication, yes.**
Q. Is every graduate student's Master's thesis --
A. **Yes.**
Q. -- considered published?

A. **It is, yes.**
Q. Does -- he did not write a Ph.D.?
A. **No.**
Q. Do you know where Mr. Greenwood is now?
A. **The last time I heard from him he was working for the Defense Mapping Agency.**
Q. Did you also have a student named Watson?
A. **Mark Watson, yes.**
Q. Do you know when he was your student?
A. **No. I can't remember. Sorry.**
Q. Was it prior to Mr. Greenwood?
A. **I think it was after, after.**
Q. Do you know if he examined any of the material in the --
A. **No.**
Q. -- bags?
A. **He didn't.**
Q. Do you know if he ever -- did he write a Master's thesis?
A. **He did.**
Q. And other than at the University of Maryland was that ever published?
A. **No.**
Q. Do you know where he is currently?
A. **He lives in this area.**

Q. Do you know if he's working in geology?
A. **He's -- the last I heard of him he's an electron microscopist for a titanium company somewhere in the Baltimore area.**
Q. Was Mr. Veerta your student also?
A. **Yes.**
Q. Do you know when he was your student?
A. **The late '80s? I don't really remember. Maybe early -- I don't really remember, early '90s.**
Q. Mr. Greenwood had a fellowship in the department?
A. **He, yes, he did.**
Q. And that was a fellowship paid for by the R. T. Vanderbilt Company?
A. **Yes, it was.**
Q. Did Mr. Watson also have a fellowship that was paid for by R. T. Vanderbilt?
A. **No.**
Q. Were there other fellowships --
A. **No.**
Q. -- paid for by R. T. Vanderbilt? In the materials that R. T. Vanderbilt gave us and I brought them with me there appear to be two fellowships. You don't recall another one?
A. **No. It was there -- it was the same fellowship. It was only one person and it --**
Q. Mr. Greenwood?

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A. Yes.
Q. You were asked to bring all the tests and analysis performed on talc mined or supplied by R. T. Vanderbilt for International Talc. Is it your testimony that the samples in the bag are all from R. T. Vanderbilt or International Talc so far as you know?
MR. RADCLIFFE: Objection; vague, ambiguous, assumes facts not in evidence.
BY MS. ABRAMS:
Q. Is that correct?
A. Well, ask me again.
Q. She'll read it to you.
MR. RADCLIFFE: I change my objection to an objection to the form.
(The reporter read back the previous question.)
THE WITNESS: They are all the samples that were supplied to me for analysis by R. T. Vanderbilt. They do not include samples that were supplied for the work performed by William Greenwood.
BY MS. ABRAMS:
Q. And is there a reason you didn't bring his samples?
A. They belong to the University of Maryland.
Q. Do the samples in the bag belong to the University of Maryland?
A. No.

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Q. Were those samples that you, that belong to you in a consulting capacity?
A. They were.
Q. Where would Mr. -- where would Mr. Greenwood's samples be kept?
A. In, in my laboratory.
Q. How many samples to your knowledge did Mr. Greenwood use?
A. Ten.
Q. Do you know how much material remains from his --
A. No.
Q. -- samples? And those came from R. T. Vanderbilt?
A. Not all of them, no.
Q. Do you know where else they came from?
A. They were other samples of talc that had been given to the University of Maryland.
Q. Mr. Thompson has testified that the particular ore out of Mine 3 is a very unique ore and that he's discussed that with you. Did he ever give you a sample of that ore?
MR. RADCLIFFE: Object to the form.
THE WITNESS: There -- he didn't give me a sample of the ore, no. He gave me a sample that says No. 3 mine on it.
BY MS. ABRAMS:
Q. Is it -- did you analyze that and is the analysis in this stack of papers?

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A. Um, this says No. 3 mine right on it.
Q. Okay. Do you recall what you found?
A. I mean just generally speaking. It's the material that is characteristic of the Gouverneur talc deposit.
Q. Did -- so you don't, you don't have an understanding there was anything unique about the ore in the number 3 mine?
A. I know nothing --
MR. RADCLIFFE: Object to the form.
THE WITNESS: I know nothing about the mine or the number 3 mine or any other number mine. I only know I have a sample that says No. 3 mine on it, and it's labeled talc fiber, and this, as my recollection is, now that I think about this, is that this material is primarily fibrous talc. It doesn't have the other components of the ordinary product of the mine that's like put in paint and ceramics and things like that. So it's a kind of a special sample.
BY MS. ABRAMS:
Q. And you don't recall ever actually seeing the ore, the physical ore; correct?
A. From the No. 3 mine?
Q. Yes.
A. I have to tell you that I was at the location, and I was in an open pit. I have no idea whether that was the No. 3 mine or whatever other mine it was.
Q. You were at the open pit?

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A. It was at an open pit.
Q. Were you ever at an underground mine?
A. No, no.
Q. When did you go to the open pit?
A. Well, it was six or so years ago I guess.
Q. Why did you do that?
A. I was going to a conference in Vermont and another geologist, accompanied by other geologists, one in particular, and she wanted to visit the mine and I wanted to visit the mine. I'd never seen it, so we stopped by.
Q. Was there someone there to actually show you around?
A. There were people there, yes.
Q. Was Mr. Thompson there?
A. I don't think so, no.
Q. Mr. Putman?
A. I, I don't know who that is.
Q. The -- so getting back to the discussion we were having about the test results.
A. Yes.
Q. Do you know whether in that 222 pages there are test results for every one of these samples?
A. There are not.
Q. Do you have test results for every one of those samples?
A. I provided you every analysis that I have.

Q. Do you keep the test results in the regular course of your --
A. I do.
Q. -- work?
A. Usually.
Q. Do you believe that you have tested every sample that's in every bottle that you produced?
A. No, I don't.
Q. Do you know why you have samples that were never tested?
A. I just didn't test them I think.
Q. Now, you mention that these do not belong to the University of Maryland. Do you have a consulting company?
A. No.
Q. Did you have a consulting company?
A. No.
Q. Did you receive them in the regular course of your work as a professor at the University?
A. Yes.
Q. And why is it that you do not identify those as belonging to the University of Maryland?
A. Because I was paid as a, for the analysis privately.
Q. Did you do them on the, on your own time?
A. Yes.
Q. Did you do them in your lab at Maryland?

A. Most of them I did at home.
Q. What type of equipment do you have at home?
A. I have a microscope, polarizing light microscope.
Q. Can you do TEM or SEM at home?
A. No.
Q. Is that -- do you have that equipment at Maryland?
A. Yes.
Q. Have you examined any of these samples under, with TEM OR SEM?
A. Not as part of any consulting, no.
Q. So it's -- did you do x-ray --
A. Wait a minute. Let me just take that back. There might be -- there might be -- there might be samples in there of a project that I did do some TEM for -- some SEM at the University of Maryland.
Q. And do you recall which sample that would have been?
A. I think they're western talc samples from the western talc deposits.
Q. Why did you do TEM?
A. SEM.
Q. I'm sorry. Why did you do SEM on the western talc and not on the other samples?
A. I, I don't remember. It was some type of study they were interested in. I, I can't remember; just happened to be the protocol that met the need.

Q. You were asked to bring all correspondence with Vanderbilt and International Talc or any employee, agents or attorneys. Have you done that?
A. I have.
Q. Where did you look for the correspondence?
A. In my files.
Q. Do you have correspondence files?
A. No.
Q. How did you know -- do you have an R. T. Vanderbilt file?
A. I do.
Q. Did you produce your whole file?
A. I produced all of the documents that were in that file that related to this, that relate to this deposition.
Q. What types of documents were in there that you didn't produce?
A. I don't remember.
Q. Can you give me an example?
MR. RADCLIFFE: Objection; asked and answered. She just said she didn't remember.
BY MS. ABRAMS:
Q. Can you give me an example?
MR. RADCLIFFE: Same objection.
THE WITNESS: I don't remember.
BY MS. ABRAMS:

Q. When did you go through your files?
A. Monday, Tuesday.
Q. Of last week?
A. Of this week.
Q. How, how many, approximately how many pages are in your R. T. Vanderbilt file?
A. I have no idea.
Q. Is it a few more than what's brought here or is it hundreds more or what?
A. I have no idea.
Q. You can't say approximately whether it's bigger than the pile on the table?
A. I have no idea.
Q. Did you bring all the tests you have with respect to Mouldene talc?
A. I did.
Q. We have a letter from you to Slim Thompson regarding Mouldene. Is there anything else in that stack with respect to Mouldene other than the letter with your findings?
A. I went through my lab notebooks. If there was anything in there on, with respect to Mouldene I copied it.
Q. Would you take a look at these documents and tell us if there's anything else in there with re, specifically with respect to Mouldene, and, and including the S-158 sample that you examined?

A. It's going to take me a while. I guess that doesn't matter, huh?
Q. Why don't you go to your test results, if you would. I know there are a lot of test results in there.
MS. ABRAMS: Bless you.
THE WITNESS: That's the same document. I think that's all.
BY MS. ABRAMS:
Q. Thank you. So we'll mark this four page, four pages as Exhibit 3. We'll come back to that.
Moving down to number 5, tests performed on Nytal, and if you would just look at the actual testing material and not your correspondence, but the rough data, could you tell us which of the material was Nytal, which was Asbestine and which 3X, if you can differentiate any of that?
A. That doesn't pertain. That doesn't belong.
MR. RADCLIFFE: Okay.
THE WITNESS: It's not -- again, what are the ones I'm looking for?
BY MS. ABRAMS:
Q. Why don't we -- why don't you pull out all your test material and then I'll ask you questions. These are the tests?
A. Mm-hmm.
MS. ABRAMS: So would you mind marking this because

we're going to mark some more exhibits.
MR. RADCLIFFE: It should be 3 I think.
(Wylie Deposition Exhibit No. 3 was marked for identification.)
BY MS. ABRAMS:
Q. I'm just going to have you hold that for a minute. We're going to go through the rest of this, and then we're going to go off the record and then we'll organize this a little better so we can mark it.
Did you bring with you all financial documents relating to any work that you performed for Vanderbilt or International Talc including billing records, purchase orders and financial statement?
A. I brought you everything I had, mm-hmm.
Q. Other than what is in those records, would you have received any money from Vanderbilt for any work that you've done?
A. Not to my recollection.
Q. You were asked to bring the physical samples from the Stanton studies. Did you bring those?
A. No.
Q. Do you have those?
A. Yes.
Q. And why didn't you bring those?
MR. RADCLIFFE: Object to form.

THE WITNESS: They belong to the University of Maryland.
BY MS. ABRAMS:
Q. How large are the samples from the Stanton studies?
A. Tiny.
Q. Where are they kept?
A. In my lab.
Q. What material do you have? Do you have every single sample that --
A. No.
Q. If you don't mind, could you wait until I get my whole question before you give an answer. Okay? What samples -- I understand that Dr. Stanton had something around a hundred samples; is that right?
A. I don't know.
Q. How many do you have?
A. I don't know.
Q. Is it more than 50?
A. I would guess. I'm guessing it's at that order.
Q. Are they all kept in the same place?
A. Yes.
Q. And where are samples kept in your lab? Is there a sample room?
A. No.
Q. How are they kept?

A. In drawers, on shelves.
Q. So is there a drawer marked Stanton samples?
A. No.
Q. How do you know where the Stanton samples are?
A. I have to look for them if, every time I want them.
Q. Did you look for them this time?
A. No.
Q. So do you know where they are?
A. No. In my lab. They're in my lab.
Q. When was the last time you looked for them?
A. Many years.
Q. You signed a dec-, several declarations regarding the Stanton samples. Did you look for them before signing the declarations?
A. No.
Q. How do you know you still have them?
A. Well, I, you know, I don't, I mean unless someone came in and took them out, but that would be highly unlikely I would think.
Q. The last time that you looked for them where were they?
A. In my lab.
Q. Do you know any more specifically where?
A. In a box.
Q. Is there anything else in the box other than bottles

with samples?
A. No.
Q. Is there any chain of custody information?
A. No.
Q. You've stated in a declaration that you have reviewed Dr. Stanton's files.
A. That's correct.
Q. Did you copy any of those files?
A. Yes.
Q. Where are those materials?
A. They're probably in my files.
Q. Did you look for those?
A. No.
Q. Why not?
A. Because they belong to the University.
Q. So it's your testimony that you are -- well, strike that. My understanding is that they belong to Mrs. Stanton and she gave them to you; is that correct?
A. Not necessarily.
Q. Well, did you testify in a declaration that you went to Mrs. Stanton and looked in her attic and reviewed Dr. Stanton's papers?
A. I also went to the National Cancer Institute and reviewed his papers and his materials there.
Q. Where did you -- are the NCI papers the ones that

are in, at the University of Maryland?
A. The -- all of the papers are at the University -- anything I, anything I found is at the University of Maryland.
Q. Did you copy the files that, from Mrs. Stanton's attic and bring them to the University of Maryland?
A. I did.
Q. And it's your testimony here today that you could not bring those with you because those are the property of the University of Maryland?
A. That's correct.
Q. And you could not make copies of them because those are the property of the University of Maryland?
A. That's correct.
Q. And why is that, that you believe that you could not bring copies of Mrs., of Dr. Stanton's papers because they are property of the University of Maryland?
A. Because I acted as a professor when I received them. I was an employee of the University of Maryland.
Q. Is the University of Maryland a public institution?
A. It is.
Q. Are the papers that the University of Maryland has open to the public?
A. Not necessarily, no.
Q. Under what circumstances would they not be available to the public?

A. I -- look, this is a test, an area outside my area of expertise. You can take it up with the University lawyer.
Q. Did the University lawyer advise you not to bring Mrs. Stanton's papers?
A. No, he did not.
Q. Did you get any legal advice that you could not bring Mrs. Stanton's papers here?
A. I did not.
Q. You just decided that for yourself?
A. I don't see that, Mrs. Stanton's papers listed in this -- I see no Mrs. Stanton's papers in this subpoena.
Q. I think No. 14 says all documents identifying the source of the talc samples identified as R. T. Vanderbilt talcs from the Stanton study you refer to in your deposition testimony of August 8, 2007, in the Franklin case.
A. I would not bring anything that I acquired as a professor to a deposition that I came to by subpoena. I -- the -- I'm acting as a -- when I'm an employee of the University of Maryland, if you want University of Maryland papers, you can't ask me for them; you need to ask the University of Maryland.
Q. Did you bring copies of all the written statements you've signed?
A. I brought you everything that was on this request that I had found in my files.

Q. Did you bring financial documents relating to your work performed for Ford, Chrysler and General Motors?
A. No, I did not.
Q. And why is that?
A. I have none. All of -- I have none.
Q. It's correct that you received a half million dollar grant from Ford, Chrysler and General Motors?
A. The grant is to the University of Maryland.
Q. But that was for your work, wasn't it?
A. Yes, but the grant is to the University of Maryland.
Q. And have you received any other grants or has the University of Maryland received any other grants from Ford, Chrysler or General Motors --
A. I have no idea.
Q. -- on your behalf?
A. Any other than what?
Q. Than the $500,000 grant you received?
A. I have received -- no. I think the answer to that is no.
Q. Has the University of Maryland received any grants from R. T. Vanderbilt?
A. University of Maryland received a grant that supported the fellowship of William Greenwood.
Q. Have they received any other grants to your knowledge?

A. I, I don't remember any others.
MS. ABRAMS: Let's go off the record and take a break.
THE VIDEOGRAPHER: Going off the record. The time is 2:53 p.m.
(Discussion off the record.)
(A recess was taken.)
THE VIDEOGRAPHER: Back on the record. The time is 3 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, I want to go through some of these records that you produced. The first stack of records apparently are invoices for services. Were these kept in a separate file together?
A. No.
Q. So you actually put them in this order --
A. I did.
Q. -- when you produced them? Was there a reason for that?
A. Well, they're just willy-nilly, so I tried to make a little sense out of it.
Q. Okay. And I guess we can mark these if we have some paper clips. Can we get paper clips?
Do you have paper clips? We'll mark this as Exhibit 4.

MR. RADCLIFFE: It already has a label on it.
MR. ABRAMS: I know. It's going to have to be the beginning of 2. We're going to have -- this set is also going to be part of Exhibit 2.
MR. RADCLIFFE: So we have a set of documents that have two exhibit labels on them?
MS. ABRAMS: All, all the exhibits are going to be part of Exhibit 2, and then they're going to be separately marked. You don't like that. I'm open to suggestions.
MR. RADCLIFFE: How about if we put a label on top of Exhibit 2 and we'll name it 4, and then whatever stack of documents you have left over at the end of the day that you did not label individually we'll label those as Exhibit 2.
THE VIDEOGRAPHER: Don't forget your microphone.
MS. ABRAMS: Okay. So I'm not averse to that.
MR. RADCLIFFE: Okay.
MS. ABRAMS: We will leave open Exhibit 2. The stack of invoices will be marked as Exhibit 4, and we'll move on from there.
(Wylie Deposition Exhibit No. 4 was marked for identification.)
THE VIDEOGRAPHER: I'm actually getting some noise from your microphone there.
MR. RADCLIFFE: Are you? I'm afraid you'll get more noise if I put it on, which is why I'm trying to keep away

from it.
MS. ABRAMS: Are we ready?
BY MS. ABRAMS:
Q. This one invoice dated July 8, 1988, is to John Kelse, and it has STEMicro Corporation at the top.
A. Yes.
Q. What was STEMicro Corporation?
A. It was a company that existed for, in Rockville, Maryland, and I worked in their facility on a few occasions, and the bill was sent from them.
Q. You use their lab to do some work?
A. Mm-hmm. I did.
Q. Did they have particular equipment that you didn't have at the University that you used?
A. They had a polarizing light microscope.
Q. Is there any particular reason you used their lab as opposed to your own microscope?
A. It was close to my house.
Q. And are all these documents in Exhibit 2 true and correct copies of billing statements that we, pertain to your work for analyzing samples for the R. T. Vanderbilt Company so far as you know?
A. Yes.
Q. And they all came out of your files?
A. Yes.

Q. I'm going to skip some of the correspondence and test material. I just want to move to your sample, I mean your -- strike that. I'm going to skip over some of the written materials and move on to some of the lab entries. Let me just -- do you know what those --
A. I actually don't.
Q. Okay. It's not just me. Okay.
A. Oh, I know what it is, but I don't know what --
Q. What is it?
A. -- what samples it pertains to.
Q. I'm showing you two pages that say white, white sample chrysotile on the bottom of the first page and University of Maryland at the top. Can you tell us --
A. These, these don't, are not relevant. They, they don't belong. They're not Vanderbilt materials.
Q. How do you know that?
A. Because it -- they have chrysotile on them.
Q. Where did you find them? Can I have them back, please? Thank you.
A. In a -- my files are scattered.
Q. There's several pages after that, and it says A. Wylie paint sample on the top of the fourth page. I'm just going to hand you --
A. Oh, I know what they are. There, there was a, a material that was involved, put in some apartment somewhere,

and it had chrysotile in it as well as materials from the Gouverneur talc district.
Q. And you analyzed that material?
A. I did.
Q. That material you believe to have talc and chrysotile in it?
A. Yes.
Q. So I'm going to show you what I'm going to mark as Exhibit 4? 5, and ask you if all of these documents pertain to that analysis?
A. Yes, but none of these are my analyses.
Q. Whose analyses are they?
A. They were done by a laboratory at the University of Maryland, Baltimore.
Q. Do you know who did them?
A. Jeff Furman.
Q. Do you know why you have them?
A. They were incorporated into a report that I did on some of the materials, and there's a subreport. It's incorporated by reference. That's why I included it. It's from the, this laboratory at the University of Maryland, Baltimore, and they -- he did the TEM work on the samples, and so it was incorporated by reference in my report. So I included it.
Q. Did he do the TEM work for you or at someone else's

request?
A. I, I don't remember. Probably for me, but I, I don't remember exactly how that worked.
Q. Is there --
A. May have been was for, directly for the person that requested it; can't remember.
Q. If you would check through those documents and see if there's something in there that refers to that analysis. These are the pages that were following. Perhaps they have something regarding --
A. No.
Q. Okay.
(Wylie Deposition Exhibit No. 5 was marked for identification.)
THE WITNESS: Well, I don't see it, so you must not have given it to me. It must be in the rest of those papers. Here. I thought there was another one that I incorporated by reference. There must be another, another something. Okay. I think I'm getting them confused. This goes with that. This is a different, a different analysis that I incorporated by reference.
BY MS. ABRAMS:
Q. Okay.
A. Okay. So --
Q. Now --

A. -- that's a different problem.
Q. So I'm going to mark this -- we have Exhibit 5, so I'm going to remark Exhibit 5 with the report of investigations on the top of the exhibit. This says you received these materials from Dr. Langer; is that correct?
A. That's correct.
Q. Do you know Dr. Langer?
A. I do.
Q. Have you worked with Dr. Langer?
A. Yes.
Q. In what capacity?
A. We've co-authored papers together.
Q. Have you done consulting work on litigation for asbestos cases together?
A. No.
Q. Have you consulted regarding whether there's asbestos in materials with Dr. Langer?
MR. RADCLIFFE: Object to form.
THE WITNESS: That's, that's too broad.
BY MS. ABRAMS:
Q. Do you know why Dr. Langer sent you these samples?
A. I think he was interested in my opinion.
Q. Do you know what, why he needed your opinion on these particular samples?
A. It's my recollection that there was a case involving

an apartment building in New Jersey.
Q. Can you tell me in your handwritten notes which say **A. Wylie at the top -- strike that. Are these your handwritten notes, the two pages of notes?**
A. No.
Q. Do you know why they say A. Wylie at the top?
A. Maybe they're not related to this. Sorry.
Q. Okay. Are those -- is that your handwriting?
A. No.
Q. Okay. So by "this" we mean a doc --
A. JCF, this is Furman.
Q. Uh-huh.
A. And he may have worked on this, too. To tell you the truth, I really don't remember this. It's like 25 years ago. I really -- I just don't, sorry.
Q. So these --
A. Just as confused as my mind.
Q. -- these materials could all relate to each other?
A. Maybe. They might not.
Q. Other than what is -- why don't you just look through these again, and that's all of Exhibit 5. Other than what is written on those documents do you have any independent recollection of any matters related to any of the materials there?
A. Nothing that I haven't already told you related to

the occupancy of an apartment. That's all I can remember.
Q. And with respect to the handwritten notes that at the top that say A. Wylie, do you know whether or not any of the samples referred to in these two handwritten pages are included in the samples that you produced for us?
A. I found no tex -- no paint, no textured paint, no, nothing like that. I found no building materials among my samples.
Q. So is --
A. So I don't believe that they are.
Q. And it's your understanding that what is referred to on these two pages is paint?
A. No, not necessarily. I think there's textured, a textured ceiling, sprayed-on ceiling material and there's paint. So I think both of those things were involved in this topic.
Q. And is it your understanding that they had talc in them?
A. Well, I can read what I wrote.
Q. Okay.
A. Yes, they contain talc.
Q. And you believe they independently contained chrysotile?
A. What do you mean by that?
Q. That -- strike that. Based on your notes was there

chrysotile in the material?
A. According to my conclusions the cementaceous undercoating contains chrysotile.
Q. And with respect to the handwritten notes, can you decipher anything in those notes about, to tell us what they're about?
A. The numerical entries relate to focal length, magnification. They look like electron microscopy type of analysis was going on.
Q. Do those notes state that there's chrysotile in the material?
A. There's a statement that says sample 10, chrysotile, at the top of the page.
Q. This says DAP on it. Does that refresh your recollection about this?
A. That's a different situation. That's this report. So they're not related.
Q. All right. So these handwritten notes go with the other report?
A. They must, yes.
Q. Which says very small chrysotile?
A. Yes.
Q. And this also says DAP on it. So these don't belong together?
A. Right.

Q. Do you know, do these go with the handwritten notes?
A. I don't know.
Q. Okay. So let's have the DAP report. And I believe you -- what is AIP Environmental Laboratory?
A. It's at the University of Maryland, Baltimore, or was.
Q. Okay. So now we are going to remark -- strike that. And these two pages, do they --
A. I think that's a different topic.
Q. From this?
A. Yes.
Q. And from this?
A. Yes.
Q. Okay. So we will mark as Exhibit 6 all the DAP documents.
(Wylie Deposition Exhibit No. 6 was marked for identification.)
BY MS. ABRAMS:
Q. Would you go to the stack that you have clipped together. Is there a reason those are clipped together?
A. They're all photomicrographs.
Q. Do they all -- do you know what they refer to?
A. These are all related to a study on western talc.
Q. Okay. We'll mark those as Exhibit 7.
(Wylie Deposition Exhibit No. 7 was marked for

identification.)
BY MS. ABRAMS:
Q. Where did you find these notes? Do you have a folder that says western talc?
A. No.
Q. What --
A. I have a lab notebook.
Q. A lab notebook just on western talc?
A. No.
Q. What is the lab notebook?
A. It's just a book where I enter my observations.
Q. Are they kept sequentially in, in any kind of order?
A. Not really. I have four or five active ones, and I pick them up, and they're spread out among the three.
Q. Do you keep your old lab notebooks?
A. I do.
Q. Did you look in all your old lab notebooks?
A. I did.
Q. How far back do they go?
A. To the beginning of my time as a professor.
Q. Do you keep in your lab notebooks your consulting work and your University of Maryland research together?
A. I do.
Q. So you'd have to look through your lab notebook -- you don't have a separate consulting lab notebook?

A. I don't.
Q. Okay. You ment- -- Exhibit 3 is about Mouldene. Do you have notes that pertain to Nytal in your materials?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. All right. Let's go through your lab notes and see what else they pertain to, if we might.
A. This says sample 78-88 from John Kelse.
Q. Okay. May I have the notes that go with that. Is that just one page of notes?
A. Yes.
Q. And what's the next?
A. Let me see that. This doesn't pertain. That's all I have on that one. The next one says Westal 003. This is a western talc sample.
Q. Okay.
A. These are, these are pictures related to that.
Q. Western talc?
A. Mm-hmm.
Q. We'll clip these together. So the -- just for the record the July 2nd, 1988, notation the first page you gave me, I'm sorry, was for which?
A. That has no relevance.
Q. Okay. So what is this page before?
A. It says it's from John Kelse, R. T. Vanderbilt, and

it says 78-88. I know nothing else about it.
Q. Do you believe 78-88 is in this pile of --
A. I don't think so.
Q. So you don't have any idea what that is?
A. No.
Q. Would it have been received possibly in 1988 or is that 88 not related?
A. I have no idea.
Q. Okay. You don't keep records by --
A. No.
Q. Okay.
MR. RADCLIFFE: Got to wait until she finishes her question.
BY MS. ABRAMS:
Q. And then the west -- you have Westal at the top which is 1/6/90 so that has to do with Westal. What other lab notes do you have?
A. Actually this does not, is not relevant. This says Vansil MG. That's western talc.
Q. And just for the record you've ripped off the bottom. What did that pertain to?
A. Other work.
Q. Was it talc work?
A. It has nothing to do with R. T. Vanderbilt.
Q. Was it talc work?

A. I don't know. I just know it wasn't R. T. Vanderbilt. The next one is, says fibrous talc, XRD samples, and it has USNM 48277, 44866, 101849 and RT V1 fibrous concentrate.
Q. Do you know what that pertains to?
A. Samples from the Smithsonian and a sample from R. T. Vanderbilt of a fibrous concentrate.
Q. Do you know what you used those samples for?
A. I doubt it was -- I was probably just looking at them for my own interest. They probably are unrelated to anything that has to do with consulting. I probably ought to take them back.
MR. RADCLIFFE: Well, if it has to do with Vanderbilt, you can give them to her.
THE WITNESS: Okay.
BY MS. ABRAMS:
Q. Is there anything on these notes, these two pages of notes, that tell you what your findings are?
A. I'll have to look at them again. They're x-ray diffraction patterns, comparisons of x-ray diffraction patterns.
Q. And you don't have a recollection of why you looked at this material; correct?
A. I was comparing those four samples.
Q. And it says as a group the following peaks were

observed which do not conform to anthophyllite or talc. Can you see that notation at the top?
A. Yes.
Q. Did you write, anywhere note what they do conform to, if anything?
A. I did not.
Q. Could you tell from looking at that data what they do conform to?
A. No.
Q. What other information would you need?
A. Lots. Reference books, computer programs.
Q. Okay. We will mark, I just want to keep it in order, the Vansil MG half page as Exhibit 8. Westal 003 as Exhibit 9.
(Wylie Deposition Exhibit Nos. 8 and 9 were marked for identification.)
MS. ABRAMS: July 2nd, 1988, sample 78-88 from John Kelse, R. T. Vanderbilt, Exhibit 10. Fibrous talc -- sorry -- XRD samples Exhibit 11.
(Wylie Deposition Exhibit Nos. 10 and 11 were marked for identification.)
BY MS. ABRAMS:
Q. Is there any information on this document Exhibit 11 that would tell you how to locate the particular samples that you're, you looked at?

A. No. Well, I take that back. The -- those are numbers from the Smithsonian. So you could go to the Smithsonian and get those samples.
Q. How did you get the samples?
A. I went to the Smithsonian and I got them.
Q. How do you get samples from the Smithsonian?
A. You request as a researcher.
Q. How does the Smithsonian get samples?
A. People give them to them.
Q. How did you know that the Smithsonian had the samples that you wanted to look at?
A. I didn't. I went and looked through their collections.
Q. Were you particularly looking for fibrous talc --
A. No.
Q. -- at the time? Were you just looking for things of interest?
A. No. I was looking for amphiboles.
Q. Do you know, were you -- was that for a study that you were doing?
A. I was -- yes. It was for a study I was doing.
Q. Did you publish the study?
A. No. Well, some of it.
Q. Okay. Where did you publish it?
A. Some of it was published in the American

Mineralogist around 2001.
Q. Do you recall the name of the paper?
A. Tremolite, ferroactinolite, systematics, cell dimensions, optical properties.
Q. Was there anything about asbestos in that paper?
A. The habit of the samples that were used in the paper were identified as asbestos or nonasbestos, whatever habit they had. They were so identified.
Q. Did you find asbestiform habit in any of the talc samples that you reviewed for the paper?
MR. RADCLIFFE: Objection to form.
THE WITNESS: I didn't review talc samples for that paper.
BY MS. ABRAMS:
Q. So this fibrous talc XRD sample, that was not included in the paper?
A. No.
Q. And this particular fibrous talc XRD sample, do you recall any publication or reference that, why you referred to this particular sample?
A. Not that I recall.
Q. Do you know if you communicated your findings to R. T. Vanderbilt?
A. I don't know.
Q. If we could just go through the rest of your

studies.
A. This says R. T. Vanderbilt, and it says ceiling textured paint. So I think that belongs to the first set of exhibits that we were discussing this, this one.
Q. Okay. Now, we still haven't figured out what these go to; right?
A. No.
Q. Okay. So why don't I put that together and we'll --
A. This also says paint samples from Langer.
Q. Let's put all that together. Okay. We'll mark this as the next in order.
(Wylie Deposition Exhibit No. 12 was marked for identification.)
BY MS. ABRAMS:
Q. When was the last time you ever, you have talked to Dr. Langer?
A. Two or three years. Two years.
Q. So you haven't talked to Dr. Langer about this case that we're --
A. No.
Q. -- currently talking about?
A. No.
Q. Okay. Why don't we continue on.
A. That's all the lab notes that I have.
Q. Okay. You have some handwritten notes?

A. These are, have Furman's name on it. So they probably belong to that, this (indicating).
Q. This goes with Exhibit 6; correct?
A. I think so.
Q. Put these in here. Okay. Now, you produced in Exhibit 3 lab notes regarding Mouldene, and you have sent -- from R. T. Vanderbilt 7/89. Can you tell me, Dr. Wylie, is it your understanding that with respect to the July 28th, 1989, letter you wrote to Dr. Thompson these, this is the only written information that you have in your lab regarding that sample in these, in these pages?
MR. RADCLIFFE: Object --
BY MS. ABRAMS:
Q. Is that correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I've given you everything I have from my lab, from my notes, with respect to everything that I have ever done for R. T. Vanderbilt.
BY MS. ABRAMS:
Q. Okay. And that would include anything you have with respect to the Mouldene talc S-158 sample; correct?
A. I've given you everything that I have with respect to every sample that I've ever analyzed for R. T. Vanderbilt.
Q. Okay. If I could ask you to go through the rest of those documents and see if you can tell me which ones go

together and what they are, please?
A. **This is a study that I did on the western talc materials.**
Q. Okay. Let's put all the western talc materials together, if you would. And with respect to that study, we have the notes and photomicrographs in Exhibit 7. Do these pertain to the same study that you've just --
A. **Yes.**
Q. -- handed me the documents for? So we'll mark these 7-B.
(Wylie Deposition Exhibit No. 7-B was marked for identification.)
BY MS. ABRAMS:
Q. What else did you bring?
A. **This is a letter and a set of samples from a flotation project that R. T. Vanderbilt had undertaken.**
Q. What's a flotation project?
A. **Flotation is a process of mineral separation.**
Q. Did you do the flotation for them?
A. **No.**
Q. They did the flotation?
A. **Yes.**
Q. What's the purpose of it?
A. **You have to ask them.**
Q. Did they send you sample -- they apparently sent you

samples from the flotation project?
A. **Yes.**
Q. Can you look at the pages and tell me what they've asked you to do there?
A. **It says they're for fiber evaluation.**
Q. Okay. Did you do a fiber evaluation; do you know?
A. **Here it is.**
MS. ABRAMS: Could you repeat the question?
(The reporter read back the previous question.)
THE WITNESS: That, if you look at the beginning of that report, it answers some specific questions that were posed about those samples, and that's what I answered.
BY MS. ABRAMS:
Q. Do you know where the samples were from or what they are?
A. **They were samples that came from the Gouverneur talc district, as far as I know, but actually I don't know. It doesn't say but --**
Q. So you --
A. **Assumed.**
Q. Do you know whether the seven samples for the flotation project are included in the group of samples here?
A. **They are.**
Q. So we'll mark this as --
THE REPORTER: 13.

MS. ABRAMS: Okay. Exhibit 13.
(Wylie Deposition Exhibit No. 13 was marked for identification.)
BY MS. ABRAMS:
Q. Can you look through your papers and tell us what else is referred to, what other studies?
A. **This is a letter on ceramic greenware.**
Q. Do you recall looking at ceramic greenware?
A. **I don't really know what it is, so --**
Q. And did you get it from Mr. Kelse?
A. **Mm-hmm. This is --**
Q. How did -- go ahead.
A. **Go ahead.**
Q. Please.
A. **I was just going to continue.**
Q. Are there other documents in there that pertain to the ceramic greenware study you might have done?
A. **I think that's the only one that has that name on it.**
Q. Okay. I'll put this aside. What else do you have?
A. **NC Ceramic Supply gear casting slip.**
Q. Okay. Is that -- do you think that's related in some way?
A. **Probably.**
Q. Okay. Are there other documents in there regarding

ceramics?
A. **Ceramics.**
Q. Let's put them all together.
A. **Here, ceramic greenware.**
Q. And this is -- you had -- you did some, a report from work that you did at STEMicro; correct?
A. **Right.**
Q. On the ceramic greenware. Anything else that pertains to ceramic greenware? Let's just mark them all as one exhibit.
A. **No.**
MS. ABRAMS: Okay. This will be 14.
(Wylie Deposition Exhibit No. 14 was marked for identification.)
BY MS. ABRAMS:
Q. Do you recall any issue with respect to asbestos in ceramic, encased ceramics that R. T. Vanderbilt was interested in knowing about?
A. **I don't really know how to answer that question.**
Q. Okay. Do you recall anything about this analysis?
A. **No.**
Q. Let's continue. What else --
A. **This says something about ceramics also, and it also says Nytal 99.**
Q. Okay. Any other ceramics? This is a 1984 document,

and we'll mark this as Exhibit 15. This shows that there was a Texas, Texas lawsuits regarding Nytal 99. Do you recall Texas lawsuits --
A. **No.**
Q. -- with the customer Aztec Ceramic?
A. **No.**
Q. Do you know if Vanderbilt supplied materials to Aztec Ceramic?
A. **I don't.**
MS. ABRAMS: This letter will be 15.
(Wylie Deposition Exhibit No. 15 was marked for identification.)
BY MS. ABRAMS:
Q. And you did analysis -- or strike that. Did you do analysis on this sample in 1984 for R. T. Vanderbilt so far as you know?
A. **I don't know. If it's not in my, among my papers, I don't know that I did.**
Q. And would you look that -- there's actual chain of custody information as to what that material is that's in the letter; correct?
A. **I don't recognize chain of custody. I wouldn't know what you were talking about.**
Q. Well, it tells, this letter tells you what the material is and where it came from. Isn't that right?

A. **It says, it gives a date. It says RTV order number. It says the grade. I mean I can read it from here; Aztec Ceramic, car number and tons.**
Q. It says the retained shipment sample enclosed was identified as follows; correct? And then it tells you how it was identified. That was right?
A. **Would you like me to read it? The retained shipment sample enclosed was identified as follows.**
Q. What else do you have documents?
A. **This is Nytal 200, a report of a sample I received from the Environmental Protection Agency.**
Q. Do you know why you received a sample from the Environmental Protection Agency of Nytal?
A. **I don't.**
Q. Do you recall receiving it in 1985?
A. **No.**
Q. Do you recall that you were asked to determine if there was chrysotile or amphibole asbestos in the material as reported by you on your notes?
A. **It says I received this bag identified. The objectives were stated, that the sample was examined to determine if chrysotile asbestos or amphibole asbestos was present in the material and to identify all fibrous constituents in the material.**
Q. And that was to Al Harvey? You sent him your

report; is that correct?
A. **Yes.**
Q. And you knew Al Harvey personally?
A. **Yes.**
Q. And you know John Kelse personally?
A. **Yes.**
Q. You met and talk to him many times?
A. **Who?**
Q. John Kelse.
A. **What -- define many.**
Q. How many times have you talked to John Kelse?
A. **Ten.**
Q. How many times have you talked to Slim Thompson?
A. **Twenty.**
Q. You wrote papers with Mr. Thompson? Have you written papers with Slim Thompson?
A. **Hmm, you know, I don't think so. You've got my CV?**
Q. I probably do. I have everything else.
A. **Well, you can look at it and tell me.**
Q. You've written with John Kelse?
A. **No.**
Q. Do you recall this document, the "Asbestiform and Prismatic Mineral Growth Habit and Their Relationship to Cancer Studies"?
A. **Oh, this, I do, mm-hmm.**

Q. And that was with John Kelse; correct?
A. **No, not that I know of. Oh, he's on here, but this is a paper that -- it's not a paper.**
Q. What is it?
A. **I'm sorry. So I really didn't understand your question.**
Q. Okay.
A. **It's not a published paper. It was put out by the National Stone Association, and I mean the information is, is worthy, but it just wasn't a published paper.**
Q. And how did you come to be part of this group that put this paper out?
A. **I was probably invited to participate.**
Q. And that was with -- do you know Kelly Bailey from Vulcan Minerals?
A. **I do.**
Q. And you know John Kelse?
A. **I do.**
Q. And Rich Lee?
A. **I do.**
Q. And is Mr. Lee a friend of yours also?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I know Rich Lee. He's a colleague.
BY MS. ABRAMS:
Q. When, when did you write this paper?

A. I didn't write it.
Q. What participation did you have in this paper?
A. I provided some of the data.
Q. And for the record this is a March 2004 pictorial presentation, "The Asbestiform and Prismatic Mineral Growth Habit and Their Relationship to Cancer Studies," and we'll mark this as the next in order, but I'll need a copy because I need my copy back.
(Wylie Deposition Exhibit No. 16 was marked for identification.)
BY MS. ABRAMS:
Q. I just want to be clear for the record. This isn't something you brought. This is something I brought, and I'm putting it in the middle of your papers so we'll have a clear record on that.
Do you know what, where this has been used or what your purpose was in participating in it?
A. That's two questions. The first question, do I know where it's been used? The answer to that is no, other than to say that I believe that the National Stone Association has taken the document to the regulatory bodies to present the data from it.
Q. Who was the principal author of this paper?
A. Kelly Bailey.
Q. Was he the one that you were communicating with --

A. Yes.
Q. -- about the paper? So did you know that Mr. Kelse was involved in the paper?
A. I don't remember.
Q. Or Mr. Lee?
A. Oh, I'm sure along the way that I, I did know, but it's a -- you know, we all contributed to that paper. I did some specific analysis actually on that paper.
Q. What analysis?
A. Provided data.
Q. What, do you recall what that was?
A. If you give it back to me, I can tell you. I provided the material for Exhibit P and photographed it.
Q. Okay.
A. Anyway, I probably took some of the other photographs. I can't remember.
Q. Did you prepare any of the text?
A. I edited it. I reviewed it.
Q. So you reviewed the whole paper?
A. I did review it, yes.
Q. Do you -- did you review the -- and in this paper you talked about the Stanton talc samples as Vanderbilt samples?
A. I, I have to refresh my memory.
Q. It says Stanton tremolitic talc samples 6 and 7.

Those are the ones that you understand that Dr. Stanton --
A. Yes.
Q. -- that's your testimony --
A. Yes.
Q. -- that it's, that it's Vanderbilt talc. Now, in this paper on page 44, do you know who summarized the health studies with respect to R. T. Vanderbilt Company?
A. Prob -- I don't know.
Q. Do you endorse, did you endorse for this paper the statement that the Brown, Wagoner NIOSH 1980 publication concluded, quote, "exposures to asbestiform tremolite and anthophyllite stand out as the prime suspect etiological factors associated with observable increase in bronchogenic cancer," end quote, which is their findings, and then the statement of the paper no confirmed mesotheliomas?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Did you read that when you, when you endorsed these findings?
A. My, my expertise, when you do a joint paper, your expertise is the part that you involve yourself in.
Q. Do you know, Dr. Wylie, whether there have been cases of mesothelioma in Gouverneur?
A. That question is too open-ended, I'm sorry. In the town? I don't really know what you're talking about.

Q. Do you know that Gou --
MR. RADCLIFFE: Let me just say that, that you represented to the court that you needed to take Dr. Wylie's deposition as a percipient witness, and is it your position that the incidence of mesothelioma cases in Gouverneur has to do with her involvement in the past as a percipient witness?
MS. ABRAMS: This is a paper that Dr. Wylie wrote which --
MR. RADCLIFFE: That's not accurate.
MS. ABRAMS: Excuse me. This is a paper that she edited, reviewed and endorsed. She just testified to that. The paper states there were no mesotheliomas in Gouverneur. I'm just asking her if she's aware that there are mesotheliomas in Gouverneur.
MR. RADCLIFFE: Fine, but we also --
MS. ABRAMS: So we can talk about it --
MR. RADCLIFFE: We also --
MS. ABRAMS: -- or she can answer the question or you can tell her not to, but I don't want to spend a lot of time on this because I have a very limited time, Tom, and I just want to move on.
MR. RADCLIFFE: I don't want to spend any time on it because that's not why we're here.
MS. ABRAMS: So that's my question, and I want to know if she's going to answer it.

MR. RADCLIFFE: Well, it's -- you do have -- we all have a limited amount of time, and if you're going to waste it like this, it's going to be severe. Go ahead and answer, Doctor, if you know.
THE WITNESS: I don't understand the question.
MS. ABRAMS: Could you read back the question?
(The reporter read back the previous question.)
THE WITNESS: In the town of Gouverneur?
BY MS. ABRAMS:
Q. Among Gouverneur talc workers.
MR. RADCLIFFE: Same objection.
THE WITNESS: I, I don't know that.
BY MS. ABRAMS:
Q. You -- do you know that there are mesotheliomas in the town of Gouverneur?
A. I don't know that.
Q. Do you know of any mesotheliomas in the Gouverneur talc area?
A. There's a report of, that I am aware of of mesotheliomas in the area.
Q. Is that the Hull Abraham paper?
A. Yes.
Q. And that's about New York State talc workers?
A. I don't think so. I don't -- that's not the way they're identified.

Q. How -- what's your understanding of how that --
A. They're people that, from that area. That's all I understood.
Q. Just general pop --
A. I haven't read it in a long time. That was my understanding.
Q. Okay.
THE VIDEOGRAPHER: Excuse me, Miss Abrams.
MS. ABRAMS: Yes. Go ahead and change the tape.
THE VIDEOGRAPHER: This marks the end of volume one, tape number one, in the deposition of Dr. Ann Wylie. Going off the record. The time is 3:55 p.m.
(Discussion off the record.)
(Wylie Deposition Exhibit No. 2 was re-marked for identification.)
THE VIDEOGRAPHER: Back on the record. Here marks the beginning of volume one, tape number two, in the deposition of Dr. Ann Wylie. The time is 3:58 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, I want to go back to the bottles that you brought and ask you, each of these bottles has a little label inside of it. Did you write those labels?
A. I did.
Q. And was that recently when you just produced these samples?

A. Yes.
Q. So is it correct that you found some sample in a drawer or somewhere, you took material out of that sample and put it in a bottle, and you put a label in the bottle that was, that identified the material that, where you took it from?
A. That's correct.
Q. So is the label in the bottle the exact label that you have in your sample in your lab?
A. It's the exact label.
Q. Okay. How do you know that these are all the samples that you looked at for R. T. Vanderbilt?
A. They're the samples that I have in my laboratory. I looked through all my places where I keep them and --
Q. Well, you mentioned to us you didn't look or produce the Stanton samples. So obviously you didn't look in that area where the Stanton samples are; correct?
MR. RADCLIFFE: Object to the form. Go ahead.
THE WITNESS: I didn't look at the Stanton samples for R. T. Vanderbilt.
BY MS. ABRAMS:
Q. You didn't look at any Stanton samples; correct?
A. Oh, I've looked at a lot of Stanton samples, but I didn't look at them for R. T. Vanderbilt.
Q. Let me rephrase the question.

A. Okay.
Q. When you produced samples for us --
A. Yes.
Q. You did not go to the place where you have the Stanton samples and produce any of that material; is that correct?
A. I did not.
Q. Okay. So you didn't look in that material for this production. How do we know that you have looked everywhere in your lab where samples might be?
A. Because I'm telling you I did.
Q. So the only other place where you might have looked is a box of samples that came from, that were Dr. Stanton's samples, and you specifically didn't look there; correct?
A. That's correct.
Q. Okay. I'd like to move on and ask you some questions about some of the documents that were produced to us by R. T. Vanderbilt that may also be contained in the exhibits that we have been looking at. Let me just find my notes here. When you received material from R. T. Vanderbilt to analyze, what form did it come in?
A. Usually in a plastic bag.
Q. Was it generally a powder material?
A. Generally.
Q. Was there any other kind of material you received

other than powder?
A. The samples of western talc were particulate.
Q. Are those included in the --
A. Yes.
Q. -- bag here?
A. You know, pieces. By particulate I mean gravel-sized pieces.
Q. Okay. You did a study with Dr. Mossman?
A. Yes.
Q. And Skinner?
A. Yes.
Q. And that, in that study you received some materials from R. T. Vanderbilt; correct?
A. That is correct.
Q. Are those materials contained in this group of materials?
A. No, they're not.
Q. And why not?
A. Because that was a research project.
Q. So every, it is not correct that everything that R. T. Vanderbilt sent was put in there; correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I'm sorry about that. I thought I made it quite clear that the samples that they gave me for the work that Bill Greenwood did are also not there. So any

samples that I receive for research projects I, I did not include.
BY MS. ABRAMS:
Q. What's your definition of a research project?
A. It's a project over which I have total control, and it's a project that I've undertaken because I want to study a problem.
Q. So is it your testimony that no one got paid for any of the work that was done in the paper that you did with Mossman/Skinner?
A. No. I had -- that's not so. I had students working on that project, measuring and counting and sizing, you know, particles and the, all of that. They were paid.
Q. By who?
A. They were -- they must have been paid by a grant to the University of Maryland. So I guess there was another grant.
Q. From R. T. Vanderbilt?
A. It must have been, yes.
Q. Did R. T. Vanderbilt pay Professor Skinner?
A. I don't know.
Q. Did R. T. Vanderbilt pay Professor Mossman?
A. I don't know.
Q. If R. T. Vanderbilt granted money to the University for your research with Professors Skinner and Mossman, you

consider that not -- you consider that independent research; correct?
A. I do.
Q. And, therefore, for some reason those samples can't be included?
A. They belong --
MR. RADCLIFFE: It's not for some reason. She's already stated that they belong to the University of Maryland and not to her.
MS. ABRAMS: Is that an objection?
MR. RADCLIFFE: It's an attempt to stop the same questions over and over again because, as you say, we are here for a limited amount of time.
MS. ABRAMS: What's the objection?
MR. RADCLIFFE: Asked and answered.
MS. ABRAMS: Could you read the question back, please?
(The reporter read back the previous question.)
BY MS. ABRAMS:
Q. Is there a reason they can't be included?
A. They belong to the University of Maryland.
Q. And how much material do you have left from the Mossman/Skinner work?
A. I don't know.
Q. Is it more than what's included in one of those

bottles?
A. I don't know.
Q. When was the last time you looked at that?
A. Many years.
Q. Where is that material kept in your lab?
A. It's in my laboratory.
Q. Where?
A. I don't know.
Q. Did you run across it when you were looking and producing these samples?
A. No.
Q. Did you -- and you received no legal advice from your attorney or the University that you could not produce material that was requested from the subpoena because it belonged to the University; is that correct?
MR. RADCLIFFE: Object. Asked and answered. Misstates prior testimony. Go ahead.
THE WITNESS: Answer, okay. I asked the University attorney whether I had to produce samples that were part of research projects, and he told me no.
BY MS. ABRAMS:
Q. What other samples other than for the Mossman study and the Stanton studies do you have that you have not produced today that have to do with R. T. Vanderbilt or International Talc?

MR. RADCLIFFE: Object to the form.
THE WITNESS: I've already answered that question, that the samples that were provided for William Greenwood's thesis research.
BY MS. ABRAMS:
Q. I'm sorry. That's correct. Anything else?
A. No.
Q. I'll attach as the next in order -- could you look at these documents and tell me if you recall Mr. Kelse paying money to Catherine Skinner for work done on the research project?
MR. RADCLIFFE: For the record let me note that this is a, evidently a bill from Yale University with a check, two checks which you're showing to Dr., I'm sorry, I'm showing to Dr. Wylie.
BY MS. ABRAMS:
Q. Right. Were you aware of those?
A. I know nothing about this.
Q. Were you aware that -- well, strike that. Do you generally provide drafts of papers, research papers to corporations prior to publication?
A. No. I take that back. If in the event that there is proprietary material, it is sometimes required that papers be reviewed.
Q. Are you aware that -- let me attach as the next in

order a letter to you from Catherine Skinner and some attachments and ask you if you recall receiving that letter?
(Wylie Deposition Exhibit Nos. 17 and 18 were marked for identification.)
A. No.
Q. Do you know that there was correspondence during the time of the research that you, Brooke Mossman, Catherine Skinner did between Catherine Skinner and John Kelse and Brooke Mossman?
A. Well, this says it's to me, but I don't have any recollection.
Q. Well, that wasn't my question.
MS. ABRAMS: Could you read the question back, please?
(The reporter read back the previous question.)
THE WITNESS: I, I don't remember. I have no memory of it.
BY MS. ABRAMS:
Q. Do you know, was there a grant to the University for, from R. T. Vanderbilt for mineralogical characteristics of fibrous talc?
A. Yes.
Q. What was mineralogical characteristics of fibrous talc?
A. That was the work that William Greenwood worked on.

Q. Did you publish a paper out of that?
A. I think I already answered that question that his --
Q. No, I didn't -- I'm not asking if he published a paper.
A. No.
Q. Did you use --
A. His work.
Q. Did you use any of his research in your own publications?
A. I may have referenced him. I, I don't recollect.
Q. I'd like to show you an August 25th, 1982, letter from you to George MacDonald, Rollins Burdick Hunter of Illinois, and ask you to take a look at that.
A. Okay.
Q. And actually before we talk about this paper, is it correct that the samples in the paper you did with Mossman and Skinner came from R. T. Vanderbilt?
A. Um --
Q. Or some of the samples?
A. Some of the samples.
Q. You don't know where they got those samples from; correct?
A. No.
Q. You didn't go to the mines or mill the product; correct?

A. No.
Q. And it didn't come from a bag that they sent you, an unopened bag of finished product material; correct?
A. That's correct.
Q. It was taken on their representation that the material that they sent you is what it was; correct?
A. Correct.
Q. Okay. Now, turning to this August 25th letter. If you would, please, look at your definition here of what is asbestos, the four characteristics.
A. Excuse me. This is not a -- these are not characteristics of asbestos. They're characteristics of the habit of asbestos.
Q. Okay. All right. With that correction would you take a look at that.
A. Mm-hmm.
Q. And if I could just read that for the record. I apologize I don't have another copy, unless there's one in this stack here. That in your -- in 1982 you noted that there needed to be fiber bundles exhibiting splayed ends, parallel extinction, parentheses, (the non-asbestiform varieties may exhibit oblique extinction); curved fibers, and extreme elongation often in excess of a 100 to 1. Did I state that right?
A. (Witness nodded head.) Yes.

Q. Can you tell me what the parallel extinction and your statement the non-asbestiform varieties may exhibit oblique extinction, what that means?
A. The non-asbestiform vari -- the asbestos, asbestos is composed of amphiboles that have formed in the asbestiform habit and a serpentine mineral known as chrysotile in the asbestiform habit. Of the amphiboles there is most of the amphiboles in the world, and there's probably about a hundred of them, occur in a crystal with a structure that has, it belongs to a crystal system known as orthorhombic. The rest of them belong to a crystal system known as monoclinic, and monoclinic minerals exhibit extinction characteristics at an angle to their direction of elongation. That's the normal case.
In the asbestiform habit, however, the fibrills are smaller than a wavelength of light. They occur in bundles, and their properties are anomalous, and so instead of displaying this oblique characteristic at an angle their extinction is parallel to the direction of elongation. So it's an anomalous property associated with that habit.
Q. Is there a way to state that in lay terms?
A. No.
Q. Is there a way to state that in any less -- in any more available vocabulary?
A. I thought I was explaining it fairly straight-

forwardly. I could have been much more complicated.
Q. Is there a way to make it simpler?
A. I could tell you that the property must be observed under the polarized light microscope, and that parallel extinction is the property of, under polarized light, under the polarized light when the nickels are crossed. You know, do you want me to go into this?
Q. No. Thank you.
A. It's a very distinctive property. I can tell you that.
Q. You said curved fibers. Does crocidolite have curved fibers?
A. Yes.
Q. In what way are they curved?
A. They're curved.
Q. For example, there's a very different presentation between a crocidolite fiber and a chrysotile fiber; correct?
A. They're different minerals.
Q. Did -- is -- chrysotile is curved or --
A. Well, chrysotile can be curved. It's curved, yes, and when it's in the asbestiform variety.
Q. Okay. So that's not -- the curve or straightness of a fiber is not a distinction between chrysotile and amphiboles?
A. No.

Q. Okay. And here you said that extreme elongation often in excess of 100 to 1. That's the aspect ratio?
A. Yes.
Q. Do you know in 1982 where you obtained that definition?
A. I wrote it.
Q. Do you know what you relied on to write that definition?
A. Observations of many, many samples.
Q. Was there an existing mineralogy text that you relied on with that definition in it?
A. No.
Q. Were there mineralogy texts that had definitions of asbestos?
A. Hand specimen characteristics, yes.
Q. What do you mean by that?
A. I mean they're -- the definition that you find in the most famous mineralogical reference book called Dana, Dana's Textbook of Mineralogy has hand specimen descriptions of minerals. So they describe and it describes asbestos. There's a Dictionary of Geology. It has hand specimens with the kinds of properties that you observe if you pick this stuff up in your hand, not under the microscope. That's a microscopic definition.
Q. Were there textbooks that ident -- had microscopic

definitions of asbestos, asbestiform habit as you say?
A. Not directly. There are some optical texts that point out the parallel extinction characteristics of asbestos.
Q. So in 1982 is it fair to say that you identified this as a definition of asbestiform habit that was not necessarily documented in any prevailing texts?
A. The charact -- the characteristic of asbestos as having parallel extinction had been well documented.
Q. How about as a 100 to 1 aspect ratio?
A. That's based on my observations.
Q. And that's in looking at, well, observations of which, what types of asbestos?
A. All types.
Q. For example.
A. Crocidolite, amosite, actinolite asbestos, anthophyllite asbestos, tremolite asbestos, chrysotile --
Q. So you --
A. -- asbestos.
Q. Who identified the tremolite asbestos as asbestos that you looked at to know that that was, that fit within an appropriate definition?
A. Who? Well, the samples came from building materials. The samples came from the Smithsonian. The samples came from the collections at the United States Bureau of Mines. The samples came from mine products, asbestos mine

products. They were mining it and they produced it as that. It's a commercial term and it had that as their product; lots of different sources.

MS. ABRAMS: Respectfully move to strike as nonresponsive. It was a bad question.

BY MS. ABRAMS:

Q. It's not your fault. Let me try it again. Did you --

MR. RADCLIFFE: If it was a bad question, it probably was responsive then, but go ahead. Sorry to interrupt.

MS. ABRAMS: That's okay, Tom.

BY MS. ABRAMS:

Q. It's correct that in 1982 when you wrote this definition to George McDonald there is not a textbook that you could point to to say this is, you can go and look here and this is kind of a textbook definition. Is that fair?

A. Yes. You know, I don't know what year the publication came out from the Bureau of Mines, but I believe that a facsimile of that definition is published, and I'm not -- I think it was after this. So if that's the case, and it's not a text -- it's not a textbook. Textbooks generally don't have that kind of information in them.

Q. The government's definition, the NIOSH definition of asbestos, asbestiform habit was different, correct --

MR. RADCLIFFE: Object to form.

BY MS. ABRAMS:

Q. -- at that time 1982?

A. I don't remember.

Q. You say in this letter -- well, strike that. Was it your observation that materials that were amphiboles in this sample that did not meet this definition were cleavage fragments?

A. Yes.

Q. Was it a process of elimination so that those materials that did not exhibit the four characteristics that were amphiboles would by definition be in the alternative cleavage fragments?

A. Those are population characteristics, not individual particle characteristics.

Q. So would that be correct for the population of amphiboles that if they did not fit the four criteria, by definition they would have then been defined as cleavage fragments?

A. No.

Q. Okay. What would they be if they were something that didn't fit the four categories and were not cleavage fragments?

A. They could have been bisolite fibers. There are, there are other habits. They could have been massive

varieties that didn't exhibit cleavage.

Q. Well, in this letter you say, and I'll hand it to you, the tremolite and anthophyllite present as major constituents of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments.

A. That's correct, because they exhibited all of the characteristics of cleavage fragments.

Q. Did you -- and what characteristics -- and then you go on to say most of the cleavage fragments are elongated and many have aspect ratios in excess of 3 to 1.

A. That's correct.

Q. So then you go on to say, according to our existing federal government regulations these cleavage fragments can be called fibers. However, this is not mineralogically valid. I observed no anthophyllite or tremolite asbestos fibers in the samples I examined.

A. That's correct.

Q. Did you state here why you believed that those fibers were cleavage fragments?

A. I didn't.

Q. Now, you mention in here also fibrous talc, and that's something you had seen in the samples, in some of the samples that you have reviewed from Gouverneur; correct?

A. I have, yes.

Q. And the fibrous talc, can you tell me, if you could, was the fibrous talc in that material asbestiform, if you can tell from that?

A. Yes. It says it also exhibits the characteristics listed above for the asbestiform habit.

Q. The fibrous talc?

A. Yes.

Q. And you, do you recall, you looked with polarized light microscopy and dispersion staining. What's dispersion staining?

A. It's a method of evaluating the index of refraction of the material.

MR. RADCLIFFE: Can I see that exhibit for a moment?

MS. ABRAMS: Sure.

BY MS. ABRAMS:

Q. What -- could you briefly say what you do?

A. Sure. You put them out, make them out of, small amount of material, you put it in an oil with known index of refraction, and for dispersion staining which you, is one method of looking at it you use a special objective, and the objective has like a little black dot on the back focal point of the objective, and so the, some of the light is refracted at the boundary between the mineral and the oil.

Q. Okay.

A. And the, if the, if there are, there are, are many

different indices of refraction for different wavelengths within the visible spectrum. So take, for example, a situation where you have a mineral whose, some of the middle part of the visible spectrum has an index of refraction that's equal to the oil; it's not bent. If it's the upper part of the spectrum or the lower part of the spectrum it has different indices of refraction and so it will be bent at the interface.

So when you have this little black dot on the back of the objective, the central part of the light coming through in the middle part of the visible spectrum is blocked, and so you don't see it, and so you end up with the mineral particle taking on a color, and that color is a, the result of part of the spectrum coming through and the, and part not, part being blocked.

So that's what dispersion staining actually does. And so you can put a mineral in a lot of different oils. You put this special objective in. You see the particles take on particular colors. That tells you something about which part of the visible spectrum the oil and the mineral have basically the same index of refraction.

MR. RADCLIFFE: I hate to interrupt, but I want to double check something with the court reporter, if I may. Can you show me the previous question?

MS. ABRAMS: Would you mind reading it? Don't you

-- you can --

MR. RADCLIFFE: No, before. Okay. No, before that.

MS. ABRAMS: What was the question? You don't have to put this on the record. What was the question?

MR. RADCLIFFE: It was, and the fibrous talc, can you tell me if you could was the fibrous talc in that material asbestiform habit, if you can tell from that?

MS. ABRAMS: Okay. Are you ready?

MR. RADCLIFFE: Yep.

BY MS. ABRAMS:

Q. So do you -- this sample is not identified. Do you know whether the sample that is referred to in this 1982 paper is included in this package?

A. It said it's identified as tremolitic talc. I don't know.

Q. Okay. You mention in here there may be a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc present from this locality. Strike that. I take that back. I apologize. I misread that. Although I did not observe any in the sample portion I examined, there may be a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc present from this locality. Do you know what you based that observation on?

A. Probably other material from the area.

Q. So you, you know that there are fibers that are in

that anthophyllite asbestos fibrous talc transition. Is that a transition?

MR. RADCLIFFE: Object to the form.

THE WITNESS: There are particles that have optical properties that are intermediate between the mineral anthophyllite and the mineral talc.

BY MS. ABRAMS:

Q. Is that a transitional fiber?

MR. RADCLIFFE: Object to the form.

THE WITNESS: That has --

BY MS. ABRAMS:

Q. Go ahead.

A. It has been referred to as that.

Q. Do you refer to it as a transitional fiber?

A. I usually use the term intermediate, but maybe I've used it. You know, that's -- there are particles between.

Q. So your -- in this letter your, your aspect ratio was in the 100 to 1 neighborhood; correct?

A. That does not mean that all particles have that aspect ratio. It means that within the population of the material, the mineral, you find particles that range up to a 100 to 1.

Q. Did you have a lower limit at the time in 1982 of what the aspect ratio needed to be that you recall that's not stated on this paper?

A. No.

Q. Do you know what reason there was that you didn't state it here?

A. No.

Q. Let me show you --

MR. RADCLIFFE: Is that -- did you mark that?

MS. ABRAMS: Sorry. This is -- it's produced by R. T. Vanderbilt as WES 000840.

MR. RADCLIFFE: Thank you.

BY MS. ABRAMS:

Q. The next document I want to talk to you about, Dr. Wylie, is WES 000838. If you would take a look at that.

A. Mm-hmm.

Q. It's, there's a handwritten date at the top March 8th, it appears to be 1983. Is that your handwriting?

A. It looks like it.

Q. And does that -- is that correct, it's 1983?

A. It looks like it.

Q. So this was written less than a year later. This is a letter to Mr. Guy Driver. Do you know who that is?

A. He was a lawyer for R. T. Vanderbilt.

Q. You were testifying, it says with a view towards testifying. Was that a case that you were doing some work for R. T. Vanderbilt for, the Poindexter case?

A. I have -- I don't remember that.

Q. You don't have an independent recollection right now about this incident?
A. No.
Q. And without looking through all the samples do you recall whether these Nytal samples are among the ones that you produced here?
A. I, I don't remember.
Q. Now, you -- here you use polarized light microscopy Becke line technique and dispersion staining. What is Becke line technique?
A. It's a different -- it's a traditional or a typical technique that mineralogists have used for centuries really to determine the relationship between the index of refraction of the mineral and the index of refraction of an oil. The dispersion staining methodology that I described to you before is a different way of viewing the same phenomenon. Becke line is a different way of viewing the same phenomenon: The split of part of the visible spectrum having one relationship to the solid and part of the visible spectrum having a different one, and when that occurs, one sees, when you sort of defocus the microscope, you see rings of color around the edges of the micro, of the particle, sometimes going into the particle.
Q. Was there a reason you didn't use the Becke line technique in 1982, in the previous study?
A. I have no -- I don't remember.

Q. Is there a -- is there some rationale for particular situation where you would have used it?
A. Normally speaking, I use Becke line technique. Dispersion staining I was experimenting with at that time to see how it worked. So maybe I just applied it because I was experimenting with it. It's the same -- you're using the microscope in exactly the same way. You're observing a physical phenomenon in two dif -- using two different ways of seeing exactly the same phenomenon, and so I, you know, was probably experimenting with dispersion staining. I may have begun to be teaching it. I don't know.
Q. Do you know whether this was the case, the litigation case was a mesothelioma case?
A. I have no recollection.
Q. Do you -- now if you look at your four characteristics of the asbestos, asbestos habit, number two is parallel extinction, a characteristic of asbestos only when the ordinary varieties exhibit oblique extinction such as for tremolite. That was a little bit of a refinement from your previous letter; is that right?
A. Slightly different, mm-hmm.
Q. And do you know why you changed that statement?
A. No. It says the same thing.
Q. Okay.
A. It says for those minerals that normally exhibit oblique extinction. I believe it really says exactly the same thing.

Q. So it -- do you know whether, was this the first litigation case that you were involved in for R. T. Vanderbilt?
A. I don't remember.
Q. Do you know, have you ever been involved in cases of workers' compensation in New York?
A. I, I don't -- I don't know.
Q. Okay.
A. I mean, you know, I've been involved in a very small number of cases, and to tell you the truth I really don't know what they were.
Q. Okay. And again, you say extreme elongation often in excess of 100 to 1 without a definition of the lower limit; correct?
A. Correct.
Q. Did you have at that time an idea of what the lower limit was?
A. I don't believe there is a lower limit. Asbestos is asbestos independent of the aspect ratio.
Q. So the aspect ratio could be 3 to 1?
A. Or 2 to 1.
Q. Could there be -- well, strike that. Now, in this report you found that tremolite and anthophyllite were major constituents of the samples; is that right?

A. Yes.
Q. And again you said that these were cleavage fragments?
A. Yes.
Q. In fact, if you look back at the other letter, that the language of this letter is quite similar to the first letter. Was this something that -- strike that. Let's look at the first letter.
The first letter says in August 1982 to Mr. MacDonald the tremolite and anthophyllite present as major constituents, present as major constituents of the samples, of this sample do not exhibit any of these characteristics. All of the tremolite and anthophyllite particles I observed are properly called cleavage fragments. Those are identical statements; correct?
A. Yes.
Q. From 1982 of August to Mr. MacDonald to Mr. Driver in 1983. These were different samples; correct?
A. I believe the first one is just labeled tremolitic talc. I don't know what it was.
Q. One was done -- well, was the first one done for purposes of litigation?
A. I don't know. They were different materials. I'm sorry. They were definitely different samples.

Q. The sample that you were talking about here in 1983, well, you said most of the cleavage fragments are elongated and many have aspect ratios in excess of 3 to 1. Rarely particles with aspect ratios up to 20 to 1 were observed. Was that a finding that you were looking for, greater than 20 to 1?
A. I, I was not looking for that. I was looking to determine if there was any asbestos in the sample.
Q. When you say I observed no anthophyllite or tremolite asbestos fibers in the sample I examined, what definition were you using? Was that the definition as identified in numbers 1 through 4?
A. Yes.
Q. Now, you found true mineral fibers in the sample that you identified as fibrous talc. By that did you mean asbestiform fibers?
A. I meant fibrous talc.
Q. Correct. When you said true mineral fibers, were those asbestiform fibers?
A. They have the habit of asbestos -- asbestiform habit. They occur in the asbestiform habit. Yes. It exhibits characteristics listed above for the asbestiform habit. Yes.
Q. The -- when you say the maximum index of refraction of fibrous talc does not exceed 1.6 --

A. Yes.
Q. -- for -- could you read that?
A. The lambda equals 589 nanometers.
Q. Okay. If the -- if the fibers had -- if you observed fibers greater than 1.6, would that have meant that they weren't talc?
A. If I had --
MR. RADCLIFFE: Object to the form.
THE WITNESS: Yes.
BY MS. ABRAMS:
Q. Okay. So that the importance of the 1.6 and below is that that identified for you or helped identify that it was talc and not something else?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Does that make sense? Let me modify that. That showed you --
A. The inverse.
Q. That showed you it -- I'm sorry. Could you say what it is?
A. Well, just because something has an index of refraction less than 1.6 doesn't mean it's talc. Okay. I mean --
Q. The fact that it was less than 1.6 told you that it was too low to be tremolite or anthophyllite?

A. Correct.
Q. Okay. What did it need to be to be tremolite or anthophyllite?
A. Well, that's a complicated question, because the index of refraction of amphiboles is very much a function of their composition which is a variable, particularly iron-magnesium ratio, but in general what I looked for when I was using this as a discriminator was throughout the literature and all the samples, all the published data that I could have ever found on anthophyllite and tremolite I looked for the lowest indices of refraction that I could find, and that was my discriminator.
Q. Do you recall what that was?
A. For anthophyllite the highest index of refraction was around, as I recollect, around 1.606 that I -- the lowest --
Q. Yes.
A. -- highest index of refraction.
Q. Okay. Now, this says in the samples I examined there were a few fibers which fall somewhere between anthophyllite asbestos and fibrous talc. What do you call those?
A. We, we already had this conversation.
MR. RADCLIFFE: Object to form.
THE WITNESS: Yeah, intermediate fibers.

BY MS. ABRAMS:
Q. Is there -- is there a textbook that says that those particular fibers would not be called anthophyllite asbestos?
A. The basic work on this was published in the '60s by Stemple and Brindley, and he was one of the premier mineralogists in the nation, and he called it fibrous talc.
Q. He was examining talc from Gouverneur?
A. He was.
Q. Other than that is there any reason in your mind why at this time when you were writing this you would not have called that anthophyllite asbestos?
MR. RADCLIFFE: Object to the form.
THE WITNESS: It did not have the appropriate optical properties for anthophyllite.
BY MS. ABRAMS:
Q. Part of it did; correct?
A. No.
Q. No part of that fiber looked like anthophyllite?
A. It had the wrong indices of refraction.
Q. Okay. In, in your 1982 report you say the maximum index of refraction of fibrous talc does not exceed 1.596; correct?
A. Yes.
Q. In your letter of --
A. Well, I assume -- you're reading something. I can't

see it.
Q. Well, I'm happy to show it to you.
A. I mean I'm assuming you're reading correctly. Yes.
Q. And in this letter in front of you in March of 1983 you say the maximum index of refraction of fibrous talc does not exceed 1.6.
A. Yes.
Q. Where is that difference from?
A. Well, it's almost within the error of the methodology, and I, I you know, may just be the oil that I was using. I don't really know. They're almost identical. That's not a big difference.
Q. Okay. Now, if I could, the next letter that I have that's or a report is WES 000410 through 422, and this is a December 4th, 1983, report of investigation from you to, regarding two samples received from Mr. N.v.d. Burgh sent at the request of Mr. J. L. Spoormaker of R. T. Vanderbilt Company. The two samples are labeled IT-325 and IT-FT. Could you take a look at that?
A. Mm-hmm.
Q. And I'm going to -- I'm going to mark and give you copies of these documents WES 0840 as Exhibit 19, and WES 838 as Exhibit 20.
MR. RADCLIFFE: I don't have any problem with you marking for identification a document with your highlighting

or writing on it.
MS. ABRAMS: I'm going to get copies.
MR. RADCLIFFE: But I do want to substitute at some point a copy without writing or highlighting.
MS. ABRAMS: Right. Hopefully the copies won't be highlighted, and I'll ask the court reporter to do that. May I have that for a minute?
THE WITNESS: Sure.
MS. ABRAMS: Thank you. I got you. Do you want to take a break, a five-minute break? Do you need a break? Anybody need a break? Do you want to take a few minutes?
MR. RADCLIFFE: Are you almost done?
MS. ABRAMS: Hmm?
MR. RADCLIFFE: Are you almost done? Do you want to just go through and wrap it up?
MS. ABRAMS: I'm not almost done. What time is it?
THE WITNESS: Ten minutes to 5.
MS. ABRAMS: No. I've got quite a bit. I haven't talked to her about any of that.
(Wylie Deposition Exhibit Nos. 19 and 20 were marked for identification.)
MS. ABRAMS: But I'm almost -- well, I've got probably another half hour on this line of questioning.
MR. RADCLIFFE: Let's go.
BY MS. ABRAMS:

Q. Okay. Do you know who Mr. N.v.d. Burgh is?
A. No.
Q. Do you know who Mr. Spoormaker is of R. T. Vanderbilt?
A. No.
Q. In this report it says that you used polarized light microscopy and Cargille index of refraction liquids. Are those different from the ones you used in the past --
A. No.
Q. -- two reports? It's the same?
A. Same.
Q. You say scanning electron microscopy and energy dispersion x-ray analysis was not used because four of the major components of the material: Talc, serpentine, anthophyllite and talc-amphibole, cannot be distinguished readily by this method; is that correct?
A. Correct.
Q. What about --
MR. RADCLIFFE: Was your question did you read it correctly or --
MS. ABRAMS: Well --
MR. RADCLIFFE: -- was your question is that a correct statement of fact?
BY MS. ABRAMS:
Q. You can look at it. Would that also be true of TEM?

A. This was true in 1983.
Q. Okay. What about TEM?
A. I didn't have a TEM in 1983.
Q. In 1983 was there TEM?
A. I assume.
Q. And would TEM have been able to make that distinction?
A. No.
Q. You say in this, why don't you take a minute and just look at this report so that you can, I can ask you some questions about it.
A. All right. Well, I'm, I'm not going to read the whole thing. It's pages. Why don't you just ask me a question.
Q. Do you know, do you recall what the samples that were labeled, what they came in?
A. Bottles.
Q. Do you recall, was there any chain of custody with the samples as to where they came from?
A. No.
Q. They did not come from any particular product bags, sealed bags of the product?
A. I told you they, they just came in bottles.
Q. Could you read -- the aspect ratios for the tremolite were between what numbers?

A. One to 1 to 20 to 1. Most are in the range 3 to 1 to 10 to 1.
Q. And that would have at the time qualified as an asbestos fiber under the government's definition; correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: I mean it would have classified, it would have qualified as a fiber.
BY MS. ABRAMS:
Q. Now, if you would, you found in this material fibrous talc in two different habits. If you could start and just review that paragraph and tell me were both of those habits in your analysis in that report asbestiform?
A. It says the first type can be called asbestiform, bundles, et cetera. Type II described as ribbon-like. These particles appeared wide low birefringent particles that may be almost isotropic.
Q. Is that asbestiform, the second one?
A. No.
Q. Okay. You say that anthophyllite particles are generally more acicular than the tremolite particles. They frequently have aspect ratios of 20 to 1 and when they have the shape they can only be distinguished from talc amphibole and talc by careful evaluation of the indices of refraction. Did those anthophyllite particles with greater than 20 to 1 aspect ratios, and I'll let you review your report, have the

appearance of asbestos?
A. Repeat the question, please.
(The reporter read back the previous question.)
THE WITNESS: No.
Q. You mention that -- and why is that? You say here that they --
A. Characteristics of asbestos were lacking in the anthophyllite mineral in the sample.
Q. You mentioned there's no indication of fiber bundle growth flexibility or extreme aspect ratio. What, what is fiber bundle growth flexibility? Was there, was there an indication of fiber bundle growth without flexibility? And feel free to look in your report.
A. I think there's a comma missing.
Q. Okay.
A. Fiber bundle growth, comma, flexibility. There's a comma missing.
Q. So in this report you did not see fiber bundle growth --
A. I didn't.
Q. -- for the anthophyllite?
A. I did not.
Q. But because this material -- strike that. You say but, however, the high aspect ratio particles may be mineral fibers even though they are not asbestiform. What does that

mean? What kind of mineral fibers? Strike that question.
What, what other type of fiber, anthophyllite fiber is there besides a non-asbestiform anthophyllite fiber and an asbestiform anthophyllite fiber?
A. All fibers are not asbestiform. There are minerals. There are mineral fibers. There are amphiboles that grow in a fibrous habit that is not asbestos.
Q. Is, is it correct, Dr. Wylie, that in this report you found something, you found anthophyllite fibers that you believed needed further examination? And I'll let you look at that.
A. Examination of the unprocessed ore would probably enable the distinction to be made.
Q. So is it fair to say there that you did not have sufficient information to make the determination as to whether or not the anthophyllite in that sample was asbestiform or not just based on the sample that you had?
MR. RADCLIFFE: Object to the form.
THE WITNESS: No. You -- no. What this question -- what this states is that in the definition I used for fiber is going to be quite different from the regulatory definition. So I'll tell you what it is so when I'm speaking about it you'll understand what I'm talking about. The word --
BY MS. ABRAMS:
Q. Well, I think we need to know what you meant then.

A. That's what I meant, then.
Q. Okay.
A. A fiber is a mineral particle that attains its shape by growth, not by breakage, and it's very difficult when you have these, in this case, these small number of highly elongated particles to determine whether or not they attained their shape by growth or by cleavage, and that is the question that I raised here. Examination of the unprocessed ore would better enable that distinction because the unprocessed ore has not been ground, and so you can determine from the unprocessed ore whether or not this material is a fiber, in other words, attained its shape by growth, versus having been crushed into this particular form.
Q. Assuming -- well, strike that. That examination then, if, if the material was from that examination by growth rather than breakage, that would have indicated it was asbestiform material; correct?
A. No.
MR. RADCLIFFE: Object to the form.
THE WITNESS: It would have indicated that it had attained its shape by growth and that it was a fiber. All fibers are not asbestiform.
BY MS. ABRAMS:
Q. It could also have shown that it -- well, don't fiber bundles get crushed as well in the processing?

A. **Actually --**
Q. Or do you know one way or the other?
A. **Yes, I do. Asbestos, let's -- well, fiber bundles of --**
Q. Actually let me just --
A. **Let's start all over again.**
Q. -- interrupt you for one second. Did you know back at this time when you wrote this whether fiber bundles were, when they were crushed, could be crushed with the milling process?
A. **Fiber bundles of what?**
Q. Of asbestos.
A. **Okay. Asbestos, one of the properties of asbestos is that it has extraordinarily high tensile strength. It has such high tensile strength that it's practically impossible to crush it.**
Q. Did Slim Thompson ever show you the rock that he got from Mine 3 that he said he couldn't crush with a sledgehammer?
MR. RADCLIFFE: Objection. It misstates the testimony.
THE WITNESS: No.
BY MS. ABRAMS:
Q. Is that what you mean by tensile strength?
A. **No.**

Q. Okay. Did you ever examine the unprocessed ore in order to be able to make the distinction?
A. **No.**
Q. So you were never asked to do further studies on this material in order to answer that question?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Is that correct?
A. **Not that I recollect.**
Q. So in your conclusion you say that Type I fibrous talc is clearly asbestiform, and talc amphibole and fibrous talc Type II form acicular particles, and there's evidence to suggest they are marginally asbestiform; is that correct?
A. **That's what it says.**
Q. Okay. Then you say the anthophyllite is both acicular and prismatic, and the particles may be formed by growth or cleavage or both. However, the anthophyllite does not appear to be asbestiform. You did not elaborate on why you believe that; correct, in the conclusion?
A. **That's what, that's what it says.**
Q. So had you ever, other than the Gouverneur talc area have you ever seen asbestiform talc before -- strike that. Other than in Gouverneur have you ever seen asbestiform talc?
A. **Yes.**
Q. What other areas?

A. **Other talc deposits.**
Q. Do you know where they are?
A. **Yes.**
Q. Where?
A. **Georgia, California.**
Q. The desert talc that you examined, was that also asbestiform talc?
A. **No.**
Q. Do you remember where in California you've --
A. **No.**
Q. Okay.
A. **Montana.**
Q. Then you say regarding, at the end you say, in fact, there is an apparent continuum between fibrous talc and anthophyllite in optical properties and habit. A similar series of minerals is present in anthophyllite asbestos from Finland. Do you recall saying that?
A. **Yes.**
Q. So is this the talc, the anthophyllite material that you viewed in this IT-325 and IT-FT had similar optical properties to the anthophyllite asbestos in Finland?
A. **No.**
Q. Okay. Could you just read that statement for me?
A. **Sure. A similar series of minerals is present in anthophyllite asbestos from Finland. However, there fibrous**

talc is a minor constituent while anthophyllite is abundant. Here fibrous talc is the most common phase, while talc-amphibole and anthophyllite occur in minor amounts.
Q. So that's the difference. They're kind of the reverse of one another; is that correct, in terms of the amount of anthophyllite and talc?
MR. RADCLIFFE: Object to the form.
THE WITNESS: The -- this is a series of minerals. This is not a series of mineral habits. This is a series of minerals.
BY MS. ABRAMS:
Q. Okay.
A. **Okay. Minerals and mineral habits are two different things.**
Q. Was what I just asked you correct though?
MS. ABRAMS: Could you read the question back, the one before?
(The reporter read from the record as requested.)
THE WITNESS: Yes.
MR. RADCLIFFE: Same objection.
THE WITNESS: That's correct.
BY MS. ABRAMS:
Q. Thank you. Now, I want to move on to, and then we'll take a break after this, the January 25th, 1985, report of lab analysis, and this is WES 000397. And let's mark the

December 4th, 1983, exhibit we just talked about as next in order which was WES 410 and pages following.

(Wylie Deposition Exhibit No. 21 was marked for identification.)

MS. ABRAMS: And the next in order for the January 25th, 1985, report of laboratory analysis, it will be Exhibit 22.

(Wylie Deposition Exhibit No. 22 was marked for identification.)

BY MS. ABRAMS:

Q. In this report on Nytal 99 which you -- well, strike that. This was about a sample of Nytal 99 that you got from Slim Thompson in October of 1984; correct?

A. Yes.

Q. And you used polarized light microscopy in conjunction with immersion oil techniques; correct?

A. Yes.

Q. And that's similar to what you'd done in the past?

A. (Witness nodded head.)

Q. Correct?

A. Correct.

Q. Here, here you say no asbestos was identified in the sample. Asbestos fiber populations are composed of either chrysotile or a member of the amphibole family that occur as particulates that display some or all of the following

characteristics: Fiber bundles with splayed ends, curved fibers, aspect ratios in excess of 20 to 1 and widths less than one micrometer for fibers longer than five micrometers and matted masses of individual fibers. Did I read that correctly in the third paragraph?

A. Sounds right, mm-hmm.

Q. Where, where did you get that definition, from Dr. Wylie?

A. I wrote it.

Q. So you created it?

A. Mm-hmm.

Q. And what did you create it based on?

A. Well, I think by this point we had begun measuring particles. Data were available on the actual sizes of asbestos fibers, so we were able to be a little bit more -- I was able to be a little bit more specific.

Q. Where did you get the data from?

A. I measured the particles.

Q. So you measured material that you believed was asbestos and then you measured -- and then you determined based on those measurements what the appropriate parameters were for defining an asbestos material; is that correct?

A. In the optical microscope, yes.

Q. Did you discuss this definition -- well, strike that. Did, did you publish this definition in any, in any

peer reviewed literature?

A. I think so, yes.

Q. Do you know where at the time in 1985?

A. Oh, I don't remember.

Q. And here again in the fourth paragraph you note that you found asbestiform or fibrous talc; is that right?

A. Yes. Yes.

Q. So it's very -- you -- strike that. You had discussed in written form with R. T. Vanderbilt Company in the 1980s that they had a material called, that you determined was an asbestiform talc material?

A. Yes.

Q. Then you go on again in the last paragraph to discuss the tremolite and anthophyllite in the sample. You did find tremolite and anthophyllite; correct?

A. I believe that's what it says.

Q. And you say that they displayed the characteristics typical of cleavage fragments. Amphibole cleavage fragments lack the characteristics of asbestos. Individual particles longer than five micrometers typically do not exceed 20 to 1 in aspect ratio. That was the report on what you were finding in the sample; correct? The particles that you found that were longer than five micrometers did not exceed a 20 to 1 aspect ratio?

A. I think I was generalizing here. Individual

particles longer than five micrometers typically do not -- yes. I think that's -- I wasn't generalizing. I think I was referring to the subject -- you know, it's been a long time. I assume.

Q. So that's what you saw generally, but does that -- that's only what you saw generally. There may have been some in the sample that did fit that criteria; correct?

A. I -- it -- I said -- whatever I said there is what I said. I mean I, you know, I said generally, so it's possible they were a lot less, too. I mean --

Q. You say while some of the particles of anthophyllite in the intermediate talc amphibole have aspect ratios that are higher than those typical of tremolite, they do not display the characteristics of the asbestiform habit; correct?

A. Yes.

Q. So you found anthophyllite material and intermediate material that did display some characteristics of asbestos under your definition but not necessarily the characteristics of what you called the asbestiform habit; correct?

A. That would be correct.

Q. Now I want to move on to, and that is Exhibit 22. I want to move on to Exhibit, what I'll call Exhibit 23, report on sample of Nytal, August 14th, 1985, and your definition, here you're talking about tremolite under results, and you say no asbestiform tremolite was observed. Asbestiform tremolite

and other asbestiform am -- amphiboles are --
(The reporter requested clarification.)
BY MS. ABRAMS:
Q. Asbestiform tremolite and other asbestiform amphiboles are characterized by fiber bundles exhibiting splayed ends longer than five micron -- um fibers with aspect ratios typically in excess of 20 to 1 and with less than 1 um, micrometer, flexible fibers, fiber bundles showing parallel extinction and/or matted masses of fiber. Was that your definition then?
A. Yes.
Q. Would you read the second-to-last paragraph, please --
A. Sure.
Q. -- on the study.
A. A few particles were encountered whose index of refraction parallel to elongation fell between 1.600 and 1.610. These particles are quite rare. They compromise (sic) much less than 0.1 percent of the sample. They have high aspect ratio greater than 20 to 1 and are best classified as talc-amphibole. They do not appear to be asbestiform although they are clearly fibers.
Q. So again you're noting an -- anthophyllite -- strike that. Were those anthophyllite fibers?
A. There -- I don't know.

Q. You're noting fibers that appear to have some of the characteristics of asbestos but that you do not believe to be asbestiform; is that correct?
A. That's what it says.
Q. And that would be based on the definition that you used that we just read of what you believed asbestos was at the time?
A. Yes.
Q. That's 23.
(Wylie Deposition Exhibit No. 23 was marked for identification.)
BY MS. ABRAMS:
Q. February -- oh, sorry. February 13th, 1987, you looked at for R. T. Vanderbilt samples of Nytal 100 and Pfizer CP 36-30 (sic) talc. Do you recall doing that analysis?
A. I don't remember doing it, but I have this document.
Q. Your definition of asbestiform now in 1987 is that it has to meet the following criteria: Mean aspect ratios ranging from 20 to 1 to 100 to 1 or higher in particles longer than five microns; (2) very thin fibrills usually less than .5 microns in width; and (3) two or more of the following: (a) parallel fibers occurring in bundles; (b) fiber bundles displaying splayed ends; (c) fibers in the form of thin needles; (d) matted masses of individual fibers; and (e) fibers showing curvature. Where was that definition from?

A. I wrote it.
Q. And that definition is not the same as the definition you previously had in 1980 -- in the earlier 1980s?
A. No. Knowledge advances. I knew a lot more about asbestos then.
Q. And so in this definition you believe the fibers needed to be now less than .5 microns instead of one micron?
A. At this point we had electron microscopy studies of populations, so we had better data.
Q. Okay. And who, and did you, did you write any text or other material that is used in educational institutions to define asbestos after 1987 to alert people of the change in the definition?
A. I've published a lot of papers, and they're out there, and they may be used in educational institutions or they may not. I don't know.
Q. Is it fair to say that the, this was still quite different from the federal definition of what asbestos was?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. At the time?
MR. RADCLIFFE: Object to the form. You keep on saying -- you said federal definition several times as if there's one single federal definition of what asbestos is, much less asbestos fiber.

MS. ABRAMS: That's fine.
BY MS. ABRAMS:
Q. Do you know of any federal definition of asbestos that was analogous to the one that you posit here in 1987 at that time?
A. Federal government has never really defined asbestos.
Q. Do you know of one federal entity that subscribed to this definition of asbestos in 1987?
A. Bureau of Mines.
Q. Any others?
A. No.
Q. Does -- is this specific definition in, of asbestos, was that published somewhere by the Bureau of Mines?
A. I think so, but I have to look at the paper. I published it a lot of places.
Q. So you published it for the Bureau of Mines?
A. No. I said I published a lot of places. The Bureau of Mines may also have published it.
Q. Do you know for a fact any publication where the Bureau of Mines adopted your definition of asbestos as written here in February 13, 1987?
A. I can't remember.
Q. And did -- you didn't use TEM in this analysis, did you?

A. In that analysis? No.
Q. You say some of the fibrous talc has the characteristics of the asbestiform habit. However, because it is talc it's not asbestos. Is it -- is it correct, Doctor, that there was a time when chrysotile was not considered to be in the same family as other asbestos materials?
A. It isn't today. It's a different mineral group.
Q. Okay.
A. Still considered that.
Q. So chrysotile is not considered asbestos?
A. Yeah. Chrysotile is asbestos.
Q. Okay. But it's a different mineral group; correct?
A. Correct.
Q. Let's mark this as 24.
A. But it's used commercially as asbestos.
(Wylie Deposition Exhibit No. 24 was marked for identification.)
MS. ABRAMS: Why don't we take a break now because I'm on the -- up to Mouldene.
THE VIDEOGRAPHER: This marks the end of volume one, tape number two, in the deposition of Dr. Ann Wylie. Going off the record. The time is 5:22 p.m.
(A recess was taken.)
THE VIDEOGRAPHER: Back on the record. Here marks the beginning of volume one, tape number three, in the deposition of Dr. Ann Wylie. The time is 5:33 p.m.

BY MS. ABRAMS:
Q. We're back on the record. I want to go back to a discussion of the Mossman paper, the paper you did with Mossman and Skinner.
THE REPORTER: Excuse me. Can I shut this?
MS. ABRAMS: Yeah, sure. I can do that.
BY MS. ABRAMS:
Q. Let me see if I can refresh your recollection that the study you did from, with Mossman and Skinner was in response to a request from R. T. Vanderbilt?
A. Yes.
Q. Let me just show you. So these pages found in the files of R. T. Vanderbilt refer to the study that you did with Mossman and Skinner?
A. It seems to. I've never seen it before.
Q. Mark that next in order.
MR. RADCLIFFE: May I -- may I see that?
(Wylie Deposition Exhibit No. 25 was marked for identification.)
BY MS. ABRAMS:
Q. Let me show you, this is W -- this is RTV Weston 007943 which is a document produced by the R. T. Vanderbilt Company from the, stated by them from the files of John Kelse. I show you this, Dear John and Slim, and that will be John Kelse and Slim Thompson; correct? And this is from you?

MR. RADCLIFFE: She hasn't --
BY MS. ABRAMS:
Q. Enclosing a draft number 3 of the paper that you sent to Brooke and Cathy. Does that refresh your recollection that R. T. Vanderbilt reviewed drafts of the paper you presented?
A. Yes.
MR. RADCLIFFE: Object to the form of the question.
BY MS. ABRAMS:
Q. Can you tell us now any more information on how this study came about and what R. T. Vanderbilt's role was in the study that you published with Mossman and Skinner and others?
A. They funded it and they provided the samples.
Q. Do you recall correspondence with them during the various steps of the process?
A. No.
THE VIDEOGRAPHER: Ma'am, I'm sorry. Those papers are rubbing up against your microphone.
MS. ABRAMS: Oh, I'm sorry. Thank you.
BY MS. ABRAMS:
Q. Do you recall that, that there was an issue that, that Professor Skinner found asbestiform anthophyllite or what appeared to be asbestiform anthophyllite in the material from R. T. Vanderbilt and that that was an issue that was raised prior to the publication of the study?

A. There was -- are you referring to a document? Perhaps I could look at it.
Q. Well, right now I'm looking at a letter from John Kelse to Catherine Skinner which was not cc'd to you, but you're welcome to look at it and tell me if you recognize it.
A. I don't remember the letter.
Q. Do you remember, do you remember the discussion about anthophyllite asbestos that is referred to in the letter?
A. I remember a discussion about anthophyllite, identification of anthophyllite.
Q. Do you remember the identification potentially of anthophyllite asbestos by Professor Skinner?
A. I remember a discussion about the identification of anthophyllite.
Q. And just reading from the letter it says, I believe Slim feels, and that will be Slim Thompson; correct? Is that correct?
A. I didn't write the letter. I assume.
Q. As I do, that we must still explore the anthophyllite issue you raise. As I understand it, you are suggesting the existence of anthophyllite asbestos in some of these samples. And this is a letter from John Kelse to Catherine Skinner, and we'll mark that as the next in order.

I'll let the court reporter mark those. And the letter will be Exhibit 27.

(Wylie Deposition Exhibit Nos. 26 and 27 were marked for identification.)

BY MS. ABRAMS:

Q. There's a No. 7941 is, it says, Ann, and I'll represent to you again this came from Kelse's files, attached please find recent correspondence from Catherine and my response to her. Neither Slim nor I are thrilled about the extra work through her. We'd rather you were doing it but diplomatically we really can't stop it. And it appears Catherine is trying to resolve this mixed fiber issue in her own mind. So, with some uneasiness, I don't think we should stop her.

Do you recall getting that kind of a --

A. No.

Q. -- correspondence from John Kelse?

A. No.

Q. Is it typical when you write peer reviewed research articles that you correspond first with corporate sponsors?

A. You already asked me that question, and I answered it.

Q. And what's the answer?

MR. RADCLIFFE: Why does she have to answer it again?

MS. ABRAMS: I didn't ask that question. I asked --

BY MS. ABRAMS:

Q. I just asked you is it typical?

MS. ABRAMS: You can read the question back, please.

MR. RADCLIFFE: Well, she said she answered it before. Why does she have to answer it again?

THE WITNESS: You asked me that exact question, but I'll answer it again. It is typical to provide a copy of a manuscript to insure that there's no proprietary information quoted.

BY MS. ABRAMS:

Q. My, my question is, is it typical to correspond back and forth about the substance of the research paper with the corporate sponsor that is, that is sponsoring the research?

A. I've only had two corporate sponsors for research, so typical is hardly a question I can answer. It appears that there was correspondence on this. There was disagreement between myself and Catherine about the criteria for the identification of the mineral anthophyllite. It has nothing to do with anything except a scientific disagreement about what criteria she should apply.

Q. This was in --

A. I'd be happy to describe that to you if you are at all interested.

Q. This was in 1995?

A. I -- whatever.

Q. And my question was, you, the paper that you published with Professor Skinner and Professor Mossman and others, that was a peer reviewed article; correct?

A. It was.

Q. Did you tell the publication or the peer reviewers that that article was done in conjunction with direct input from R. T. Vanderbilt?

A. It was not done in, with direct input from R. T. Vanderbilt.

Q. So you don't consider e-mails and comments and questions about the information that you're studying and writing about from a corporation that is the subject matter of the research as, as having any bearing on that publication?

A. I don't.

MR. RADCLIFFE: Objection; argumentative.

BY MS. ABRAMS:

Q. And you don't believe that there was any need to disclose any of those communications or the input and interaction with R. T. Vanderbilt regarding the substance of the paper prior to, or to the reviewers of the paper?

MR. RADCLIFFE: Same objection.

THE WITNESS: They -- we did disclose that they funded the project.

BY MS. ABRAMS:

Q. My question is, you did not feel it necessary to disclose that they interacted with you regarding the substance of the information?

A. They did not interact with me regarding the substance of the paper.

Q. And you don't believe they interacted with Catherine Skinner or Brooke Mossman?

A. I'm neither one of those people. I'm not answering for them.

Q. This is an exhibit next in order RTV Weston 7938. This is a -- apparently this is a communication from you by e-mail to Catherine Skinner about your differences regarding the substance of the paper. Do you know why that communication was found in the files of John Kelse at R. T. Vanderbilt?

A. I don't.

Q. Did you bcc John Kelse with this communication, blind copy him?

A. I doubt it.

Q. Did you give it to him?

A. I don't remember.

MS. ABRAMS: Mark that next in order. So that would be -- the exhibit we just talked about would be Exhibit 29, and the exhibit with Ann, comma, at the top, please, attached please find correspondence, is 28. I'll let you mark those.

(Wylie Deposition Exhibit Nos. 28 and 29 were marked for identification.)
BY MS. ABRAMS:
Q. I want to show you right now a July 28th, 1989, letter that says Dear Dr. Thompson crossed out at the top and says Slim, from you. It's WES 751. Do you recall that letter?
A. I've seen it in my files.
Q. See if I have another -- yeah. Let me hand you that one. We'll mark it Exhibit 30. This is about Mouldene S-158. Do you recall what, how you received that specific sample?
A. No.
Q. Do you recall whether there was any chain of custody attached to that specific sample?
A. I don't recall.
Q. You didn't see one in your files?
A. Whatever I gave you on those samples are the, all the information that I have on the containers of the samples.
Q. Do you know why in, on July 28th, 1989 -- or strike that. Do you know why you were sent a sample of Mouldene S-158 to examine?
A. No.
Q. Did Slim Thompson, to your recollection, ever tell you why in 1989 he wanted you to examine a sample of a material that had not been produced since the 1970s?

A. No.
Q. Did he tell you it was for purposes of litigation?
A. I, I don't remember anything about it.
Q. Do you know when you wrote this letter which of your definitions that we've read in the last series of definitions you applied to this sample in determining whether or not there was asbestos in it?
A. No.
Q. Could you look at the paragraph on fibrous talc. It says fibrous talc occurs in fiber bundles with splayed ends and as what appears to be individual fibers. So that would be an asbestiform habit; correct?
MR. RADCLIFFE: Object to the form.
THE WITNESS: It is. It says it appears in fiber bundles with splayed ends.
BY MS. ABRAMS:
Q. And the end of the paragraph it says, in general the more the fibers display the classic characteristics of asbestos, fiber bundles with splayed ends, with small fiber width, curved fibers, et cetera, the lower are the indices of refraction within the ranges given above.
A. That's correct. That's what it says.
Q. So were you looking at fibrous talc, some of which was in an asbestiform habit and some of which was approaching a non-asbestiform habit?

A. You know, this was 20 years ago. I really couldn't tell you what was in my mind at the time.
Q. Okay. You said the anthophyllite does not display asbestiform characteristics. It's most easily recognized by its peculiar striped extinction pattern which also appears to be reflected in plain light as variable indices of refraction. What is a striped extinction pattern?
A. When you put the material under cross nickels and you rotate it, some parts of it have one type of optical behavior and another, another part has a different optical behavior. So they go to extinction at different positions.
Q. Do you know, you did not write down here how you examine this material, that I can see. Do you recall or can you tell what you did?
A. Well, I used polarized light microscopy and index of refraction analysis.
Q. You didn't use SEM or TEM?
A. There's nothing in here that would suggest that I did.
Q. Was -- strike that. The tremolite, like anthophyllite, does not display the characteristics of asbestos. It is generally blocky but an occasional particle has an aspect ratio in excess of 10 to 1. Did you record anywhere the amount other than generally?
A. I doubt it.

Q. You noted that tremolite and anthophyllite were about five to ten percent of the sample. In your experience from what you had reviewed of Gouverneur talc from R. T. Vanderbilt was that typical or atypical?
A. I don't remember.
Q. What does the quartz -- does the quartz have any significance in there?
A. It was there.
Q. Did you ever look at any Mouldene to your knowledge after this?
A. I have no indication in any of my papers that I did.
Q. When did you first -- well, strike that. How -- you first met Slim Thompson in the 1970s; correct?
A. I first met Slim when I started working with the Bureau of Mines.
Q. And did you interact with Slim Thompson in, in terms of your work with the Bureau of Mines? Did you have a professional, frequent professional interaction based on that?
A. No. He, he lives in another place. The Bureau of Mines -- I mean I remember him coming to the Bureau of Mines once. I don't know whether there were two times, but not that frequently, no.
Q. So you -- do you consider him a friend?
A. Yes, mm-hmm.
Q. So you've over the years been, have you been social

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friends?
A. **No.**
Q. Professional friends?
A. **Professional friends.**
Q. That you see frequently at meetings and that kind of thing?
A. **No, not frequently, but I have seen him at meetings. I generally tend not to go to too many meetings recently.**
Q. So how often have you talked to Slim Thompson say in the last five years?
A. **Probably not at all. Maybe once.**
Q. Okay. And if you still had a Mouldene sample S-158, it would be in there?
A. **Yes. It's there.**
MS. ABRAMS: Okay. I'll take that and mark that as 30. Is that 30? Yes.
(Wylie Deposition Exhibit No. 30 was marked for identification.)
BY MS. ABRAMS:
Q. You in this July 28th, 1989, letter do not define in terms of aspect ratio or fiber diameter any specifics with respect to your definition.
A. **No.**
Q. Is -- that's correct?
A. **That's correct.**

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Q. You didn't note here whether either the tremolite or anthophyllite appeared as bundles with splayed ends or otherwise; is that correct?
A. **Would you like me to read it out loud?**
Q. I'd like you to answer my question, please.
A. **It said -- well, you could read this yourself. Tremolite like anthophyllite does not display the characteristics of asbestos. I mean what are you asking me? The anthophyllite does not display asbestiform characteristics.**
MS. ABRAMS: Could you read the question back, please?
(The reporter read back the previous question.)
THE WITNESS: I said tremolite like anthophyllite does not display the characteristics of asbestos. I didn't specify those characteristics. If that's the question, that's correct.
BY MS. ABRAMS:
Q. Well, what my question is, you didn't state in there that the anthophyllite or tremolite were, were characteristic of cleavage fragments?
A. **I didn't use the term cleavage fragments in the document.**
Q. Okay.
MS. ABRAMS: Why don't we just go off the record for

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a minute and I can see what else I have here.
THE VIDEOGRAPHER: Going off the record. The time is 5:58 p.m.
(Discussion off the record.)
THE VIDEOGRAPHER: Back on the record. The time is 6:03 p.m.
BY MS. ABRAMS:
Q. Looking at what we've marked as Exhibit 3, the Mouldene talc notes that you have, the first two pages of Exhibit 3, the Mouldene talc notes, you note, the first thing you note is 1.600 many asbestiform bundles; is that correct?
A. **Yes.**
Q. Then you note -- well, could you read this notation, please, there?
A. **1.584, some still gamma less than 1.584, i.e., chrysotile-like, in general the more form the lower gamma. Looks like asbestiform but then it's crossed out. Straight fibers - higher gamma.**
Q. So you started to write asbestiform and then you crossed out something there; correct?
A. **That's what it looks like.**
Q. And your observation was that some of the material you were looking at was chrysotile-like; is that correct?
A. **That's what it says.**
Q. And could you read the notation 1.560?

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A. **Most straight fibers have N perpendicular to elongation greater than 1.560. A few have alpha prime less than 1.560. More chrysotile-like, lower N than 1.560, fiber bundles N alpha less than 1.560.**
Q. These are -- can you tell us, are these, is this a series of observations or what are these different numbers as you go down referring to? Are they your observations or counting?
A. **No. Those are different index of refraction oils. Those are the oils, the index of refraction of the oils that I put the samples in.**
Q. And then the notes are your observations of the material based on the specific oils?
A. **Yes.**
Q. How did it happen that NCI decided to give Dr. Stanton's materials to Maryland; do you know?
A. **They asked me if I wanted it.**
Q. Do you know why they asked you as opposed to anybody else?
A. **I was interested in mineral fibers.**
Q. Who was it there that you knew that knew that you were interested in mineral fiber?
A. **Marta Wade and Lewis Lipkin.**
Q. Did you know Dr. Stanton?
A. **I never met him. I heard him speak.**

Q. I just have to confirm that you have absolutely no plans of testifying in this case as an expert; correct?
A. Correct.
MR. RADCLIFFE: She's testifying right now. Half the questions you've asked her have been for her expert opinion.
MS. ABRAMS: Not at all. She was not -- she was disclosed and withdrawn as an expert.
BY MS. ABRAMS:
Q. Is there any chance in the world that you would come and testify in California in this case?
A. Any chance? No.
MR. RADCLIFFE: It's my understanding that since you've taken her deposition I'm free to designate her on this transcript.
MS. ABRAMS: I don't think so.
MR. RADCLIFFE: Why not? Taken in a western case. You noted it.
MS. ABRAMS: First of all, we're not done. We have like many hundreds of pages of stuff to go through. Second of all, if you have something that you want to present to the judge, present it, but we don't have to meet and confer about that now. My understanding is, no, you don't get that opportunity.
MR. RADCLIFFE: Well, I --

MS. ABRAMS: But if you plan on calling her in any form or shape as an expert, I'm going to tell you right now I need to go through her qualifications. I need to go through her job history. I need to go through her entire curriculum vitae. I need to go through the basis of any opinions she might be asked to give, and I need to depose her as an expert, so --
MR. RADCLIFFE: I don't need to call her as an expert witness. I'm not going to ask for any expert opinions. I'm going to ask her -- I'm going to ask her questions about her, as a percipient witness. Sorry. I meant to call Dr. Wylie. I shouldn't talk about her as, talk about you as if you're not sitting right here listening to us.
MS. ABRAMS: It was kind of rude. I'm just trying to make sure I'm not going to ask you something I've already asked you, so you have to bear with me. Mr. Radcliffe didn't tell me you'd be providing 200 pages of documents and a bunch of samples --
MR. RADCLIFFE: That's -- that's --
THE WITNESS: Most of what you have --
MS. ABRAMS: -- at 1:30 in the afternoon which I could have looked at at a lunch break.
MR. RADCLIFFE: That's a bit -- that's stretching it a bit since you served Dr. Wylie with a subpoena and asked for these materials.

MS. ABRAMS: Well, I just mentioned the subpoena to you yesterday, and you never said yes she has things and she'll be bringing them.
MR. RADCLIFFE: If you --
MS. ABRAMS: Because otherwise I probably wouldn't have agreed to a 1:30 deposition.
MR. RADCLIFFE: If you mentioned the subpoena to me, you did, but I think it's unfair and incorrect for you to suggest that you asked me if there was going to be a production, because if you had, I would have said yes.
MS. ABRAMS: Anyway, it doesn't matter. We can meet and confer later.
MR. RADCLIFFE: Okay. It doesn't matter. I agree.
MS. ABRAMS: No. We can meet and confer later. Not on, you know --
MR. RADCLIFFE: I have nothing to meet and confer about. Sorry.
MS. ABRAMS: So I think what I need to do now is go off the record and look at some of the materials that we didn't talk about and see what's in there because I haven't had a chance to do that.
THE WITNESS: You'll find mostly what I gave you is what you've already looked at.
MS. ABRAMS: Okay. That would be great.
THE VIDEOGRAPHER: Going off the record. The time

is 6:11 p.m.
(A recess was taken.)
THE VIDEOGRAPHER: Back on the record. The time is 6:25 p.m.
BY MS. ABRAMS:
Q. Dr. Wylie, we were talking about the Mossman paper. I'm going to attach that as -- well, it's Wylie, Skinner, Marsh, Snyder, Garzione, Hodkinson -- Hodgkinson (sic), Winters and Mossman, 1997. I want to attach that as next in order. In the acknowledgements it says that work was supported in part by a grant from NIEHS to BTM and from R. T. Vanderbilt Company to AGW and CS. Did you reflect -- did you bring for us in the invoices -- I didn't see it -- information on the grant that you received from R. T. Vanderbilt for this study?
A. I don't have any information -- I don't have -- I think it was to the University, so I don't have it. I have no other papers. I went through everything I had. I've given you everything I had.
Q. So if you had gotten a grant from R. T. Vanderbilt to do research, that information wouldn't necessarily be in your files? It might be in the University's files?
A. If it was a grant to the University, it would be in the University's files.
Q. Is there a way to access that information for old

grants; do you know?
A. I don't know.
Q. As an administrator have you ever attempted to access that information for any purpose?
A. No.
Q. It doesn't -- I've read the paper, and I have never seen in here any information that there was correspondence or interaction between R. T. Vanderbilt and the principals in this. That's a correct statement?
MR. RADCLIFFE: Object to the form.
BY MS. ABRAMS:
Q. Prior to the publication of the study?
MR. RADCLIFFE: Object to the form. Go ahead. It's also asked and answered, but go ahead.
THE WITNESS: Yeah. I think the question was you've read it and you didn't find anything. Is that correct?
BY MS. ABRAMS:
Q. Well, is it there?
A. Well, I don't -- if you didn't find it, I'll take your word for it.
Q. Well --
A. I doubt it because there was no substantive interaction with them on the conclusions of the paper.
Q. And the samples FD-14, S-157 and CPS-183, would those not be included in there because this was a University

grant?
A. That's correct. There is a CPS-183 sample, however, right here.
Q. Why did you include that?
A. I don't know.
Q. So that would have been part of the University's property?
A. Not necessarily.
MR. RADCLIFFE: No. That -- you're assuming facts not in evidence. We've already been over the over study --
MS. ABRAMS: Well, I haven't said anything.
MR. RADCLIFFE: -- that involved this material.
BY MS. ABRAMS:
Q. So you used material that you got from R. T. Vanderbilt for a prior study that was done not for purposes of research in this study that was done for research purposes?
A. No. I don't think so.
Q. And as you sit here today, you don't recall the amount of the grant?
A. No.
Q. Is it fair to say that your conclusion in this study is that the talc from -- well, strike that. Did you have a conclusion in this study as to whether the talc from R. T. Vanderbilt was carcinogenic?
MR. RADCLIFFE: You don't think that's an expert

opinion?
MS. ABRAMS: I'm just asking what she wrote.
THE WITNESS: Shall I read you the discussion?
BY MS. ABRAMS:
Q. I'm actually asking is, is there in the paper a conclusion as to whether or not the talc is carcinogenic or is that not something that you dealt with?
A. There's a discussion of some hypotheses about what characteristics have been observed in a variety of cells that are exposed to high concentrations of fibers. These are cell studies. These are not animal studies. They're not human studies. They're not epidemiological studies. They're cell studies. So they look at properties that are associated with materials that are known to be carcinogens, and those are compared. That's what the study concludes.
Q. So it -- then this paper does not necessarily conclude that the material from -- strike that. There is not a conclusion in there that the material -- that's a double negative. Let me try it again.
You would not draw from your paper a conclusion that the material that, the talc material that you studied from New York State was not carcinogenic. That wouldn't be a proper conclusion, would it?
MR. RADCLIFFE: I object. I think you're asking for an opinion.

BY MS. ABRAMS:
Q. I'm actually not. I don't want your opinion. I want to know what your paper said.
A. Okay. So really what it says is that the data suggests caution in generalizing about durable fibers greater than five microns. It's significant because it re -- it supports the reanalysis of the Stanton data which I did in 1987 on crocidolite and others and provides data implicating the importance of mineral fiber type rather than fiber length per se.
So really what we were looking at here, the general conclusions about this is that in response to these particular cells that were treated in this particular way that talc fiber behaves differently than asbestos. That's all the conclusions.
Q. And in your -- did you ever do any studies to take that conclusion to a more general conclusion?
A. Did I do any follow-up work with Dr. Mossman?
Q. To perhaps broaden the scope of that finding?
A. No, but I would like to.
Q. So -- okay. So your conclusion here was to the issue of it's not necessarily the length of the fiber. It's what it's made up of?
A. That's right.
Q. And that was in -- that contradicts or is different

from what Dr. Stanton had said in his paper?
A. Somewhat, yes, mm-hmm.
Q. Do you know if Dr. Mossman has done any studies, follow-up studies on this issue?
A. Dr. Mossman's done a lot of work. I don't know whether it was after this paper, before this paper. I'm not familiar enough with her vitae to be able to tell you that.
Q. Have you ever done any other research with Catherine Skinner other than this, for this paper?
A. No.
Q. And what about Brooke Mossman?
A. Have I done any research? No.
Q. I'd like to show you this correspondence regarding International Talc 325 analysis of asbestos content which I'll show you as a group and mark it as the next in order.
A. Okay.
MS. ABRAMS: Are you running out of exhibit --
THE REPORTER: No. Is this Exhibit 31?
MS. ABRAMS: Yes. Are you willing to stay longer? Are you okay? If you need a break for food or something, let us know.
(Wylie Deposition Exhibit No. 31 was marked for identification.)
THE WITNESS: They're two copies of the same report, so we can look at them together.

BY MS. ABRAMS:
Q. Oh, good. Thank you. This -- is it correct that in 1995 according to this letter John Kelse sent you a sample of USG material to analyze?
A. May I see the letter that suggests --
Q. Oh, I'm sorry. I thought you had all this. I'll take the report. You keep the rest.
A. Yeah. That's what I thought. It didn't come from -- it didn't come from John Kelse. It came from Charlie Byers.
Q. Okay. Did you know Mr. Byers before this?
A. Huh-uh, no.
Q. So John Kelse asked you to look at the material though; correct?
A. Yes.
Q. Do you recall that United States Gypsum analyzed International Talc material from R. T. Vanderbilt and believed that it had asbestos in it? That's why you were asked to examine the material?
A. Is that stated in here somewhere? I can't really remember all this. Let me just see. It appears that Mr. Struss's report is in some contention here.
Q. Mr. Struss believed there was asbestos in the material?
A. Mr., Mr. Struss applied apparently the definition of

longer than five, narrower than three, micrometers and with a length-width ratio of at least five, and he used that parameter, those parameters and, as the definition for asbestos.
Q. And in this report to Mr. Byers you defined the characteristics of a population of amphibole particles that would be asbestiform; correct?
A. Yes.
Q. And based on that definition you reported that this was something besides an asbestiform material?
A. Yes, but I think what you said was incorrect. Mr., Mr. Struss used a, dimensions that are advocated by NIOSH for counting fibers. They are not definitions of asbestos, but rather, which portion of the asbestos population should be included in the analysis.
It's a very important distinction, and it is characteristic of all of the federal criteria. They define asbestos, and then they give you the criteria that should be applied that portion of the population that's to be counted. It's a different distinction, and Mr. Struss made the leap that the counting rules were a definition which I do not think that they ever have been, and I think that he made a mistake.
MS. ABRAMS: Move to strike to the extent that response was nonresponsive.
BY MS. ABRAMS:

Q. We don't have Mr. Struss's report, I don't think, do we?
A. I didn't have it.
Q. Do you know what -- you wrote directly to Mr. Byers of United States Gypsum; correct?
A. The letter's addressed to Mr. Byers.
Q. And you -- do you know whether or not what -- well, strike that. Do you know what United States Gypsum did as a result of obtaining this information from you?
A. I do not.
Q. Do you know if they still continued to purchase International Talc 325?
A. I do not know.
Q. Did -- is it -- well, strike that. Can I have that? We can mark that.
John Kelse writes to you, as always, we appreciate your willingness to assist with these sporadic inquiries and emergencies. Do you know what the emergency was here?
A. No.
Q. Do you know whether they were going to lose USG as a customer?
A. I know nothing about, about it.
Q. Did -- so did John Kelse call you from time to time with requests to sample material that customers believed had asbestos in them?

A. **All the information that you have is all the contacts that I've had with John Kelse.**
Q. We'll mark these pages as 32.
(Wylie Deposition Exhibit No. 32 was marked for identification.)
BY MS. ABRAMS:
Q. Next, 33 is a Declaration of Ann Wylie in Support of Defendant Soco-Lynch Corporation's Motion For Summary Judgment. Do you -- do you recall that declaration?
A. **I actually don't, but I signed it.**
Q. Do you know why you wrote that declaration?
A. **No.**
Q. Was it a lawyer that contacted you asking you to write a declaration?
A. **You know, I really don't know.**
Q. Do you know Chuck Sheldon?
A. **No.**
Q. Is this -- do you know why this included the International Talc mines?
A. **I do not.**
Q. Do you know that you have sampled materials from the former International Talc mines?
A. **We've already discussed the two samples that have IT written on the samples, and those are -- mean International Talc.**

Q. So is that the basis of your understanding that you sampled materials from the former International Talc mines?
A. **That's the basis for my -- mm-hmm.**
Q. You don't, you don't know which particular mines?
A. **No. You asked me that before, too. I don't know.**
MS. ABRAMS: This is 33, the declaration.
(Wylie Deposition Exhibit No. 33 was marked for identification.)
BY MS. ABRAMS:
Q. 34 is --
MS. ABRAMS: Oops, I'll wait for you.
BY MS. ABRAMS:
Q. -- a declaration that you signed on June, in June 1993 regarding affidavits of Arthur Rohl and Jerald Abraham. Do you recall that declaration?
A. **Not really, but it was -- I did it. It's in my files.**
Q. Apparently you believe that Dr. Rohl and Dr. Abraham misquoted information from you at some point?
A. **Mr. Rohl.**
Q. Do you want to -- can you answer the question?
A. **Dr. Rohl used a definition that I disagree with. It's not mineralogical, and, and Dr. Abraham states that I support his contention, and I have never so stated that, that there's asbestiform tremolite, 1993.**

Q. Do you know what you were referring to there?
A. **No, I don't.**
Q. This is a letter to Nora Grimbergen, Hoagland, Longo, Moran, Dunst & Doukas, LLP, regarding the -- you're writing in response to a letter you received on April 15th from Dr. Jerald Abraham in which -- strike that. Dear Miss Grimbergen: I'm writing in response to a letter you received on April 15th from Dr. Jerald Abraham in which my work is quoted extensively. Does that --
A. **Mm-hmm. I remember this.**
Q. Does that have anything to do with this affidavit or is that a different issue?
A. **You know, there's many years between these two. So I assume it has a different issue.**
Q. Okay. Do you recall anything about that issue? This is in 2004.
A. **I don't.**
Q. Is -- do you know who this attorney is?
A. **No.**
Q. Or who she represented?
A. **No.**
Q. Do you get inquiries from attorneys around the country regarding issues about asbestos in Nytal or other talcs?
A. **Yes.**

Q. Other than R. T. Vanderbilt?
A. **Yes.**
Q. How often would you say you get those kind of inquiries?
A. **Once a month.**
Q. And generally what are they in reference to?
A. **I don't -- I don't know. I don't -- I tell them I'm not interested.**
Q. So it's to ask you if you'll --
A. **Work for them.**
Q. -- work for them, okay. This is a 1989 letter to you from Dennis Race. Enclosed is the long promise CPSC taped transcript. Do you know what that is? Is that Consumer Products Safety Commission?
A. **Possible.**
Q. You don't recall this?
A. **No.**
Q. You don't recall the transcript?
A. **No.**
Q. And you didn't find it in your files?
A. **No.**
MS. ABRAMS: I'll just mark these three as Exhibit 34.
(Wylie Deposition Exhibit No. 34 was marked for identification.)

THE VIDEOGRAPHER: Your papers are rubbing up again.

MR. RADCLIFFE: It's coming up on 7:00. How much longer do you think you have?

MS. ABRAMS: Well, I just want to get through these. Some of these are duplicates which is good, but I just have to find them.

MR. RADCLIFFE: Okay. But that's not really an answer to my question.

MS. ABRAMS: I don't have a whole lot more after this.

MR. RADCLIFFE: What does that mean? Ten minutes? Fifteen minutes?

MS. ABRAMS: I don't know, Tom. I just don't know how much stuff is in here that I haven't seen before because I can't really --

MR. RADCLIFFE: And what is in here? Are those the documents that Dr. Wylie provided?

MS. ABRAMS: Yes. They are the documents Dr. Wylie provided. Like here's a duplicate. I mean I can try to go off the record, put these in some kind of date order and go through them or --

MR. RADCLIFFE: Let's just keep going, although let me note again that in your papers filed with the court in Maryland you said that Dr. Wylie was instrumental to the defense of R. T. Vanderbilt and that everybody relied upon her

and that she had, Dr. Wylie has information that was, that you had to get.

MS. ABRAMS: I've asked her.

MR. RADCLIFFE: If you've asked her, then we're done, right?

MS. ABRAMS: I've asked her some of it. I don't know what's in here.

MR. RADCLIFFE: All right.

MS. ABRAMS: I mean --

MR. RADCLIFFE: Let's go. Let's go.

MS. ABRAMS: We can suspend for today. I probably have --

THE WITNESS: No.

MS. ABRAMS: I can probably go through stuff, and then if I need to spend a few more minutes or an hour, we can do it on the telephone. I'm happy to do that because I don't think there's a lot, but there may be some, and I don't know what's in there. I have to go through all the samples, see what's in there.

MR. RADCLIFFE: Let's go off the record.

THE VIDEOGRAPHER: Going off the record. The time is 6:51 p.m.

(Discussion off the record.)

MR. RADCLIFFE: So let's go on the stenographic record. And what we've discussed is that Ms. Abrams is going

to suspend her questioning with the agreement that if she needs up to another hour in the future, we will find the time to do that, mutually agreeable time to do it by telephone, and that has to do with the papers. Ms. Abrams has indicated she doesn't know if she has any questions about the samples, and if she does --

MS. ABRAMS: Well, I have to go through all of this and make sure I don't have any more questions based on what I brought, but I don't think there's much.

MR. RADCLIFFE: I'm not limiting the content of your hour. I'm just saying that you get an hour, and that if she has any questions about the samples, we'll deal with that.

MS. ABRAMS: If I can't do them in the hour --

MR. RADCLIFFE: We'll discuss it.

MS. ABRAMS: Okay.

MR. RADCLIFFE: And I'm going to ask, I'm going to ask a few questions on the video tape.

MS. ABRAMS: But if you ask her more questions, I may ask her some questions based on your questions, so I reserve my right to ask them later.

THE VIDEOGRAPHER: One moment. Back on the record. The time is 6:55 p.m.

MS. ABRAMS: And just for the record, Dr. Wylie, I may have some objections, so if you could wait until Mr. Radcliffe finishes his question and give me an opportunity

to put my objection on the record, I'd appreciate that.

THE WITNESS: Okay.

MR. RADCLIFFE: Dr. Wylie, she will have some objections, so pause.

EXAMINATION

BY MR. RADCLIFFE:

Q. Dr. Wylie, good evening. Can you, can you tell me how long ago R. T. Vanderbilt started to send you samples of minerals for you to examine? Approximately when was the first time?

A. Around 1980, '81.

Q. And in front of us you've actually produced, it's probably not on the camera, but there must be 30, 40, 50 different types of samples of minerals. Are these all from R. T. Vanderbilt?

A. Yes.

Q. And are these minerals that R. T. Vanderbilt sent you over time to analyze?

A. Yes.

Q. The -- have all the mineral samples that R. T. Vanderbilt sent to you, have they all been talc minerals?

MS. ABRAMS: Lacks foundation, calls for speculation. You can answer, if you know, from just sitting

here, and it's overbroad and vague and ambiguous, compound.
THE WITNESS: Almost every single one. There might have been one sample in there that was just a tremolite sample.
BY MR. RADCLIFFE:
Q. Okay. And, and have those samples been sent to you over time? In other words, were they all sent to you in 1980, or have they been sporadic --
MS. ABRAMS: These are leading questions.
BY MR. RADCLIFFE:
Q. -- from 1980 on?
MS. ABRAMS: Objection. It's overbroad, compound and leading.
THE WITNESS: They have been sent to me over a period of about 15 years.
BY MR. RADCLIFFE:
Q. And when R. T. Vanderbilt sent you the talc samples for you to analyze, did they -- was one of the questions in which R. T. Vanderbilt was interested whether or not there was asbestos in the sample?
MS. ABRAMS: Objection; leading, vague and ambiguous, lacks foundation, speculative, overbroad.
THE WITNESS: That was the question that they, they asked.
BY MR. RADCLIFFE:

Q. And in response to the question, in response to the questions asked by Vanderbilt about these talc samples, did you ever report that you found asbestos in any of the talc samples?
MS. ABRAMS: Same objection.
THE WITNESS: No.
MR. RADCLIFFE: Those are all the questions I have.

EXAMINATION

BY MS. ABRAMS:
Q. Dr. Wylie, when they sent samples, many of those samples that are sitting there in those 50 samples were for purposes of litigation where R. T. Vanderbilt was sued in asbestos case; is that correct?
A. No.
Q. That's not correct?
A. That most of the samples were for litigation? No.
Q. And how do you know that?
A. Because I put them in the bag. I think the vast majority of them were for their flotation product -- project.
Q. How many of them?
A. I don't remember; 25.
Q. So 25 samples were for the flotation project and what --

A. Yes, roughly.
Q. And what was the flotation project?
A. This is a, a process they were using somewhere, I don't know where, to try to separate out the minerals that composed their material, perhaps purify the talc. I don't really know what, what they were using. I don't know if they were using their regular ore. I don't know if they were using a prospect somewhere, but they were assessing the effectiveness of an, a flotation process.
Q. So what was the question there?
A. What, what did the flotation do to the material.
Q. What did the flotation do to the material?
A. Well, it had varying -- there were a lot of samples for different runs with different numbers of process times they went through the flotation process, and if I recollect correctly, they, they were able to pretty well purify the, the talc, the mineral talc, but I don't believe it was -- it wasn't a hundred percent effective. I don't remember. It's in some of those reports I gave you, but that's the process.
Q. So it wasn't about was there asbestos in the material; it was about what did the flotation process work; correct?
A. Those -- that's right.
Q. And that's for most of the samples that are in there?

A. Probably --
MR. RADCLIFFE: Object to the form. Go ahead.
THE WITNESS: Probably half.
BY MS. ABRAMS:
Q. And the other half were for litigation purposes?
A. No. There were a number of samples provided from western talc, and to my knowledge they had nothing to do with litigation.
Q. Well, do you know if they did or didn't?
MR. RADCLIFFE: Asked and answered.
THE WITNESS: To my knowledge they had nothing to do with litigation.
BY MS. ABRAMS:
Q. What did they have to do with?
A. They were interested in what the mineralogy of their materials out there looked like.
Q. So again, that was just to see what was in there?
A. Yes.
Q. And that wasn't about asbestos. It was just to see what was in that material?
A. They were interested in what the material looked like, what the tremolite looked like, what it was like, what the materials, the minerals that were in there and what their habits were.
Q. And that material was from Death Valley; do you

know?
A. I don't know.
Q. But, in fact, you did not ever find asbestos in any western talc, did you?
A. No.
Q. Are you aware of other people that have found asbestos in talc from Death Valley?
A. It's, it's reported in the literature that there's asbestos from Death Valley.
MS. ABRAMS: That's it for me. Those are all the questions I have with the reservation of --
MR. RADCLIFFE: With our agreement.
MS. ABRAMS: With the reservation of rights pursuant to the stipulation. Thank you very much for coming tonight.
THE VIDEOGRAPHER: Here marks the end of volume one, video tape number three, in the deposition of Dr. Ann Wylie. Going off the record. The time is 7:02 p.m.
(Whereupon, signature having not been waived, the videotaped deposition of ANN G. WYLIE, Ph.D. was concluded at 7:02 p.m.)

* * *

ACKNOWLEDGMENT OF DEPONENT

I, ANN WYLIE, Ph.D., do hereby acknowledge that I have read and examined the foregoing testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any corrections appear on the attached Errata sheet signed by me.

(DATE) (SIGNATURE)

CERTIFICATE OF SHORTHAND REPORTER

I, Janet A. Hamilton, Registered Diplomate Reporter and Notary Public before whom the foregoing deposition was taken, do hereby certify that the foregoing transcript is a true and correct record of the testimony given; that said testimony was taken by me stenographically and thereafter reduced to typewriting under my direction and that I am neither counsel for, related to, nor employed by any of the parties to this case and have no interest, financial or otherwise, in its outcome.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of September, 2009.

Registered Diplomate Reporter
Notary Public in and for the
State of Maryland
My Commission Expires
March 4, 2012

ERRATA SHEET

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