

THE STATE OF SOUTH CAROLINA
In the Court of Appeals

APPEAL FROM RICHLAND COUNTY
Court of Common Pleas

Jean Hoefer Toal, Circuit Court Judge

Appellate Case No. 2024-001550
Lower Court Case No. 2023-CP-40-04072

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Jun 18 2025

SC Court of Appeals

Michael L. Perry and Lonnie L. Long, Respondents,

v.

American International Industries, Atlas Turner Inc., Avon Products, Inc., Barretts Minerals Inc., BlockDrug Company, Inc., Brenntag North America, Inc., Brenntag Specialties, LLC, Bristol-Myers Squibb Company, Buy-Low General Merchandise, Inc., C&S Wholesale Grocers, LLC, Calvin Klein Inc., Chanel Inc., Charles B. Chrystal Company, Inc., Chattem, Inc., Colgate-Palmolive Company, Color Techniques, Inc., Cosmetic Specialties, Inc., Coty Inc., CVS Health Corporation, CVS Pharmacy, Inc., EDC Drug Stores, Inc., Estee Lauder Inc., Estee Lauder International, Inc., The Estee Lauder Companies Inc., Food Lion, LLC, Genuine Parts Company, Glamour Industries Co., Himmel Management Co. LLC, Himmel Media LLC, Honeywell International, Inc., Idelle Labs, Ltd., IMI Fabi (Diana) LLC, IMI Fabi (USA) Inc., IMI Fabi, LLC, Janssen Pharmaceuticals, Inc., Johnson & Johnson, Johnson & Johnson Holdco (NA) Inc., Kenvue Inc.; L'Oreal USA, Inc., L'Oreal USA Products, Inc., LLT Management LLC, Long's Drugstores of South Carolina, Inc., LTL Management LLC, Minerals Technologies Inc., The Neslemur Company, Piggly Wiggly, LLC, Pneumo Abex LLC, Presperse Corporation, The Procter & Gamble Company, PTI Royston, LLC, PTI Union LLC, Ralph Lauren Corporation, Rite Aid of South Carolina, Inc., Shulton, Inc., Specialty Minerals Inc., Sumitomo Corporation of Americas, Union Carbide Corporation, Vi-Jon, LLC; Walgreen Co., Walmart Inc., Defendants,

Of which American International Industries is the Appellant.

RECORD ON APPEAL

Adam Sinclair Ruffin
1320 Main Street, Suite 300
Columbia, SC 29201
(803) 470-4529
adam@ruffinappeals.com

Stephanie G. Flynn
Nicholas J. Cherry
Timothy Peck
2 West Washington Street, Suite 1100
Greenville, SC 29601
(864) 751-7607
sgflynn@foxrothschild.com
ncherry@foxrothschild.com
tpeck@foxrothschild.com

Robert E. Thackston
Kurt W. Greve
3333 Lee Pkwy, Suite 700
Dallas, TX 75219
robert.thackston@nelsonmullins.com
kurt.greve@nelsonmullins.com

Attorneys for American International
Industries

Misty A. Farris (Admitted Pro Hac Vice)
David C. Humen
Charles William Branham, III
1801 North Lamar Street, Suite 300
Dallas, TX 75202
(214) 722-5990
mfarris@dobslegal.com
dhumen@dobslegal.com
tbranham@dobslegal.com

Theile B. McVey
John D. Kassel
Jamie Rutkoski
1330 Laurel Street, P.O. Box 1476
Columbia, SC, 29202
(803) 256-4242
tmcvey@kassellaw.com
jkassel@kassellaw.com
jrutkoski@kassellaw.com

Rachel A. Gross
3141 Hood St., Suite 450
Dallas, TX 75219
(214) 838-1884
rgross@iolagross.com

Attorneys for Plaintiffs

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1 thing to the company, what you do right now.
2 And I know you're tired, and you're probably
3 tired of hearing me talk, and you're tired of
4 sitting here, and you're tired of it all. This
5 is the most important part to this company.

6 Please stay with us, please do the right
7 thing, and please tell this company, "Don't
8 ever do anything like this again."

9 Thank you so much.

10 MR. BROWN: Your Honor, I object to "doing
11 the right thing."

12 THE COURT: Overruled.

13 All right. Ms. Bueno.

14 MS. BUENO: Ms. Flynn is going to start,
15 Your Honor.

16 THE COURT: Very good. Ms. Flynn for AII.

17 - - -

18 CLOSING ARGUMENT BY MS. FLYNN

19 - - -

20 MS. FLYNN: Ladies and gentlemen of the
21 jury, as I told you before, I've only been able
22 to talk to you about damages. And that's
23 because AII was found to be in default in this
24 case. And what that means is that AII, my
25 company, did not respond to plaintiffs' legal

1 claim within the required time frame.

2 MS. MCVEY: Objection, Your Honor.

3 THE COURT: I'll tell you what. Approach.

4 (Whereupon a bench conference was
5 held.)

6 THE COURT: Tell me what the objection is.

7 MS. MCVEY: She just said the only reason
8 they are here is because they were in default
9 and didn't file timely.

10 THE COURT: Ms. Flynn, I've told you what
11 I told the jury is that the law, by law, you've
12 been found liable. Please don't do that again.
13 Sustained.

14 MS. MCVEY: Thank you, Your Honor.

15 (Bench conference concluded.)

16 THE COURT: Objection is sustained.

17 MS. FLYNN: I did tell you before that AII
18 is here by operation of law. Sadly, I did not
19 have the opportunity to truly defend this
20 company before you. Had I been able to do so,
21 I would have told you that they are a
22 family-owned company in California. It was
23 started by a man named Mr. Ryzman who
24 immigrated to the United States. And he
25 basically went door to door -- he started the

1 company going door to door selling false nails
2 and eyelashes. He would literally wear them
3 himself and go door to door, and that's how his
4 business started. Today that's still AII's
5 main business. They're still located in
6 California, one building, a family-owned
7 company.

8 For a brief period of time, from 1987 to
9 2017, they sold Clubman talc. While I was not
10 able to put on evidence or defend AII in this
11 case, the plaintiffs could have put on a case
12 against AII, and they did not. They showed you
13 no evidence that there was ever any asbestos in
14 the pharmaceutical-grade talc that they elected
15 to use, they showed you no evidence that AII
16 intentionally ignored or disregarded any
17 information that any pharmaceutical --

18 MS. MCVEY: Objection, Your Honor.

19 THE COURT: Yes, the objection is
20 sustained. They have been -- ladies and
21 gentlemen of the jury, by operation of law,
22 they have been found liable, and they have been
23 found liable on the averments of the complaint,
24 which includes multitudinous discussion of the
25 content of their Clubman talc. And they are

1 liable for injuries suffered as a result of the
2 content of their talc. And that is how the
3 matter was pled, and by law they have been
4 found liable for that.

5 You may proceed. Objection is sustained.

6 MS. FLYNN: Ladies and gentlemen, in this
7 final phase of trial, you do not have to award
8 damages. Punitive damages are intended to
9 punish a defendant for extraordinary and
10 outrageous misconduct and to prevent the
11 defendant from committing similar acts in the
12 future. Punitive damages can only be awarded
13 when the evidence clearly and convincingly
14 establishes that the defendant was actually
15 reckless and willful and wanton.

16 Now, over the last week and a half,
17 Mr. Perry's -- almost two weeks now --
18 Mr. Perry's lawyers have showed you evidence
19 related to Johnson & Johnson. Please
20 understand that AII is not associated with
21 Johnson & Johnson, and the evidence that you
22 saw does not apply to us and should not be
23 considered against American International
24 Industries.

25 The situation in which we find ourselves

1 does not reflect the reality of AII's business
2 practices. And the heart of the case as to AII
3 is essentially this: We've not been shown to
4 have done anything wrong and should not be
5 punished.

6 MS. MCVEY: Objection, Your Honor.

7 THE COURT: By operation of law, AII has
8 been found liable for a tort, the commission of
9 a wrong, the infliction of an injury on
10 Mr. Perry. It is not correct to argue that
11 they have not been shown to have done anything
12 wrong. By operation of law, they have been
13 found to have injured Mr. Perry.

14 So the objection is sustained.

15 MS. MCVEY: Thank you.

16 MS. FLYNN: To award punitive damages
17 against AII in this case would be like going
18 into a room where something is broken and
19 beating your kid over it. It's not right. We
20 ask ourselves if it's fair to punish someone
21 without knowing anything about them.

22 In conclusion, I ask you to consider the
23 lack of evidence that's been presented to you
24 against AII. We respectfully request that you
25 refrain from punishing a company that you heard

1 nothing about and please place a zero next to
2 AII on the verdict form. I apologize. I'm a
3 little bit nervous. This is a big deal for the
4 company, and so I just ask that you please take
5 a look at the evidence and place a zero next to
6 AII's name. Thank you.

7 THE COURT: Thank you, ma'am.

8 Ms. Bueno. Ms. Bueno for Defendant
9 Johnson & Johnson.

10 MS. BUENO: Thank you, Your Honor.

11 THE COURT: Yes, ma'am.

12 - - -

13 CLOSING ARGUMENT BY MS. BUENO

14 - - -

15 MS. BUENO: Thank you, ladies and
16 gentlemen, for the last two weeks of your time.
17 I am so appreciative of the time and energy you
18 put into this case, and we hear you. On behalf
19 of Johnson & Johnson, we hear you. We respect
20 your decision and we appreciate you being here.
21 We needed you. We had a dispute that we could
22 not resolve outside of the courtroom, which is
23 why we needed you and your service. And we
24 thank you for it.

25 You're here in this stage to figure out

1 whether to punish Johnson & Johnson. And the
2 conduct that you're considering is the
3 company's conduct, not mine. So if I did
4 something in this trial, if I asked a question
5 in cross-examination, if I took an action that
6 you thought was inappropriate, you hold that
7 against me. I ask you not to punish my client
8 for it.

9 And I'm going to spend a little time today
10 talking to you about the evidence you've heard,
11 because what you're being asked to do is figure
12 out whether or not a company is reprehensible.
13 And so I want to talk through some of the
14 evidence you heard that I'd ask you to think
15 about as you're figuring out what number, if
16 any, to put on that line.

17 You heard about Johnson & Johnson doing
18 more than any other cosmetic talc company. You
19 heard that we exceeded industry standards. We
20 did more when we tested our talc. And I'm not
21 going to go through and do my whole closing
22 argument again. That's not appropriate here
23 and I don't want to waste your time. But I ask
24 you to remember that it wasn't just
25 Johnson & Johnson, but it was the FDA who was

1 looking at our products bought off the shelves,
2 that symposiums were held, not with
3 Johnson & Johnson, but with the FDA and
4 specialists and toxicologists who looked at the
5 issue and determined that cosmetic talc was not
6 a health hazard. And I ask you to remember
7 about other testing you've seen, the fact that
8 we put documents on the Web for anybody to look
9 at. There was not an effort to conceal the
10 information.

11 And I ask you to remember Dr. Kuffner. We
12 did not bring an expert witness to this trial,
13 as plaintiffs pointed out over and over again,
14 but we brought the head doctor of a large
15 company, Dr. Kuffner. And Dr. Kuffner, when I
16 asked him about the allegations in this
17 courtroom about Johnson & Johnson hiding
18 information from the FDA and not telling the
19 FDA our findings, he told you that that was not
20 true. And he said, "That's not true, and so I
21 reviewed the company documents. And I also
22 talked about my time in the company from 2006
23 until today. And that's not how the company
24 behaves."

25 And this is a big company, no question.

1 \$70 billion is a lot for a net worth. But that
2 amount is for a lot of different subsidiaries,
3 tens of thousands of employees. And I heard
4 counsel say that a company is not flesh and
5 blood. And, you know, that's technically
6 correct, but it is, right? We're talking about
7 conduct of people, of people. And there's a
8 lot of people that make up this company,
9 doctors and scientists from all over the world.

10 So that big number you hear is not related
11 to talc, it's not related to talc sales. And
12 keep in mind, if you will, please, that the one
13 time the FDA found asbestos in talc, that small
14 amount, within two days this company made the
15 decision to take that lot off the market
16 immediately. And Johnson & Johnson no longer
17 sells talc, talc-based Johnson's Baby Powder.
18 And so one of the things that Justice Toal told
19 you was the purpose of punitive damages in part
20 is to deter, which means to stop behavior from
21 continuing. This product is no longer on the
22 market.

23 Dr. Kuffner, the head doctor, I also asked
24 him about the allegations in this courtroom and
25 the fact that there are claims that

1 Johnson & Johnson knew there was asbestos and
2 sold it anyway. And I asked him what he
3 thought about that. And he told you that he
4 was insulted by that allegation because, as a
5 physician, he's dedicated his whole life to
6 caring for patients, protecting patients, as
7 have the other physicians and nurses and
8 pharmacists on the safety team. And so it goes
9 against who we all are as health care
10 professionals. And so, yeah, it cuts right to
11 the heart when I hear that.

12 Look, I wasn't back with you in the jury
13 room, obviously. I have no idea how you came
14 to check "yes" for Question Number 8, whether
15 you thought our conduct was willful, whether
16 you thought it was wanton, whether you thought
17 it was reckless. I don't know the severity of
18 your feelings about this. But one thing I know
19 for sure is that a lot of the documents that
20 you saw in this trial were from many decades
21 ago. They were from the '70s, '60s, a time
22 when the people who are currently at this
23 company were not there. And the people who
24 were there are no longer with the company.
25 This company is a different company today. So

1 if your goal is to punish conduct that happened
2 those decades ago, I'd just ask you to take
3 that into consideration, as well.

4 And, again, as the judge told you and as
5 you heard, you don't have to award punitive
6 damages in this case. You have already given a
7 large award to Mr. Perry and Mr. Long, which we
8 respect, and we thank you again for your time.
9 I wish there was more I could say and answer
10 questions for each of you. I wish I could sit
11 there and hear your decision and why. And I
12 can't do that; so I don't know what I can say
13 right now, other than thank you, and thank you
14 for being here. On behalf of
15 Johnson & Johnson, thank you.

16 THE COURT: Thank you, Ms. Bueno.
17 Mr. Adams in reply?

18 MR. ADAMS: Thank you, Your Honor.

19 - - -

20 REBUTTAL ARGUMENT BY MR. ADAMS

21 - - -

22 MR. ADAMS: They told you they hear you,
23 "We hear you. We hear you." And then they
24 went and they reargued what you've already
25 seen, that the FDA said it was okay, that they

1 didn't really know, that it wasn't so bad, that
2 they exceeded industry standards with the tests
3 that said you could find a billion asbestos
4 fibers in a bottle and say it wasn't there.

5 They haven't heard you at all. If they
6 heard you, they would have got up and said,
7 "We're sorry. We'll never do it again." But
8 they got up and they said, "We exceeded
9 industry standards." They haven't heard a
10 thing. Please make them hear you.

11 My math was wrong. 1 percent is
12 \$700 million. .1 percent is 70 million.
13 Please make them hear you.

14 MR. BROWN: Your Honor, we object. May I
15 approach?

16 THE COURT: Yes.

17 (Whereupon a bench conference was
18 held.)

19 MR. BROWN: It's just the same.

20 THE COURT: You've obviously given them a
21 number. I understand that. Overruled.

22 MS. MCVEY: Thank you.

23 (Bench conference concluded.)

24 THE COURT: Objection is overruled.

25 MR. ADAMS: They said they never hid it

1 from the FDA. You've seen Dr. Hutchinson's
2 report in the '70s, where he found the same
3 asbestos that everyone else had found. They
4 hid the report and they convinced the FDA
5 everybody else got it wrong. And then they got
6 away with it for 70 years. And they just got
7 up in front of you and said, "This happened a
8 long time ago." It happened a long time ago
9 because they hid it from the American public
10 for 70 years.

11 It's late. Everybody wants to go home.
12 Don't let them get away with it, please. This
13 is a big deal. You heard that from AII when
14 they came up. This is a big deal. You know
15 what's a big deal? What Michael Perry is going
16 through. There's a fly (indicating). It's at
17 the worst time. But that is a big deal. This
18 is money. What Michael is going through is a
19 big deal.

20 This happened a long time ago? I'm going
21 to leave you with this. This didn't happen a
22 long time ago. This is May 9th, 2020, after
23 the FDA found it, found the asbestos, took
24 pictures of it. They sent it to RJ Lee.
25 RJ Lee found the same thing, and then they told

1 the American public it wasn't there. And you
2 know what they did next? They sent out this
3 press release saying, "We're taking it off the
4 market, but it's not because it's not safe."
5 And then they said, "Existing inventory will
6 continue to be sold through retailers until it
7 runs out." Sell it all, even the last drop.
8 Sell it. Sell all of it, and get up and take
9 zero responsibility after you told them they
10 are responsible.

11 Please do the right thing. Thank you so
12 much.

13 THE COURT: Thank you, Mr. Adams.

14 Ladies and gentlemen of the jury, you may
15 retire to your jury room.

16 JURY FOREPERSON: May I ask you a
17 question?

18 THE COURT: Yes, ma'am. Do you have it in
19 written form there?

20 JURY FOREPERSON: Yes, ma'am.

21 THE COURT: Let the bailiff bring it to
22 me. Thank you.

23 THE BAILIFF: (Handing.)

24 THE COURT: All right. "To be clear, who
25 does the money from punitive damage get paid

1 out to?" Signed by the foreperson of the jury.

2 Approach.

3 (Whereupon a bench conference was
4 held.)

5 THE COURT: I'm supposed to tell them to
6 Mr. Perry; is that right?

7 MS. MCVEY: Yeah.

8 THE COURT: Very good.

9 MS. PEPKE: It's a complicated question.
10 It doesn't all go to Mr. Perry, but I don't
11 know what their --

12 THE COURT: No, no, no. It's all his.
13 Out of that he pays his attorneys' fees, but it
14 all is his.

15 MS. MCVEY: Taxes.

16 THE COURT: Absolutely that will not be
17 said.

18 MS. MCVEY: He pays tax on it.

19 THE COURT: Absolutely.

20 (Bench conference concluded.)

21 THE COURT: Thank you, ma'am. The answer
22 to your question is: To Mr. Perry.

23 All right. You may go to your jury room.

24 (The jury exited the courtroom at this
25 time.)

STATE OF SOUTH CAROLINA
COUNTY OF RICHLAND

IN THE COURT OF
COMMON PLEAS
FOR THE FIFTH
JUDICIAL CIRCUIT

- - -

MICHAEL L. PERRY AND LONNIE	)	
L. LONG,	)	
	)	
Plaintiffs,	)	
	)	Case No.
vs.	)	2023-CP-40-04072
	)	
AMERICAN INTERNATIONAL	)	
INDUSTRIES, ET AL.,	)	
	)	
Defendants.	)	

HEARING BEFORE: THE HONORABLE JEAN H. TOAL
VOLUME I

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Columbia, South Carolina

REPORTED BY: Cynthia First, RPR, CRR
EveryWord, Inc.
P.O. Box 1459
Columbia, South Carolina 29202
803-212-0012

APPEARANCES:

DEAN OMAR BRANHAM SHIRLEY, LLP
 BY: RACHEL A. GROSS, ESQUIRE
 302 North Market Street, Suite 300
 Dallas, Texas 75202
 214-722-5990
 rgross@dobslegal.com

and

KASSEL MCVEY
 BY: THEILE B. MCVEY, ESQUIRE
 1330 Laurel Street
 Columbia, South Carolina 29202
 803-256-4242
 tmcvey@kassellaw.com
 Representing the Plaintiffs

NELSON MULLINS RILEY & SCARBOROUGH, LLP
 BY: MITCHELL BROWN, ESQUIRE
 BY: A. MATTISON BOGAN, ESQUIRE
 Meridian, 17th Floor
 1320 Main Street
 Columbia, South Carolina 29201
 803-7900-2000
 mitch.brown@nelsonmullins.com
 matt.bogan@nelsonmullins.com
 Representing Defendants Johnson & Johnson; LTL
 Management, LLC; J&J Holdco (NA), Inc.; Janssen
 Pharmaceuticals, Inc.; and Kenvue, Inc.

APPEARANCES (Continued)

BUTLER SNOW

BY: KIM BUENO, ESQUIRE

BY: AMY M. PEPKE, ESQUIRE

1400 Lavaca Street, Suite 1000

Austin, Texas 78701

737-802-1820

kim.bueno@butlersnow.com

amy.pepke@butlersnow.com

Representing Defendants Johnson & Johnson; LTL
Management, LLC; J&J Holdco (NA), Inc.; Janssen
Pharmaceuticals, Inc.; and Kenvue, Inc.

FOX ROTHSCHILD

BY: STEPHANIE G. FLYNN, ESQUIRE

BY: NICHOLAS J. CHERRY, ESQUIRE

2 West Washington Street, Suite 1100

Greenville, South Carolina 29601

864-751-7607

sgflynn@foxrothschild.com

ncherry@foxrothschild.com

Representing Defendant American International
Industries

1 testing came in from Dr. Hopkins anyway. So
2 they still got everything in to the jury about
3 Johnson & Johnson's so-called negative testing
4 anyway. To this whole crying foul about the
5 spoliation order and Your Honor committed all
6 this error is just not accurate. Your Honor
7 was very clear. They got it in to the jury
8 anyway. There was no error.

9 I think I just kind of blasted through
10 everything really quickly, because I know
11 you're in a hurry, but do you have any
12 questions?

13 THE COURT: No.

14 MS. GROSS: Okay. I'll take my seat.

15 THE COURT: I'm going to turn to
16 Ms. Flynn. Please make it quick, Ms. Flynn.

17 Ms. Stephanie Flynn on behalf of AII.

18 MS. FLYNN: Yes, Your Honor. Thank you.

19 And we did file reply briefs on Friday,
20 and I sent those to Your Honor by e-mail. I
21 did bring a couple of extra copies today.

22 THE COURT: Yes, ma'am. I saw them.

23 MS. FLYNN: Okay. So I do think we really
24 largely covered -- I'm glad we filed those
25 reply briefs, so hopefully that will help you

1 out.

2 THE COURT: Yes. I think a good deal of
3 what you argued derivative of what
4 Johnson & Johnson argued has been covered. All
5 right. You do have some things that are
6 specific to the AII verdict, so go ahead.

7 MS. FLYNN: I do, yes, Your Honor. And I
8 wanted to start out by saying we do adopt the
9 arguments made by Johnson & Johnson --

10 THE COURT: Yes, I know.

11 MS. FLYNN: -- to the extent relevant to
12 us, obviously.

13 As you know, Your Honor, we moved during
14 the trial for a directed verdict on the issues
15 of fraudulent misrepresentation and punitive
16 damages. The basis for that is because default
17 does not mean that the pleadings are beyond
18 reproach. AII can still attack the sufficiency
19 of those, so that's what we were doing during
20 the trial.

21 We do have a problem with the fact that
22 the allegations in the pleadings were made in a
23 global conclusory way. Asbestos cases are so
24 different from most of the cases that you see
25 in these courtrooms and that --

1 THE COURT: Ms. Flynn, I don't think it's
2 necessary for you to argue much of that. You
3 could not accept the entire time this case was
4 tried what a default means. A default means
5 that you are liable. It's not just the
6 averments of the complaint and their
7 specificity or lack of. It is a finding of
8 complete liability for what it is alleged his
9 injury is, and the fact -- and the allegation
10 that you caused it. That cannot be contested
11 any further.

12 And a lot of what was done was an attempt
13 to revisit that or try to redefine what a
14 default means and what liability means.

15 So I understand you have arguments about
16 that, but I think my rulings are pretty clear
17 about that. And I know you disagree with me,
18 and that's fine. You've got a record on your
19 brief on that. I would move on to some other
20 things.

21 MS. FLYNN: Thank you, Your Honor. I will
22 do that.

23 The other -- moving beyond to that --
24 moving beyond that, obviously, we've argued as
25 the third point for our JNOV that AII was not

1 in default on the inoperative.

2 THE COURT: Yes, you argued that because
3 you answered the amended complaint, you are not
4 in default, and you've cited some law that you
5 think supports your point of view about that.

6 That's not the law of South Carolina, in
7 my view. I've ruled that way in the course of
8 trial, and my views have not changed since
9 then.

10 So, again, I think there was no error by
11 the Court in not recognizing your attempt to
12 answer the amended complaint.

13 MS. FLYNN: I understand, Your Honor. And
14 our only point on that would be that there is
15 no law in South Carolina. The plaintiffs cited
16 law from five states, five other states, where
17 we have cited South Carolina federal law that
18 does agree with us. And South Carolina has
19 precedent to say that you can look to federal
20 law when there's no state law on the issue.
21 That's what we did, and the South Carolina
22 District Court agrees with us on this. So
23 those are the cases we cited. We think the
24 Court should look to those cases and not to
25 case law from other states.

1 THE COURT: All right.

2 MS. FLYNN: As grounds for a new trial,
3 Your Honor, we moved on the basis that we had
4 no notice that this was essentially going to
5 turn into a combined damages hearing and trial
6 situation against Johnson & Johnson. There are
7 certain notice requirements under Rule 55(b).
8 The plaintiff first should apply to the Court
9 for a default judgment. In addition to that,
10 they have to serve AII, per Rule 5(a), by
11 First-Class Mail.

12 This is not a permissive rule. We think
13 that the Court's order on our default judgment
14 also required them to do the same thing. We
15 think that the trial subpoena that was served
16 on me by FedEx is not sufficient in that regard
17 to accomplish what's intended by this rule.

18 Plaintiffs argue that this is a
19 technicality, that there was no actual harm to
20 us because we were here and we did participate
21 in the trial. And I certainly understand that
22 argument. The problem with that is that if AII
23 is not relieved from its technicality --

24 THE COURT: Let me ask this: You were
25 aware for many, many months that this case had

1 been set for trial when it was set for trial,
2 were you not?

3 MS. FLYNN: Yes, Your Honor.

4 THE COURT: I put out those orders at the
5 beginning of the year. This was way into the
6 year. So you had been notified, and you knew
7 from the very beginning that your client was in
8 default. By the time you got this case, you
9 knew your client was in default, and you knew
10 the trial had been set at the time it was set.
11 So I don't understand the contention that
12 somehow or another you weren't knowledgeable.

13 In addition to that, we had many
14 pretrials. We had many motions hearings on
15 this case. You attended them. We had pretrial
16 on this case. This was not something where
17 there was some sneaky effort to at the last
18 minute suddenly schedule a trial at which your
19 default would be a part of the equation for
20 liability.

21 MS. FLYNN: I think that --

22 THE COURT: So it's not a mere
23 technicality. It's the absolute knowledge you
24 had throughout the entire history of the many,
25 many hearings held on this and the early

1 setting of it for trial.

2 MS. FLYNN: We absolutely understood the
3 trial date and that a trial was going to
4 happen. What we didn't understand was how the
5 damages hearing was going to be held in
6 conjunction with that, especially when --

7 THE COURT: You elected to try -- that's
8 completely untrue. You understood that it was
9 going to be a trial to determine that because
10 you elected. You had the ability to have the
11 judge try it or the jury try it. The reason I
12 allowed it to be tried by the jury is because
13 you insisted on that. Did you not?

14 MS. FLYNN: I do not think we insisted on
15 either one. The election to try it before a
16 judge or a jury is the plaintiffs' election.
17 It's not my election.

18 THE COURT: Pardon me. I'm saying the
19 plaintiff elected -- and that wasn't an
20 election made at the last minute. The
21 plaintiff does get to elect it. The plaintiff
22 elected to have the damages tried, and that was
23 done months before the case was tried, and you
24 had notice of that.

25 MS. FLYNN: If that's the case, they

1 should have complied with the specific --

2 THE COURT: Well, I understand your
3 argument, but I think what was done fully
4 complied with the requirements.

5 MS. FLYNN: And I understand Your Honor's
6 position, ruling on that. Our position would
7 be that AII was held in default on a
8 technicality by not answering --

9 THE COURT: AII was held in default
10 because they did not answer and didn't even
11 engage you as a lawyer until well after that.
12 And only at that time did you try to get them
13 to undo the default, which they declined to do.

14 So I understand your arguments about it.
15 Please don't -- we are at about quarter of
16 5:00, so let's move on.

17 MS. FLYNN: Yes, Your Honor.

18 I'm trying not to repeat anything.

19 Some of these arguments, as you
20 understand, are repetitive, including our
21 motion to vacate default. I think all of the
22 arguments that we make to vacate default are
23 included --

24 THE COURT: I understand why you want to
25 make a record of it at this time, and I accept

1 that.

2 MS. FLYNN: So a lot of that is included.

3 We did include as part of our JNOV an
4 objection to the Court's charge number 4. I
5 think Mr. Brown touched on this a little bit
6 about what happened in connection with that. I
7 think there are multiple errors in connection
8 with that charge that the defendants, plural,
9 were told to the jury to have stipulated to the
10 total economic losses.

11 Then, in addition to that, it was added on
12 to that that AII had also stipulated to the
13 past actual medicals of \$510,000. And when
14 doing that, the Court told the jury that that
15 was another element of loss, when it was
16 talking about the extra \$510,000, and then
17 stated to the jury, when you saw those two
18 figures added together, 3 million and 329-some
19 thousand and then 510,000, that's what was
20 meant. So if you're going to award anything,
21 that is what to consider.

22 So that effectively amounts to maybe three
23 different problems with that charge. And we
24 think that the jury did follow that, and that
25 that's what they awarded when they looked at

1 it. Essentially -- it essentially doubled
2 the --

3 THE COURT: What you have ignored or
4 choose not to bring into this record at this
5 time is the reason I charged it, made that
6 charge, was because the jury requested some
7 information about that. So I supplied that
8 information by simply saying this piece of the
9 claim for damages is arrived at by putting
10 together these two numbers.

11 MS. FLYNN: Everything that I've just
12 talked about was during the original charge
13 read to the jury before any jury questions or
14 anything else. That was all -- this was all
15 part of the actual original charge are what
16 points we're making in this argument.

17 THE COURT: Well, okay.

18 MS. FLYNN: And I won't go on about that.
19 I just think -- you know, we think that it was
20 problematic that the jury was bound to follow
21 that charge and it doubled the actual amount.

22 THE COURT: I don't think I directed them
23 to make any particular finding, and I stay with
24 that.

25 MS. FLYNN: Your Honor, I really think

1 that most of our arguments and everything are
2 covered in our briefing and in our reply
3 briefing.

4 THE COURT: I agree with that.

5 MS. FLYNN: I don't know that there's
6 anything additional that we need to make over
7 and above what we've said in our written
8 briefing or what we've adopted from J&J's
9 arguments.

10 THE COURT: All right.

11 MS. FLYNN: Unless the Court has some
12 questions for me about what we've briefed, and
13 I'm happy to answer any questions that you
14 have, but otherwise I'm happy to sit down.

15 THE COURT: All right. That's good.

16 MS. MCVEY: Your Honor, I'm going to be
17 two minutes on this argument.

18 THE COURT: All right.

19 MS. MCVEY: Let me just say that we'll
20 fully incorporate all of our briefing to
21 respond to that.

22 THE COURT: All right.

23 MS. MCVEY: Just going briefly to charge
24 number 4, when you were talking about economic
25 stipulation. When Ms. Flynn talked about

1 defendants, plural, stipulating to
2 \$3.3 million, that was the J&J entities you
3 were talking about. It was plural in the
4 verdict form and everything else. It was clear
5 what you were explaining. You can read it one
6 way if you want to, which is how she's doing
7 it, but it was clear to me and everybody else
8 that you were giving what the different parties
9 had stipulated to in that charge, and that you
10 didn't even say to AII. That's why they called
11 the economist and all that kind of stuff, too.

12 The jury also had the written jury charge,
13 each one of them did, to look at those
14 stipulations. And it was clear as day what was
15 happening there; so I don't believe there was
16 any confusion.

17 Just briefly on this notice argument. It
18 has been clear, and I have had many
19 conversations with Ms. Flynn and her
20 co-counsel, Mr. Peck, how this trial would go
21 forward, meaning the liability portion would go
22 forward against any remaining defendants, and
23 AII would be around to contest any damages to
24 the extent they wanted to do that.

25 They certainly did that in this case. And

1 we know that they had notice because before
2 this trial ever started, you'll recall that
3 they filed a petition for writ of certiorari in
4 the Supreme Court talking about the trial and
5 the damages was going to start. On
6 June 29th -- that was on June 28th.

7 On June 29th of 2024, they moved to stay
8 this case in front of you, the trial and
9 damages. And at the pretrial hearing, AII
10 admitted and, of course, knew and did say they
11 were going to come and participate in this
12 trial.

13 The purpose of Rule 55 is so when you look
14 at a default against a defendant who never
15 appeared, and then I don't give you notice that
16 I'm going to have a damages hearing so you can
17 contest the damages, that's what that purpose
18 is. There is no question they had all the
19 notice on Planet Earth, because they moved to
20 get out of default about 17 times, and we've
21 heard it all the way through.

22 So I do want to just point out one last
23 thing about suggesting numbers in a verdict.
24 You and I disagreed about suggesting a number
25 for the punitive verdict. In fact, they cited

1 you Rule 8, which has only to do with
2 pleadings. It has nothing to do with whether
3 or not an attorney can suggest numbers to a
4 jury in a verdict. You recall that they
5 suggested zero. That's a number.

6 So this tit-for-tat stuff, Mr. Adams was
7 unkind in his closing, you'll recall that
8 Ms. Bueno also called Michael Perry a liar and
9 suggested that he magically found these bottles
10 of Johnson's Baby Powder. They were so old and
11 they happened to be somewhere else. It's
12 called argument. And I don't want to get into
13 the merits of all that, but the idea that they
14 could suggest a number and we can't suggest a
15 number, and somehow that's wrong, is a little
16 infuriating to me.

17 Now, Mr. Adams made it clear the jury
18 could do whatever they wanted to do with the
19 numbers. There's no question. And I kind of
20 admire how Mr. Brown went through and kind of
21 figured out how maybe the jury came to these
22 numbers, but that's total speculation.

23 He clearly asked for \$2 million a year for
24 each year of his life that he would lose, which
25 I think added up to, like, \$70 million, and

1 they gave him a fraction of that.

2 So, Your Honor, we believe these verdicts
3 are appropriate. They are not excessive. The
4 difference in these talc verdicts are that the
5 plaintiffs are so much younger. They're so
6 much younger. They have active economic loss.
7 Before we started the trial, there was \$3.2
8 million in stipulated economic loss, before we
9 even got to any of the noneconomic topics and
10 everything else that was going on.

11 And he was only 53 years old. And the
12 jury heard about not only that he was going to
13 die, but they were going to find out in
14 November, which is coming up, that his pleura
15 had already doubled, and it was going to be a
16 painful, horrific, agonizing death. His
17 husband was going to have to watch him do that.

18 This is not a much older person who has
19 lived a full life. This is something very
20 different from that. And we believe this
21 verdict is not excessive in any way, and we ask
22 that you not remit it.

23 I think that's the only other point that
24 hadn't really been addressed as to AII. I'm
25 happy to answer any other questions as to their

1 motion, but I know time is tight.

2 THE COURT: All right.

3 MS. MCVEY: Last thing, the setoff motion.

4 We have obviously given them the full credit

5 for the full amount of the total settlements.

6 We have not chosen to allocate leading to a

7 future wrongful death claim, even though Jolly

8 says that we can here. So they're getting a

9 dollar-for-dollar setoff.

10 So as we take that into account, I think

11 the total -- the total gross settlements were

12 \$11,255,000, Your Honor. And so if you --

13 THE COURT: So the total setoff is 11 --

14 MS. MCVEY: \$11,225,000. And I have sent

15 you an itemized listing.

16 THE COURT: Right.

17 MS. MCVEY: And then I've given you the

18 releases.

19 THE COURT: So the way that setoff would

20 work is it's allocated between AII and

21 Johnson & Johnson?

22 MS. MCVEY: No, ma'am. They both get the

23 full credit off the compensatory damages. So

24 the total compensatory verdict was

25 32 million -- I didn't write it down.

1 Let me tell you this way: When we take
2 the total verdict combined and you subtract the
3 \$11,255,000, the full amount of the setoff --

4 THE COURT: Right.

5 MS. MCVEY: -- Johnson & Johnson and AII
6 would be jointly and severally liable for
7 \$21,431,250. And the reason why they're --

8 THE COURT: And that's actual?

9 MS. MCVEY: That's actual damages. Then
10 Johnson & Johnson would be responsible for --

11 THE COURT: And that means none of it is
12 being applied to the loss of consortium?

13 MS. MCVEY: It is. I just combined it all
14 together because it's a straight
15 dollar-for-dollar setoff. It doesn't matter.

16 THE COURT: So, again, when you come up
17 with the 21,431,250, which is the net after
18 setoff, is that the net off of the combination
19 of the Michael Perry and Long verdicts?

20 MS. MCVEY: Yes.

21 THE COURT: Okay. I understand what
22 you've done.

23 MS. MCVEY: Yes. So I'm just giving a
24 flat-out dollar for dollar. We could allocate
25 50 percent and 50 percent, but it comes out to

1 the same number.

2 THE COURT: Right.

3 MS. MCVEY: So the actual damage award,
4 then judgment for Johnson & Johnson and AII,
5 because they're jointly and severally liable in
6 this case --

7 THE COURT: Right.

8 MS. MCVEY: -- because they were both
9 found to be reckless, is \$21,431,250. And then
10 Johnson & Johnson would be responsible for
11 \$30 million in punitive damages and AII would
12 be responsible for \$760,000 in punitive
13 damages.

14 THE COURT: Okay.

15 MR. BROWN: Your Honor, very briefly. I
16 know we are running out of time.

17 There was an allusion to an Avon claim in
18 bankruptcy. We don't know the significance of
19 that, but I know it's a claim. It's not money
20 they've received, but it could be a very
21 substantial number. We don't have any
22 information about what that number is. And
23 Avon also is involved in this.

24 MS. MCVEY: Avon is in bankruptcy, so
25 we're not getting paid any potential settlement

1 STATE OF SOUTH CAROLINA IN THE COURT OF
2 COUNTY OF RICHLAND COMMON PLEAS
 FOR THE FIFTH
 JUDICIAL CIRCUIT

3 - - -

4 MICHAEL L. PERRY AND LONNIE)
 L. LONG,)
5)
 Plaintiffs,)
6) Case No.
 vs.) 2023-CP-40-04072
7)
 AMERICAN INTERNATIONAL)
8 INDUSTRIES, ET AL.,)
)
9 Defendants.)

10

11 HEARING BEFORE: THE HONORABLE JEAN H. TOAL
12 VOLUME II

13

14 DATE TAKEN: Wednesday, September 25, 2024
15 TIME BEGAN: 9:30 a.m.
16 TIME ENDED: 10:37 a.m.
17 LOCATION: Richland County Judicial Center
18 1701 Main Street
19 Courtroom 3B
 Columbia, South Carolina

20 REPORTED BY: Cynthia First, RPR, CRR
21 EveryWord, Inc.
22 P.O. Box 1459
 Columbia, South Carolina 29202
 803-212-0012

23

24

25

1 APPEARANCES:

2

3 DEAN OMAR BRANHAM SHIRLEY, LLP
4 BY: RACHEL A. GROSS, ESQUIRE
5 302 North Market Street, Suite 300
6 Dallas, Texas 75202
7 214-722-5990
8 rgross@dobslegal.com

9 and

10 KASSEL MCVEY
11 BY: THEILE B. MCVEY, ESQUIRE
12 1330 Laurel Street
13 Columbia, South Carolina 29202
14 803-256-4242
15 tmcvey@kassellaw.com
16 Representing the Plaintiffs

17

18

19 NELSON MULLINS RILEY & SCARBOROUGH, LLP
20 BY: A. MATTISON BOGAN, ESQUIRE
21 Meridian, 17th Floor
22 1320 Main Street
23 Columbia, South Carolina 29201
24 803-7900-2000
25 matt.bogan@nelsonmullins.com
Representing Defendants Johnson & Johnson; LTL
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Pharmaceuticals, Inc.; and Kenvue, Inc.

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1 APPEARANCES (Continued)

2

3

BUTLER SNOW

BY: KIM BUENO, ESQUIRE

4

BY: AMY M. PEPKE, ESQUIRE

1400 Lavaca Street, Suite 1000

5

Austin, Texas 78701

737-802-1820

6

kim.bueno@butlersnow.com

amy.pepke@butlersnow.com

7

Representing Defendants Johnson & Johnson; LTL
Management, LLC; J&J Holdco (NA), Inc.; Janssen
Pharmaceuticals, Inc.; and Kenvue, Inc.

8

9

10

FOX ROTHSCHILD

BY: STEPHANIE G. FLYNN, ESQUIRE

11

BY: NICHOLAS J. CHERRY, ESQUIRE

2 West Washington Street, Suite 1100

12

Greenville, South Carolina 29601

864-751-7607

13

sgflynn@foxrothschild.com

ncherry@foxrothschild.com

14

Representing Defendant American International
Industries

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P R O C E E D I N G S

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THE BAILIFF: All rise.

THE COURT: Thank you. Please be seated.

All right, ladies and gentlemen. This is Michael L. Perry and Lonnie L. Long against American International Industries and Johnson & Johnson, defendants, 2023-CP-40-04072.

Welcome to the River Bluff students. Glad to have you with us this morning.

Ladies and gentlemen, what I propose to do is give you a very broad outline of what I'm thinking about.

On the successor liability issue, which is separate and apart from the verdict issue but an issue we agreed to defer and consider before we closed out the posttrial. I respect Mr. Brown as much as any lawyer that has practiced in front of me, and his scholarship was well done, but I simply can't make the leap on the basis of conventional motions of successor liability.

I think *Nationwide* does guide us about

1 what South Carolina would do, but some courts
2 have gone further and looked at the issue that
3 is worrying me the most about successor
4 liability in connection with Johnson & Johnson,
5 and a series of other entities created in the
6 wake of the massive increase in tort litigation
7 throughout the United States related to
8 allegations that Johnson & Johnson products,
9 particularly baby powder, contain asbestos and
10 that those products have caused its users in
11 certain rare instances to develop cancers, the
12 most common of which are mesothelioma, a
13 disease of the lining of the lungs, and ovarian
14 cancers of various sorts. In the wake of the
15 continuing litigation in this area,
16 Johnson & Johnson chose to restructure the
17 corporation.

18 The allegation of the plaintiffs is that
19 that restructuring was an attempt to avoid
20 liability in connection with the averments in
21 this case that Johnson & Johnson's baby powder
22 caused Mr. Perry to develop mesothelioma, now
23 diagnosed and predicted to end his life in just
24 a few years.

25 Certainly, it's almost uniformly true

1 throughout the state courts that successor
2 liability can be found when an entity
3 purposefully tried to divest itself of assets
4 in order to avoid known liability or claimed
5 liability that have resulted in litigation.

6 I note with interest that Oregon, when the
7 *Lee* case arose in state court, has some very
8 robust case law on this issue and does not
9 allow successor liability, but its case law is
10 much reflective of our own *Nationwide* case.

11 And I think what's important to note about
12 *Nationwide* is there's not a requirement of a
13 finding of fraud in its most pejorative sense;
14 but if there is a finding of deliberate
15 attempts to shield or escape liability for
16 already known claims of liability, then that's
17 enough to trigger the rule in *Nationwide* that
18 successor corporations will not be a means of
19 allowing the corporation first charged with
20 responsibility to evade that responsibility.

21 And that's how I look at successor
22 liability in the big picture. Much case law
23 has been argued, and I'll expect to have that
24 included in the proposed orders that are given
25 me on the topic. That is the way I rule on

1 that issue.

2 With respect to Johnson & Johnson's
3 motions for JNOV and AII's motions for JNOV,
4 they are almost entirely claims of errors of
5 trial with respect to decisions made about the
6 admission and nonadmissibility of evidence and
7 other activity by the Court, including
8 excluding certain testimony, limiting certain
9 testimony, and the Court's directions to the
10 jury during trial and charges thereafter.

11 All those undergird the motions -- the
12 motions for judgment non obstante veredicto. I
13 deny those motions.

14 New trial absolute in and of itself is, in
15 J&J's instance, not materially different from
16 the motion JNOV. It does include a greater
17 emphasis on some of the activities by the judge
18 in the trial of the case and the charges.

19 New trial absolute for AII is like its
20 motion of JNOV, primarily a tag onto the
21 arguments of J&J.

22 The arguments that AII makes particular to
23 it are, first, that I should have set aside the
24 default or that, even if I allowed the default,
25 they did not receive a fair trial on damages

1 because of violations by the plaintiffs of
2 certain civil procedure rules in that regard as
3 well as unfairness by the Court.

4 I deny the motions for a new trial
5 absolute. And in particular with regard to
6 AII, I believe that the very lengthy time
7 between the Court's orders with respect to
8 setting your case for trial, the Court's orders
9 with respect to how the case was to be tried in
10 the pretrial hearings, all of which were known
11 to AII and all of which the court proceedings
12 were participated in by AII, conform with any
13 requirements of the civil procedure rules with
14 respect to notice.

15 With respect to 13th juror, I'm very
16 familiar with this area. The *Folkens* case is
17 one I know well, and it sets forth some very
18 clear guidelines for 13th juror and does
19 emphasize, as Mr. Brown did in his arguments,
20 that the Court does not give a reason, because
21 what 13th juror literally means is that the
22 Court hangs the jury by weighing in and saying
23 the verdict is incorrect and should have been a
24 verdict for the defendant, for example, in this
25 case.

1 And that's all the Court has to say, is
2 I'm invoking my authority as the 13th juror to
3 weigh in against the verdict as it is rendered,
4 and therefore that results in a hung jury and
5 results in a new trial.

6 I decline to use the 13th juror doctrine
7 to interfere with the decision that the jury
8 made.

9 Then there is the motion by the defendant
10 J&J for a new trial nisi remittitur. I grant
11 that motion. And the question is what are the
12 parameters of that nisi remittitur?

13 And I'm going to say I still have not
14 gotten my calculator out and figured this out
15 for the next time, but I am very mindful, as I
16 decide how to remit this verdict, of the fact
17 that Johnson & Johnson and AII will receive the
18 benefit of a very substantial amount already in
19 the pipeline for the plaintiff as a result of
20 settlement agreements.

21 I have examined each. They are fair.
22 They are reasonable. And I find that the
23 overall accumulation of \$11 million in actual
24 damages is fair and reasonable. And that very
25 much influences my thought about what is fair

1 and reasonable as far as the \$63 million
2 verdict, of which the part remitted is an
3 actual damage verdict and a punitive damage
4 verdict.

5 The relationship between the two does not
6 violate the rules that we have with respect to
7 the percentage of punitive damages, which are
8 limited in South Carolina by statute to three
9 times the amount of actual damages. The
10 punitive damage award in this case does not
11 violate that statute.

12 And that also weighs heavily in my thought
13 about how to structure this thing.

14 I do not consider this verdict a runaway
15 verdict. And although I am mindful of the
16 contentions that were made about the argument
17 of Mr. Adams, the contention being that on that
18 basis alone, the verdict should be overturned
19 because the argument -- Mr. Adams' argument
20 appealed to the passion and prejudice of the
21 jury and I did not sufficiently honor the
22 objections that were made or direct Mr. Adams
23 in that regard sufficient to save the verdict
24 from the taint of being an appeal to passion
25 and prejudice. I don't find -- I was

1 dissatisfied with some of what Mr. Adams did.
2 I have reflected that at trial. I reflected
3 that yesterday as we argued these motions
4 originally. I do not think that that conduct
5 rises to the level of something that appeals to
6 passion and prejudice.

7 And I say that in light of everything that
8 happened in the trial, and I also say that in
9 light of the substantial sum that was projected
10 by the parties that did so, \$11 million, when
11 the primary claim was against Johnson &
12 Johnson, because that is the -- when all the
13 other exposures are discussed, and they were
14 discussed in the course of the trial of the
15 case, they pale in comparison to the heavy
16 exposure to Johnson & Johnson's product.

17 I think the jury -- as I've said
18 previously in reaction to the motion for a new
19 trial absolute and the motion of JNOV by
20 Johnson, I believe the jury was well within its
21 ability to look at the scientific and medical
22 information and corporate information that was
23 made available in the trial to conclude that
24 Johnson & Johnson's baby powder contained
25 asbestos, that the company knew about it for

1 years, that the company did not issue warnings,
2 did not sufficiently test, tested in a way that
3 guaranteed a result, all of this revealed in
4 the papers of the corporation and the testimony
5 of its former corporate representative and
6 high-level executive officer, Dr. John Hopkins.

7 And, in fact, that testimony was done by
8 video, and the parameters of that testimony
9 were agreed to by both parties, those parties
10 that did agree to endorse everything that
11 Dr. Hopkins said. And I don't mean to suggest
12 that, but the parties agreed to put that
13 testimony before the jury.

14 So its admissibility and the admissibility
15 of matters included in that testimony cannot
16 now be challenged. They were admitted by the
17 agreement of the parties.

18 And that testimony, first and foremost, is
19 the testimony that would have justified the
20 findings of responsibility that the jury made,
21 information out of Johnson & Johnson's records.

22 That testimony was supported by expert
23 testimony of experts whose qualifications were
24 examined in detail by me before this trial
25 started with strong contentions by the opposing

1 parties to the experts by the plaintiff and
2 defendants that they weren't qualified, that
3 they shouldn't be allowed to express an
4 opinion, that I should not qualify them.

5 I denied most of those motions. I limited
6 certain expert -- certain witnesses presented
7 by Johnson & Johnson in two ways.

8 Johnson & Johnson's corporate
9 representative was Dr. Kuffner. He is a
10 high-level medical officer, chief medical
11 officer of Johnson & Johnson. For years the
12 designated corporate representative was
13 Dr. John Hopkins. Dr. Kuffner has taken his
14 place.

15 They testified, each of them, not because
16 they were offered as experts nor qualified by
17 the Court, as they must be as experts; they
18 were offered as fact witnesses and as the
19 person who at Johnson in the trial of the case.

20 With Dr. Kuffner, at a certain point the
21 defense attempted to introduce through
22 Dr. Kuffner expert testimony of a geological
23 nature and of a medical nature and of a
24 scientific nature with respect to the causation
25 issue with regard to Johnson & Johnson, whether

1 its material contained asbestos and whether
2 what it contained could have caused the
3 mesothelioma that Mr. Perry contended was the
4 baseline of his tort claim against Johnson &
5 Johnson.

6 With respect to geological evidence, I
7 qualified the expert in geology. But with
8 regard to their medical experts and their
9 geology, I made one limitation, and that was
10 that they were not qualified to express a
11 medical opinion on the cause of Mr. Perry's
12 mesothelioma.

13 They intended to express the opinion that
14 his mesothelioma was spontaneous or idiopathic.
15 The word "idiopathic" simply means we don't
16 know. It's not a medical diagnosis. And I
17 noticed that that was, in past cases I've
18 tried, the original way this issue used to be
19 discussed.

20 But "spontaneous" is also a way of talking
21 about this. That's a "we don't know" thing as
22 well. It simply means it must have erupted on
23 its own because we know no medical or other
24 kind of reason that would explain how this lung
25 became damaged by mesothelioma.

1 They're not attributing it to asbestos;
2 they're not attributing it to anything. They
3 are saying that there's a spontaneity that
4 exists that caused it.

5 I find over time that that theory is not
6 well supported by scientific materials. And a
7 host of scientific material was put at issue in
8 this trial, much of it pretrial; much of it is
9 exhibits in the trial. I read every single
10 piece of it.

11 And the conclusion I reached, that I
12 reached pretrial, that "spontaneity" and
13 "idiopathic" are not medical diagnoses, was
14 made in the light of the materials submitted to
15 me upon which I was asked to judge the
16 competency of the expert witnesses to issue the
17 testimony they're going to issue.

18 So, again, with respect to the experts
19 that were offered in this area by Johnson &
20 Johnson, I certainly allowed all of them to
21 testify, but I limited the testimony of
22 Dr. Weill, Dr. Diette, and Mr. Sanchez in that
23 regard.

24 There was another expert that was
25 attempted to be -- that was going to be

1 proffered, and I indicated that I would admit
2 that expert testimony and denied motions by the
3 defendants to strike that witness or limit that
4 witness. I did not limit Dr. Barlow.
5 Dr. Barlow could have gotten up here and
6 testified in the sphere of her expert opinion.
7 Johnson & Johnson chose not to offer that
8 witness when its turn came to present its case.
9 So for all those reasons, the conclusions that
10 I reached are that a fair trial was had.

11 I think the best I can say about the
12 amount comes straight out of one of the finest
13 posttrial orders I have ever had the privilege
14 of reading and one that I recommend for your
15 attention as you each submit a proposed order
16 to me, and that is the order in Garvin against
17 AGCO Corporation and many others. The cite is
18 2012-CP-40-6675. It is an order issued by
19 Judge -- then trial Judge Gary Hill, who served
20 at my appointment when I was chief as the
21 leader of the asbestos docket.

22 D. Garrison Hill signed an order on
23 November 14th, 2014, in which he did
24 essentially what I'm going to do in this case.
25 He affirmed the -- he denied motions for

1 judgment notwithstanding the verdict and new
2 trial absolute, but he granted the defendant's
3 motion for a new trial nisi remittitur, and he
4 nisi'd the order.

5 And what he did -- he was looking at an
6 \$11 million award. He reduced that to
7 \$1.5 million; and a punitive damage award,
8 which he reduced from \$11 million to
9 \$3.5 million. And he let the loss of
10 consortium award stand as it was initially
11 decided.

12 So I give that as some outline of what
13 I've decided to do.

14 But how much should the nisi remittitur
15 be? I've had a hard time deciding that, I'll
16 be honest with you. I think it ought to
17 reflect a fair increase above what is set off.
18 And there are a lot of ways of figuring these
19 percentages, even using Judge Hill's
20 percentages.

21 Some things that differentiate the Perry
22 case from the *Garvin* case are, first of all,
23 the age of the plaintiff. That worked in --
24 that was one thing that Judge Hill considered
25 significant in reducing the verdict.

1 Also, the economic loss projected for
2 Mr. Garvin was substantially different from the
3 economic loss presented in this case.

4 And, of course, the life expectancy.
5 Mr. Garvin's life expectancy was about 10
6 years, as I recall it, while Mr. Perry's life
7 expectancy is something north of 27 years, as I
8 recall it. So there are a lot of differences
9 there.

10 And, quite honestly, if I applied the
11 literal differences between this award and
12 Judge Hill's award, the nisi would be pretty
13 slight, if any, in terms of fitting it into the
14 variables. But I do think that some reduction
15 should be made.

16 With respect to Michael Perry's other
17 damages -- with respect to Michael Perry's
18 actual damages, his actual damages are the
19 combination of 19,237,5 and 3.8, if I'm not
20 correct. And I would combine those together.

21 Now, and let me also say another thing,
22 that what I would do is look at the ratio
23 between the loss of consortium and Perry's
24 actual damages to make my reductions.

25 The loss of consortium, I think Mitch is

1 probably right about how they figured it. They
2 used a figure per year, and that's the figure
3 that was used in trial to make some account of
4 the competence testimony about the present
5 value of the right to receive money over a
6 period of time. I think that's the concept the
7 jury used. And I will try to use that same --
8 and I will try to use that same kind of logic
9 if I reduce the verdicts.

10 With respect to the punitive damage
11 verdict, the first thing is, of course, none of
12 the \$11 million setoff applies to the punitive
13 verdict. The punitive damage sits at
14 30 million freestanding.

15 I think punitive damages are appropriate
16 in this case because of the intentional
17 conduct. And I think the jury was well within
18 its rights to find that the conduct -- that the
19 predicate for the conduct, which is the finding
20 of willful, wanton conduct, allowed the finding
21 of actual damages.

22 And it is also significant that the jury
23 also found -- that the jury in Johnson &
24 Johnson's case did not find fraudulent
25 misrepresentation. In the case of AII, it

1 found fraudulent representation. Why? Because
2 that was alleged in the complaint and AII
3 defaulted.

4 And I depart here for a moment to say that
5 was the source of a constant exchange between
6 myself and the counsel for AII, and it's
7 continued up to our posttrial arguments.

8 And it's just a -- I respect Ms. Flynn.
9 Stephanie Flynn is one of the finest defense
10 lawyers we have. She's doing the bidding of
11 her client, and I don't criticize that. I've
12 sat in that chair many times during the course
13 of my trial practice and suffered some defeats
14 in that regard.

15 But "default" means what it says. And
16 they try somehow to say the damages claim has
17 to be set by the court and, therefore, this
18 fraudulent conduct doesn't count in some kind
19 of way.

20 They allege fraud as a part of their
21 deliberations. The jury found fraud with
22 respect to AII, as they must; and therefore,
23 AII had a firmer predicate for the finding of
24 the verdict of -- and that coupled with the
25 fact that they also found willful, wanton -- by

1 clear and convincing evidence found willful,
2 wanton, and reckless conduct on the part of J&J
3 goes a long way in my mind to the feeling -- to
4 the ruling that in the case of AII on the front
5 end, I will not grant a new trial nisi
6 remittitur. I will let the verdict stand as
7 the jury wrote it, which was a punitive damage
8 verdict of \$760,000 for AII, along with a --
9 and then AII, of course, is jointly and
10 severally liable with Johnson & Johnson for the
11 actual damages. There's no separation there.
12 That's part of the situation that the
13 contributions under the Joint Tortfeasors Act
14 puts us in with respect to actual damages for
15 any defendants who go to trial.

16 So that's the situation for joint AII. I
17 want to make that clear on the front end before
18 we then proceed to look at the punitive damage
19 situation with respect to Perry.

20 I have not got a calculator to do this my
21 way, but I am going to say my preliminary
22 thought is to remit \$3 million of the actual
23 damage loss of consortium verdict so that the
24 loss of consortium would be reduced by that
25 amount.

1 And with respect to the actual damage
2 verdict, my current inclination is to reduce
3 the actual damage verdict by \$6 million for
4 Mr. Perry.

5 Now, what I would like for you all to
6 do -- that's not my final ruling because I'm
7 still going to read some of the things that
8 have very newly been submitted to me as rulings
9 by other courts that bear on this matter.
10 That's my initial reaction to what to do about
11 this.

12 I would like posttrial orders to be like
13 this:

14 Ms. McVey, I would like for you to submit
15 a posttrial order in two weeks.

16 MS. MCVEY: Your Honor, can I submit it
17 quicker than that?

18 THE COURT: Yes, you can.

19 MS. MCVEY: Okay. I think we can get you
20 a posttrial order by Monday.

21 THE COURT: Okay. If you submit it by
22 Monday, I will give defendants until -- let me
23 look at my calendar. The plaintiffs will --
24 plaintiff will submit its proposed order which
25 covers all the topics I've raised.

1 And with respect to the remittitur, can
2 frame it as I have framed it but offer
3 alternatives. I will close that out.

4 MS. MCVEY: Okay.

5 THE COURT: And that will be done by
6 September the 30th -- close of business
7 September the 30th.

8 MS. MCVEY: Yes, ma'am.

9 THE COURT: With respect to defendants,
10 I'm going to turn it to you, Mr. Bogan. You
11 got any suggestions to make time-wise for your
12 reply?

13 MR. BOGAN: Today is Wednesday; so --

14 THE COURT: Yes.

15 MR. BOGAN: She's doing it in five days.
16 I mean, you want ours by the following Monday,
17 whatever that is, the 8th -- or the 7th?

18 THE COURT: How do you feel about that?
19 Can you do it by that time, or do you need
20 till --

21 MS. MCVEY: Ideally, we will get it done.
22 I don't want to rush Mr. Bogan, but I am
23 concerned about the timing of not entering --

24 THE COURT: Well, that's the only thing.
25 The volatility of this situation -- we're going

1 to talk about that in a minute.

2 Mr. Bogan, why don't we just go on and say
3 the Monday following her Monday.

4 MR. BOGAN: October 7th?

5 THE COURT: That's correct, October 7th.

6 MR. BOGAN: Judge, I know she's going to
7 draft the orders as you've outlined, but one
8 thing -- not to back up, but I heard you rule
9 on punitives for AII, but did you give your --

10 THE COURT: I uphold punitives for each
11 party. But with respect to AII, I choose not
12 to remit any amount of the punitive damage
13 verdict, 750 or 780, whatever it was.

14 With regard to actual damages, of course,
15 AII is in it like y'all are. It's the
16 contribution on joint tortfeasors.

17 MR. BOGAN: And I just missed, Your Honor,
18 you saying you were upholding for both parties
19 on punitives. I just didn't hear that part.

20 THE COURT: I uphold both parties
21 punitive -- well, I uphold the award of
22 punitive damages, but I nisi remit the amount.
23 So, in essence, I grant a new trial on nisi
24 remittitur. If the plaintiff accepts the
25 amount of the nisi, then that's what happens,

1 correct?

2 MR. BOGAN: Oh, yes, ma'am. I wasn't
3 contending. I just didn't know if you were
4 reducing punitives in any way for J&J. That's
5 the question I was asking.

6 THE COURT: Yes. That's what I just got
7 done saying, I think.

8 MS. MCVEY: You reduced the actual damages
9 award to what I understand to be \$15 million --
10 no. I'm sorry. You reduced the loss of
11 consortium award by \$3 million, the actual
12 damages --

13 THE COURT: Oh, okay. I didn't give you a
14 number on the --

15 MR. BOGAN: That's all I was asking.

16 THE COURT: I'm going to reduce the amount
17 of the punitive damage verdict. Okay?

18 MR. BOGAN: Thank you. So I wasn't
19 meaning to be persnickety.

20 THE COURT: Yes.

21 MS. MCVEY: And, Your Honor, just as we --
22 when we talk about ratio --

23 THE COURT: Yes.

24 MS. MCVEY: -- even if you reduce his
25 actual damages amount the way that you have --

1 THE COURT: Yes.

2 MS. MCVEY: -- you're still well within
3 any kind of acceptable ratio.

4 THE COURT: You were to begin with. You
5 would be if I didn't take a dime off of the
6 punitives as awarded.

7 MS. MCVEY: That's right. And the only
8 reason I say that is you went through a lot of
9 what the Garvin order said. And the biggest
10 thing for Judge Hill -- Justice Hill now; Judge
11 Hill then -- because I was in that case, is
12 that Mr. Garvin, as you mentioned, was older,
13 but he also had testicular mesothelioma.

14 THE COURT: That's correct.

15 MS. MCVEY: Which at the time was cured.

16 THE COURT: Right.

17 MS. MCVEY: That was very different than
18 what Mr. Perry has.

19 THE COURT: No question about it.

20 MS. MCVEY: So I just wanted to make
21 sure -- I don't think that was ever in the
22 record; so I wanted to make sure that's --

23 THE COURT: No, that was in the record and
24 in his order. That is specifically recited in
25 his order. And, yes, that bears on what you

1 may say as you respond to what my preliminary
2 reduction would be.

3 MS. MCVEY: Okay.

4 THE COURT: I look at Garvin as a
5 touchstone for me. And so, as you contemplate
6 what you're going to write back -- there are a
7 lot of things that will be written that have to
8 do with the rulings made at trial and so forth
9 and so on; but as you contemplate how you want
10 to respond, I look at this as a guideline.

11 Now, I will say about the Garvin verdict,
12 the landscape has changed radically since that
13 case was tried. First and foremost, the
14 average verdicts are much higher now all across
15 the country with respect to -- particularly
16 with respect to cosmetic talc-type cases.

17 With respect to industrial mesothelioma
18 cases, they are also higher. And there are
19 several interesting articles that are in the
20 literature about that. But with respect to
21 talc and cosmetic product verdicts, the
22 verdicts are very, very different than they
23 were when Garvin was decided, no question.

24 MS. MCVEY: Yes, ma'am.

25 THE COURT: They're very, very different

1 from when I tried the first three J&J cases I
2 cited, and the verdicts were for the defendant
3 or a hung jury in each one of them.

4 MS. MCVEY: That's right.

5 THE COURT: So there is a difference.

6 But the other thing about the landscape
7 that is very different that we're going to talk
8 about here in a minute is what
9 Johnson & Johnson has done to reformulate
10 itself by the use of bankruptcies.

11 And that concerns me deeply about what
12 happens with this case and where it stands in
13 line if that activity persists.

14 MS. MCVEY: Thank you, Your Honor.

15 THE COURT: Okay. So with respect to the
16 punitive damage verdict, what I'm saying is
17 this: I am going to remit that verdict, but I
18 have not decided what the amount is. And I
19 will take suggestions about that.

20 If the defendant chooses to make
21 suggestions, they will be done in complete
22 preservation of its contention that the trial
23 was not fair to them and that the verdict
24 amounts were not fair to them and greatly
25 exceeded what was justified by the evidence

1 offered. And that's fine.

2 Now, there is, of course, this whole
3 matter of how the parties should be structured.
4 And let's talk about that for a minute.

5 Just in the course of since the case has
6 ended, as the verdict was announced,
7 Johnson & Johnson made another significant
8 shift in its corporate status. And, Ms. McVey,
9 recite for the record what that was.

10 MS. MCVEY: Your Honor, the day that the
11 verdict came in after Johnson & Johnson
12 multiple times told this Court and us that LTL
13 was the proper party -- I'm sorry. I'm getting
14 them confused. It was LTL, but this was LLT
15 was the proper party and would be able to
16 satisfy any judgment. The day this verdict
17 came in, LLT had been dissolved. And so
18 there's --

19 THE COURT: And what happened to its
20 liabilities, if you know?

21 MS. MCVEY: It went to, I believe,
22 Pecos -- to Pecos, P-E-C-O-S, River.

23 THE COURT: Right. Then I received a
24 motion from the defendants posttrial to
25 substitute Pecos for LLT. Correct?

1 MS. MCVEY: Yes, ma'am. And my suggestion
2 had been -- because they gave us a declaration,
3 but it's totally one-sided. And they may be
4 totally right.

5 But instead of substituting out, why
6 wouldn't we just add Pecos in if that's what
7 they're saying is the proper entity?

8 THE COURT: All right. That's what you
9 request?

10 MS. MCVEY: Yes, ma'am.

11 THE COURT: All right.

12 MS. MCVEY: That way, it makes us not have
13 to go dig into all this stuff right now that's
14 not necessary. What we want to do is have the
15 right people who are responsible for the
16 judgment, and they may be right. And if LLT
17 doesn't exist, then it will be Pecos River.
18 But at least we'll have Pecos River in without
19 taking out LLT to the extent they're not right.
20 That's just what I understand.

21 THE COURT: All right. I want to turn
22 after this -- and after I ask some questions of
23 the defense about this particular piece of it,
24 I want to turn to the broader question of how
25 any judgment would be secured, because I'll

1 tell you on the front end, I'm not entitled to
2 pause or stay the judgment -- or I'm going to
3 issue a judgment order in this matter. So what
4 could be the possible security of that is
5 something I want to talk about.

6 But I'm going to turn to you now, lawyers
7 for Johnson & Johnson, and ask you first: Do
8 you have the ability to make a representation
9 now that Pecos could be added rather than
10 substituted? Do you have the authority to do
11 that?

12 MS. PEPKE: We don't have the authority,
13 although I have sent offer requests to the
14 client to consider the suggestion.

15 THE COURT: All right. So I think what's
16 happened here is that I don't -- I am not
17 inclined -- I am inclined to protect this
18 verdict by adding Pecos rather than
19 substituting, but I am not going to do that
20 because I don't think the -- I think the
21 defense ought to be given a fair shot at
22 consulting with the corporate party, the
23 representation of the companies involved,
24 before they indicate anything about that. And
25 that, I'm sure, can be done during the time

1 period we have before the orders -- proposed
2 orders come.

3 MS. MCVEY: And I think that makes sense.
4 So what we'll likely do in our proposed order
5 is add Pecos in.

6 THE COURT: Right. And understanding that
7 I haven't made a decision one way or another
8 about that, but then I'm going to await what
9 they have to say about it.

10 MS. MCVEY: I think that's fair, and I'm
11 happy to give that to them. And I think
12 ultimately you can order it even if their
13 client can't be --

14 THE COURT: I probably could, but I prefer
15 to let them have the ability to check with
16 their client about that.

17 Then there's the broader question of how
18 this judgment, as it's finally issued by me,
19 can be secured. And I'm going to turn first to
20 the defense to talk about it, because they've
21 done some thinking about that, I think.

22 All right. So, Mr. Bogan, would you speak
23 to that for me.

24 MR. BOGAN: Yes, ma'am.

25 I think the suggestion Mr. Brown made

1 yesterday that I could reiterate again here
2 today would be a bonding mechanism of securing,
3 if Your Honor would be so inclined to permit
4 that. I think it's in your discretion, if you
5 allow that, to bond the judgment off.

6 And in particular -- I mean, it's Rule 62,
7 Your Honor, as you know. But also I would cite
8 to 18-9-130(A) (1) (a) is the bonding statute
9 that talks about sufficient security there. So
10 that would be our suggestion.

11 I mean, other alternatives would be paying
12 them into court. I don't have the authority to
13 offer that, but that's another alternative to
14 securing it. Because I know they're -- you've
15 mentioned priority of bankruptcy and other
16 things. But Johnson & Johnson is not in
17 bankruptcy; so a bond would be my suggestion,
18 Your Honor, if you'll permit that.

19 THE COURT: And what I will do is this:
20 I'm inclined to do a bond, but now I want to
21 know how it's securitized and what bearing
22 18-9-130(A) (1) (a) has. I'm familiar with this
23 section. It's changed over time since I was in
24 practice and used to represent companies that
25 issued these kinds of bonds. So --

1 MR. BOGAN: And, Your Honor, I would say
2 this: Obviously, once Your Honor makes a
3 decision about the total amount of reduction,
4 including punitives -- and I'm speaking to
5 ordinary practice, like you're talking about in
6 your experience, would be to go to a bonding
7 entity. AIG, for example, often bonds
8 judgments.

9 It would be who you use to bond it off,
10 depending on the amount, which bonding agent or
11 insuring agent you would go to. So we would,
12 of course, engage in all that depending on --

13 THE COURT: Sure, sure.

14 MR. BOGAN: I don't know that it's changed
15 much from what you remember, Your Honor. The
16 statute has changed but what happens hasn't.

17 THE COURT: Well, I was much engaged in
18 doing the work on an individual, large amount
19 of bonds type -- well, it was large for us in
20 those days, but nothing like what you see
21 now -- as well as draft a surety agreement. So
22 I have never delved into it in recent years to
23 see how much has changed since I used to draw
24 these instruments.

25 But what we'll do is just have you make

1 the specific proposal in the order proposal
2 that you make, if your client allows that. And
3 Mitch indicated there was some interest in
4 doing that.

5 MR. BOGAN: Yeah. And we would still
6 stand by that suggestion that we bond it. The
7 question would be to Your Honor specific is I
8 don't know yet who it would be. It would
9 depend on the amount that we need bonded, to
10 which --

11 THE COURT: Sure.

12 MR. BOGAN: -- entity you'd go to. That's
13 all I mean.

14 THE COURT: I understand. I understand.

15 MS. MCVEY: And just from our
16 perspective -- and we'll put it in our
17 potential draft -- they had wanted to bond only
18 25 million, and we would want the bond to be
19 the full amount of whatever the judgment is.

20 THE COURT: Yes, the bond needs to be in
21 the amount of whatever I remit to, or if I
22 don't, then they could -- y'all can come back
23 at another time, and they could say what they
24 want to secure and how, and you can reach some
25 kind of accommodation.

1 But I would vote -- and I just throw this
2 into the middle -- that, like the *Weist* case,
3 this might provoke some discussion amongst the
4 parties as to how to resolve this case.

5 This case is not in the same category at
6 all as the ones that are attempting to be
7 resolved by these various bankruptcies. The
8 mesothelioma cases are being treated very
9 differently, as I understand it.

10 We've talked informally amongst us about
11 some of that activity. But for the record, the
12 most recent activities involving various
13 corporate reconfigurations and restructuring by
14 Johnson & Johnson and its entities has been
15 aimed primarily at creating prepackaged
16 settlements, or prepackages, they're called, in
17 connection with ovarian cancer cases.

18 Mesothelioma cases are in a different
19 category and -- but they're going to be
20 affected, just like this case will be affected,
21 by all the so-called restructurings.

22 And that is why I am determined to have
23 orders that protect the collectibility of this
24 verdict at whatever amount it is or becomes or
25 is agreed to from all this other activity that

1 is going on.

2 And the defense lawyers -- these defense
3 lawyers -- Ms. Bueno, Ms. Pepke, and
4 Mr. Bogan -- are not the people that make these
5 decisions at all, and I'm keenly aware of that.
6 And I'm not going to bind them and ask them to
7 put something on the record today about that.
8 It just wouldn't be fair.

9 So that will be wrapped up in whatever is
10 submitted to me otherwise.

11 MR. BOGAN: Yes, ma'am. And all I would
12 say, Your Honor, is, in terms of the statute
13 which you're going to go look at that I cited
14 and the amount of the bond, I mean, as we stand
15 here, it's going to be -- the amount of the
16 bond is going to be whatever the new loss of
17 consortium number is, whatever the new actual
18 damages number is, whatever the new punitive
19 damages number is, minus the setoff --

20 THE COURT: Right.

21 MR. BOGAN: -- and I don't know if that
22 number is above 25 million or not because we
23 don't know the math yet.

24 THE COURT: I don't either.

25 MR. BOGAN: And so my point only is you

1 can read the statute and interpret it for what
2 it says. You don't need my argument on it
3 today. We're going to present plenty of stuff
4 to you. But we don't know the amount yet; so I
5 think we're a little bit ahead of ourselves on
6 deciding what it's going to be, whether it's
7 the full amount or 25 million under the
8 statute. And that will be to Your Honor to
9 decide.

10 THE COURT: All right. I understand that.
11 And nobody's giving away anything in that
12 regard.

13 Now, with regard to proposed orders,
14 Ms. Flynn, you have the same time period that
15 Johnson & Johnson has, which is October 7th, to
16 file your reaction to what they file.

17 MS. FLYNN: Yes, Your Honor. Thank you.

18 MS. MCVEY: Your Honor, we're going to
19 submit two separate orders, I think, one on
20 Johnson & Johnson and one on AII for the ease
21 of the two separate parties.

22 THE COURT: Certainly. I think that makes
23 plenty of sense.

24 Now, anything else that I need to cogitate
25 about?

1 MS. MCVEY: I don't think so, Your Honor.

2 THE COURT: All right. I just would again
3 reiterate that I am pretty firm in my decision
4 to remit this verdict, but the amounts are
5 subject to a lot of discussion, thoughtful
6 discussion by both sides. And I know you'll
7 give that. I would hope that it would be
8 thoughtful enough to resolve the matter,
9 because I'm always optimistic about such
10 things.

11 But at least I want to have both sides --
12 or all sides of the equation get enough
13 permission from their client to discuss
14 remission in their proposals.

15 MS. MCVEY: Okay.

16 THE COURT: Anything further?

17 All right. Thank you so much. And it's
18 been my honor to be the trial judge in this
19 very complex matter.

20 With all of the heartburn you go through
21 in the intensity of a trial, I again say that I
22 express my great admiration for all of you
23 attorneys. And tell Mr. Adams and the other
24 attorneys involved, Cowan and the others that
25 are not present today, that extends to them as

1 well.

2 Thank you so much.

3 MS. MCVEY: Thank you.

4 THE COURT: Court will be in recess.

5 - - -

6 (Proceedings were concluded at 10:37 a.m.)

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EXHIBIT 1

Page 14

1 before we get started, just a couple quick
2 things on the record. We'll do what we
3 always do for South Carolina depositions,
4 meaning in terms of stipulations, the
5 first one being obviously that this
6 deposition is being conducted pursuant to
7 the South Carolina Rules of Civil
8 Procedure.

9 Second is that all objections except
10 those as to the form of the question or
11 responsiveness of the answer are reserved
12 until the time of trial.

13 Third is one objection by a defendant
14 is good for all. That means you can mark
15 just "defense counsel" in the transcript
16 unless somebody specifically wants to opt
17 out. I've never heard of that happening
18 before, but just in case.

19 Fourth is that an appearance by a
20 defendant here today does not waive any of
21 their possible defenses. And that
22 includes any and all defenses. I'm not
23 going to list them out, but it doesn't
24 waive any of them.

25 Does any defendant have any

Page 15

1 stipulations they'd like to bring up to
2 add?

3 Okay. Well, then we can go ahead and
4 get started. Are we on? Okay.

5 BY ATTORNEY GROSS:

6 Q Good morning, Mr. Perry.

7 A Good morning.

8 Q Go ahead and introduce yourself to
9 everybody. Breathe. Breathe first and then go
10 ahead and --

11 A My name is Michael Perry.

12 Q Okay. How are you feeling today?
13 Are you nervous?

14 A I'm a little nervous. A lot, a lot
15 of processing right now. But I'm as good as I
16 can be on this day.

17 Q We're going to take it step by step,
18 question by question. We're going to get
19 through this, okay?

20 A Uh-huh.

21 Q Everybody will tell you if you need
22 to take a break at any time, you just let us
23 know. I'm going to keep my eye on you, though;
24 okay?

25 A Okay.

Page 16

1 Q All right.

2 A Thank you.

3 Q We are here today to take your
4 deposition. Do you understand that?

5 A I do.

6 Q Have you ever done anything like this
7 before in your entire life?

8 A I have been deposed before, but
9 nothing to this gravity.

10 Q How many times have you been deposed
11 before?

12 A Twice.

13 Q Was it for work?

14 A Work and a real estate venture that I
15 was involved in.

16 Q Got it. So never in any sort of the
17 personal injury capacity?

18 A No, sir -- or no, ma'am. Sorry.

19 Q That's okay. It happens all the
20 time. Don't worry.

21 Your deposition, Michael, is being
22 videotaped. And do you understand that this
23 video could be played to a jury later at trial?

24 A I do.

25 Q What is your understanding of why

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1 we're all here today?

2 A My understanding is to tell my story,
3 my journey that I'm going to take with, with
4 mesothelioma, and to find closure and hold the
5 individuals that caused this to me accountable.

6 Q Okay.

7 A And however that ends is the most
8 important thing to me, to make sure that my
9 family and loved ones are taken care of after
10 I'm gone.

11 Q Okay. I know this is going to be
12 hard. But, again, we're going to take this step
13 by step, question by question; okay?

14 A Yeah.

15 Q Okay. You've already mentioned it,
16 but have you been diagnosed with a disease?

17 A I was diagnosed with mesothelioma
18 back in July of 2023.

19 Q Okay. Do you have an understanding
20 of what causes mesothelioma?

21 A I do.

22 Q What's that?

23 A My exposure to asbestos.

24 Q Okay. How does sitting down for long
25 periods of time affect you physically right now?

Page 38 1 Q Okay. That being said, let's stick 2 with talc for a little bit; okay? 3 A Uh-huh. 4 Q I want to start with talc that you 5 used on yourself, so we're going to put your mom 6 to the side for now; okay? 7 A Okay. 8 Q Big-picture question: Can you tell 9 us the brands of talc powder that you remember 10 using on your body throughout your life? 11 A Yes. 12 Q Go ahead. 13 A Johnson & Johnson Baby Powder. 14 Johnson & Johnson Baby So Soft [sic]. Polo 15 Ralph Lauren talc. Drakkar fragrance talc. 16 Obsession Calvin Klein talc. Ammens talc. Gold 17 Bond talc powder. Equate powder. 18 I'm sure I've missed a couple, but 19 that's the ones that are right on the forefront 20 of my mind. 21 Q Did you use any of the powders that 22 you've named throughout your entire life as a 23 constant? 24 A Yes. 25 Q Which one?	Page 40 1 powder. You said just a second ago you used 2 that clear throughout your entire life; is that 3 correct? 4 A That's correct. 5 Q And same for Clubman? 6 A Clubman as well, yes. 7 DEFENSE COUNSEL: Objection to form. 8 BY ATTORNEY GROSS: 9 Q So for those, tell us the years -- 10 just so we're clear, tell us the years that you 11 remember using Johnson's baby powder and 12 Clubman. 13 DEFENSE COUNSEL: Form. 14 BY ATTORNEY GROSS: 15 Q You can ignore the objections. 16 Go ahead. 17 A It would have been 1974, '75, clear 18 up until the 1990s. 19 Q Okay. 20 A Excuse me. 2019. I apologize. 21 2019. 22 Q Okay. That's okay. Let me just ask 23 a cleaner -- let me just make sure it's clean, 24 okay? 25 You said just now you remember
Page 39 1 A Would have been the Johnson & Johnson 2 products. 3 Q Was there ever any other powder that 4 you used throughout your entire life in addition 5 to Johnson's baby powder? 6 A Clubman would have been one from my 7 childhood clear up to my adult. 8 Q Did you ever use a powder called 9 Stetson? 10 A Stetson. Yes, I did. It was not one 11 of my favorites. It was a gift, but it was one 12 of them that I used. 13 Q Were there any talc powders that you 14 remember your father using that you then used 15 yourself? 16 A One that I used was my father's 17 Old Spice talc powder. 18 Q So what I want to do is spend the 19 next few minutes, I want to just work our way 20 through these and see if we can't get a 21 framework for years. We've already touched on a 22 couple, but years in which you remember using 23 these powders, okay? 24 A Uh-huh. 25 Q So let's start with Johnson's baby	Page 41 1 starting to use Clubman and Johnson's baby 2 powder in about 1974, 1975; correct? 3 A Yes. 4 DEFENSE COUNSEL: Objection; form. 5 BY ATTORNEY GROSS: 6 Q And you used both up through 2019. 7 You just said that. 8 A That's correct. 9 DEFENSE COUNSEL: Objection; form. 10 BY ATTORNEY GROSS: 11 Q All right. Let's go through the rest 12 of the powders you said you remember. Well, 13 strike that. 14 Before we do that, how many 15 bottles -- this is going to be hard. But how 16 many bottles of Johnson's baby powder would you 17 say you purchased in a year on average 18 throughout your life? 19 A Oh, several. More than I could 20 count. 21 Q How about Clubman? 22 DEFENSE COUNSEL: Objection; form. 23 THE WITNESS: Several. 24 DEFENSE COUNSEL: Objection; 25 nonresponsive.

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1 ATTORNEY GROSS: That's not
2 nonresponsive, but that's fine.
3 BY ATTORNEY GROSS:
4 Q So you said you bought several
5 bottles --
6 DEFENSE COUNSEL: Does he recall how
7 many he bought?
8 ATTORNEY GROSS: You can -- counsel,
9 you can ask whatever you like on cross, so
10 let's get back.
11 DEFENSE COUNSEL: I'm sorry. I
12 thought you were engaging in colloquy.
13 BY ATTORNEY GROSS:
14 Q When you said you bought several
15 bottles of Johnson's baby powder per year --
16 A Uh-huh.
17 Q -- give us a flavor for how much
18 "several" is.
19 A How many bottles I bought a year?
20 Q If you can. But just give us a
21 flavor for how much "several" really means. I
22 mean, that could mean just about anything.
23 A Ten or more.
24 Q Okay. How about Clubman?
25 A Clubman --

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1 DEFENSE COUNSEL: Objection; form.
2 THE WITNESS: -- would be very
3 similar.
4 BY ATTORNEY GROSS:
5 Q Okay. Let's keep going. Gold Bond,
6 you mentioned Gold Bond. When is the first time
7 that you remember beginning to use Gold Bond on
8 yourself?
9 A Gold Bond would have been used mostly
10 when I was doing my sailing. That would have
11 been a product that I put in my shoes to help
12 with the smell and the growth that was --
13 because my shoes stunk so bad. So we put that
14 in my shoes to help keep that under control.
15 Q When did you start sailing, about?
16 A It was in the '90s.
17 Q Okay. When is approximately the last
18 time you remember using Gold Bond powder on
19 yourself?
20 A 2019.
21 Q Okay. And same question that I'm
22 going to ask you for all of those. How many
23 bottles of Gold Bond would you say you purchased
24 in a year on average?
25 A Several. That was another one that

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1 would have been, you know, a common purchase at
2 the store.
3 Q Got it. You also mentioned Calvin
4 Klein Obsession; correct?
5 A That's correct.
6 Q Okay. I'm just going down my list
7 here. When do you first remember using Calvin
8 Klein Obsession powder on yourself?
9 A Calvin Klein Obsession, I, when I,
10 when I was able and I was gainfully employed and
11 I had a little extra disposable income, I would
12 buy those types of products. They were always
13 fun to put something like that on when you're
14 going out to a bar or going to be around other
15 people. But I remember vividly that that was a
16 part of my culture, part of my routine back in
17 the '90s.
18 Q Okay. So starting in about the '90s
19 for Obsession?
20 A Yes.
21 Q Okay. When is the last time,
22 approximately, you remember using the Obsession
23 on yourself?
24 A It would have been pre-2019.
25 Q Pre-2019.

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1 A Yeah.
2 Q Why do you say "pre-2019"?
3 A Well, at that point in time, it was
4 not one of my favorites. And there is no need
5 to buy it anymore. Lonnie certainly didn't like
6 it.
7 Q Oh, Lonnie didn't like it?
8 A He didn't like it.
9 Q Okay. Which of your powders did
10 Lonnie like?
11 A It would have been Ralph Lauren.
12 Q Okay. Let's stick with Ralph Lauren,
13 then. When is the first time you remember using
14 Ralph Lauren on yourself?
15 A Ralph Lauren would have been used in
16 '90s as well, and I used that one pretty often,
17 even into my professional career.
18 Q When's the last time you remember
19 using Ralph Lauren about?
20 A That would have been pre-2019.
21 Q For the Ralph Lauren, how many
22 bottles, approximately, do you remember
23 purchasing in a year?
24 A It would have been several as well.
25 And this is when I was working, and I would have

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1 to go out to the mall. If I could find that on
2 sale or find an end cap, I would always buy a
3 bottle of that. So I always had a bottle of
4 Ralph Lauren somewhere, either in the car or in
5 my travel bag or at the house.

6 Q What about the Calvin Klein
7 Obsession; how often would you say you bought
8 bottles of that in about a year?

9 A Not as often. It wasn't one of my
10 favorites. But it would have probably been less
11 than six a year.

12 Q Okay. How about Drakkar Noir? When
13 do you first remember using Drakkar Noir powder
14 on yourself?

15 A That would have been also the 1990s.

16 Q Go ahead.

17 A And that would have been one of my
18 favorites as well, so that would have been a
19 heavy buy.

20 Q When you say "heavy buy,"
21 approximately how many bottles of Drakkar Noir
22 powder do you remember purchasing in a year?

23 A Six or more.

24 Q Would that have been something you
25 purchased as much as the Johnson's baby powder

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1 Eventually, I was able to say, "I don't want any
2 more of it." But that was one that I did use;
3 it just wasn't one of my favorites.

4 Q Do you remember about when you would
5 you have gotten that powder as a gift-ish?

6 A That was really one of my very first
7 ones.

8 Q Okay.

9 A So that would have been like 19 --
10 late 1980s, because it was a gift. It wasn't
11 coming out of my pocket. So, yeah, that would
12 have been 1980-something.

13 Q Okay. You also mentioned, when you
14 were listing off at the powders, you listed
15 Ammens, A-M-M-E-N-S; is that correct?

16 A That's correct.

17 Q When is the first time you remember
18 using this Ammens powder on yourself?

19 A It was would be in the 1990s.

20 Q And similar exercise, when's the last
21 time you remember using the Ammens powder on
22 yourself?

23 A That would have been, that product
24 was going to be used clear until, into the mid,
25 till later, 2000s. And that was because of the

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1 or the Clubman?

2 A Not as much. Johnson's baby powder
3 and Clubman were always my go-to for so many
4 other reasons. So I was always buying more of
5 that than I was scented powders.

6 DEFENSE COUNSEL: Objection; form.
7 BY ATTORNEY GROSS:

8 Q Got it. Okay. When was about the
9 last time you remember using the Drakkar Noir
10 powder on yourself?

11 A It would have been pre-2019.

12 Q Okay. So same, the years that we're
13 looking at are the same so far for Ralph Lauren,
14 Drakkar Noir, and Calvin Klein Obsession; is
15 that correct?

16 A Correct.

17 Q Okay. What about Stetson? What do
18 you remember -- when's the first time you
19 remember using Stetson powder on yourself? I
20 know you didn't like it that much.

21 A Stetson was a gift from a family
22 member. And, of course, with family members,
23 you better use it. But it was one of those that
24 I used. And I think that I got a couple
25 different Christmas gifts of it as well.

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1 rash and the jock itch that I would get from
2 working out on the farm or being on the boat.

3 Q Was Ammens a medicated powder?

4 A It is.

5 Q Again, same exercise: How many
6 bottles of Ammens powder would you say you
7 purchased in a year on average?

8 A It was several. But it really
9 depended on, I would buy more of it when I was
10 on the boat than I would when I was at the farm.

11 Q How long were you on that sailboat
12 for?

13 A Each tour was a week long. So we
14 were talking, you know, years that I was, I was
15 doing that program.

16 Q Okay. When is the, just so we get a
17 framework, you know, for these powders that you
18 say you used primarily or a lot on the sailboat,
19 just so we have a framework here, when did you
20 start doing that, those tour work on the
21 sailboat?

22 A Oh, I started doing tours in the
23 early 1990s.

24 Q Okay.

25 A Yeah.

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1 cows, the horses, the chickens, the goats, the
2 whole herd of our menagerie, they -- you know,
3 that was just part of trying to -- South
4 Carolina in June, July is incredibly, incredibly
5 hot. So trying to stay fresh was very
6 difficult. And the Johnson & Johnson products,
7 the Equate products was part of our culture on a
8 multiple-day -- a multi-day routine.

9 Q Let me ask you about Equate, because
10 you just brought it up. What do you remember --
11 well, strike that.

12 You told us earlier that Lonnie was
13 using Equate, and that's how you first became
14 accustomed to using it; correct?

15 A That's correct.

16 Q Okay. So given that -- tell us what
17 you remember about Equate and why you continued
18 to use it.

19 A Equate was just one of those products
20 that Lonnie -- I love Lonnie to death. I
21 absolutely love him to death, but sometimes he
22 could be the cheapest guy in the world. So he
23 would not splurge on the Johnson & Johnson
24 product. He would just splurge on Equate
25 because it just came down to simple economics.

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1 He just would not spend that money.

2 Q And did you use -- strike that.

3 I should have asked you this earlier,
4 and I forgot. Were you ever around Lonnie when
5 he would apply powder?

6 A Absolutely.

7 Q Okay. Tell us a little bit about
8 that.

9 A Lonnie and I, as a married couple or
10 as a living couple, cohabitating couple, we
11 would shower together. And we would dry off,
12 dry off each other, and then we would apply the
13 powders to each other or separately. But that
14 was part of our intimate process. We would just
15 take showers together. It was so much easier.

16 Q What powders do you remember Lonnie
17 applying to himself while you were around him?

18 A Certainly Equate, Johnson & Johnson,
19 and any of the fragrant powders that I used.

20 Q So you guys would intermingle your
21 products?

22 A Yes. Absolutely.

23 Q Which of your -- what did you call it
24 earlier? You used a specific -- your vanity
25 products?

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1 A My vanity products.

2 Q Your vanity products. Okay. Which
3 of your vanity products did Lonnie apply to
4 himself while you were around?

5 A Occasionally -- it was very, very
6 occasional. It would be the Ralph Lauren.

7 Q Did he not like any of the other
8 smells?

9 A Lonnie, Lonnie, as long as I've known
10 Lonnie, he has never put on cologne. Lonnie,
11 you get what you get with him, and he is what he
12 is. I love him to death. But if you, if you
13 didn't like how he smelled, he really didn't
14 care.

15 Q Did Lonnie feel one way or the other
16 about your Clubman powder?

17 A Yes. So --

18 DEFENSE COUNSEL: Objection; form.

19 THE WITNESS: -- Lonnie and I,
20 because of my use with Clubman clear back
21 to when I was a small child and going to
22 the barbershop with my father, the -- if I
23 may just veer off for a second, the barber
24 would utilize --

25 BY ATTORNEY GROSS:

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1 Q I'm going to ask you about that. So
2 just for now, let me re-ask the question just so
3 it's clean.

4 A Okay.

5 Q How did Lonnie feel about your
6 Clubman powder?

7 A He loved it.

8 DEFENSE COUNSEL: Objection; form.

9 THE WITNESS: And we would have
10 plenty of Clubman in the house that we
11 would use.

12 DEFENSE COUNSEL: Objection;
13 nonresponsive.

14 BY ATTORNEY GROSS:

15 Q So let me stick with Clubman for a
16 minute. What do you remember about Clubman and
17 why you used it?

18 DEFENSE COUNSEL: Objection; form.

19 THE WITNESS: Clubman I remember
20 clear as a small child when my father was
21 taking me to the barbershop. And it was
22 always a joy. We'd go there every couple
23 weeks. And at the very, very end of my
24 haircuts, the barber, because I was on the
25 big-boy seat in the chair, the barber

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1 would reach around me and I'd be in the
2 middle. And he would have this horsehair
3 brush and the wooden handle. And he would
4 shake the Clubman down into the horsehair
5 brush and then wiggle it a little bit.
6 And then he would start wiping Clubman all
7 over me, down my neck and so forth.

8 And that's how I've always remembered
9 that fond memory of the showmanship of the
10 barber, that he -- how he took time to
11 wipe me off. I dealt with that product --
12 not dealt with it, but I used that product
13 clear up until 2019. And then I stopped
14 using that product abruptly.

15 DEFENSE COUNSEL: Objection;
16 nonresponsive.

17 BY ATTORNEY GROSS:

18 Q What other ways, aside from the
19 barber, would you use Clubman?

20 A What other ways?

21 Q Yeah.

22 A I'd use it all over my body. Shake
23 it three or four shakes. Always up here in this
24 area, down my torso, underneath my armpits. I
25 loved the smell, the fragrance of Clubman.

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1 Q Was Clubman a powder that you had
2 during the years when you were on the sailboat?

3 A Yes. Clubman has also been a
4 Christmas gift that I was -- it was always -- I
5 always had Clubman. I think it's a very, very
6 masculine, macho-smelling powder.

7 Q Is that why Lonnie likes it?

8 A Yes.

9 Q How about Gold Bond; what do you
10 remember -- we've touched on the Gold Bond, that
11 you used it in your shoes. But what do you
12 remember about Gold Bond and why you used it?

13 A Well, I remember Gold Bond being --
14 you know, it's just a product that we could, we
15 could use readily. I used it in my shoes. It
16 was a source of a lot of fights with shooting
17 Gold Bond at each other, over the top of your
18 head because I'm sailing with all these guys and
19 so when we would all be together; it was like
20 sometimes like a big fraternity. And it wasn't
21 uncommon for someone to get a big glob of Gold
22 Bond right in the middle of their head just
23 being a brunch of frat boys.

24 Q Did you ever use Gold Bond for any
25 reason other than in your shoes?

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1 A I've used it on my hands. It really
2 depended on -- if I had to get into the engine
3 room, what product did I have that I could get
4 my hands dry and my face dry? And so sometimes
5 it was that Gold Bond.

6 Q And for the years in which you were
7 using Gold Bond in your shoes -- are you with me
8 so far?

9 A Years?

10 Q No. No, no, no, no. I'm just
11 orienting you where I'm going; okay?

12 A Okay.

13 Q So in the years in which you used
14 Gold Bond in your shoes, how close would your
15 face be when you would put that powder into your
16 shoes?

17 A I would just say, you know, a couple
18 feet.

19 Q Okay. Could you still see --

20 A Absolutely.

21 Q -- the powder in the air?

22 A Absolutely.

23 Q Did you breathe it when you'd use the
24 Gold Bond in your shoes?

25 A Absolutely.

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1 Q Okay. So you could smell the Gold
2 Bond when you put it in your shoes, right?

3 A Absolutely.

4 Q How about Old Spice? I know this one
5 is a little bit different, and you've talked to
6 us a little bit about it. But what do you
7 remember about Old Spice and why you used it?

8 A Old Spice really came back to trying
9 to emulate my father and his masculinity. It
10 was something that we shared together. It's
11 certainly not a fragrance that was one of my top
12 favorites. But it was always a fond memory of
13 the times my dad and I spent together.

14 Q How about Ammens? You told us
15 earlier that is a medicated powder; correct?

16 A Correct.

17 Q What do you remember about Ammens and
18 why you used it?

19 A Well, Ammens took care of some
20 nuisances when I was on the sailboat, being the
21 jock itch or the chafing that I would get from
22 being in wet suits all the time.

23 Q Was Ammens a powder that you and
24 Lonnie would have used on the farm as well?

25 A Absolutely.

EXHIBIT 124

Benjamin H. Adams (CSB 272909)
Conor R. Nideffer (CSB 253931)
Tyson B. Gamble (CSB 266677)
DEAN OMAR BRANHAM SHIRLEY, LLP
302 N. Market Street, Suite 300
Dallas, Texas 75202
Telephone (214) 722-5990
Facsimile (214) 722-5991
badams@dobslegal.com
cnideffer@dobslegal.com
tgamble@dobslegal.com

Attorneys for Plaintiffs

SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES, CENTRAL DISTRICT
COMPLEX ASBESTOS LITIGATION

Coordinated Proceeding
Special Title (Rule 3.550)

LAOSD ASBESTOS CASES

RITA-ANN CHAPMAN and
GARY CHAPMAN,

Plaintiffs,

vs.

AVON PRODUCTS, INC., et al.,

Defendants.

J.C.C.P. No. 4674

Case No. 22STCV05968

[Assigned to Hon. Lawrence P. Riff, Dept. 7]

**DECLARATION OF DR. STEVEN E.
HABER, M.D., F.A.C.P., F.C.C.P.**

Complaint Filed: February 16, 2022

Trial Date: September 26, 2022

1 I, Steven E. Haber, M.D., F.A.C.P., F.C.C.P., declare:

2 1. I am a physician licensed to practice in the States of Texas, Arkansas, New Mexico,
3 Mississippi, and Oklahoma. I have been Board Certified in Internal Medicine by the American
4 Board of Internal Medicine since 1989 and Board Certified in the subspecialty of Pulmonary
5 Diseases since 1992. I am a diplomate of the National Board of Physicians and Surgeons. I am a
6 Fellow of the American College of Chest Physicians and a member of the American College of
7 Occupational and Environmental Medicine and the American Thoracic Society. I am a Fellow of
8 the American College of Physicians. I maintain a medical practice in pulmonary disease,
9 occupational lung disease, and internal medicine. I have been actively practicing medicine for
10 more than 30 years in the fields of Internal Medicine and Pulmonary Diseases. My medical
11 licensure is current. Currently, I practice medicine at Respiratory Medicine Consultants in
12 Houston, Texas. I have hospital privileges at several Houston area hospitals.

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15 2. As part of my practice, I see patients with a variety of medical and pulmonary
16 diseases. I have diagnosed and managed patients with a variety of occupational pulmonary
17 diseases, including asbestos-related diseases. I have been involved in the diagnosis and
18 management of patients with malignant mesothelioma. I have extensive knowledge and clinical
19 experience in the area of occupational lung diseases. I am a certified B-reader from the Centers for
20 Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH),
21 and the Appalachian Laboratory for Occupational Safety and Health (ALOSH). I have been a
22 NIOSH-certified B-reader since 2003. I have published in peer-reviewed medical journals,
23 including on malignant mesothelioma. I have testified on behalf of plaintiffs and defendants in
24 litigation regarding asbestos-related disease, including mesothelioma. I have been accepted in both
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1 State and Federal courts as an expert in internal medicine, pulmonary medicine, and occupational
2 lung disease. A copy of my CV is attached (Exhibit A).

3 3. Pulmonologists evaluate and treat patients with diseases of the chest and respiratory
4 system. As an internist and pulmonologist, I have specialized knowledge of the pathophysiology,
5 biology, and disorders of the chest and respiratory system. Pulmonologists must also maintain
6 specialized knowledge of the epidemiology of diseases of the chest and respiratory system, which
7 is among the subjects upon which we are tested to obtain board certification. Additionally,
8 understanding disease causation is essential to our diagnostic duties. Pulmonologists may face
9 diagnostic situations with a broad differential diagnosis (the number of potential diseases
10 consistent with those of the patient). To focus diagnostic investigation more narrowly, particularly
11 when dealing with dust-related diseases, a comprehensive occupational and exposure history helps
12 the pulmonologist. With asbestos-related diseases, the ability to use information from an
13 occupational and exposure history requires the pulmonologist to understand industrial hygiene,
14 toxicology, chemistry, geology, mineralogy, and epidemiology. Moreover, physicians frequently
15 read the reports and conclusions of other physicians or scientists and rely upon others' work in
16 clinical practice.

17 4. All opinions that I have issued in this report are expressed within a reasonable
18 degree of medical certainty. I base my opinions, on the clinical, radiological, and pathological data,
19 Ms. Rita Chapman's exposure history, my education, training, and experience as a medical doctor
20 and pulmonologist, and the current medical and scientific evidence about the health effects of
21 asbestos, including epidemiological evidence, animal studies, case reports, fiber burden analyses,
22 and laboratory testing. I have attached a listing of references pertaining to the opinions stated
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1 herein (Exhibit C). I reserve the right to amend or supplement my opinions based upon any new
2 or additional information, including information as to talc sources, as discovery progresses.

3 5. I make this declaration to address specific issues in this case. This declaration does
4 not include the entirety of my opinions in the case.

5 6. I have received the following records and materials pertaining to this case: Volumes
6 1 (May 3, 2022), 2 (May 4, 2022), 3 (May 10, 20202, 4 (May 11, 2022), 5 (May 12, 2022), 6 (May
7 13, 2022), and 7 (May 16, 2022) of the deposition testimony of Ms. Rita Chapman along with
8 exhibits; Volumes 1 (May 31, 2022), 2 (June 1, 2022), 3 (June 2, 2022), and 4 (June 3, 2022) of
9 the deposition testimony of Mr. Gary Chapman along with exhibits; Deposition testimony of
10 Delbert Baker dated August 3, 2022; Declaration of Matthew Sanchez, Ph.D. dated July 21, 2022;
11 Declaration of Michael Burke, Ph.D. dated July 20, 2022; Declaration of Jennifer Sahmel, Ph.D.
12 dated July 25, 2022; Declaration of Ms. Rita Chapman dated August 16, 2022; Declaration of
13 Mark Rigler, Ph.D. dated August 24, 2022; Attached listing of documents (Exhibit B).

14 7. I have received and reviewed Ms. Rita Chapman's medical records from Mayo
15 Clinic Scottsdale. In addition, I have received and reviewed the following radiology studies of Ms.
16 Chapman from Mayo Clinic: Two-view chest x-ray dated January 16, 2020, Chest CT dated March
17 31, 2020, Two-view chest x-ray dated April 7, 2021, Two-view chest x-ray dated May 28, 2021,
18 Chest CT dated November 30, 2021, Single view, portable chest x-ray dated December 7, 2021,
19 PET/CT dated December 16, 2021, Single view, portable chest x-rays dated January 17 to 20, 2022
20 (6), Two-view chest x-ray dated January 25, 2022, Single view, portable chest x-rays dated
21 February 7, 2022 (2), and Chest CT dated February 7, 2022.

22 8. On May 2, 2022, I personally interviewed Ms. Chapman.

23 9. Ms. Chapman's medical history is as follows:
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1 In March 2021, she presented with chest pain, dyspnea, pleurisy, and cough. She underwent
2 MRI of the chest on March 3, 2021, which revealed a large left pleural effusion with compressive
3 atelectasis of the left lung. She underwent thoracentesis on March 10, with removal of 900 mL of
4 serous fluid (procedure terminated prematurely due to symptoms). The fluid was a lymphocytic
5 exudate, but the cytology revealed only reactive mesothelial cells.

6
7 In October 2021, her symptoms returned, and she was found to have recurrence of the
8 pleural effusion. She underwent thoracentesis on November 1, again removing 900 mL but with
9 no definitive diagnosis by cytology. Immunohistochemical staining was positive for calretinin and
10 D2-40 but negative for TTF-1, PAX8, ER and Claudin 4. There was lost BAP 1 expression. Her
11 chest CT performed November 30, 2021 revealed increasing left pleural effusion, left pleural
12 thickening, and pleural nodularity, consistent with mesothelioma.

13
14 On December 7, 2021, she underwent fiber-optic bronchoscopy, EBUS, pleuroscopy, and
15 left medical thoracoscopy with parietal pleural biopsies and placement of a left pleural pigtail
16 catheter by Dr. Sakata. She had removal of 1.8 L of pleural fluid. There were numerous parietal
17 pleural nodules of the chest wall and diaphragm. The pathology from the pleural biopsies, read by
18 Dr. Yasmeen Butt, revealed epithelioid malignant mesothelioma. The 11L lymph node (from the
19 EBUS biopsy) also revealed epithelioid malignant mesothelioma.

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21 On December 16, 2021, her PET/CT revealed a moderate left pleural effusion with
22 irregular pleural thickening and abnormal FDG uptake consistent with malignant mesothelioma,
23 including the hilar lymph nodes. There was no extra thoracic malignancy identified.

24
25 On December 20, 2021, she underwent oncology evaluation by Dr. Vinicius Ernani. She
26 was diagnosed with cT2cN1 malignant mesothelioma of the pleura and recommended for
27 chemotherapy as well as possible extrapleural pneumonectomy.
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1 On January 6, 2022, she underwent cardiothoracic consultation by Dr. Jonathan D'Cunha.
2 He recommended mediastinoscopy, laparoscopy, and left video-assisted thoracoscopic surgery
3 (VATS).

4 On January 17, 2022, Dr. D'Cunha performed fiber-optic bronchoscopy, thoracoscopy
5 with talc pleurodesis, laparoscopy, and mediastinoscopy with lymph node dissection for further
6 management of Ms. Chapman's malignant pleural mesothelioma. There was diffuse disease
7 throughout the left chest, including on the diaphragm and lung. He removed 1000 mL of pleural
8 fluid. This surgery was complicated by damage to her vocal cord. The pathology revealed
9 malignant mesothelioma of the left pleura, but the lymph nodes and laparoscopy were negative.
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11 On February 7, 2022, she presented to the emergency room with palpitations and shortness
12 of breath. Her chest CT revealed a large pericardial effusion. Her echocardiogram confirmed the
13 presence of a large pericardial effusion with evidence of tamponade. She underwent
14 pericardiocentesis with removal of 740 mL of exudative fluid and placement of a pericardial drain.
15 The cytology of the pericardial effusion was suspicious for malignant mesothelioma.
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17 On February 14, 2022, Dr. Ernani indicated there was "very low chance" for surgery in her
18 future and he recommended combination immunotherapy with nivolumab every two weeks and
19 ipilimumab every six weeks. She began palliative immunotherapy on February 15, 2022. She was
20 given an estimated 18-month overall survival.
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22 On May 27, 2022, Ms. Chapman had an oncology follow-up with Dr. Ernani. Her chest
23 CT revealed extensive nodular pleural thickening on the left, encasing the left lung. There was
24 nodular pericardial thickening but no pericardial effusion. New findings included loculated pleural
25 fluid in the left major fissure, reticulation in the right lower lobe and ground glass opacities in the
26 right lower lobe. She was continued on palliative immunotherapy.
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1 On June 24, 2022, she had another oncology follow-up at Mayo Clinic. She complained of
2 having progressive palpitations and chest pains. She was scheduled for cardiology testing. She was
3 continued on palliative immunotherapy.

4 Ms. Chapman's past medical history includes dyslipidemia, GERD, vitamin D deficiency,
5 cataracts, and osteoarthritis. She was quite healthy and physically active. She had normal
6 pulmonary function in 2019. Her past surgical history includes hysterectomy with oophorectomy
7 (1980). She had no history of diabetes, hypertension, coronary artery disease, thyroid disease,
8 peptic ulcer disease, hepatitis, chronic liver disease, bowel disease, chronic kidney disease,
9 nephrolithiasis, bladder disease, migraines, skin disease, venous thrombosis, anemia, Parkinson's
10 disease, neuropathy, bone disease, seizure disorder, sleep apnea, rheumatoid arthritis, lupus,
11 scleroderma, asthma, emphysema, COPD, chronic bronchitis, fungal lung disease, active
12 tuberculosis, chest radiation therapy, pneumothorax, fractured ribs, penetrating chest wound, chest
13 trauma, or pneumoconiosis. Apart from mesothelioma, she has never had any cancer.

14 She receives her medical care through the Mayo Clinic. Her internist is Dr. Sophie Bersoux.
15 Her oncologist is Dr. Vinicius Ernani, her pulmonologist is Dr. Lewis Wesselius, her interventional
16 pulmonologist is Dr. Kenneth Sakata, her diagnosing pathologist is Dr. Yasmeen Butt, her
17 cardiothoracic surgeon is Dr. Jonathan D'Cunha, and her cardiologist is Dr. Reza Arsanjani. Her
18 current medications include Yervoy (ipilimumab), and Opdivo (nivolumab).
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20 During my interview with Ms. Chapman, she indicated she was experiencing continued
21 weight loss, diminished appetite, hoarseness, loss of taste, dry mouth. chest pains, cough,
22 abdominal bloating, generalized weakness, loss of balance, weakness, dizziness, severe fatigue,
23 anxiety, and depression.
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1 10. Ms. Chapman's social history is as follows:

2 She was born in Los Angeles California in 1946. She graduated from San Gabriel high
3 school in 1964. She was never in the military. She received her BA degree in business and human
4 resources in 2010. She smoked cigarettes from 1965 to 1990, between 1.0 and 1.5 packs per day.
5 She never chewed tobacco. She was married in 1965. Her son was born in 1965 and her daughter
6 was born in 1976. She currently resides in Scottsdale, Arizona. She has no history of alcohol abuse
7 or illicit drug use. She has a pet dog. She never raised birds. She has never lived or visited Turkey
8 or Libby, Montana. She was unaware of ever being exposed to radon and has no underground
9 basement in her home. Between 1964 and 1966, they did do some home remodeling, extending a
10 kitchen. Her husband helped his father do this remodeling. This included her husband doing
11 drywall work with joint compound. This work was mainly on weekends, and she cleaned up
12 afterwards, including dry sweeping. She washed his clothing, always shaking out his clothes first.
13 She has no significant environmental exposures to radiation, and she has never lived in or near any
14 known asbestos-polluted environment.
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16 Her husband worked as a parts man for McDonnell Douglas (approximately 1966-1973),
17 Hyster Forklift Company (approximately 1973-1992), Papé Material Handling Company
18 (approximately 1992-1995) and Arnold Machinery (1996-2010). His first three jobs were in
19 California and his last job was in Arizona.
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21 11. Ms. Chapman's occupational history is as follows:

22 From 1964 to 1970, she worked at Britt's department store, primarily in the cosmetics
23 department. She also worked in the shoes department, jewelry department, and clothing
24 department. She tried a lot of the cosmetic products, including powdered products. From 1970
25 until 1992, she worked for Sears. Initially, she worked doing clerical work and as a secretary but
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1 by 1978 she became the human resources (HR) manager. From 1992 until 1996, she was the HR
2 manager for a construction company (Feeno Construction) in Northern California but work strictly
3 in an office setting. From 1996 until 1998, she worked as the HR manager for a call center in
4 Arizona. From 1998 until 2003, she was the HR manager for AG Communications Systems. From
5 2003 until 2012, she worked as the HR manager for Discover Financial Services. She “retired” in
6 2012 but from 2012 through 2018, she worked part-time for My Sister’s Closet, pricing jewelry
7 and clothing. From 2018 until 2020, she worked part-time in HR for TBC, a consignment store.
8 From 2020 to 2021, she went back to work for My Sister’s Closet. From November 2021 until
9 July of 2022, she worked for The Real Real, as a jewelry appraiser. Apart from her job at Britt’s,
10 she denied any potential for occupational asbestos exposure.
11

12 She has never done any construction work, sandblasting, welding, jackhammering,
13 grinding, stonecutting or masonry work, smelting, mining, metal working, electrical work, pottery
14 or ceramics manufacturing, glass manufacturing, cotton processing, automotive work, electronics
15 manufacturing, foundry work, professional farming, dye manufacturing, rubber product
16 manufacturing, work as a barber/hairdresser, work as an insulator, pipefitter, boilermaker,
17 plumber, millwright, or machinist, demolition work, work in a refinery, power plant, or paper mill,
18 railroad work, work as a butcher, offshore work, or work in the plastics or textile industry.
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20 She has had no known occupational exposures to silica, beryllium, chromium, cadmium,
21 nickel, isocyanates, diesel exhaust fumes, arsenic, solvents, lead, benzene, carbon tetrachloride,
22 radiation, benzene, or pesticides. She was never overcome by any gas, chemical or fume
23 necessitating urgent medical care and has had no prolonged absences from work due to injury or
24 illness.
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1 12. Ms. Chapman's family history is as follows:

2 Her father worked at a golf course and her mother was a housewife. Both of her parents
3 had smoked cigarettes but quit in the early 1960s. Her father died from natural causes at the age
4 of 93 and her mother died from complications of breast cancer at the age of 84. She has no family
5 history of malignant mesothelioma, renal cell carcinoma, ophthalmic cancers, or melanoma. She
6 does have a family history of breast cancer (mother), colon cancer (maternal grandmother, paternal
7 uncle), stomach cancer (paternal grandfather), and ovarian cancer (paternal aunt).
8

9 13. I reviewed the deposition testimony of Ms. Chapman, her husband Gary Chapman
10 and the testimony of Delbert Baker. Ms. Chapman testified that she used various powder products
11 on a daily and regular basis for over 70 years. She used powdered products on her body (including
12 arms, shoulders, axillae, back, chest and face). She sometimes applied these products more than
13 once a day. Also, she put powder into her shoes, panties, and pantyhose.
14

15 14. In her depositions, Ms. Chapman described using Avon body powder products 3-4
16 times a week from 1954 to 1978 on average. She also described the use of Avon face powders and
17 makeup in this time frame. She told me that during high school her use of Avon body powders
18 was closer to every day. Her mother and aunt were both "Avon ladies," meaning they sold Avon
19 products. She used Avon when she was 8 or 9 years old, because they would sample the products
20 in the family home to help them sell to their clients. Ms. Chapman also described the use of Avon
21 face powders and makeup from the 1990s until 2009 or 2010. Between 1978 and the late 1990s,
22 she described limited use of Avon products. She used several different lines of Avon body powder
23 products, including, but not limited to Topaz sets, Lilac, Lily of the Valley, Blue Bird, Wild Rose,
24 Persian Wood, Skin So Soft, Honeysuckle, Lucid, Rhapsody, Moon Wind, Unforgettable,
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1 Hawaiian White Ginger, Bird of Paradise, Cotillion, Jasmine, Charisma, Here's My Heart, and
2 Rapture.

3 15. Ms. Chapman used Cashmere Bouquet from about 1965 until 1978. She used the
4 powder on her body after showering, to "freshen up." It would take her about a minute to apply
5 the product to her body, which she would apply directly. She indicated that she used it hundreds
6 of times for over a dozen years.

7
8 16. Ms. Chapman began using Cover Girl in about 1964 and continued to use it for
9 over 50 years. The Cover Girl makeup included loose and compact face powder, and she used this
10 on a nearly daily basis. Although she used various brands of makeup over the years, she mainly
11 used Cover Girl. She applied Cover Girl face powder thousands of times for over fifty years.

12 17. Ms. Chapman was around her mother and grandmother when they were using Coty
13 face powder starting in about 1954 in the family home. She began using it on herself when she
14 was about 18 (1964) and continued to use Coty face powder until recently. Coty was a face powder
15 that she would apply with a puff to her face. She used it when applying makeup. Ms. Chapman
16 testified she used Coty "a lot," and indicated she bought a new container every month or so. She
17 saw family members apply Coty, mainly on weekends. She was exposed to Coty powder thousands
18 of times in her life.

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20 18. Ms. Chapman used Revlon face powder for decades, beginning in around 1964.
21 She used a puff to apply the powder from the compact onto her face. She used Revlon face powder
22 several thousands of times in her fifty or more years of using the product.

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24 19. Ms. Chapman also used Jean Naté body powder from approximately 1964 until the
25 mid-1970s. She used it on all parts of her body and applied it in a similar way as she did the other
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1 products, utilizing a powder puff. It took minutes to apply the product. She used the product two
2 to five times a week. She would use about six containers a year.

3 20. Ms. Chapman described regular and repeated use of Estée Lauder body powder
4 from approximately 1964 to 1978.

5 21. Ms. Chapman was exposed to asbestos from talcum powder supplied by Whittaker,
6 Clark & Daniels (WCD) to cosmetic companies, including Coty, Revlon, Cover Girl, Estée
7 Lauder, Jean Naté, and Avon. From the 1960s until 2004, WCD sold talc from Italy, Montana,
8 North Carolina, and Canada to cosmetic companies that Ms. Chapman subsequently inhaled. WCD
9 sold Talc 4601, a talc from Madoc, Canada, used in Coty face powder from 1969 to 1970. From
10 1970 through at least 1978, WCD remained the exclusive supplier of Italian talc (Talc 1615) used
11 in Coty. WCD sold talc to Revlon from the 1960s until 2004. In the mid-1970s until early 1980s,
12 Cover Girl used WCD's Italian and Montana talcs in loose powder and compact powders. WCD
13 sold substantial quantities of talc (primarily Italian) to Estée Lauder from 1975 through 1978.
14 Avon's body powder products specified WCD talc grades throughout at least 1969 to 1978,
15 including talc from (a) Canada (Avon code 0810: Talc 4602), (b) Montana (Avon code 0815: Talc
16 4608) and (c) North Carolina (Avon code 0768: Talc 2450). In the 1990s, Ms. Chapman used Avon
17 compact face powders and other Avon products. WCD sold significant quantities of talc to Avon
18 throughout the 1990s.

19 22. Mr. Chapman worked as a parts man for Douglas Aircraft/McDonnell Douglas
20 (approx.1966-1973), Hyster Forklift Company (approx. 1973-1992), Papé Material Handling
21 Company (approx.1992-1995) and Arnold Machinery (approx.1995-2010). While working at
22 McDonnell Douglas, Mr. Chapman was repeatedly and routinely exposed to dust from Ford,
23 Bendix, Clark, Hyster, Mercury, NAPA, and Rayloc brakes. He also had exposures to dust from
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1 dry clutches and gaskets over decades, including from opening thousands of boxes of gaskets and
2 hundreds of boxes of clutches. Out of the hundreds of boxes of clutches Mr. Chapman opened at
3 Douglas, the only brand he remembers is Borg Warner. He worked in close proximity to auto
4 mechanics installing and removing gaskets and clutches, including using compressed air to blow
5 down the clutch assembly and scraping off old gaskets. On a daily basis, he swept up the parts area
6 or was around as others swept. He reported daily exposures to dust from these products and
7 materials at these job sites, which would get on his clothing and person.
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9 23. From 1966 until October of 1973, Mr. Chapman worked as a parts man in the
10 automotive and heavy equipment maintenance garage at Douglas Aircraft, which later became
11 McDonnell Douglas. He worked around brake products and opened “hundreds” of boxes of brakes,
12 including brakes from Ford, Bendix, Clark, Mercury, NAPA, Rayloc and Hyster. He entered the
13 work bays in the garage at least four or five times a day, “maybe more.” He estimated that he was
14 nearby, frequently within only 3-4 feet, “hundreds” of times while mechanics sanded and/or arc
15 grinded brake shoes and while mechanics used compressed air during brake replacements. This
16 created visible dust. He handled hundreds of old “core” brake shoes that he put in a bin. On a daily
17 basis, he was exposed to dust from sweeping the parts room. The sanding and arc grinding of
18 brakes, the use of compressed air, and dry sweeping all created dust. He worked nearby to auto
19 mechanics installing and removing gaskets and clutches, including using compressed air to blow
20 down the clutch assembly and scraping off old gaskets. He testified the Douglas garage operated
21 7 days a week, 24 hours per day, and that “there was dust everywhere,” and there was no way to
22 avoid it. McDonnell Douglas never warned him about asbestos dust or told him he could not take
23 his work clothing home, even after the passage of Federal OSHA asbestos regulations in 1972.
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1 24. While working at McDonnell Douglas, Mr. Chapman worked around multiple
2 models of Hyster lift trucks. He ordered replacement parts, including brakes shoes, for those lift
3 trucks directly from Hyster's location in Commerce, CA. He recalled opening boxes from Hyster
4 that contained brake shoes.

5 25. Mr. Chapman left McDonnell Douglas in approximately October of 1973 and
6 began working at Hyster Forklift Company in Commerce, CA. He worked at Hyster until 1992.
7 While at Hyster, he was around brakes, clutches, and gaskets. He estimated having opened
8 "thousands" of boxes of clutches, "thousands" of boxes of brakes, "and more than a thousand"
9 boxes of gaskets. He testified that working at Hyster, there was no way he could avoid all the dust
10 from brakes, clutches, and/or gaskets. Hyster had an auto repair service garage that Mr. Chapman
11 visited three or four times per week. The mechanics in the service garage sanded brake shoes,
12 removed gaskets with scrapers and wire brushes, and blew out brake drums with compressed air.
13 Mr. Chapman testified there was no way for him to avoid the dust from brakes, clutches, and
14 gaskets in the Hyster service garage. Hyster never warned him about asbestos or required him to
15 leave his clothing at work.

16 26. Mr. Chapman worked as a parts manager at Papé from approximately 1992 to 1995.
17 Papé was an authorized Hyster dealer. He opened "thirty or forty" boxes of brakes and "hundreds"
18 of boxes of gaskets while working there.

19 27. Mr. Chapman performed his own brake work on various automobiles from 1964 to
20 approximately 1974, mostly Fords. He sanded the brakes for 1-2 minutes. Mr. Delbert Baker
21 confirmed at his deposition that he told Mr. Chapman to sand the brake shoes to take the glaze off
22 while working on Mr. Chapman's Ford vehicles. Mr. Baker testified the brake shoes were about
23 one foot away from Mr. Chapman's chest when he sanded them.
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1 28. Mr. Chapman testified to working around various Ford products at McDonnell
2 Douglas, including hundreds of Mercury tugs that utilized Ford engines, Ford C-series trucks, as
3 well as replacement brakes and gaskets. He testified opening boxes of brakes from Ford and that
4 Ford supplied the biggest brakes he saw at McDonnell Douglas. He witnessed mechanics sanding
5 and arc-grinding Ford brakes, and he was frequently within 3 to 4 feet of such work. Mr. Chapman
6 testified there was no way to avoid the dust from the sanding and arc grinding of brake shoes.
7 Ninety-eight or ninety-nine percent of the brake shoes for Ford vehicles at McDonnell Douglas
8 were purchased directly from Ford. He also worked on his own personal Ford vehicles, sometimes
9 with his wife present, including a 1956 Club Sedan, for which he performed two brake jobs. He
10 also owned a Ford Maverick in the 1970s, a 1966 Ford Fairlane GT, and his father owned a 1964
11 Ford F-150 truck. He did at least one brake replacement on the 1964 Ford F-150. His wife was
12 probably present for at least one brake job on the 1966 Fairlane.
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14 29. Mr. Chapman testified to working around Bendix brake products at McDonnell
15 Douglas, Hyster, and Papé. In addition, he used Bendix replacement brakes on his personal
16 vehicles, including a 1966 Ford Fairlane. He recognized the Bendix name, stating “we were around
17 Bendix brakes.” He testified that the brakes had the Bendix name on them and came in boxes that
18 did not have any caution labels or asbestos warning on them.
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20 30. Mr. Chapman testified he ordered Borg Warner clutches for work done on C-series
21 Ford trucks and Clark tugs at McDonnell Douglas. He stated, “I know Borg Warner and I know
22 all of them, so over the years the name is just synonymous to a clutch” He recalls seeing
23 compressed air being used on clutch assemblies at McDonnell Douglas. He also ordered clutches
24 while working at Hyster. The only brand of clutch Mr. Chapman recalled was Borg Warner.
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1 31. Mr. Chapman initially indicated that he did not order from Pep Boys while at
2 McDonnell Douglas, or that it was “not very often.” He later testified to having no knowledge or
3 recollection of ever ordering from Pep Boys while working at McDonnell Douglas, Hyster, or
4 Papé. He did not know if his father, wife, or any of his friends ever purchased brakes, clutches, or
5 gaskets from a Pep Boys and he did not recall ever having gone into a Pep Boys store.

6
7 32. Mr. Chapman wore his work clothes home. Ms. Chapman did her husband’s
8 laundry on a weekly basis throughout their marriage, usually every Saturday. Mr. Chapman never
9 did the laundry. Ms. Chapman shook out Mr. Chapman’s clothes in the bedroom before putting
10 them in the hamper. She shook his work clothes out every time she did the laundry and she breathed
11 in the dust.

12 33. Mr. Chapman also testified about home remodeling work at their residence on
13 Stevens Street. He recalled using premixed drywall joint compound supplied by Kaiser Gypsum.
14 Some of the days he worked on the Stevens Street property he was “covered head to toe” with
15 dust. Ms. Chapman would have come and helped with clean-up work. Ms. Chapman laundered
16 Mr. Chapman’s clothing after he performed drywall work with Kaiser Gypsum joint compound.
17 Mr. Chapman also sanded Kaiser Gypsum drywall in the family home where he lived with Ms.
18 Chapman for nine years. Ms. Chapman testified the sanding made “everything dusty and dirty in
19 the kitchen,” and that she “had to clean it off the kitchen counters and the stove and sweep up the
20 floor from the dust.” Ms. Chapman testified that her husband’s clothes “were covered in it” and
21 she had to “wash his clothes.” She testified that “some of the dust got into the living room on the
22 carpet and I did dust that – vacuum that.”

23 34. I reviewed the above-cited radiology. The chest x-ray from January 2020 shows no
24 evidence of pleural effusion and there are no classifiable parenchymal or pleural abnormalities.
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1 The chest CT from March 2020 reveals a small left pleural effusion. There is no pleural plaquing,
2 pleural calcification, or diffuse interstitial fibrosis. The CT from November 2021 shows a moderate
3 left effusion, nodular pleural thickening on the left, and left lower lobe atelectasis. There is apical
4 pleural thickening on the right. There is no pleural plaquing, pleural calcification, or diffuse
5 interstitial fibrosis. The CT from February 2022 reveals a large pericardial effusion. There are
6 small pleural effusions and pleural thickening present bilaterally. There is no pleural calcification
7 or diffuse interstitial fibrosis.
8

9 **Medical Summary:**

10 35. Ms. Chapman was active and in good health until February 2021 when she
11 presented with chest pain, pleurisy, and cough. She was found to have a large left pleural effusion
12 and underwent thoracentesis. The cytology was negative for malignancy. In October 2021, her
13 pleural effusion increased, and she underwent a second thoracentesis procedure, again with
14 nondiagnostic cytology. Her chest CT taken November 30, 2021 was consistent with malignant
15 mesothelioma. On December 7, 2021, she underwent pleuroscopy, medical thoracoscopy with
16 pleural catheter insertion, and thoracentesis. The pathology from the pleura and 11L lymph node
17 was positive for malignant mesothelioma. She was diagnosed with malignant mesothelioma. On
18 January 17, 2022, she underwent bronchoscopy, mediastinoscopy with lymph node dissection,
19 laparoscopy, and thoracoscopy with pleural fluid drainage. The pathology again confirmed
20 malignant mesothelioma. In February 2022, she was found to have a large pericardial effusion
21 with tamponade, requiring pericardiocentesis. The pericardial fluid was suspicious for malignant
22 mesothelioma. On February 15, 2022, she was started on palliative immunotherapy. She was not
23 felt to be a surgical candidate. As of June 2022, she was still receiving immunotherapy and was
24 remaining symptomatic.
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Overview of opinions:

36. The generic term “asbestos” is used to describe a heterogeneous group of hydrated magnesium silicate minerals in fiber form. The definition of asbestos can differ depending on context. As a commercial term, asbestos refers to a group of six mined minerals that have commercially useful properties, including high heat resistance, acid resistance, electrical resistance, tensile strength, and in some cases, flexibility. Geologists or mineralogists may have different definitions, being more concerned about how it was formed, whereas physicians and scientists are more concerned if the fiber can create a risk for disease. The federal government defines asbestos as the fibrous serpentine (chrysotile) and the fibrous forms of the amphibole group (amosite, anthophyllite, crocidolite, tremolite and actinolite). A fiber has an aspect ratio of at least 3:1. Chrysotile, amosite, anthophyllite, crocidolite, tremolite and actinolite, when in a fibrous form, can cause a spectrum of diseases, including cancer. Based on the medical and scientific literature on the health effects of asbestos, to physicians such as myself, “asbestos” means any of these six minerals in fiber form. The commercial properties of asbestos do not correlate with the health effects. There are other fibrous minerals, not meeting the definition of asbestos, which are also capable of producing adverse health effects.

37. The adverse health effects of asbestos include asbestosis, asbestos-related pleural disease, lung cancer, and malignant mesothelioma. These diseases all have in common long latency periods and a cumulative dose-response relationship. The occurrence of disease also depends upon individual susceptibility.

38. Asbestos is a toxin and all asbestos fiber types are capable of inducing DNA damage. The carcinogenic risks apply to all fiber types wherever they are found, including from talc containing asbestos. Asbestos fibers have been shown to induce oxidative stress, inflammatory

1 response, genetic changes, epigenetic alterations, and cellular toxicity and tissue injuries in target
2 cells in vitro and tissues in vivo. There is an increased susceptibility to cancer from early-in-life
3 exposures to carcinogenic hazards, such as asbestos.

4 39. I have reviewed the declaration of Matthew Sanchez, Ph.D., who indicates he is a
5 geologist at R.J. Lee. I have also reviewed prior reports and declarations of Dr. Sanchez. Dr.
6 Sanchez applies the most stringent or narrow definition for asbestos possible. He requires
7 characteristics to identify an asbestos fiber that are unrelated to health concerns and results in
8 undercounting of asbestos fibers.
9

10 40. The U.S. Geological Survey ("USGS") rejected R.J. Lee's use of a commercial
11 definition for asbestos because "properties of commercial-grade asbestos such as flexibility and
12 tensile strength have not been shown to directly contribute to health effects and should not be the
13 sole basis for exclusion of materials that may otherwise meet demonstrated health-related criteria
14 such as length, width, bulk chemistry, and perhaps surface chemistry." As the USGS recognizes,
15 different contexts call for different definitions for asbestos:
16

17 Asbestos has been defined by works in many disciplines including those in the
18 commercial asbestos industry and the mining industry, those in the regulatory
19 community, and the mineralogical and geological sciences.... [T]he definition of
20 asbestos (and related terminology) can vary depending on the source and purpose.
21 For example, a definition of asbestos appropriate for the asbestos cloth industry,
22 which might require a very long, thin, highly flexible fiber might be different from
23 that used in the asbestos cement pipe industry which could utilize a more brittle and
24 perhaps shorter and wider fiber. Both of these definitions could be vastly different
25 from those used in the health community, where the concern is exposure, risk and
26 ultimately disease.

27 41. The definitions employed by Dr. Sanchez result in excluding hundreds of samples
28 evidencing asbestos in cosmetic grade talc (of the ore, processed talc, and end products), including
samples relating to cosmetic grade talc from Italy, North Carolina, and Montana.

1 42. Dr. Sanchez' declaration also states:

2 The FDA has agreed that trace contamination cannot be extrapolated to presume a
3 level of contamination sufficient to cause an asbestos-related disease. In its 1986
4 review of whether cosmetic talcum powder should be affixed with a warning label,
5 the FDA performed a risk assessment and concluded that, even if one assumes talc
6 is contaminated with 0.1% asbestos, it presents no increased risk of causing an
7 asbestos-related illness. The FDA concluded: FDA surveillance activities that were
8 conducted in the latter portion of the 1970s showed that the quality of cosmetic talc
9 had significantly improved, and that even when asbestos was present, the levels
10 were so low that no health hazard existed. . . . [T]he risk from a worst-case estimate
11 of exposure to asbestos from cosmetic talc would be less than the risk from
12 environmental background levels of exposure to asbestos . . . over a lifetime.
13 Consequently, we find there is no basis at this time for the agency to conclude there
14 is a health hazard attributable to asbestos in cosmetic talc. . . . [T]he agency
15 concludes that there is no need to require a warning label on cosmetic talc.

16 The FDA did not issue a formal statement that trace contamination could not cause disease
17 nor do the data support such a conclusion. Dr. Sanchez references a letter from the Acting
18 Associate Commissioner for Regulatory Affairs in a response to a citizen's petition over 35 years
19 ago, which was based on a risk assessment by Mr. Robert Brown, a mathematician, not a medical
20 doctor. Mr. Brown's conclusions regarding a worst-case scenario were based on faulty
21 assumptions and contradicted by actual data from industry regarding the amount of asbestos in the
22 talc it sold. This risk assessment was a thought experiment of lifetime risk for certain cancers after
23 exposures to talcum powder while being diapered from birth until age two. Thus, the exposure was
24 not consistent with the talc exposures at issue in this case, unrelated to diapering, and some of
25 which were many decades in duration. Mr. Brown was incorrect in the amount of air a baby
26 breathes, thus under-estimating exposure 5-6-fold. The amount of air an adult breathes per minute
27 (minute ventilation) is 3-4 times greater than that of a neonate. The higher the minute ventilation
28 the greater amount of asbestos that will be inhaled at any given air concentration. Additionally,
29 Mr. Brown made assumptions regarding the frequency (five diaper changes per day), length of
30 diapering time (1.25 minutes), and duration (2 years), all of which likely further falsely lowered

1 the actual risk. Moreover, there was an assumption of instantaneous stoppage of exposure (i.e., no
2 consideration of the lingering asbestos in the air) and lack of re-entrainment, both of which are
3 scientifically incorrect assumptions.

4 Mr. Brown assumed that the asbestos content in talc was 0.1%. One of the citations in
5 support of this assumption is from a November 1984 letter by Linda Taylor, Ph.D., who
6 acknowledged that no testing had been done on talc since 1979 (which had a limit of detection of
7 0.1% for tremolite and 1-2% for anthophyllite or chrysotile). She noted, "...it is not known
8 whether cosmetic talc (used today) is contaminated with asbestos" and "or what levels of asbestos,
9 if contaminated." The FDA documents cited to explicitly state the lack of data or foundation for
10 the amount of asbestos in cosmetic products, let alone the worst case for those talcs. It was an
11 assumption.
12

13 The risk assessment also acknowledged there was a "general consensus" that current talc
14 mines are "virtually free of asbestos," which has been shown to be inaccurate due to industry's
15 withholding of hundreds of tests evidencing asbestos in talc. This includes tests relating to the talc
16 sources used by Cashmere Bouquet. The author of the risk assessment was also led to believe by
17 industry that the "offending mines have gradually been abandoned" making the conclusion of the
18 Acting Associate Commissioner unsurprising when he stated: "the quality of cosmetic talc has
19 significantly improved." This was not the case. Cashmere Bouquet continued to use the same talc
20 source, Italian talc, both before and for years after this time frame. Moreover, this limits its
21 predictions about the "worst case scenario" of talc use to current (as of 1986) talcs. This would not
22 be a worst-case use for people like Ms. Chapman, who were using the admittedly worse talcs from
23 the 1960s and 1970s.
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1 From a medical perspective, the amount of asbestos in a product is an important
2 consideration but a more important consideration is actual air sampling during use, which indicates
3 the number of asbestos fibers in the air, and available to be breathed in. As noted later in this report,
4 air sampling shows that even with talc containing less than 0.1% asbestos, significant amounts of
5 asbestos fibers are released into the air. These levels, when associated with repeated use, have long
6 been associated with asbestos related illness, including mesothelioma. Moreover, the FDA has
7 repeatedly evaluated this issue since 1986 and as recently as 2019 concluded that levels well under
8 0.1% should not be used and do represent health concerns. In fact, levels as low as 0.00002% were
9 found to be adulterated and should not be used.
10

11 The information relating to the asbestos in Johnson & Johnson's talc was not made
12 available to the medical and scientific community for decades. Johnson & Johnson never publicly
13 produced a single asbestos test in any case prior to 2017. Johnson & Johnson did not inform the
14 FDA that it possessed test results finding asbestos in the mine ore and the finished talc product,
15 nor did Johnson & Johnson provide those testing results to the FDA. An analyst from an outside
16 laboratory hired by Johnson & Johnson (Ian Stewart) and Johnson & Johnson worked together to
17 manipulate the asbestos testing results of Johnson & Johnson's products done by outside
18 laboratories and reported those manipulated findings to the FDA as negative results. These are
19 examples of efforts by Johnson & Johnson that kept the scientific community, including myself,
20 as well as governmental regulators from critical health information regarding a carcinogen in its
21 baby powder. After Johnson & Johnson's testing was made known through litigation, multiple
22 scientific and medical articles were published identifying and discussing the dangers associated
23 with Johnson & Johnson's talc. Since then, Johnson & Johnson has taken the product off the market
24 in the United States and eight agencies have established a group to evaluate the proper methods to
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1 consider and analyze talc. This withholding of information from regulators impacts the weight of
2 findings by the FDA or its Acting Associate Commissioners in 1986.

3 Since 2017, multiple scientific and medical articles have been published identifying and
4 discussing the dangers associated with asbestos in cosmetic talc. As a physician and scientist, it is
5 a normal part of my medical practice to read and/or rely upon the testing of others, including
6 biologists, industrial hygienists, statisticians, and other physicians.

7
8 43. Malignant mesothelioma results from neoplastic transformation and uncontrolled
9 growth of mesothelial lining cells, most commonly encountered in the visceral pleura and second
10 most commonly in the peritoneum. Normally, the mesothelium is a very slowly renewing tissue
11 and thus it is less likely that any random DNA error would go unnoticed by the body's DNA repair
12 mechanisms. The inflammatory injury mediated by asbestos greatly increases mitotic activity and
13 creates an environment capable of inducing carcinogenesis. Based on genome-sequencing data, a
14 normal adult cell cannot suddenly or spontaneously transform into a cancer cell.

15
16 44. Every tumor contains thousands of genetic (and epigenetic) alterations that are not
17 present in the patient's germline (i.e., somatic mutations), but only a small fraction of these
18 alterations occurs in "driver" (cancer-causing) genes. Mutations in only about 1% of genes in the
19 human genome have been shown to act as driver genes for common cancers and random mutations
20 generally encompass somatic point mutations rather than driver mutations. In solid tumors of
21 adults, at least three driver genes are needed for a cell to evolve into an advanced cancer.

22
23 45. BCRA1 associated protein-1 (BAP1) is one of the known tumor suppressor genes.
24 Somatic BAP1 mutation is a common driver for malignant mesothelioma, likely due to DNA
25 damage caused from exposure to asbestos. There are a select number of known cases in the world
26 of a germline (inherited), autosomal dominant BAP1 mutation. These individuals are at increased
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28

1 risk for several cancer types, particularly melanotic cancers, but also malignant mesothelioma and
2 renal cell carcinoma. However, studies of this cohort and animal studies demonstrate that the risk
3 of mesothelioma is still generally dependent on exposure to asbestos and that there is an increased
4 sensitivity to asbestos in these individuals. The lack of BAP1 staining in tumor cells can sometimes
5 help pathologists differentiate mesothelioma from benign tissue or other malignancies. BAP1
6 testing of tumor cells cannot inform scientists of the germline status of the patient.

8 46. The adverse health effects of asbestos were first reported in the late 1800s. By the
9 early 1900s, there were more published data that asbestos exposure is hazardous to human health
10 and potentially deadly. In the 1920s and 1930s, more scientific and published literature reported
11 on the health effects of breathing asbestos. By the 1930s and 1940s, medical articles and journals
12 indicated that asbestos could cause cancer. Although cases of pleural tumors associated with
13 asbestos exposure were described in the 1940s and 1950s, the relationship of mesothelioma and
14 asbestos was more firmly established by 1960, based on a case series of 33 patients [Wagner,
15 1960].

17 47. Asbestos is a well-known cause of malignant mesothelioma. In fact, the causal
18 relationship between asbestos exposure and the development of mesothelioma is so firmly
19 established in the medical and scientific literature that it is accepted as fact. In the United States,
20 asbestos is the major cause of malignant mesothelioma and the only epidemiologically established
21 environmental cause of mesothelioma.

23 48. Asbestos is the only identifiable cause for most mesotheliomas. The relationship
24 between asbestos and mesothelioma is so strong that some consider mesothelioma a “signal” or
25 “sentinel” tumor. There is wide agreement that when mesothelioma is seen, asbestos exposure will
26 likely have previously occurred, or conversely, when asbestos exposure has occurred, there is
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28

1 significant relative risk of later mesothelioma. All fiber types of asbestos are capable of inducing
2 mesothelioma.

3 49. There is no evidence of a threshold level below which there is no risk of
4 mesothelioma [Hillerdal, 1999]. Mesothelioma has been reported to occur with brief or low-level
5 asbestos exposure. There is no completely “safe” level of asbestos exposure that has been
6 established [EPA, 1986]. Mesothelioma is a dose-response related disease, however; the greater
7 one’s cumulative exposure to asbestos, the greater their risk for the development of mesothelioma.
8 Nevertheless, mesothelioma may be related to brief, low level, or indirect exposures to asbestos.
9 Cases of mesothelioma have been reported in the medical and scientific literature after as little as
10 only one day of exposure and even a “slight” exposure to asbestos has been reported to result in
11 mesothelioma.
12

13 50. Epidemiological studies look at the relationship between cumulative asbestos
14 exposure and risk of mesothelioma. Studies have demonstrated increased risk for malignant
15 mesothelioma associated with cumulative asbestos exposures in ranges below one fiber/cc-year.
16 For example, Iwatsubo et al found a four-fold risk for pleural mesothelioma among workers with
17 estimated cumulative asbestos exposures of 0.5-0.99 fibers/cc-years [Iwatsubo, 1998]. In a follow-
18 up investigation of this national registry, Rolland and colleagues identified an almost 3-fold
19 increased risk for malignant mesothelioma with a cumulative occupational asbestos exposure
20 below 0.07 fibers/cc-years [Rolland, 2006]. Rodelsperger et al found almost an eight-fold
21 increased risk associated with an exposure of less than 0.15 fibers/cc-years and with no threshold
22 [Rodelsperger, 2001]. Lacourt et al reported a four-fold increased risk from exposures at or below
23 0.1 fibers/cc-years [Lacourt, 2014]. In a study from the Netherlands, Offermans et al found over a
24 doubling of the risk for pleural mesothelioma after median exposure to 0.20 fibers/cc-years
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1 [Offermans, 2014]. Ferrante et al found over a four-fold risk for pleural mesothelioma from
2 exposures between 0.1-0.99 fibers/cc-years [Ferrante, 2016] Jiang et al found over a 20-fold
3 increased risk from exposures below 0.5 fibers/cc-years [Jiang, 2018]. The EPA estimated more
4 than a two-fold increased risk for malignant mesothelioma associated with asbestos exposures of
5 0.01 fibers/cc-years and OSHA estimated a 3.5-fold increased risk from exposures at 0.1 fibers/cc-
6 years [EPA, 1986; OSHA, 1986]. There are additional studies showing elevated risk of
7 mesothelioma with similar ranges of exposure.
8

9 51. Thus, scientists have repeatedly shown that cumulative exposures in ranges below
10 1 fiber/cc-year, 0.1 fiber/cc-year, and even 0.01 fiber/cc-year are linked to or associated with a
11 two-fold or higher risk of mesothelioma. Moreover, the risk of mesothelioma from such exposure
12 ranges has been corroborated throughout the medical and scientific literature and comports with
13 the data that I have reviewed and considered as a pulmonologist.
14

15 52. Physicians determine causation of mesothelioma based upon the qualitative history
16 of asbestos exposure and not upon a quantitative dose analysis of that exposure. This methodology
17 for establishing causation of mesothelioma is widely accepted in the medical community, has
18 demonstrated increased risk for malignant mesothelioma, and has been repeatedly published in the
19 medical and scientific literature. Even in the absence of markers of asbestos exposure, a history of
20 occupational, domestic, or environmental exposure to asbestos will suffice for attribution of
21 asbestos causing mesothelioma [Henderson, 1997]. Because there may be too many variables
22 when considering someone's exposures to asbestos, arriving at a specific dose might not be
23 scientifically valid. Rather, scientists and physicians will categorize exposures in terms of (1) job
24 class (for example, "insulation worker" or "pipefitter"), (2) qualitative assessment (based on the
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1 nature, regularity, proximity, duration, and intensity of exposure), or (3) dose range estimates
2 (based on comparisons to measurements from like exposures).

3 53. Latency, the time from first exposure to manifestation of disease, is prolonged in
4 the case of mesothelioma, generally decades.

5 54. Benign markers of asbestos exposure are not required to attribute asbestos as a
6 cause of mesothelioma. Most cases of malignant mesothelioma do not also have asbestosis, and
7 depending on the study, many, if not the majority, also do not have radiographic evidence of
8 pleural plaquing.

9 55. All asbestos fiber types demonstrate high biopersistence in the human lung [Feder,
10 2017].

11 56. Physicians usually determine causation of mesothelioma based upon the qualitative
12 history of asbestos exposure and not upon a quantitative dose analysis of that exposure. This
13 methodology for establishing causation of mesothelioma is widely accepted in the medical
14 community and has been repeatedly published in the medical and scientific literature.

15 57. Regarding fiber size, in a study on rats, Stanton et al reported that longer ($\geq 8 \mu\text{m}$)
16 and thinner ($\leq 0.25 \mu\text{m}$) amphibole fibers appear to be more carcinogenic, but they did not identify
17 a specific fiber length that had no biological activity, including fibers $< 5 \mu\text{m}$ in length [Stanton,
18 1981]. Although longer fibers may be retained more within the lung tissue, studies have shown
19 that shorter fibers predominate in the pleura and mesothelial tissue [Suzuki, 2002]. Moreover,
20 researchers have found that in occupational environments, fibers $< 5 \mu\text{m}$ significantly
21 outnumbered longer fibers [Dement, 1990]. Short fibers have been shown to produce toxic effects,
22 including carcinogenesis [Yeager, 1983], and the scientific data do not support the conclusion that
23 “short fibers” have no biological effect.
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1 58. Asbestos is present in ambient air, both indoors and outdoors. These “background”
2 or “ambient” asbestos fibers are mostly (85%) composed of short (<1 µm) chrysotile fibers
3 [ATSDR, 2001]. Only about 2% of ambient asbestos is amphibole asbestos and testing has
4 demonstrated no background anthophyllite asbestos. As reported by the ATSDR, using TEM the
5 urban ambient asbestos airborne concentration is less than 0.00003 fibers/cc. Dr. Sahmel’s
6 comparison of cosmetic talc exposures to background levels is inappropriate. Asbestos exposures
7 from talc use involve a range of asbestos types and lengths that are not found in the background.
8 Moreover, many consider chrysotile asbestos to be less carcinogenic to the mesothelium than
9 amphibole fibers and based on certain published studies, asbestos fibers under 4 µm in length are
10 less toxic than longer fibers. Additionally, exposures to asbestos from cosmetic talc use are added
11 on to a person’s cumulative exposures, including to background exposures. The background
12 asbestos in the air is fundamentally different in 1) amount 2) type and 3) length than the exposures
13 associated with talc source from Italy, North Carolina, Montana, Canada, and others.

16 59. Based on my review, Ms. Chapman never lived near any known asbestos-polluted
17 environment.

18 60. There are limits to the use of epidemiological methods when studying diseases like
19 malignant mesothelioma, which are exceedingly rare and generally not diagnosed until many
20 decades after the initial exposure (prolonged latency). For example, to ensure sufficient power,
21 large numbers of individuals need to be followed for an extended period of time. Relatively small
22 sample sizes and/or insufficient follow-up will lead to under-ascertainment of disease. Moreover,
23 malignant mesothelioma is an aggressive cancer, with a life expectancy generally measured in
24 months, and thus there are limitations to obtaining accurate and complete exposure histories.
25 Researchers often must rely upon the memory of relatives or friends to reconstruct a person’s
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1 exposure history. Confirmation bias can be introduced by the nature of the questions asked that
2 may seek information only related to known causes and fail to ascertain information on other
3 potential causes that may be relevant. Certainly, until recently physicians and researchers were not
4 inquiring about talcum powder usage. Many studies rely on death certificates, and prior to 1999,
5 the International Classification of Diseases (ICD), did not have a code specific for malignant
6 mesothelioma. As a result, deaths from mesothelioma were often recorded as other types of cancer
7 (for instance, “pleural cancer” or “peritoneal cancer”), resulting in significant under-ascertainment
8 of mesothelioma cases. Finally, given the persistent detection of asbestos in the ambient air, in
9 some cases made even higher by surrounding industry or environment, there is no “unexposed”
10 group with which to compare to the studied “exposed” group. This will lead to a false lowering of
11 the relative risk.
12

13 61. A “background” incidence of malignant mesothelioma has been estimated or
14 suggested to be 1-2 per million/year. Other data support a much lower background level. This
15 background level does not mean that these are unrelated to mutagen exposure. In fact, whether a
16 background level occurring in the absence of exposure to asbestos or other mutagen truly exists is
17 unproven. Scientists use this rate when performing epidemiological studies to help determine if a
18 particular industry or exposure scenario is associated with a higher rate than a person in the general
19 population. Pathology studies have shown that malignant mesothelioma prior to the industrial age
20 was vanishingly rare to non-existent.
21

22 62. While men with malignant mesothelioma may outnumber women, thought related
23 to more frequent occupational asbestos exposures, both men and women are equally capable of
24 developing this malignancy. There is no biological reason to conclude that women are less
25 sensitive to the carcinogenic effects of asbestos or that women are more likely than are men to
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1 develop mesothelioma unrelated to asbestos, including some sort of genetic predisposition. While
2 some studies made conclusions about the etiology of mesothelioma in women as unrelated to
3 asbestos, researchers often ignored potential exposure pathways or merely assumed that no
4 pathway existed. Although pleural mesotheliomas outnumber peritoneal mesotheliomas in both
5 men and women, some researchers note that women have a slightly lower pleural to peritoneal
6 mesothelioma ratio and opine that this provides evidence of “spontaneous” mesothelioma in
7 women, allegedly because women inhale less asbestos than their husbands who had brought
8 asbestos home on their clothing. This ignores the obvious differences in human anatomy.
9 Powdered substances applied to the perineal area can directly enter the peritoneum through the
10 female genital tract. Moreover, studies of women have found markers of asbestos exposure that
11 were not from industrial sources, and instead suggested the asbestos came from cosmetic talc.
12

13 63. The lack of a documented history of exposure to asbestos does not mean that the
14 mesothelioma occurred unrelated to asbestos exposure, as many affected individuals may be
15 unaware that they had been exposed years earlier and medical investigation of exposure sources is
16 often lacking. It would be incorrect to assume such cases are “spontaneous” or “idiopathic.” As
17 scientific knowledge has expanded over time, we have learned of additional sources of asbestos
18 exposure not previously inquired about.
19

20 64. Asbestos-related diseases are not isolated to only those occupations that have been
21 studied. Specific exposure scenarios do not require separate epidemiological studies to make
22 causal connections.
23

24 65. Once inhaled, asbestos fibers cause inflammation, injury to the cells, and genetic
25 alterations, which can then produce a malignant phenotype progressing to malignant
26 mesothelioma. Asbestos acts in a cumulative and dose-dependent manner in causing mesothelioma
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1 but relatively low-dose exposures to asbestos have been demonstrated to increase the risk for
2 mesothelioma. Assessing a potential exposure source as a percentage of asbestos by weight may
3 be misleading because even a small weight of asbestos can contain exceptionally large numbers of
4 fibers. For example, just one gram (about one-fourth of a sugar cube) of asbestos could contain
5 billions to trillions of asbestos fibers.

6
7 66. Talc is a hydrous magnesium silicate inorganic material that is mined from the
8 earth, and is generally not a monomineralic material, but rather a mixture of mineral phases. Some
9 of these minerals may pose occupational or even consumer risk of disease.

10 67. Asbestos is an impurity (also referred to as a contaminant or co-mineral) of some
11 talc deposits.¹ The type of formation associated with talc deposits involve four of the six relevant
12 minerals: chrysotile, anthophyllite, actinolite and tremolite.²

13
14 68. Johnson & Johnson obtained the talc for its talc products from various sources,
15 including Italy, Vermont, and China. Prior to around 1967 the source mine was from Italy. From
16 approximately 1967 until 2003, the primary source of talc for Johnson & Johnson's talc products
17 was the Vermont mines. After 2003, their talc has been sourced from China.

18 69. Based on my review of deposition testimony, interrogatory responses, formulas,
19 and sales records, it is my understanding that Cashmere Bouquet exclusively used talc from Italy
20 up through 1968. Thereafter, Italian talc was used alone, or as a blend with North Carolina talc
21 (late 1960s to early 1970s), Willow Creek, Montana talc (1971 to 1979), or Beaverhead, Montana
22 talc (1979 and onward). I have reviewed hundreds of samples evidencing asbestos in talc ore from
23 Val Chisone, Italy, processed talc from Italy, and in finished cosmetic products using talc from
24

25
26 ¹ Exhibit 1. (2004 Van Gosen publication in Environmental Geology); Exhibit 2. (1974 Rohl publication in
27 Environmental Health Perspectives); Exhibit 3, (1974 Pooley abstract on Mineralogy in Talc); Exhibit 4. (8/6/1971
J&J internal memo); and Exhibit 5. (1985, American Chemical Society Characteristics of Italian Talc).

28 ² Exhibit 3.

1 Italy, including published literature looking at Cashmere Bouquet. Similar evidence exists for the
2 relevant talc from North Carolina and Montana, meaning there is repeated evidence that the talc
3 ore and products are reported to have asbestos. As of June 2021, MAS had reported on testing of
4 approximately 91 containers of Colgate-Palmolive Company's Cashmere Bouquet talc products,
5 finding asbestos in about 87%. Of those from the 1950s through 1990s, approximately 98%
6 contained asbestos. I have considered these findings with correlation to the geological and
7 mineralogical information regarding these talc mines. The finding of asbestos impurities is
8 consistent with the information about the geology of the mines. Much of the information that I
9 have reviewed and relied on was not referenced by Dr. Sanchez or Dr. Sahmel in their declarations
10 submitted in this case.
11

12 70. Based on the information I have received to date, there appears to be a pattern for
13 the formulas for Avon's loose powder or body powder products, i.e., they routinely contained the
14 same talc codes regardless of the particular Avon brand name or fragrance. Avon used talc from
15 the following locations: California (Desert talc), North Carolina (Regal)(Hitchcock), Canada
16 (Madoc, Ontario), Italy (Val Chisone), Montana (Beaverhead)(Willow Creek), Alabama and
17 Vermont (Windsor). As noted above, there is information evidencing asbestos in talc products
18 from Italy, North Carolina, and Montana. I have also reviewed hundreds of tests evidencing
19 asbestos in samples of Vermont talc ore, processed talc from Vermont, and products sourced from
20 cosmetic grade Vermont talc. Moreover, the talcs from California and Canada have levels of
21 asbestos consistent with industrial talcs, significantly higher than seen in other mines. I have also
22 seen repeated testing on Avon products uniformly finding asbestos in each talc source. This
23 product testing found significant levels of asbestos, which is consistent with the other information
24 I have reviewed. Ms. Chapman also described the use of face powders as early as the late 1990s
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1 until 2009 or 2010. I was informed that the information for the formulas for those talcs were
2 requested but have not been provided.

3 71. Coty was an operating division of Pfizer from 1963 to 1992. Based on my review
4 of deposition testimony, interrogatory responses, and sales records, Coty Airspun loose face
5 powder used predominantly, if not exclusively, Italian talc in the late 1960s to late 1980s. Records
6 indicate Coty (which, to my understanding, was then a division of Pfizer) purchased Talc 4601
7 from Madoc, Ontario in at least 1969 to 1970 and possibly Talc 141 (from Alabama and/or
8 Montana) at times. WCD sold Italian talc to Coty throughout the early 1970s to 1982 and was the
9 exclusive supplier for at least the majority of the 1970s.
10

11 72. Based on my review of interrogatory responses, the talc sources used in Cover Girl
12 was coded Talc 141 and came from Alabama and Montana. Pfizer sold Talc 141 through WCD
13 and identified asbestos fibers by TEM/SAED in Talc 141 26 times in samples from 1976 to 1988.
14

15 73. Color Techniques sold Ontario talc (coded 10-230 and 10-240 for Penhorwood
16 talc/Timmons) to Revlon (referenced as "Timato" or RCT 1004/RCT 1004CX) during the years
17 Ms. Chapman used Revlon face powders. This included Touch and Glow and Jean Naté, two type
18 of talc powders identified by Ms. Chapman. There is information this talc was purchased by
19 Revlon starting in the mid-1980s as well as specified in Touch and Glow starting in 1985 to be
20 18% of the formula. In addition, Jean Naté Bath Powder and Talc used "Timato" (RCT 1004CX
21 Canadian talc) from at least January 1989.
22

23 74. I have reviewed the declaration of Dr. Sanchez submitted in this case. I disagree
24 with his conclusions claiming there is no asbestos in talc sourced from Italy, North Carolina, and
25 Montana talc mines. Dr. Sanchez failed to consider much of the information that I have relied on.
26 I do not find his conclusions persuasive given the limited scope of his review noted in his
27
28

1 declaration. I have critically reviewed and relied on hundreds of tests applicable to the talcs at
 2 issue in this case that were not referenced by Dr. Sanchez. Moreover, he uses a different definition
 3 of asbestos than I do; one that has been rejected by the EPA and is too narrow to capture fibers
 4 that are known carcinogens. His definition results in the exclusion of numerous tests that evidence
 5 asbestos based on regulatory definitions and health and safety considerations.

6
 7 75. It has been reported that asbestos found in talc ore is impossible to fully remove
 8 from the ore. Talc containing asbestos fibers is carcinogenic to humans and causes malignant
 9 mesothelioma. Companies made efforts to use citrus acids to burn asbestos out of the talc, float
 10 the asbestos out of the talc, or otherwise remove asbestos from talc through reagents, ultrasonic
 11 grinding and beneficiation.³ These methods do not work.⁴ Dr. Pooley, a geologist and consultant
 12 to cosmetic talc companies beginning in the 1970s admitted that “if you’re producing a talc and
 13 it’s got asbestos in it, no way you’re going to get it out.”⁵ Avon was informed by December 19,
 14 1972, that beneficiation efforts do not work.⁶ I do not find the claims by Dr. Sanchez suggesting
 15 that asbestos can be entirely removed from the talc to be supported by any of the information I
 16 have reviewed.

18 **Asbestos Content**

19 76. I have reviewed the published literature, FDA testing, testing by cosmetic talc
 20 companies, testing by cosmetic talc company suppliers, testing by third party labs hired by
 21

23 ³ Exhibit 6 (4/12/1960, Battelle Report on the use of reagents); Exhibit 7 (5/23/1958 Battelle Report on flotation
 24 efforts); Exhibit 8 (7/31/1959 Battelle Report on flotation efforts); Exhibit 9 (8/31/1959 Battelle Report on
 25 ultrasonic grinding efforts); Exhibit 10 (1/24/1968 Battelle Report on flotation efforts); Exhibit 11 (1/29/1974
 26 confidential reagent system at J&J’s talc plant); and Exhibit 12 (12/31/1959 Battelle Report on flotation efforts);
 27 Exhibit 13.

28 ⁴ Exhibit 6 at Table 2; Exhibit 7 at 7, 10, 14 & A-1; Exhibit 8 at A-1; Exhibit 9 at 9; Exhibit 12 at A-1; Exhibit 10;
 and Exhibit 11.

⁵ Exhibit 14 (Dr. Pooley 2/1/2018) at 30:17-31:7, 119:11-14, 119:17-21.

⁶ Exhibit 13, Avon internal memo discussing beneficiation concluding, “they have had no success in separating
 tremolite from Italian talc.”

1 cosmetic talc companies or talc suppliers, expert reports from material scientists and geologists,
2 and more, indicating that talc source mines used by many cosmetic talc companies, including those
3 from Italy, Montana, North Carolina, Brazil, Vermont, California, New York, Ontario, Australia,
4 Alabama, and China contained asbestos. I have also reviewed and relied on geological and
5 mineralogical data regarding talc deposits to determine if the testing information is consistent with
6 the asbestos impurities associated with the talc mine. Testing spanning decades have tested
7 positive for asbestos.
8

9 77. I have also reviewed test results where no asbestos was detected, however the vast
10 majority of such testing was limited in one or more ways, such that the testing was of limited value.
11 In making my assessment of reliability, I have analyzed the study methodology, just as I have
12 when evaluating published medical literature as part of my practice of medicine. As a physician
13 and scientist, it is a normal part of my medical practice to read and/or rely upon the testing of
14 others, including biologists, industrial hygienists, statisticians, and other physicians.
15

16 78. It has long been recognized that transmission electron microscopy (“TEM” or
17 electron microscopy) is the superior test to detect asbestos in talc.⁷ Laboratory consultants urged
18 talc companies to use TEM to test for asbestos, as it was far more sensitive than any other testing
19 method.⁸
20
21
22

23 ⁷ Exhibit 15 (J&J corporate representative testimony), Exhibit 16 (Practical Aspects of Talc and Asbestos, by
24 Cyprus Industrial Minerals).

25 ⁸ Exhibit 17 (5/18/1973 J&J internal document re talc); Exhibit 18 (9/30/1992 notes on J&J meeting with its
26 consultant where J&J was told “TEM is the only suitable method for looking for fibers of biologically relevant
27 dimensions in lungs, therefore it is logical to use the same technique for examining mineral products for biologically
28 relevant fibers.”); Exhibit 19 (Email from Luzenac, a supplier to cosmetic talc companies, stating: “I think we all
recognize XRD, PCM, and PLM are simply not sensitive enough to provide complete assurance that the talc is free
of detectable asbestos.”). Exhibit 16 (Practical Aspects of Talc and Asbestos, by Cyprus Industrial Minerals noting
limitations of XRD including “lower levels of sensitivity can allow a large number of asbestos fibers to go
undetected”).

1 79. The J4-1 testing method utilized x-ray diffraction (“XRD”) as the initial screen to
2 determine if any further testing was necessary.⁹ The limit of detection for XRD was between 0.5%
3 and 5%, thus enabling millions to trillions of asbestos fibers in a gram of talc to escape detection.¹⁰
4 TEM is the most sensitive tool in terms of detecting the presence of asbestos in talc, more than
5 10,000 times as powerful than XRD.

6 80. As a physician, when selecting the appropriate test for a patient, one needs to
7 consider the strengths and weaknesses of the tests available. For example, a CT scan is a far more
8 sensitive test for screening for lung cancer than plain chest x-ray; so much so that the data on lung
9 cancer screening does not support the use of the chest x-ray. Nevertheless, even by chest CT a
10 cancer can go undetected, and thus even a “negative” chest CT does not allow the physician to tell
11 his/her patient that he/she is cancer-free.

12 81. I have reviewed testing pertaining to the presence of asbestos in talc products,
13 including Johnson & Johnson’s, Avon, Revlon, Chanel, Cashmere Bouquet, and Coty. These data
14 provide support for my opinions in this case.

15 82. There are hundreds of tests evidencing asbestos in cosmetic talc spanning many
16 decades, including cosmetic talc from Vermont and Italian mines. Various testing laboratories,
17 such as the Battelle Memorial Institute, McCrone Associates, and the Colorado School of Mines
18 Research Institute, tested for asbestos impurities in the source talc ore, processed ore, and finished
19 products involving cosmetic grade talc from Italy and Vermont. Each of these testing laboratories
20
21
22

23
24 ⁹ Exhibit 20 (CTFA Method J4-1 Part I & Part II).

25 ¹⁰ Exhibit 21 (XRD limit of detection is 1-2% asbestos by weight); Exhibit 2 (1974 Rohl publication finding that
26 “very large numbers of asbestos fibers may be present in talc end products, yet they remain undetected if only
27 optical microscopy and x-ray diffraction are used”); Exhibit 22 (Consultant warning that XRD’s limit of detection is
28 only 1% and other techniques are necessary to estimate asbestos accurately); Exhibit 23 (4/24/1974 McCrone report
noting that XRD failed to find asbestos in 15 samples of talc where the asbestos was otherwise verified); Exhibit 24
(3/15/1976 meeting on asbestos in talc recognizing that the limit of detection for XRD could be as bad as 5% with
some asbestos types).

found asbestos minerals in the source talc ore or cosmetic talc products using Italian and Vermont talc that was tested.¹¹ Tests performed by cosmetic talc companies and their suppliers revealed that

¹¹ See, e.g., Exhibit 25 (10/15/1957 Battelle Memorial Institute report); Exhibit 26 (5/9/1958 Battelle Memorial Institute report); Exhibit 7 (5/23/1958 Battelle Memorial Institute report); Exhibit 8 (7/31/1959 Battelle Memorial Institute report, p. 30,55 & App. 1); Exhibit 9 (8/31/1959 Battelle Memorial Institute report); Exhibit 27 (9/15/1959 Battelle Memorial Institute report, produced by J&J with missing pages); Exhibit 12 (12/31/1959 Battelle Memorial Institute report); Exhibit 28 (3/8/1960 Battelle Memorial Institute report); Exhibit 6 (4/12/1960 Battelle Memorial Institute report); Exhibit 29 (6/6/1961 Battelle Memorial Institute report); Exhibit 30 (8/25/1961 Battelle Memorial Institute report); Exhibit 31 (10/13/1961 Battelle Memorial Institute report); Exhibit 32 (4/7/1966 Battelle Memorial Institute report); Exhibit 33 (1/30/1967, internal analysis of talc finding similar amounts of fibrous tremolite in Italian based talc products); Exhibit 34 at Table 2 (11/01/1967, comparison of its Vermont and Italian talc with other source mines finding tremolite and serpentine asbestos); Exhibit 10 (1/24/1968 Battelle Memorial Institute report); Exhibit 35 (12/4/1970 Colorado School of Mines Institute testing results); Exhibit 36 (4/14/1971 Colorado School of Mines Institute letter); Exhibit 37 (5/14/71 internal testing by Dr. Ashton in a letter with an attachment including Colorado School of Mines Institute testing results); Exhibit 38 (6/30/1971 Colorado School of Mines Institute testing results); Exhibit 39 (7/7/1971 Colorado School of Mines Institute testing); Exhibit 40 (9/3/71, McCrone preliminary report); Exhibit 41 (10/21/71 McCrone report on Vermont talc samples); Exhibit 42 and 43. (8/9-10/1972, repeated testing finding fibrous tremolite); Exhibit 44 (10/19/1972 testing results from NY University consultant for FDA); Exhibit 45 (10/27/1972 McCrone report looking at same samples as NY University consultant for FDA - 108T and 109T); Exhibit 46 (4/19/1973 Internal testing on JPB); Exhibit 47 (4/27/1973 Internal testing on JPB); Exhibit 48 (4/26/1973 internal evaluation of Vermont mine); Exhibit 47 (4/27/1973 Microscopic Exam of JBP finding tremolite/actinote in four different lots of JBP); Exhibit 49 (2/11/1974, McCrone testing to J&J finding chrysotile); Exhibit 50 (4/04/1974 Colorado School of Mines meeting to authorize experiments to attempt destroy tremolite in Vermont talc); Exhibit 23 (4/24/1974 McCrone report); Exhibit 51 (5/14/1974 McCrone report); Exhibit 52 (7/8/1974 McCrone report); Exhibit 53 (10/10/1974 McCrone Report); Exhibit 54 (12/9/1974 McCrone Report); Exhibit 55 (7/1/1975, McCrone Report); Exhibit 56 (9/11/1975, McCrone testing); Exhibit 57 (11/5/1975, McCrone Report); Exhibit 58 (11/19/1975 McCrone Report); Exhibit 59 (7/5/1976 Colorado School of Mines Research Institute report); Exhibit 60 (10/5/1978 McCrone testing); Exhibit 61 (11/6/1980 McCrone Report); Exhibit 62, (2/24/1984, McCrone Report); Exhibit 63, (11/2/1984 McCrone Report); Exhibit 64. (2/26/1985, J&J Analytical Report on cosmetic grade Chinese talc); Exhibit 65 (4/29/1986 McCrone Report); Exhibit 66. (1/30/1987 J&J testing of Vermont talc); Exhibit 67. (3/30/1987 J&J testing of Vermont talc); Exhibit 68. (10/1/1987 testing of Vermont talc); Exhibit 69 (10/13/1988 Windsor mineral reporting asbestos in cosmetic grade talc); Exhibit 70 (11/26/1990 McCrone Report); and Exhibit 71 (McCrone testing).

there was asbestos in the Vermont and Italian talc used in in cosmetic talc products.¹² Independent labs have also found asbestos in Italian and Vermont talcs use products.¹³

83. For example, Pfizer's testing by TEM with SAED of Italian talc grades Talc 1615 and Supra in the 1970s and 1980s revealed asbestos fibers in significant concentrations in about half of 234 samples. Moreover, Dr. Pooley found asbestos in his testing of Coty Airspun face powder. Sample #11 in Dr. Rohl's 1976 publication appears to be Coty Airspun loose face powder based on other documents that I have reviewed. These tests are particularly pertinent in this case given the years of use by Ms. Chapman. These tests of Italian talc also add additional support

¹² See, Exhibit 72 (University of Minnesota Report finding asbestos); Exhibit 73 (9/25/1972 memo regarding FDA finding of asbestos which noted Dr. Pooley found tremolite asbestos in the Italian mines used by Defendants); Exhibit 74 (5/16/1973 Dr. Pooley Report); Exhibit 75. (9/13/1973 Dr. Pooley results of tremolite and actinolite); Exhibit 76 (4/1/1977, EMV Report); Exhibit 77 (12/15/1977 Mountain State Research and Development Report); Exhibit 78 (2/9/1979, DOC Analytical Research quality control notes) Exhibit 79 (2/20/1978 report on the Geology of Vermont talc); Exhibit 80 (8/24/1982 exposures samples for South Plainfield Mill, a Cyprus Mill used for cosmetic talc products coded 2800959. Asbestos contaminant was given code 20. Code 20 was found in the mill repeatedly); Exhibit 81 (5/15/1984 testing done at Cyprus Mill at South Plainfield Mill, finding asbestos in air samples); Exhibit 82 (3/14/1988 R.J. Lee Group Report); Exhibit 83 (1/17/1989 E.S Laboratories Report); Exhibit 84 (5/23/1989 R.J. Lee Group Report); Exhibit 85 (3/5/1991 Supplier Report); Exhibit 86 (1/29/1992 Supplier Report); Exhibit 87 (3/25/1992 Supplier Report); Exhibit 88 (5/21/1992 R.J. Lee Report); Exhibit 89 (3/26/1996 Supplier Report); Exhibit 90 (4/23/1998 letter from J&J's consultant, Dr. Blount, regarding testing results); Exhibit 91 (3/1998 Dr. Blount letter); Exhibit 92 (5/23/2002 Supplier Technical Report); Exhibit 93 (3/31/2003 Supplier Report); Exhibit 94 (2/26/2004 Supplier Certification Report); Exhibit 95 (02/27/2004 Supplier Product Certification); Exhibit 96 (2/26/2004 Supplier Product Certification); and Exhibit 97 (3/4/2011 Summary of Asbestos Results: Grade 66/96).

¹³ See Exhibit 98 (8/3/1972 testing from Dr. Lewin); Exhibit 99 (9/30/1972 testing finding chrysotile and tremolite in 1615 talc); Exhibit 100 (8/28/1973 competitors' testing finding chrysotile in Vermont and Italian talc); Exhibit 101 (3/5/1976 testing finding tremolite in Italian talc); Exhibit 102 (11/10/1971 letter from Langer at Mount Sinai School of Medicine); Exhibit 103 (1/1/1972 Dr. Snider report of cosmetic talc); Exhibit 104 (4/27/1972 Dr. Zumwalde report using standard methods used for asbestos samples and finding over 25,000 fibers in a single milligram of talc); Exhibit 105 (6/12/1972 ES Laboratories Talc Analysis); Exhibit 106 (8/24/1972 Memo reporting Sperry Rand's lab); Exhibit 107 (8/31/1972 Memo discussing Sperry Rand Microanalytical lab results); Exhibit 108 (7/31/1973 Table 2 contains test results from Dr. Weissler confirming asbestos in cosmetic talc)(Lewin sample); Exhibit 100 (8/28/1973 test results of Vermont talc, JBP and Italian talc); Exhibit 109 and 110 (10/16/73 Ernest F. Fullam Inc., scientific consultants reports finding thousands of fibers of chrysotile asbestos and amphibole asbestos in a milligram of Italian talc and a milligram of Vermont talc); Exhibit 111 (10/29/1973 test results from Hazen Research for Italian talc and JBP); Exhibit 112 (12/13/1973; asbestos findings by Dutch Consumer Organization); Exhibit 113 (1/2/1974 report finding asbestos); Exhibit 114 (9/9/1975 Memo about Dr. Langer Analysis of Talcum Powder Products); Exhibit 115 (Meeting with Dr. Langer on July 9 Concerning Analytical Analysis of Talc); Exhibit 3 (1974 Pooley abstract on Mineralogy in Talc); Exhibit 116 (9/26/1984 Report of talc and asbestos in mining territory); Exhibit 117 (12/4/1997, Bain Environmental Report); Exhibit 118 (8/25/1997 Report from the Health Science Center at Syracuse); Exhibit 119 (12/4/2000 communication about testing from Bain Laboratories); and Exhibit 120 (1/5/2004 testing by Forensic Analytical); Exhibit 121.

1 regarding the presence of asbestos in Johnson & Johnson's, Cashmere Bouquet's, and others'
2 Italian-sourced talc. MAS found asbestos in 13 of 13 samples (100%) of Coty Airspun loose face
3 powder. In addition to reviewing MAS testing, I have reviewed a summary table of all testing done
4 by MAS on Italian talc showing the presence of asbestos in Italian sourced talc from five
5 companies, spanning 6 decades.

6
7 84. Testing of Canadian talc, including by Lewin, McCrone, Avon, and the FDA, has
8 shown the presence of asbestos.

9 85. Testing of Avon samples by MAS, McCrone, Ypma, and Avon has demonstrated
10 asbestos present.

11 86. Testing of Cashmere Bouquet by MAS, Colorado School of Mines, Bowling Green,
12 Gordon, Pooley, McCrone, and others has demonstrated asbestos present. For example, Gordon
13 found asbestos in 50 of 50 samples. As of June 2021, MAS had reported on testing of
14 approximately 91 containers of Colgate-Palmolive Company's Cashmere Bouquet talc products,
15 finding asbestos in about 87%. Of those from the 1950s through 1990s, approximately 98%
16 contained asbestos.

17
18 87. Testing of Montana talc by Pfizer, ES Laboratories, Hazen Research, Engelhard,
19 Cyprus Industrial Minerals, Avon, Ernest Fullam, Johns-Manville research, and others have
20 reported asbestos present. MAS testing of Avon products from Montana also revealed asbestos
21 present. MAS testing of five talc samples from Pfizer's Treasure Mine in Montana (Project #
22 M71549, July 1, 2022) found chrysotile asbestos in all five. As noted above, in total, MAS detected
23 asbestos in 10 of 10 samples of Gold Bond talc sourced mines in Montana. Hundreds of tests using
24 TEM and SAED found asbestos in Montana talc samples.
25
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1 88. Testing of North Carolina talc products by Cyprus Mines Corporation, Pfizer,
2 Avon, Fullam, Ypma, MAS, United Sierra, McCrone and others have reported asbestos present.
3 Pfizer's testing of Talc 643 (which I understand contained North Carolina talc) using TEM,
4 revealed significant concentrations of asbestos fibers in most samples.

5 89. Testing of California talc by MVA/Compton, Pooley, United Sierra, and others
6 revealed asbestos. Testing of Canadian talc, including by Lewin, McCrone, ES Laboratories,
7 Avon, and the FDA, has shown asbestos present. Some records indicate that Coty and Nestle
8 sourced its talc from this area in the 1969/1970 timeframe. It is noteworthy that the percentage by
9 weight of asbestos in the talc from mines from California and Ontario are higher than from other
10 source mines and thus would result in higher exposures when comparing similar exposure
11 scenarios. For example, some testing (Avon) of talc from Madoc revealed 2-4% asbestos by
12 weight.
13

14 90. Testing by Dr. Lewin and/or DCST in the 1970s showed the presence of asbestos
15 minerals and/or asbestos in Jean Naté, Revlon Touch & Glow, and other products. Testing of Jean
16 Naté by MAS, including pre-1971 samples, revealed 100% of the samples tested contained
17 asbestos.
18

19 91. The number of positive test results over the course of many years, combined with
20 the use of the cosmetic talc products as described above, is sufficient for me to conclude there
21 were significant amounts of asbestos encountered from the use of the cosmetic talc products used
22 in this case.
23

24 92. Matthew Sanchez' declaration also discusses epidemiology, a subject that I have
25 education, training, and experience in as a medical doctor. As a physician, I understand the role of
26 epidemiology in assessing causation of disease. Dr. Sanchez states:
27
28

1 While I am not a professional epidemiologist, epidemiological studies are relevant
2 to my opinion that the source talc mines at issue did not contain asbestos. Three
3 epidemiological studies have followed thousands of talc miners and millers from
4 Val Germanasca. These studies found that there were no deaths among the miners
5 and millers as a result of mesothelioma. (Giovanni F. Rubino, et al., Mortality
6 Studies of Talc Miners and Millers, J. Occup. Med. (1976), a true and correct copy
7 of which is attached as Exhibit 5; Giovanni F. Rubino, et al., Mortality and
8 Morbidity Among Talc Miners and Millers in Italy, Dusts and Disease (1979), a
9 true and correct copy of which is attached as Exhibit 6; Maurizio Coggiola, et al.,
10 Update of a Mortality Study of Talc Miners and Millers in Italy, Am. J. Industrial
11 Med. 44:63-69 (2003), a true and correct copy of which is attached as Exhibit 7;
12 Enrico Pira, et al., Mortality of Talc Miners and Millers From Val Chisone,
13 Northern Italy: An Updated Cohort Study, JOEM 59:659-664 (2017), a true and
14 correct copy of which is attached as Exhibit 8.)

15 Epidemiological studies of talc are limited given there have been no studies on talc end-
16 users. Studies have shown a higher rate of malignant mesothelioma in asbestos end-users as
17 compared to asbestos miners. Studies on talc miners and millers are also limited, are often of
18 comparatively small numbers with low power, and may not include sufficiently long latencies. In
19 addition, consideration must be made for the source of the talc (i.e., how it was formed). Moreover,
20 there may be differences in exposures between miners and millers and their exposures are not
21 necessarily comparable to those of end-users. A significant number of mesothelioma deaths were
22 reported in the small cohort of Vermont miners and millers who were studied, and studies of Italian
23 talc miners and millers have revealed increased numbers of peritoneal cancers.

24 93. Animal studies can be helpful to scientists and physicians in understanding the
25 pathophysiology of disease. For example, studies of rats have shown that asbestos causes
26 malignant mesothelioma, including chrysotile and anthophyllite. It is important to recognize,
27 however, that even though we know that asbestos causes mesothelioma, not all rat studies were
28 able to demonstrate cases of mesothelioma. Johnson & Johnson have suggested their talcum
powder is safe based, in part, on animal studies, however there are only two studies of their talcum
powder (one Italian sourced and one Vermont sourced), both of which have limitations affecting

1 their reliability. Johnson & Johnson was involved in the funding of animal and epidemiological
2 studies, including Rubino, cited by Dr. Sanchez. In a published animal study, the authors were
3 given misleading information by Johnson & Johnson: they were told the talc was from “a normal
4 product lot,” when in fact it had been heavily prescreened and chosen by Johnson & Johnson
5 because it was “extremely clean.” More broadly, Johnson & Johnson played a significant role in
6 the talc industry’s efforts to prevent knowledge of asbestos in its talc from becoming public. Dr.
7 Schelz of Johnson & Johnson was Chair of the CTFA Talc Subcommittee during the 1970’s, when
8 the CTFA blocked the FDA’s efforts to choose a reliable and sufficiently sensitive analytical
9 method. Testing records evidencing the routine presence of asbestos in various talc sources,
10 including talc sources in products that Ms. Chapman routinely used were done by Johnson &
11 Johnson or at their request and kept from regulators. It is impossible to assess the reliability of
12 FDA conclusions without the understanding of what information the FDA was given and what
13 information was withheld.
14

15
16 94. In two studies (Moline 2020, Emory 2020) with over 100 cases of malignant
17 mesothelioma with no known asbestos exposures other than through repeated exposures to
18 cosmetic talcum powder, all the examined tissues revealed anthophyllite, tremolite, and/or
19 chrysotile asbestos. The combination of tremolite and anthophyllite asbestos fibers found in tumor
20 tissue is felt to be unique to talc and is a fingerprint for such exposure. Other researchers have
21 reported mesothelioma cases in women who had intensively used talcum products, including some
22 with no other known source of asbestos exposure. In a case report of a woman who had died from
23 mesothelioma and whose only known exposure was to cosmetic talcum powder, tremolite and
24 anthophyllite was found in the lung and lymph tissues as well as in bottles of the same brand of
25 talcum powder. An investigation of asbestos bodies in the general population found a high
26
27
28

1 percentage of anthophyllite and tremolite cores in women but none in male blue-collar workers,
2 suggesting cosmetic talc as the source. In a tissue analysis of malignant mesothelioma cases, talc
3 was attributed to a significant percentage of the tremolite found.

4 95. When evaluating the ability of a toxin to cause harm, in addition to dose, it is
5 necessary to assess the route of exposure. For human malignant mesothelioma, the most important
6 route is inhalation via the lungs. From there, the asbestos can reach mesothelial tissues, including
7 those of the pleura and peritoneum.
8

9 96. It is generally accepted in the scientific community that visible dust from the
10 asbestos-containing products or materials contains large numbers of asbestos fibers that greatly
11 exceed background ambient levels. Moreover, once airborne, it may take hours to days for an
12 asbestos fiber to settle. Once asbestos is introduced into the home, it will spread to all rooms and
13 is almost impossible to remove, even with the vacuum cleaner. Fibers that have settled on to other
14 surfaces in the home become re-suspended into the air by sweeping, cleaning, or other common
15 household activities. As a result, household members may be continually exposed to asbestos in
16 the home environment.
17

18 97. The importance of segregating workplace exposures from the home environment
19 has been known for a long time. Over 100 years ago, Tolman and Kendall noted the importance
20 of removing work clothing “before leaving the factory (so that) the poison is not carried...into the
21 homes of workers” [Tolman, 1913]. In the 1940s, the US Public Health Service discussed the
22 importance of having workplace changing rooms and employer laundering. In the 1940s and
23 1950s, papers were published on the hazards of laundering contaminated clothing in the home. In
24 1943, the National Safety Council wrote that contaminated work clothes should not be taken home
25 where a toxic dust could contaminate the home or expose other members of the family. In 1952,
26
27
28

1 the US Department of Labor, under the Walsh-Healy Act, required employers to prevent toxic
2 substances from being carried home on clothing. Asbestos dust may also be carried home in the
3 worker's hair or shoes. Studies have demonstrated asbestos contamination of worker's personal
4 clothing and in their automobiles. NIOSH found asbestos contamination on 100% of worker's
5 personal clothing and in the majority of their automobiles [NIOSH, 1990].

6
7 98. Once brought into the home, the asbestos dust may accumulate with time and be
8 retained for a long time. Large amounts of asbestos-containing dust may be released into the air
9 by shaking, brushing or handling asbestos-contaminated work clothing. In addition, fibers can
10 transfer to previously uncontaminated clothing, such as from contact with contaminated items
11 (furniture, carpeting, etc), being washed with the contaminated clothing, and close contact while
12 the worker is still wearing the work clothes. Once airborne, it may take hours to days for an
13 asbestos fiber to settle. Fibers that have settled onto other surfaces in the home may become re-
14 suspended into the air by sweeping, cleaning, or other common household activities.

15
16 99. Take-home asbestos on worker's clothing or person can cause significant household
17 asbestos exposure. It has been known for decades that individuals with household exposure to
18 asbestos are at risk for asbestos-related disease, including malignancy.

19
20 100. Asbestos-related disease from domestic exposures from asbestos being introduced
21 into the home of a worker who worked with or around asbestos has been reviewed by the National
22 Institute for Occupational Safety and Health (NIOSH). In its Report to Congress on Worker's
23 Home Contamination Study, NIOSH concluded that families of asbestos-exposed workers are at
24 increased risk for asbestos-related disease, including cancer.

25
26 101. The family of an asbestos worker could be exposed to considerable amounts of
27 asbestos brought home on his working clothes, which all too often it was the duty of the wife or
28

1 daughter to clean. In some circumstances, exposures such as those occurring among household
2 members may approach or even exceed occupational levels.

3 102. Woven asbestos friction materials were first used in the United States in the early
4 1900s and have been used in vehicle brakes since the 1940s. Typically, drum and disc brakes
5 contained between 35 and 60% asbestos. Average peak asbestos air concentrations in close
6 proximity to specific servicing operations, including blow-out, grinding, and beveling of truck or
7 bus brake linings were significantly elevated, in some studies over 100 times the current PEL
8 [Lemen, 2004]. In 1986, the EPA found exposures of 16 fibers/cc for using compressed air on
9 brake drums, 4-7 fibers/cc for grinding brakes, and 72 fibers/cc for beveling brakes and reported
10 cases of mesothelioma among brake mechanics. In a study of almost 400 shops, there was a mean
11 exposure of 0.1 fiber/cc-years for each year of work as an auto mechanic [Plato, 1995]. In a study
12 of hand sanding brakes containing 30% asbestos, Longo measured air concentrations of 0.52-0.96
13 fibers/cc [Longo, 2001]. In a study of grinding bus and truck brakes, the median air concentration
14 was 56 fibers/cc [Kauppinen, 1987]. In a study at a Ford dealership, car brake service had a TWA
15 of 0.68 fibers/cc and trucks had a TWA of 1.75 fibers/cc, with exposures up to 7.1 fibers/cc during
16 cleaning [Hickish, 1970]. Lorimer reported mean air concentrations of 15.9 fibers/cc during
17 blowing dust from brake drums on cars and beveling truck brakes resulted in a mean exposure of
18 37.5 fibers/cc [Lorimer, 1976]. Rohl found average concentrations of 16 fibers/cc and noted that
19 persons 65-75 feet away can be exposed [Rohl, 1976]. Other studies have also demonstrated
20 significant airborne release of asbestos from brake and clutch work. In addition to installation,
21 transport and handling boxes of new brake linings are associated with asbestos dust release. Longo
22 found air concentrations of 0.27-0.67 fibers/cc during opening brake shoe boxes [Longo, 2003].
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1 103. The weight of the evidence supports the conclusion that workers performing brake
2 repair and installation with asbestos containing products are at significant risk of developing
3 mesothelioma. In 1930, Merewether and Price reported on educating the worker on the “sane
4 appreciation of the risk,” including dangerous trades like brake and clutch workers. Freeman and
5 Kohles found the evidence favored a causal relationship between brake dust exposure and
6 mesothelioma [Freeman 2012]. In a study of mesothelioma case in Massachusetts from 1988 to
7 2003, there was a significant risk (SMOR 2.1) of mesothelioma in automotive mechanics [Roelofs,
8 2013]. From an Australian mesothelioma registry from 1945 to 2000, 2% of cases were in brake
9 workers. In a study from Canada, installation of brake linings involved “definite or probable”
10 exposure to asbestos and “clearly demonstrated” an increased mesothelioma risk [McDonald,
11 1970].
12

13 104. In the 1950s through the 1970s, drywall joint compound contained asbestos fibers,
14 primarily chrysotile asbestos, yet did not have warning labels or indicators that they might contain
15 toxic or hazardous materials [Rohl, 1975]. In 1979, it was reported that analyses of taping
16 compounds used in the US showed the majority contained asbestos [Fischbein, 1979]. Studies have
17 shown that significant asbestos air exposures occurred during mixing, pole-sanding, hand-sanding,
18 and sweeping of asbestos-containing drywall finishing products. Hazardous levels of asbestos dust
19 occurred not only in the work area but also in adjacent rooms, and levels remained significant for
20 at least 35 minutes after sweeping. It has been reported that air fiber counts in a series of reports
21 commissioned by the Gypsum Association in the early 1970s found the use of joint compound
22 produced asbestos air concentrations consistently exceeding occupational standards [Dahlgren,
23 2012]. Mean asbestos fiber concentrations for pole-sanding was 10 f/cc, hand-sanding 5.3 f/cc, dry
24 mixing 47.2 f/cc, and sweeping 41.4 f/cc [Rohl, 1975]. Verma and Middleton found the eight-hour
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1 TWA for drywall/taping workers using dry powder joint compound and hand sanding was 4.5 f/cc
2 [Verma, 1980]. In fact, drywall workers using asbestos-containing products had similar exposure
3 levels to asbestos insulation workers [Stern, 2001; Verma, 1980]. In a study of abatement of
4 asbestos-containing drywall, airborne asbestos concentrations significantly exceeded current
5 OSHA limits. In a study from 1975, Nicholson et al found that 60% of personal air samples of
6 drywall workers exceeded occupational standards [Nicholson, 1975]. Plasterers, who may use
7 asbestos-containing spackling compound, have been characterized as a high-risk trade for asbestos
8 exposure [Barnhart, 1997].

10 105. Drywall workers and plasterers have been shown to be at significant increased risk
11 for asbestos-related disease, including asbestosis. In a study of 69 drywall construction workers,
12 59% had radiographic evidence of asbestos-related disease [Nicholson, 1975]. According to a
13 report from NIOSH, plasterers had a marked increased risk of death from asbestosis [NIOSH,
14 1999]. Similarly, Stern et al reported a significantly increased mortality rate from asbestosis in
15 plasterers. Barnhart et al classified plasterers as a “high-risk” trade for asbestos exposure.
16 Fischbein et al found the prevalence of asbestosis in drywall workers to be 40.9%, again felt similar
17 to the prevalence reported amongst asbestos insulation workers. The authors concluded that
18 asbestos disease is an important health hazard of drywall workers. In 1978, Fischbein et al reported
19 on a career drywall worker who had died in 1972 from bronchogenic carcinoma, who had
20 pathological evidence of asbestosis and fibrils of chrysotile asbestos seen on transmission electron
21 microscopy [Fischbein, 1978]. These authors postulated that “this trade may soon become the
22 source of asbestos neoplastic disease.” Stern et al reported in 2001 that plasterers had a
23 significantly elevated mortality rate from lung cancer.
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1 106. According to a powdering study of babies by Johnson & Johnson, the average usage
2 of talcum powder is 2.7 g per application. Depending on the age, type of diapers, and other factors,
3 diapering changes for babies averages 8 to 12 per day. For adults, Johnson & Johnson has reported
4 average usages between 4 to 15.7 g.

5 107. There is information about how much asbestos is released in the air when using
6 cosmetic talc. I have reviewed and relied on several studies to understand a range of exposures
7 likely experienced by Ms. Chapman given the types of talc product used and her explanation of
8 use. The exposure range is likely in the range of 0.1-4 fibers/cc for most cosmetic talc use, although
9 likely significantly higher for the California and Canadian sourced talcs. This number is based on
10 multiple studies that evaluate cosmetic talc exposures.¹⁴ The FDA reported that “the amounts of
11 asbestos fibers dispersed by the use of talc containing more than trace amounts of this contaminant
12 [asbestos] exceed the standards promulgated for occupational exposure.”¹⁵ Based on the
13 information I have reviewed and relied upon, I disagree with the exposure estimates and risk of
14 use of cosmetic talc as identified by Dr. Sanchez and Dr. Sahmel in their declarations for this case.
15

16 108. In a published study by Gordon et al of an Italian-sourced talc product, using a
17 shaker container to apply 0.37 grams of talc to the shoulder, axilla, and upper arm area resulted in
18 an exposure range of 1.2-2.9 fibers/cc over the course of 5 minutes. In their puff application test,
19 using 6.25 g of talc, the exposure range was 3.5-5 fibers/cc. The short-term asbestos exposure
20 reached a concentration of 13 fibers/cc. In a publication by Steffen et al, using a shaker container
21 to the lower body with about 4 g of Italian-sourced talc, the 5-minute personal air sampling
22 revealed an asbestos exposure range of 1.8-4.5 fibers/cc. In 1972, the FDA concluded that talc
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26 _____
27 ¹⁴ See, Exhibit C list the complete reference: Steffan 2020, Gordon 2014, MAS analyses, MVA analyses,
28 Dement/NIOSH analyses, Citizen Petition.

¹⁵ See, Exhibit 122, 1972 FDA document regarding asbestos in talc.

1 with above-trace levels of asbestos would produce exposures over 5 fibers/cc TWA and ceiling of
2 10 fibers/cc. In 2018, MAS reported personal air sampling asbestos ranged from 0.8-1.9 fibers/cc
3 for the adult and 1.5-2 fibers/cc for the baby during diapering. From below the waist usage, MAS
4 found an asbestos range of 1.8-4.5 fibers/cc. Mattenklott reported the use of talcum powder
5 containing less than 0.1% asbestos by weight would result in an asbestos exposure of up to 0.018
6 fibers/cc. Taylor estimated an exposure range of 0.04-0.08 fibers/cc, assuming talc containing less
7 than 0.1% asbestos by weight. For exposures during diapering, Dement et al from NIOSH found
8 that an adult is exposed to 2.2 fibers/cc of PCM fibers and that a baby is exposed to 1.8 fibers/cc
9 over the course of two minutes. Finkelstein analyzed the data from Burns et al and found
10 concentrations ranged from 0.02 to 6 fibers/cc. Addison (1988) reported an asbestos exposure
11 range of 1.1-2.8 fibers/cc from dust containing 0.1% asbestos. Based on data from a reconstruction
12 model by Sahmel, of a 2013 Exponent study, talc application for 2.5 minutes resulted in an
13 exposure of 0.30 fibers/cc. CalOSHA and Pfizer calculated a tremolite asbestos exposure of 2-4
14 fibers/cc based on dust from talc containing a fiber frequency of 0.19-0.4%. Thus, a reasonable
15 range of asbestos exposure from cosmetic talc use is 0.1-4.0 fibers/cc, which is tens of thousands
16 of times above ambient, and millions of times above ambient amphibole levels. Exposures from
17 sources of talc containing higher percentages of asbestos could result in a higher exposure range.

20 **Conclusion**

21 109. Based on the testimony in this case, I estimate Ms. Chapman was exposed to
22 cosmetic talcum powder products thousands of times, spanning over 70 years.

23 110. I rely on, and I have considered, the various sources of information contained and
24 discussed in this report (including Exhibits B and C) regarding (a) the source talc in the specific
25 products identified, when available, (b) the concentration of asbestos in the talc in the specific
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1 products identified, (c) the quantity of talc typically used during different applications of cosmetic
2 talc products, and (d) the airborne concentration of asbestos that has been shown to result from the
3 ordinary application of cosmetic talc products as reported in the literature and other well conducted
4 analyses (e.g., Steffan 2020, Gordon 2014, MAS analyses, MVA analyses). Just as I do (and the
5 mainstream scientific community does) with any other asbestos-containing product, I make a
6 qualitative evaluation and comparison enough of such reported results to the exposure scenarios
7 described, considering the described application process, the concentration of asbestos in the
8 product, and other factors. Along with such information, I evaluate the onset, duration, frequency,
9 regularity, intensity, nature, and proximity of exposures to each specific product, making a
10 qualitative assessment of the exposure and dose relative to the peer-reviewed scientific literature,
11 including epidemiological literature, on the asbestos exposures shown to cause pleural and
12 peritoneal mesothelioma. As discussed elsewhere in this report (including Exhibits B and C), the
13 scientific community generally accepts that relatively low doses of asbestos exposure can and do
14 cause pleural and peritoneal mesothelioma.
15

16
17 **General Causation Opinions:**

18 111. Asbestos is the major cause of malignant mesothelioma.

19 112. The carcinogenic risks apply to all asbestos fiber types, regardless of source,
20 including from talc containing asbestos.

21 113. Talc containing asbestos fibers is carcinogenic to humans and causes malignant
22 mesothelioma.
23

24 114. There is insufficient scientific proof of the existence of “spontaneous” malignant
25 mesothelioma in humans (i.e., unrelated to mutagen). To the extent that such cases occur, they
26 would be exceptionally rare, far below the “background” rate.
27
28

1 115. Visible dust from asbestos-containing products contains large numbers of asbestos
2 fibers that greatly exceed background ambient levels.

3 116. Consumer talcum powder products are used in a manner that creates respirable dust
4 in the user's breathing zone.

5 117. Brakes, gaskets and clutches are used in a manner that creates dust to those working
6 on or near them. When exposed to these products, the asbestos accumulates on a person's clothes
7 and person, creating exposures to those in the home. Laundering of the clothes of those working
8 with or near brakes, gaskets and clutches is of particular significance.

9 118. In general, when compared to adults, infants, children, and adolescents are at
10 greater risk from the effects of carcinogens, such as asbestos.

11 119. Malignant mesothelioma causes significant symptomatology.

12 120. The overall survival of patients with malignant mesothelioma is dismal.

13 **Specific Causation Opinions:**

14 121. Ms. Chapman's malignant pleural mesothelioma was caused by her cumulative
15 exposures to asbestos found within the asbestos-containing talc products to which she was
16 exposed, exposures from her husband's work, and exposures to joint compound work. These
17 products constituted a significant and substantial factor in the development of Ms. Chapman's
18 malignant pleural mesothelioma, considering the onset, duration, frequency, regularity, intensity,
19 nature, and proximity of exposures. To date, there is no other documented causative exposure
20 source.
21

22 122. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
23 repetitive exposures to Avon body and face powders. These products were used in a manner that
24 created respirable dust in her breathing zone, and she likely inhaled substantial quantities of
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1 asbestos fibers from the use of this product. Even if not her sole source of exposure, this was a
2 significant and substantial exposure source, considering the onset, duration, frequency, regularity,
3 intensity, and proximity of exposures. Therefore, Avon was a substantial contributing factor in
4 causing Ms. Chapman's mesothelioma. Her exposures to face powders likely contributed as well
5 assuming similar talc sources were used in the face powders as used in Avon body powders,
6 however, Avon has not provided information about the source of its face powders.
7

8 123. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
9 repetitive exposures to Cashmere Bouquet. This product was used in a manner that created
10 respirable dust in her breathing zone, and she likely inhaled substantial quantities of asbestos fibers
11 from the use of this product. Even if not her sole source of exposure, this was a significant and
12 substantial exposure source, considering the onset, duration, frequency, regularity, intensity, and
13 proximity of exposures. Therefore, Cashmere Bouquet was a substantial contributing factor in
14 causing Ms. Chapman's mesothelioma.
15

16 124. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
17 repetitive exposures to Cover Girl face powders. This product was used in a manner that created
18 respirable dust in her breathing zone, and she likely inhaled substantial quantities of asbestos fibers
19 from the use of this product. Even if not her sole source of exposure, this was a significant and
20 substantial exposure source, considering the onset, duration, frequency, regularity, intensity, and
21 proximity of exposures. Therefore, Cover Girl was a substantial contributing factor in causing Ms.
22 Chapman's mesothelioma.
23

24 125. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
25 repetitive exposures to Coty. This product was used in a manner that created respirable dust in her
26 breathing zone, and she likely inhaled substantial quantities of asbestos fibers from the use of this
27
28

1 product. Even if not her sole source of exposure, this was a significant and substantial exposure
2 source, considering the onset, duration, frequency, regularity, intensity, and proximity of
3 exposures. Therefore, Coty was a substantial contributing factor in causing Ms. Chapman's
4 mesothelioma.

5 126. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
6 repetitive exposures to talc supplied by WCD for use in products sold as cosmetic talc products.
7 These products were used in a manner that created respirable dust in her breathing zone, and she
8 likely inhaled substantial quantities of asbestos fibers from the use of this product. Even if not her
9 sole source of exposure, this was a significant and substantial exposure source, considering the
10 onset, duration, frequency, regularity, intensity, and proximity of exposures. Therefore, WCD was
11 a substantial contributing factor in causing Ms. Chapman's mesothelioma.
12

13 127. Ms. Chapman had asbestos exposures resulting from frequent, regular, and
14 repetitive exposures to Jean Naté and Revlon Touch and Glow talc products. These products were
15 used in a manner that created respirable dust in her breathing zone, and she likely inhaled
16 substantial quantities of asbestos fibers from the use of this product. Even if not her sole source of
17 exposure, this was a significant and substantial exposure source, considering the onset, duration,
18 frequency, regularity, intensity, and proximity of exposures. Color Techniques supplied talc for
19 use in these products. Therefore, Color Techniques was a substantial contributing factor in causing
20 Ms. Chapman's mesothelioma.
21

22 128. Ms. Chapman had asbestos exposures resulting from her husband's frequent,
23 regular, and repetitive exposures to friction and gasket materials at Douglas. His work with and
24 around these products released dust that collected on his clothes and person, and which were
25 brought into his home. Ms. Chapman was married to him during his timeframe at Douglas and her
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1 contact with Mr. Chapman, particularly her laundering of his clothes, resulted in respirable dust in
2 her breathing zone, and she likely inhaled substantial quantities of asbestos fibers from these
3 products as a result. Even if not her sole source of exposure, this was a significant and substantial
4 exposure source, considering the onset, duration, frequency, regularity, intensity, and proximity of
5 exposures. Therefore, Douglas/Boeing was a substantial contributing factor in causing Ms.
6 Chapman's mesothelioma.
7

8 129. Ms. Chapman had asbestos exposures resulting from her husband's frequent,
9 regular, and repetitive exposures to friction materials at Hyster. His work with and around these
10 products released dust that collected on his clothes and person, and which were brought into his
11 home. Ms. Chapman was married to him during his timeframe at Hyster and her contact with Gary
12 Chapman, particularly her laundering of his clothes, resulted in respirable dust in her breathing
13 zone, and she likely inhaled substantial quantities of asbestos fibers from these products as a result.
14 Even if not her sole source of exposure, this was a significant and substantial exposure source,
15 considering the onset, duration, frequency, regularity, intensity, and proximity of exposures.
16 Therefore, Hyster was a substantial contributing factor in causing Ms. Chapman's mesothelioma.
17

18 130. Ms. Chapman had asbestos exposures resulting from her husband's frequent,
19 regular, and repetitive exposures to friction and gasket materials his work on Ford engines and
20 trucks while at Douglas. His work with and around these products released dust that collected on
21 his clothes and person, and which were brought into his home. Ms. Chapman was married to him
22 during his timeframe at Douglas and her contact with Gary Chapman, particularly her laundering
23 of his clothes, resulted in respirable dust in her breathing zone, and she likely inhaled substantial
24 quantities of asbestos fibers from these products as a result. Even if not her sole source of exposure,
25 this was a significant and substantial exposure source, considering the onset, duration, frequency,
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1 regularity, intensity, and proximity of exposures. In addition, Gary Chapman did brake work on
2 his own vehicles sometimes with his wife present resulting in exposures to Ms. Chapman both
3 from laundering his clothes and as a bystander. Therefore, Ford was a substantial contributing
4 factor in causing Ms. Chapman's mesothelioma.

5 131. Ms. Chapman had asbestos exposures resulting from her husband's frequent,
6 regular, and repetitive exposures to Bendix brakes. His work with and around these products
7 released dust that collected on his clothes and person which was brought into his home. Ms.
8 Chapman was married to him during his timeframe he was at Douglas, Hyster and Papé and her
9 contact with Gary Chapman, particularly her laundering of his clothes, resulted in respirable dust
10 in her breathing zone, and she likely inhaled substantial quantities of asbestos fibers from this
11 product as a result. Even if not her sole source of exposure, this was a significant and substantial
12 exposure source, considering the onset, duration, frequency, regularity, intensity, and proximity of
13 exposures. In addition, Gary Chapman did brake work on his own vehicles and this work
14 implicated Bendix brakes as well, adding to the exposure. Therefore, Bendix was a substantial
15 contributing factor in causing Ms. Chapman's mesothelioma.

16 132. Ms. Chapman had asbestos exposures resulting from her husband's frequent,
17 regular, and repetitive exposures to Borg Warner clutches while at Douglas. His work with and
18 around these products released dust that collected on his clothes and person which was brought into
19 his home. Ms. Chapman was married to him during his timeframe at Douglas and her contact with
20 Gary Chapman, particularly her laundering of his clothes, resulted in respirable dust in her
21 breathing zone, and she likely inhaled substantial quantities of asbestos fibers from this product as
22 a result. Even if not her sole source of exposure, this was a significant and substantial exposure
23 source, considering the onset, duration, frequency, regularity, intensity, and proximity of
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1 exposures. Therefore, Borg Warner was a substantial contributing factor in causing Ms.
2 Chapman's mesothelioma.

3 133. Ms. Chapman had asbestos exposures from her own work with Kaiser Gypsum
4 joint compound in addition to the exposures she had from her husband's home remodeling work
5 at their residence on Stevens Street involving the use of premixed drywall joint compound supplied
6 by Kaiser Gypsum. His work with and around Kaiser Gypsum collected on his clothes and person
7 so much so that he described being covered head to toe. Ms. Chapman's contact with Gary
8 Chapman, particularly her laundering of his clothes, resulted in respirable dust in her breathing
9 zone, and she likely inhaled substantial quantities of asbestos fibers from the use of this product.
10 Moreover, the use of Kaiser Gypsum was done in the home, so that Ms. Chapman's exposures
11 were not limited to time of her clean up or laundering of clothes because the asbestos was in the
12 home and would create exposures well after the use. Even if not her sole source of exposure, this
13 was a significant and substantial exposure source, considering the onset, duration, frequency,
14 regularity, intensity, and proximity of exposures. Therefore, Kaiser Gypsum was a substantial
15 contributing factor in causing Ms. Chapman's mesothelioma.
16

17 134. Mr. Chapman first testified that he ordered from Pep Boys while at McDonnell
18 Douglas, but not very often. He then testified to having no knowledge of ever ordering from Pep
19 Boys while at either McDonnell Douglas, Hyster, or Papé. He did not know if any of his friends,
20 father, or Ms. Chapman ever went into a Pep Boys. I was informed that continued efforts are
21 ongoing to obtain information from Mr. Chapman's employers about co-workers and supply
22 records during this time. I would need more information about the use of friction or gasket
23 materials from Pep Boys to consider what role they had, if any, in the development of Ms.
24 Chapman's mesothelioma.
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1 135. Despite the somatic loss of BAP1 from the tumor cells, it is highly unlikely that
2 Ms. Chapman has a germline BAP1 mutation, given the general lack of associated cancers in her
3 family history and her lack of previous cancer.

4 136. Ms. Chapman has no non-asbestos risk factors for mesothelioma.

5 137. Ms. Chapman's malignant pleural mesothelioma is not "spontaneous" or
6 "idiopathic."
7

8 138. Ms. Chapman's prognosis is poor, and she will die from her malignant pleural
9 mesothelioma.

10 139. The average residual life expectancy for a 76-year-old Caucasian female is 11.9
11 years. This is based upon the statistical data obtained from the September 24, 2012 National Vital
12 Statistics Reports; Vol. 61, No. 3, Table 6, Life Table for United States, 2008. This represents the
13 average number of years of life remaining for race, gender, and age matched persons living in the
14 USA who have attained a given age.
15

16 140. This declaration does not contain all my opinions, including all my causation
17 opinions in this case. I was asked to focus on specific exposures for motions in this case and as a
18 result evaluated those exposures and the role each played in Ms. Chapman's mesothelioma.

19
20 I declare under penalty of perjury under the laws of the State of California that the foregoing is
21 true and correct.
22

23 Executed this 26th day of August, 2022, at Houston, Texas.

24
25 
26 Steven E. Haber, M.D., F.A.C.P., F.C.C.P.
27
28

EXHIBIT 156

Petrogenesis and Timing of Talc Formation in the Ruby Range, Southwestern Montana

DALE L. ANDERSON,* DAVID W. MOGK, AND JOHN F. CHILDS**

Department of Earth Sciences, Montana State University, Bozeman, Montana 59717

Abstract

Talc deposits in the Ruby Range, southwestern Montana, have formed in Archean dolomitic marbles that were mineralized during retrograde calcification in the Proterozoic. Calcite-rich marbles contain the assemblage calcite-olivine-phlogopite $\pm$ tremolite, indicating that metamorphism occurred in the upper amphibolite to granulite facies (M_1); crystallization of serpentine and chlorite, and dolomitization of the marbles in the greenschist facies overprinted the high-grade calc-silicate assemblages (M_2); and talc has replaced dolomite and the other greenschist-grade silicate minerals in the latest stage of recrystallization which resulted in the formation of the main talc bodies (M_3). Structural control of the talc formation is suggested by discontinuous occurrences of talc bodies along layer-parallel fractures. Preservation of relict textures indicates that the talc formed during constant volume replacement. Geochemical analyses and mass balance calculations demonstrate that introduction of large quantities of Si and Mg and removal of Ca is required to maintain constant volume. Model reactions indicate that infiltration of a minimum of 4.8×10^5 l of water is needed to convert a cubic meter of the average high-grade marble to talc (volumetric water/rock ratio > 600). The infiltration mechanism is consistent with the observation that no isobaric univariant mineral assemblages were present to buffer the composition of the metamorphic fluids. Estimates of the maximum conditions of talc formation of 2 kbars and 400°C are based on field observations and heterogeneous phase equilibria; it is probable that the talc actually formed at much lower temperatures and pressures, possibly in a near-surface hot spring deposit. Regional geologic relations indicate that the talc mineralization occurred during the middle Proterozoic.

Introduction

INDUSTRIAL minerals such as talc are of great economic significance but are relatively poorly understood with respect to their occurrence, petrogenesis, and timing of formation compared to precious and base metal deposits. The field relations, petrography, and whole-rock chemistry of six talc prospects in the Ruby Range, southwestern Montana, have been studied in detail to develop a model for the mechanism(s) of formation of these talc deposits and to determine the timing of their formation.

Talc (and chlorite) deposits have been reported in Archean rocks that have been exposed in foreland block uplifts in the Ruby Range, Tobacco Root Mountains, Highland Mountains, Gravelly Range, and Greenhorn Range across southwestern Montana (Fig. 1; Berg, 1979; and references therein). In the Ruby Range two talc mines are currently in production: the Beaverhead mine, operated by Cyprus Industrial Minerals Company, and the Treasure Chest mine, operated by Pfizer, Inc. The talc occurrences described in this report are satellitic to these major talc-producing mines. The talc deposits of the Ruby Range

are the principal source of steatite-grade talc in the United States and ore reserves for the district are estimated on the order of 10^6 tons (Chidester et al., 1964). Talc from the Ruby Range varies in color from light green, high-purity material, to impure gray-brown and maroon talc.

Formation of economically viable talc deposits is generally restricted to two geologic environments: metamorphosed siliceous dolomitic carbonate rocks; and altered ultramafic bodies (e.g., Brown, 1973). High-purity talc deposits in the Ruby Range occur as bodies of pure talc which have replaced Archean dolomitic marble (Okuma, 1971; Garihan, 1973; Berg, 1979); alteration of ultramafic bodies in the range has not been recognized as a mechanism for formation of mineable talc bodies (Desmarais, 1981).

Geologic Setting

Archean basement rocks in southwestern Montana are exposed in Laramide-style foreland block uplifts which have been modified by subsequent basin-and-range extension (Fig. 1; Schmidt and Garihan, 1983). The Archean rocks in the Ruby Range are dominated by quartzofeldspathic gneiss (the Dillon Gneiss), with intercalated schists, quartzites, amphibolites, and marbles. These rocks have undergone amphibolite- to granulite-grade, dynamothermal metamorphism (M_1), dated at approximately 2,750 Ma using the Rb-

* Present address: R. L. Stollar and Associates, Inc., 143 Union Boulevard, Suite 640, Lakewood, Colorado 80228.

** Present address: Consulting Geologist, 705 South 5th Avenue, Bozeman, Montana 59715.

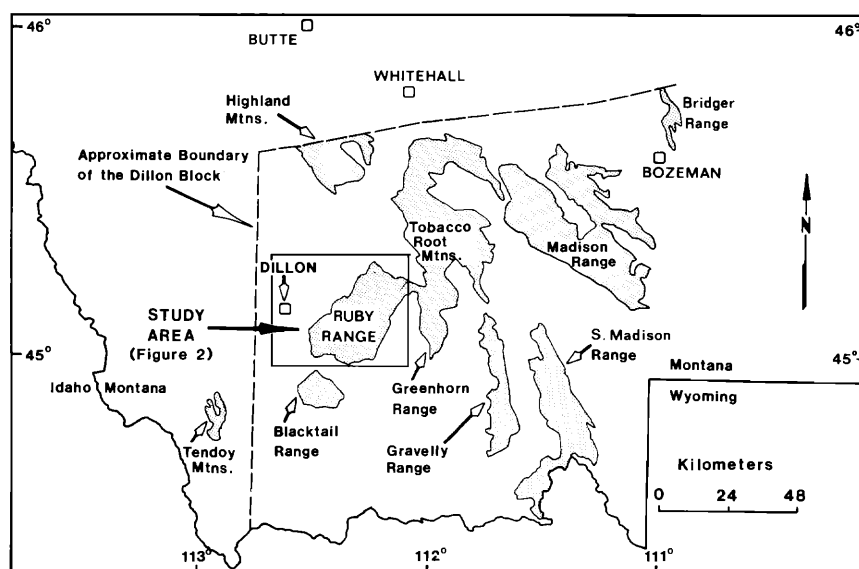


FIG. 1. Regional location map showing the study area and Archean basement exposures (stippled pattern) in southwestern Montana (modified from Bergantino and Clark, 1985).

Sr whole-rock method (James and Hedge, 1980). The peak metamorphic conditions are 700° to 750°C and 6 to 8 kbars (Dahl, 1979). M_1 metamorphism produced the dominant foliation within the central and southern Ruby Range, which strikes northeast and dips to the northwest (Karasevich et al., 1981). Megascopic and macroscopic folds associated with M_1 are isoclinal to tight with axial surfaces that strike northeast and dip to the northwest.

A Proterozoic retrograde regional thermal event (M_2) resulted in overprinting of the granulite-amphibolite-grade assemblages by greenschist-grade assemblages; no penetrative deformational features are associated with this thermal event (Okuma, 1971; Garihan, 1973; Dahl, 1979; Desmarais, 1981). Giletti (1966) reported K-Ar dates for biotite and muscovite and Rb-Sr whole-rock dates of 1.6 ± 0.1 Ga for the Dillon Gneiss. The major faults in the Ruby Range strike northwest (Fig. 2), offset the northeast-trending Archean structures, and have undergone recurrent movement since Proterozoic time (Schmidt and Garihan, 1983, 1986). Previous workers have suggested that talc formation is the result of fluid movement along these structures during the Proterozoic greenschist thermal event (Okuma, 1971; Garihan, 1973; Olson, 1976; Berg, 1979).

Contemporaneous with, and possibly prior to, incipient rifting of the Belt basin, two distinct sets of northwest-trending mafic dikes intruded the area, at 1,455 Ma and 1,120 to 1,130 Ma, probably along preexisting fracture zones (Wooden et al., 1978). It has been postulated that these dikes may also have been the source of heat and fluids for talc formation (Wooden et al., 1978). However, no apparent spatial

association between mafic dikes and talc-bearing marble was documented during the present study.

The Ruby Range and surrounding area (Fig. 1) has been interpreted as a positive tectonic feature (termed

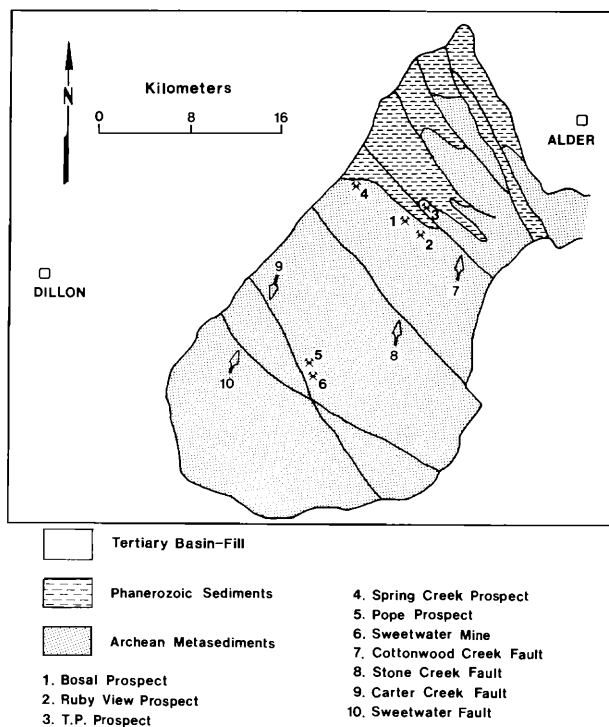


FIG. 2. Location map showing the Ruby Range, with locations of prospects examined, and major northwest-trending faults (modified from Schmidt and Garihan, 1986).

the Dillon block by Harrison et al., 1974) during middle to late Proterozoic time. The Archean rocks in the Dillon block are the most probable source for clasts of marble, gneiss, and amphibolite in the LaHood Formation, which was deposited along the southern margin of the Belt basin (McMannis, 1963; Boyce, 1975). Deposition of the LaHood Formation has been interpreted as marking incipient rifting of the Belt basin (McMannis, 1963). This observation is significant because it places the Archean rocks in a near-surface environment at roughly the same time as the thermal metamorphism in the middle Proterozoic.

The northernmost portion of the Ruby Range is covered by Phanerozoic sediments which have been subjected to Laramide-style deformation (Tysdal, 1976; Schmidt and Garihan, 1983); this area has subsequently been overprinted by basin-and-range-style extension. There are a number of Cambrian and younger dolomitic units (Pilgrim Formation, Meagher Formation, Madison Group) which unconformably overlie or are in fault contact with the Archean basement; none of these carbonate rocks have been sub-

jected to thermal metamorphism or talc mineralization.

Field Relationships and Petrography

Six talc prospects (Fig. 2) from different parts of the Ruby Range were mapped in detail on a scale of 1" = 5' or 1" = 10' (e.g., Fig. 3). The detailed maps illustrate the nature of lithologic layering of marbles within the gneiss and schist; distribution of massive talc bodies; and the dominant structural features including folds, shear zones, fault surfaces, and joints. Within each prospect, high-grade marbles, talc-bearing marbles, and altered country rock were sampled for petrologic and whole-rock geochemical analysis. All prospects examined exhibit similar mineralogic, textural, and structural relationships (Anderson, 1987). One prospect, the Sweetwater mine, exhibits additional unique mineralogic and textural relations which will be documented below. In aggregate, the mineralogic, petrologic, and structural relationships observed in these six occurrences provide a basis for interpreting the petrogenesis and timing of talc formation in the Ruby Range.

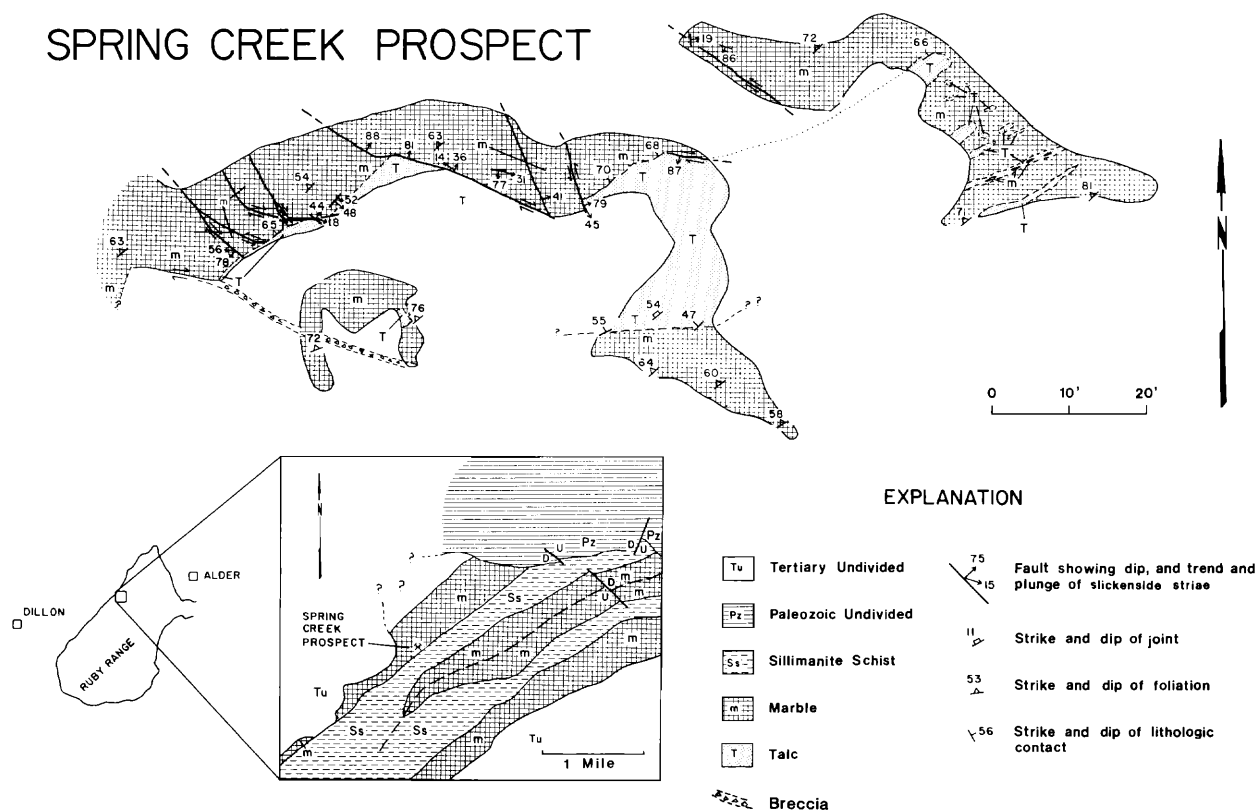


FIG. 3. Geologic map of the Spring Creek talc prospect. The solid outline delineates the extent of development on the deposit. The talc bodies have developed as local replacements of the Archean marbles; the distribution of these bodies is structurally controlled by foliation and compositional layering within the marbles. The inset map shows the regional geologic setting of this deposit (after Garihan, 1973).

High-grade marble (HGM)

Marbles containing high-grade mineral assemblages are present within tens of meters of talc-bearing zones in all prospects and are typically more calcitic than talc-bearing marbles. High-grade marbles contain the M_1 assemblage calcite-olivine-phlogopite $\pm$ dolomite $\pm$ garnet. Tremolite occurs as a replacement of olivine, in a fibrous form in shear zones, and as randomly oriented prisms in the carbonate matrix. It has not been possible, based on textural criteria, to determine if tremolite is part of the peak M_1 mineral assemblage, if it has grown in a late retrograde stage of the M_1 event, or if it is associated with the overprinting M_2 greenschist facies event. It is probable that tremolite formation was not restricted to any one of these possibilities. High-grade assemblages have been overprinted by retrograde (M_2) serpentine and chlorite. Retrograde serpentine occurs dominantly as pseudomorphs replacing olivine in a characteristic mesh texture. Accessory minerals include graphite, pyrite, and hematite.

The carbonate matrix of the high-grade marbles varies from fine to coarse grained (2–10 mm). A complex polymetamorphic recrystallization history for the carbonate matrix, similar to the metamorphic history recorded by the silicate parageneses, has been observed by transmitted light, cathodoluminescence (CL), and ultraviolet (UV) microscopy. Calcite grains in the high-grade marbles commonly contain exsolution lamellae of dolomite, indicating unmixing from a higher grade mineral assemblage (Fig. 4). These grains also exhibit zones of patchy extinction in transmitted light and anomalous fluorescence when viewed by CL and UV, suggesting that they have incompletely reequilibrated during the overprinted M_2 greenschist facies metamorphism. Many of the calcite grains that

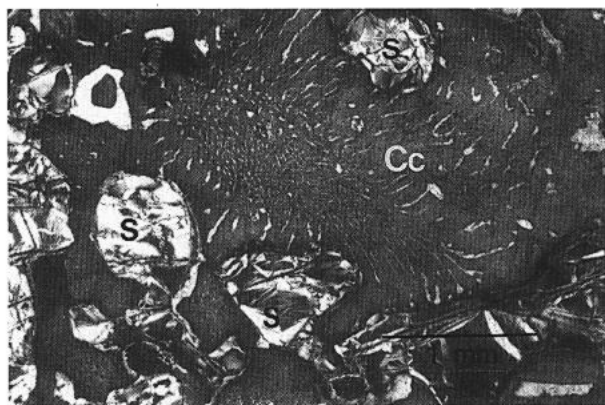


FIG. 4. Photomicrograph of a high-grade marble showing exsolution lamellae of dolomite in calcite (Cc) and an overgrowth of homogeneous calcite over the high-grade calcite core (crossed nichols). The ovoid areas with low birefringence are pseudomorphs of olivine by serpentine (S); these exhibit mesh texture.

have experienced the earlier amphibolite facies metamorphism (M_1) are rimmed by homogeneous recrystallized calcite; the abrupt boundary between cores of these grains, which exhibit exsolution lamellae and patchy zoning, and the homogeneous rims suggests that the rims formed as overgrowths during a separate metamorphic event. Calcite is also present in late-stage veins which crosscut serpentine mats. These mats are characteristic of the M_2 greenschist facies event. Dolomite is rare or absent in the high-grade marbles; presumably it has been consumed during prograde reactions that formed the Mg-bearing silicate minerals.

Quartz is rare as a primary phase and is dominantly present as late-stage filling of vugs and fractures (during M_2). Centimeter-scale siliceous layers occur locally as boudins and detached fold hinges in the carbonate matrix; these may have been primary cherty layers in the carbonate protoliths of the marble. Individual disseminated quartz grains have not been observed in the marbles, and if originally present, were probably consumed in the prograde amphibolite facies metamorphism M_1 . Some quartz was mobilized, and possibly introduced into the marbles, during high-grade metamorphism, as evidenced in outcrop by disharmonically folded quartz veins and stringers.

Talc-bearing marble (TBM)

Talc-bearing marbles have selectively replaced the high-grade marbles with greenschist facies silicate minerals and the carbonate matrix has been dolomitized during a second distinct metamorphic event (M_2). The textural evidence for the petrogenetic history of the talc-bearing marbles is described below and is summarized in Table 1. The contacts between the two marbles are abrupt and are marked by changes in dolomite content, grain size, and Mg silicate mineralogy. Talc-bearing marbles occur as isolated pods within larger marble bodies or at the contacts of the marbles with the surrounding quartzofeldspathic gneiss. The talc bodies are typically conformable with compositional layering in the surrounding marbles; they range from 1.5 to 4 m in thickness. In most cases larger talc bodies appear to pinch out along strike rather than being terminated by faults. It is important to note that the talc bodies occur as replacements of the high-grade marbles and that there is no field evidence for significant changes in volume accompanying talc formation. The dominant mineral assemblage in the talc-bearing marbles is talc-dolomite-chlorite $\pm$ calcite with accessory graphite, pyrite, manganese oxide, and quartz. Serpentine, tremolite, and phlogopite may be present as relics but are almost always seen in a reaction texture if talc is present.

The carbonate matrix of the talc-bearing marbles is dominantly composed of dolomite. It is the direct replacement of dolomite by talc that is volumetrically

TABLE 1. Summary of Replacement Reactions and Intergrowths Observed during Petrographic Analysis

Prospect		Bosal	Ruby View	T.P.	Spring Creek	Pope	Sweetwater
	Observed						
	Replacement						
1	Do → Tc	X	X	X	X		
2	S → Tc	X	X	X	X	X	
3	Ph → Tc	X	X	X	X		
4	Tr → Tc	X	X		X	X	
5	Qtz → Tc				X		X
6	M → Tc						X
7	Ph → Ch	X			X		
8	Qtz → S		X				
9	Ol → S	X		X		X	
10	Tr → S					X	
11	Feld → Ch						X
	Intergrowths						
1	Ch—Tc	X	X	X	X	X	
2	Do—Ch		X		X	X	
3	Do—S	X					
4	Ch—S		X	X	X		
5	Cc—Tc					X	

Abbreviations: Cc = calcite, Ch = chlorite, Do = dolomite, Feld = feldspar, M = magnesite, Ol = olivine, Qtz = quartz, Ph = phlogopite, S = serpentine, Tr = tremolite

the most important mineralization process. Dolomite exhibits several distinct textures which suggest that it has formed as a replacement mineral after the dynamothermal amphibolite facies metamorphism and prior to the crystallization of talc. Incomplete alteration of high-grade marbles to talc is indicated by inclusion of relict high-grade marble blocks within the talc-bearing marbles and massive talc bodies. On a microscopic scale, dolomite of the talc-bearing marbles has developed serrate boundaries convex to the calcite of the high-grade marbles, with small apophyses of dolomite growing into the calcite matrix along grain boundaries. The overall morphology of the ovoid talc-bearing marble bodies, with the wedge-shaped terminations, may be interpreted as a dolomitic front that has migrated along the M_1 structural fabric in the marble.

Within the talc-bearing marble bodies, dolomite typically occurs as discrete 1-mm to 1-cm, homogeneous hypidiomorphic to idiomorphic grains (Fig. 5). These are quite unlike the carbonate matrix of the high-grade marbles in which fine-grained calcite grains are highly strained and typically exhibit exsolution features, patchy zoning, and numerous carbonate overgrowths (as observed by CL and UV microscopy). Dolomite also occurs as rims on earlier formed calcite grains, as thin replacement zones along cleavage traces in calcite, in fracture fillings which crosscut calcite grains, and as terminated, rhombohedral crystals filling cavities. Exsolution textures are not observed in dolomite and patchy and undulose extinction in dolomite are present but not common.

The most important occurrence of talc is as the direct replacement of dolomite. Evidence for this

mechanism of talc formation is present in discrete laths or cryptocrystalline masses of talc disseminated in a dolomite matrix, as well as in massive bodies of pure talc meters across. Talc which occurs disseminated in the marble is not of economic importance. However, this talc does preserve textural relationships that allow interpretation of the talc-forming processes, as well as the timing of talc formation. The most important talc-forming reaction is:

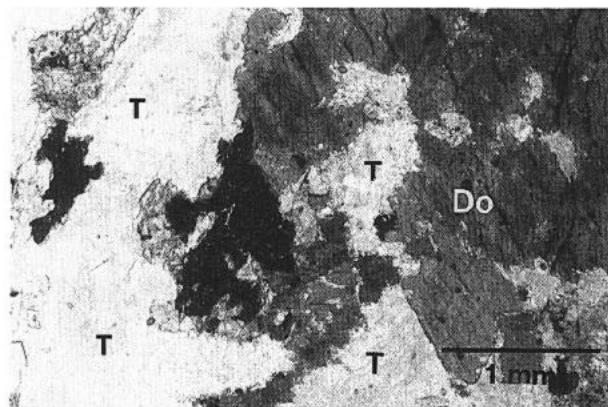
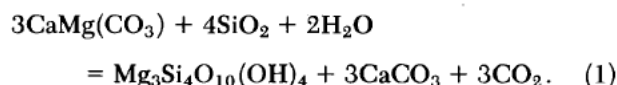
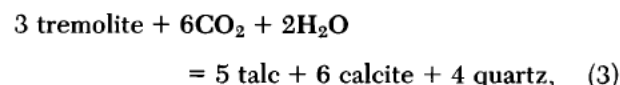
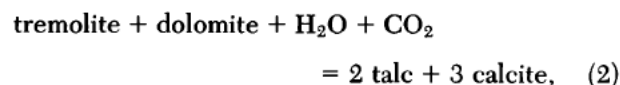


FIG. 5. Photomicrograph showing rhombohedral dolomite (Do) being replaced by talc (T). This is the dominant mechanism for talc formation in the Ruby Range. The dolomite formed during M_2 and is characteristically coarse-grained, eu- to subhedral, undeformed, and devoid of patchy zoning or exsolution lamellae.

The outlines of relict rhombohedral dolomite crystals are clearly preserved in monomineralic masses of talc (Fig. 6), and fine-grained masses of talc are observed growing at the expense of dolomite in the carbonate matrix (Fig. 5). The multivariant assemblage dolomite-talc is characteristic of large volumes of the talc-bearing marble, and there are few relict textures of earlier silicate phases in this occurrence. Quartz in the matrix was very rarely identified as a reactant mineral in the talc-bearing marbles, except for local occurrences where talc selvages may have formed adjacent to cherty layers in the dolomitic marbles. Similarly, secondary calcite, which should be a product of this reaction, is only locally present in small quantities within and adjacent to the talc-bearing marbles.

The replacement of silicate porphyroblasts by talc is common in the talc-bearing marbles, although this occurrence is volumetrically insignificant. In terms of their petrogenetic history, the most important observation is that olivine porphyroblasts are replaced by serpentine (in a characteristic mesh texture) and that the mats of serpentine, in turn, are replaced by talc (Fig. 7). Tremolite is replaced by talc, although all of the mineral reactants and products are not directly observed if one of the following reactions was operative:



and

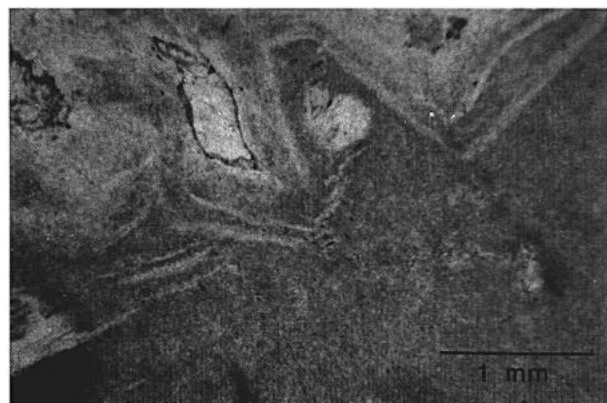


FIG. 6. Photomicrograph of massive fine-grained talc which has completely replaced dolomite. A single larger talc grain has formed in the fine-grained matrix. The outline of rhombohedral dolomite is preserved by the color bands in the talc matrix.

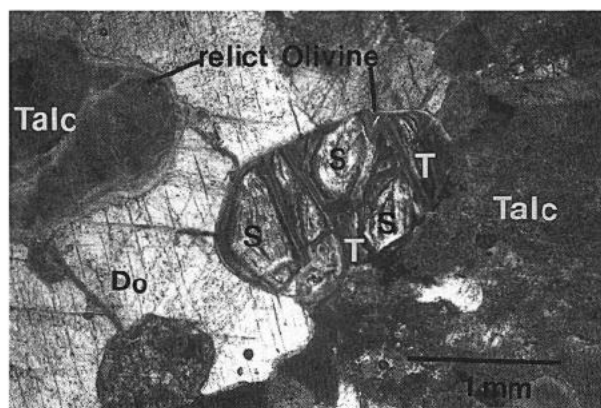


FIG. 7. Photomicrograph showing talc (T) pseudomorphs after serpentine (S) (which has previously replaced olivine). Talc occupies the ovoid mass in the upper left and the matrix on the right margin. The ovoid mass in the center is a pseudomorph of an olivine grain which has been replaced by serpentine; talc veins in this mass have subsequently replaced the serpentine. The carbonate matrix is dolomite (Do).

Puhan (1988) described the replacement of tremolite by talc and interpreted this occurrence as the result of reequilibration during the late decompressive stage of the clockwise P-T-t path of the Damara orogen. This mechanism of talc formation is not applicable in the Ruby Range because the characteristic jacket texture (quartz grains armored by dolomite as a result of the breakdown of tremolite + calcite to dolomite + quartz; Puhan, 1988) is not present. More important, the observation that serpentine precedes talc in the petrogenetic sequence provides the key evidence that talc formation occurred during a separate and distinct metamorphic cycle rather than at the retrograde stage of the earlier M_1 regional metamorphism. Phlogopite is also replaced by talc, but it is usually intergrown with chlorite that contains sagenitic rutile needles oriented at 60° to each other in pseudohexagonal symmetry.

In addition, talc occurs as botryoidal blebs which occur as open-space fillings within vugs lined by coarsely crystalline dolomite. Talc which occurs in this habit is interpreted to be a direct precipitate from hydrothermal solutions. Late-stage talc is also observed in scattered veinlets parallel to compositional layering, as small lenses in hinge zones of meter-scale open folds in marble (rare), and on joint and fracture surfaces.

The Sweetwater mine is similar to the other prospects studied in that it shows evidence of high-grade marbles being replaced by talc-bearing marbles, and in the geometry and distribution of the talc. However, it is unique because magnesite (detected by XRD analysis) is the dominant carbonate mineral. The mineral assemblage at the Sweetwater mine is magnesite-talc-chlorite. Also present are dolomite; relict phlog-

opite, serpentine, and tremolite; and accessory graphite and pyrite. Where magnesite is in contact with talc, grain boundaries are irregular and jagged, indicating formation of talc from magnesite. Quartz and calcite are present but occur in late-stage veins.

Quartz occurs as a secondary mineral in all of the talc-bearing marbles. Terminated crystals of quartz and rhombohedral dolomite occur in partially to completely filled vugs and in late-stage fractures which crosscut the foliation in the marbles. Quartz also occurs as thin layers along growth zones in the dolomite. The association of dolomite and quartz requires either lower temperature or lower $X_{(\text{H}_2\text{O})}$ than that required for talc stability. This vug- and fracture-filling quartz indicates that SiO_2 must have been mobile at least in the latest stages of metamorphism. The numerous textural varieties of talc, such as wholesale talcification of dolomite and the occurrence of talc in vugs and in fractures, indicate that mobilization of silica also occurred at an earlier stage of the greenschist facies metamorphism when the system was within the talc stability field.

The talc-forming event is designated M_3 because talc formation occurred after dolomitization of the carbonate matrix and after serpentinization of olivine porphyroblasts. It is not possible, based on regional geologic relations, textural analysis, or ambiguous geochronologic studies, to determine if this is merely a late stage of the greenschist event (M_2) or yet another overprinted thermal metamorphism.

A summary of the petrogenetic history of the talc-bearing marbles is presented in Figure 8 based on field and petrographic observations. The protolith of the marbles can only be inferred but is most reasonably a siliceous dolomitic limestone. Primary quartz

and dolomite were probably subordinate to calcite and were most likely consumed during prograde metamorphism at amphibolite to granulite conditions during M_1 (e.g., Garihan, 1973; Dahl, 1979; Karesevich et al., 1981). The high-grade marbles typically have a calcite-rich matrix and contain the silicate paragenesis olivine-phlogopite $\pm$ tremolite. Tremolite most likely has formed at different stages of M_1 as evidenced by its occurrence as porphyroblasts in the high-grade marble matrix, as well as in a fibrous habit in late-stage shears. Quartz is locally present in the high-grade marbles as relict cherty layers or as disharmonically folded quartz veins.

The talc-bearing marbles have formed as a result of a regional greenschist grade metamorphism that is only locally expressed as the selective replacement of the high-grade marbles. Dolomitization of the carbonate matrix occurred during M_2 and was accompanied by the replacement of olivine by serpentine and phlogopite by chlorite. The dominant occurrence of talc is as the replacement of dolomite. The replacement of serpentine by talc is of particular importance to the petrogenetic history because it precludes the possibility that talc simply formed during the retrograde path of M_1 and raises the possibility that some of the talc formed either at the latest stage of M_2 or perhaps even during another metamorphic event (M_3). Magnesite is only present at the Sweetwater mine. The Mg-rich bulk composition required for magnesite formation suggests that magnesite and dolomite formed as a result of extensive metasomatism of the original carbonates at the Sweetwater mine. Calcite and quartz occurrences are restricted to vein relationships, and the filling of vuggy cavities, during and after the major talc-forming events.

Dillon Granite Gneiss and interlayered schists

The Dillon Granite Gneiss conformably surrounds marble bands throughout the Ruby Range. Bands of pelitic schist are conformably interlayered within the gneiss and marble layers. Schistose layers within talc-bearing marbles have locally been isoclinally folded. Centimeter- to meter-scale boudins of schist and gneiss occur in the marbles. The amphibolite- to granulite-grade assemblage plagioclase (An_{14-54})-amphibole (cummingtonite)-biotite-quartz is dominant in the gneisses and the assemblage oligoclase-K feldspar-quartz-biotite-garnet-sillimanite is characteristic of the schists.

Both the schist and gneiss have undergone varying degrees of retrogression. The most intense alteration is characteristically developed at the contacts between marble and gneiss (or schist) layers or boudins. The degree of alteration decreases with distance from marble-gneiss contacts. In almost all cases the alteration front separating amphibolite facies and greenschist facies assemblages is abrupt.

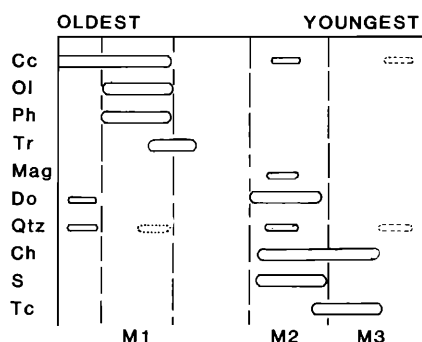


FIG. 8. Generalized paragenetic sequence representative of all six prospects examined. The larger symbols represent dominant minerals, smaller symbols are subordinate minerals, dashed symbols are minerals present in veins. Mineral abbreviations are: Cc = calcite, Ch = chlorite, Do = dolomite, Mag = magnesite, (Sweetwater mine only) Ol = olivine, Ph = phlogopite, Qtz = quartz, S = serpentine, Tc = talc, Tr = tremolite. M_1 is the regional amphibolite-granulite facies metamorphism, M_2 is the localized retrograde greenschist facies metamorphism, and M_3 is the latest stage talc-forming event. See text for full discussion.

The most obvious effect of retrogression in the schists and gneisses is chloritization of garnet and biotite and sericitization of the feldspars. Chlorite formed by alteration of biotite commonly includes sa-genitic rutile needles oriented at 60°. Serpentine, minor talc stringers, rare secondary quartz, and fine-grained sericite and calcite are also present in the alteration assemblage of the schist and gneiss. Carbonate occurs in the altered gneiss both as disseminated grains with sericite and in very fine veinlets, suggesting influx of carbonate-bearing fluids. Retrogression of the schists is recognized as either pervasive chloritization of schist lenses, or as 6- to 10-cm-thick chloritic selvages in schists where the schist is in contact with marble. Boudins of schist and gneiss within talc-bearing marbles commonly exhibit crenulated, chloritized rims. Centimeter-scale talc halos are common in marble immediately adjacent to schistose boudins.

The gneiss in and adjacent to the Sweetwater mine has excellently preserved textural relations which document the development of the chloritic alteration. Chloritic alteration of gneiss involves a chemical system different from alteration of dolomitic marble to talc. However, this process is analogous to that responsible for talc formation. Chloritization varies in intensity within the gneisses at the Sweetwater mine and is probably cogenetic with formation of magnesite and talc in intercalated marbles. Even the most intensely altered gneisses have a well-preserved relict (M_1) tectonite fabric, exhibiting foliation defined by changes in grain size, quartz ribbons, and ovoid pla-

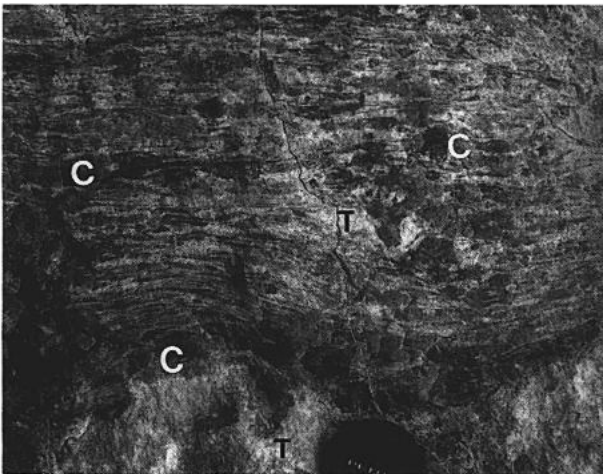


FIG. 9. Photograph of an outcrop at the Sweetwater mine showing complete replacement of the Dillon Granite Gneiss by M_2 greenschist facies minerals. The dark areas are chlorite rich (C) and the light bands are talc rich (T). Relict gneissic texture is preserved, and the larger chlorite-rich areas were once pegmatitic feldspar-rich patches. Preservation of these primary textures by talc and chlorite indicates constant volume replacement of the gneisses. The lens cap is 55 mm across.

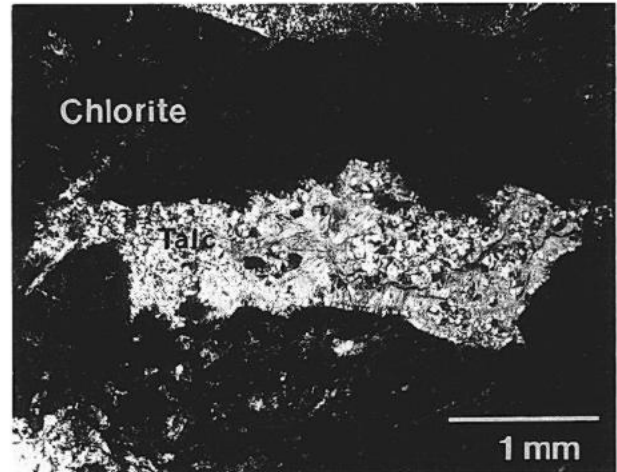


FIG. 10. Photomicrograph of talc bands (high birefringence) and chlorite (anomalous low-order birefringence) from the Dillon Granite Gneiss adjacent to the Sweetwater mine. The talc bands selectively replace quartz ribbons and the chlorite replaces feldspar-rich layers, mimicking the tectonite fabric of the gneiss.

gioclase porphyroblasts (Fig. 9). However, the quartz ribbons have been completely replaced by talc and the plagioclase porphyroblasts have been completely replaced by magnesian chlorite (Fig. 10; chlorite analysis by Bernard Evans, pers. commun.). In these cases the talc- and chlorite-forming reactions have clearly occurred as a result of constant volume replacement processes.

Structure

Faults within the prospects examined are dominantly northwest striking, and steeply dipping. The latest movement on these faults postdates talc mineralization. Measurable offset of lithologic contacts ranges from 2 cm to 7 m. Structures which crosscut marble bands at high angles and predate talc formation have not been recognized in those areas examined. The dominant joint sets strike northwest and dip to the southwest. Joint and layering surfaces are typically coated by thin selvages of talc, chlorite, and iron oxide.

Deformation resulting from talc formation, in the form of faulting or distortion of layering, has not been noted on an outcrop scale. Also, structures which may have provided large-volume conduits for fluid movement are no longer recognizable. However, it is obvious that talc-forming fluids migrated at least in part along joints, compositional layering, fault surfaces, and lithologic contacts, as evidenced by thin selvages of talc and chlorite along these surfaces.

Structural control of talc formation is indicated by the localized and discontinuous nature of talc bodies parallel to the foliation in the marbles. The structures which controlled fluid movement during talc forma-

tion are inferred to have been parallel or subparallel to layering in the marbles. This conclusion is based upon the lack of crosscutting fractures which can be visually related to talc formation.

Whole-Rock Geochemistry

Twenty-seven samples of high-grade marble, talc-bearing marble, and talc were collected for whole-rock geochemical analysis using X-ray fluorescence (XRF). Where appropriate, samples of altered gneiss immediately adjacent to marbles and/or talc were also analyzed to determine how the nature of the alteration within the gneisses relates to that seen in the marbles. Chemical analyses are presented in Table 2.

Analyses for high-grade marble, talc-bearing marble, and talc are shown on a ternary CaO-MgO-SiO₂ diagram in Figure 11A. As shown in Figure 11B, the two marbles and monomineralic talc bodies occupy distinct fields with little, if any, compositional overlap. It is unlikely that differences in bulk composition between the two marbles are due to compositional variation between the protoliths of these rocks, and a protolith composition equivalent to that of pure end-member talc would be highly unusual and fortuitous. Compositions on the Mg-rich side of the diagram (Fig. 11A) are unusual in nature and are generally restricted to special environments of formation (e.g., evaporite deposits). In addition, the forsterite- and talc-bearing parageneses are dependent on the physical conditions of formation rather than being compositionally dependent (Fig. 11 C and D). These considerations, coupled with the textural evidence of selective retrogression of the high-grade marbles to form the talc-bearing marbles, support the argument of metasomatic processes during talc formation.

The compositional changes that have accompanied the replacement of high-grade marbles by talc-bearing marbles and massive talc bodies are indicated by two distinct trends indicated by arrows in Figure 11B. The first trend (Fig. 11B) marks the transition from high-grade to talc-bearing marble. This transition involves an increase in MgO, marked by increased MgO/CaO ratios, with little apparent introduction of SiO₂. Increased MgO values in talc-bearing marble are interpreted to be the result of dolomitization which post-dates amphibolite-grade metamorphism. This interpretation is in agreement with microscopic carbonate textures which indicate that calcite in the high-grade marbles has been replaced by dolomite in the talc-bearing marbles.

The second trend shown in Figure 11B marks the transition from talc-bearing marble to massive talc bodies. Many of the talc-bearing marbles which exhibit only incipient talc formation have inherited an initial low SiO₂ content from the high-grade marbles, and their bulk compositions lie close to the composition of dolomite due to the pervasive nature of the

dolomitization of the matrix. Talc-bearing marbles that exhibit higher degrees of talcification lie on a linear chord that originates near the composition of dolomite and trends toward the composition of talc. The analyses of the massive talc bodies are slightly more siliceous than the composition of end-member talc; the higher silica values can be accounted for by the presence of small amounts of chalcedony and quartz veins in the massive talc bodies. The SiO₂/MgO ratio increases systematically along this chord in the talc-bearing marble field, suggesting introduction of large quantities of SiO₂ to form talc. This interpretation suggests that the fluid phase controlled the mineralogy of the system during talc formation by the process of infiltration (Rice and Ferry, 1982), with the amount of introduced SiO₂ acting as one of the limiting components of talc formation from precursor dolomitic marble. This interpretation is similar to conclusions drawn during previous studies (Okuma, 1971; Garihan, 1973; Olson, 1976; Berg, 1979; Walton, 1981; Piniakiewicz, 1984).

It is interesting to note that the slope of the trend from talc-bearing marbles to talc crosses MgO/SiO₂ isopleths at a relatively high angle, in contrast to the approximately parallel trend line-isopleth relationship noted for the high-grade to talc-bearing transition. These relationships suggest the possibility that two periods of fluid flux occurred. Alternatively, differing MgO/SiO₂ ratios may have resulted from compositional changes in the fluid phase during a single prolonged period of fluid flux, which could have caused this transition, followed by the transformation of talc-bearing marble to form massive talc. In either case, textural evidence cited above indicates that dolomitization occurred, in part, prior to the formation of talc. A third possible trend, the direct transition of high-grade marble to talc, is not considered likely due to lack of macroscopic and microscopic evidence supporting such an interpretation.

Geochemistry of gneiss

The whole-rock geochemistry of the gneiss in the Sweetwater mine is particularly useful for deciphering metasomatic processes associated with talc formation. Efforts were made to ensure that samples were taken from the same compositional layer to minimize variations caused by primary chemical heterogeneity between layers. Changes in the chemistry of the gneiss from the Sweetwater mine (Table 2) indicate that approximately one-half of the total SiO₂ present in the least altered gneiss was removed during transformation to intensely chloritized gneiss, and that substantial quantities of Mg⁺² were added. These changes result in an end product of gneiss with a bulk composition similar to that of magnesian chlorite ($X_{Mg} = 0.99$; analysis by B. Evans, pers. commun.).

TABLE 2. Whole-Rock Geochemical Analyses (XRF) of High-Grade Marble

A. High-grade marble							
	AB-71	AP-36	AS-68	ASW-18	AT-28	AT-31	AR-49
SiO ₂	13.30	7.88	1.03	3.78	3.48	5.81	14.20
Al ₂ O ₃	0.32	0.18	0.13	0.14	0.52	0.19	<0.01
CaO	34.20	50.50	30.00	29.00	29.40	34.00	36.50
MgO	16.60	2.61	21.20	21.30	20.40	17.30	14.10
Na ₂ O	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
K ₂ O	0.13	0.06	0.03	0.03	0.04	0.04	0.03
Fe ₂ O ₃	0.63	0.44	1.50	0.86	1.11	0.70	0.95
MnO	0.74	0.63	0.84	0.75	1.00	0.73	0.77
TiO ₂	0.03	<0.01	0.02	0.02	0.04	0.01	<0.01
P ₂ O ₅	0.02	0.02	0.04	0.02	0.02	0.02	0.02
Cr ₂ O ₃	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
L.O.I.	34.00	37.50	45.20	44.60	44.50	41.70	33.40
Sum	98.97	99.82	99.99	100.50	100.51	100.50	99.97
B. Talc-bearing marble							
	AB-65	AB-70	AP-37	AS-69	AS-70	ASW-19	AT-23
SiO ₂	14.00	17.70	6.64	8.33	4.88	4.97	5.15
Al ₂ O ₃	0.25	0.41	0.52	0.22	0.48	0.15	0.49
CaO	23.40	24.10	27.40	26.60	28.00	0.55	27.40
MgO	24.00	21.40	22.90	23.00	22.30	49.00	21.20
Na ₂ O	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
K ₂ O	0.04	0.04	0.03	0.03	0.04	0.03	0.04
Fe ₂ O ₃	1.20	1.40	0.92	1.44	1.08	1.96	3.18
MnO	0.10	0.28	0.27	0.45	0.56	0.22	0.88
TiO ₂	0.03	0.02	0.04	0.01	0.04	0.03	0.03
P ₂ O ₅	0.02	0.02	0.02	0.02	0.03	0.03	0.02
Cr ₂ O ₃	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
L.O.I.	37.40	35.00	41.80	40.50	42.80	43.30	42.20
Sum	100.44	100.37	100.31	100.24	100.54	100.60	100.59
	AT-24	AT-25	AT-26	AR-30	AR-33	AR-34	AR-37
SiO ₂	2.63	5.35	8.13	3.04	14.50	22.30	11.60
Al ₂ O ₃	0.14	0.42	0.24	0.04	<0.01	0.01	0.62
CaO	29.50	27.60	26.30	25.50	23.80	19.30	18.70
MgO	21.40	22.00	21.30	25.40	24.00	25.50	28.30
Na ₂ O	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
K ₂ O	0.03	0.04	0.04	0.03	0.04	0.04	0.04
Fe ₂ O ₃	1.64	1.51	3.20	0.95	1.00	1.54	1.46
MnO	0.91	0.88	0.84	0.12	0.60	0.17	0.15
TiO ₂	0.01	0.03	0.02	0.02	0.01	0.02	0.05
P ₂ O ₅	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cr ₂ O ₃	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
L.O.I.	44.20	42.40	40.20	45.20	36.50	31.50	39.50
Sum	100.48	100.25	100.29	100.32	100.47	100.40	100.44

Chloritization of gneiss is interpreted to have resulted from addition of Mg⁺² to the system under greenschist-grade conditions. This Mg⁺² enrichment may explain coeval magnesite formation in the adjacent marbles, which is unique to this prospect. Chloritization of the gneisses resulted in SiO₂ depletion. This SiO₂, once removed from the gneisses, would then be available for talc formation or quartz veining in adjacent marbles by the process of mass transfer

across lithologic boundaries. If MgO is present in excess, as suggested by the presence of magnesian chlorite and magnesite, it would appear that SiO₂ is the limiting component of talc formation in this prospect.

Physical Conditions of Talc Formation

The talc stability field is fairly well defined in terms of pressure (P), temperature (T), and mole fraction CO₂ (X_{CO₂}) of the fluid phase based on the experi-

TABLE 2. (Cont.)

C. Massive talc bodies						
	AB-67	AP-39	AS-71	ASW-21	AT-21	AR-35
SiO ₂	60.00	59.00	58.50	60.10	59.90	60.50
Al ₂ O ₃	0.46	1.20	1.02	0.55	0.09	0.03
CaO	0.15	0.17	0.08	0.30	0.01	0.13
MgO	32.20	32.10	31.80	32.50	27.80	31.70
Na ₂ O	<0.01	<0.01	<0.01	0.05	<0.01	<0.01
K ₂ O	0.03	0.03	0.04	0.01	0.03	0.04
Fe ₂ O ₃	0.44	0.78	0.83	0.27	6.80	1.02
MnO	0.01	0.01	0.01	0.01	0.01	0.05
TiO ₂	0.04	0.07	0.07	0.04	0.02	0.02
P ₂ O ₅	0.02	0.09	0.01	0.17	0.02	0.02
Cr ₂ O ₃	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
L.O.I.	6.08	6.31	6.08	5.70	4.93	5.47
Sum	99.43	99.76	98.44	99.71	99.61	98.98

D. Gneisses from a single gneissic layer at the Sweetwater mine			
	ASW-16	ASW-15	ASW-17
SiO ₂	33.00	71.40	74.10
Al ₂ O ₃	18.10	13.60	14.40
CaO	0.24	0.38	0.53
MgO	35.00	6.13	0.13
Na ₂ O	<0.01	<0.01	3.75
K ₂ O	0.05	3.14	5.00
Fe ₂ O ₃	0.71	0.33	1.05
MnO	0.02	0.02	0.02
TiO ₂	0.03	0.03	0.05
P ₂ O ₅	0.02	0.01	0.10
Cr ₂ O ₃	0.01	<0.01	0.01
L.O.I.	13.20	4.16	0.39
Sum	99.30	100.37	99.53

Sample ASW-17 is a relatively unaltered gneiss, ASW-15 is partially altered, and ASW-16 has been completely altered to talc and chlorite

Area designators are: AB = Bosal prospect, AP = Pope prospect, AR = Ruby View prospect, AS = Spring Creek prospect, AS = Spring Creek prospect, ASW = Sweetwater mine, AT = T.P. prospect

mental studies of Gordon and Greenwood (1970), Skippen (1971, 1974), Slaughter et al. (1975), and Eggert and Kerrick (1981). Talc phase relations are represented on the isobaric T-X_{CO₂} diagram in Figure 12 (after Evans and Guggenheim, 1988, calculated from the thermochemical data of Berman, 1988 and applying the modified Redlich-Kwong expression for nonideal mixing of H₂O-CO₂ of Kerrick and Jacobs, 1981).

There is no mineralogic geobarometer presently applicable for the M₃ talc-forming metamorphism, but two observations place a maximum limit on pressure estimates. Regional geologic relationships suggest that the crystalline rocks of the Ruby Range were exposed at the surface during the middle Proterozoic (Harrison et al., 1974); this is the most probable time of talc formation (presented below). In addition, the interpretation that talc formed by constant volume processes suggests that the reaction took place in host

rocks which provided a rigid framework; again, this suggests that talc formation occurred at relatively shallow crustal levels, and certainly above the brittle-ductile transition in the crust. A maximum pressure of 2 kbars (corresponding to a crustal level of 6 km or less) is estimated for this system. There is some dispute about the effect of pressure on the talc stability field. Recent experimental studies by Eggert and Kerrick (1981) suggest that the talc stability field contracts at higher pressures, so the isobaric T-X_{CO₂} relations calculated at 2 kbars should nearly encompass the widest range of physical conditions for talc formation.

Direct temperature estimates, based on calcite-dolomite geothermometry, are suspect because of the complex history of recrystallization, exsolution, and replacement in the carbonate rocks (e.g., M₂ dolomite is not in equilibrium with M₁ calcite, nor with calcite in later stage veins). A maximum temperature limit

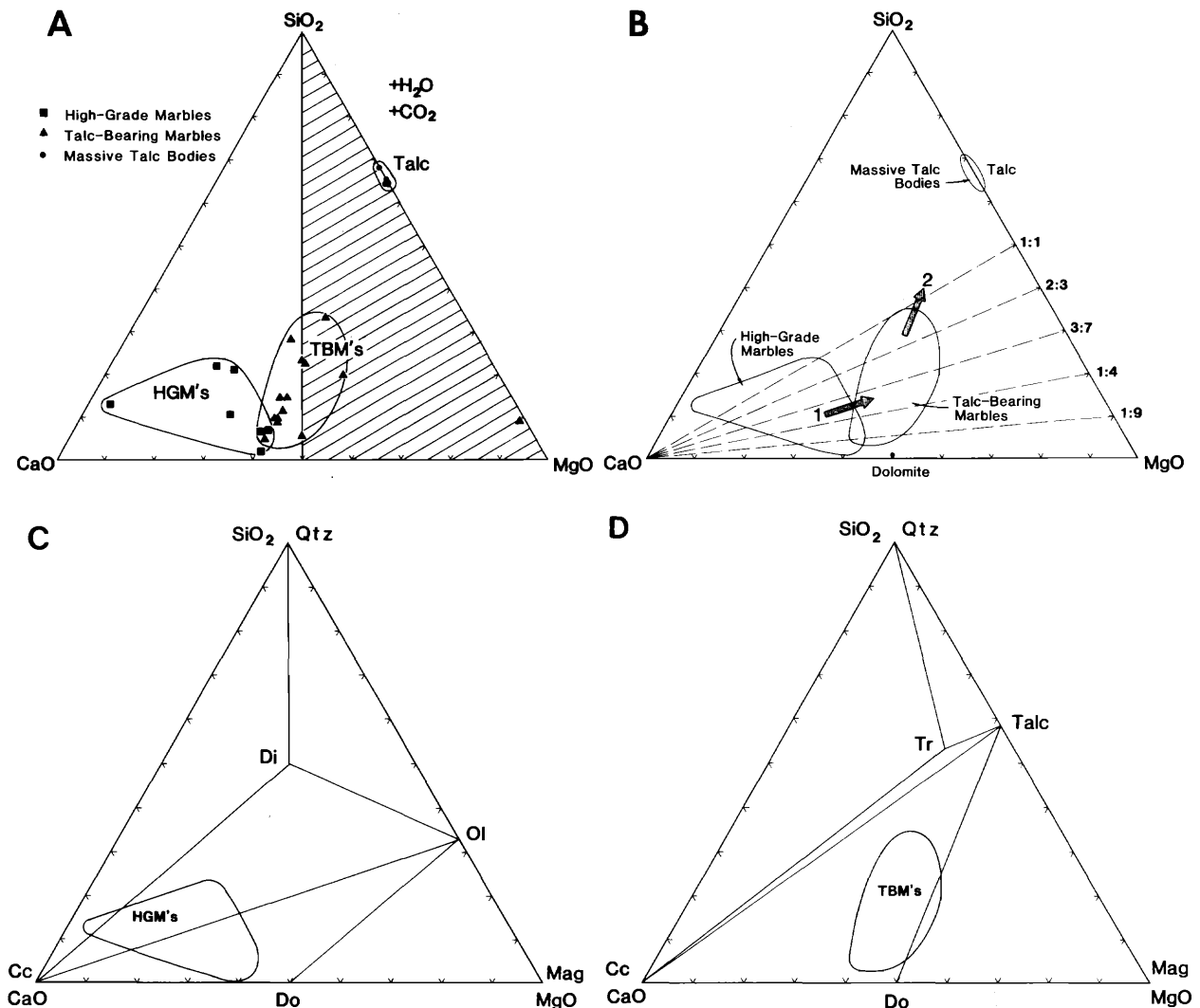


FIG. 11. CaO-MgO-SiO₂ ternary diagram showing the composition of high-grade marbles (squares), talc-bearing marbles (triangles), and massive talc bodies (circles). A. Primary compositions on the Mg-rich side of the diagram (stippled area). These are unusual in nature. B. Compositional fields occupied by high-grade marbles, talc-bearing marbles and massive talc bodies. Arrow 1 denotes the trend from high-grade to talc-bearing marble during the dolomitization stage; note the increase in MgO content without a large increase in SiO₂. Arrow 2 denotes the trend from dolomite-rich talc-bearing marbles to massive talc bodies; these marbles generally lie on a linear trend from dolomite to talc, indicating progressive increase in the amount of SiO₂ in them. The dashed lines are isopleths that define constant SiO₂/MgO ratios. C and D. Chemographies showing phase relations for the high-grade marbles, talc-bearing marbles; differences in their parageneses are due to changes in physical conditions rather than bulk compositional effects.

can be determined by examination of the stability of talc on the T-X_{CO₂} diagram. Assuming a binary mixture of H₂O-CO₂ the maximum temperature at which talc can form is approximately 460°C with X_{CO₂} = 0.45 at 2-kbar fluid pressure.

Isobaric univariant reactions, such as those represented in Figure 12 are mineralogic fluid buffers that can be used to determine the T-X_{CO₂} relations during prograde metamorphism (Skippen, 1971, 1974; Greenwood, 1975; Rice, 1977a and b; Ferry and Burt,

1982; Rice and Ferry, 1982; Flowers and Helgeson, 1983). However, the talc deposits of the Ruby Range characteristically exhibit high variance mineral assemblages; indeed, no talc-forming, fluid-buffering assemblages have been documented in any of the prospects studied. The lack of buffering assemblages has two important implications. First, the composition of the fluid phase is externally controlled by an infiltration mechanism. The large influx of water required to introduce SiO₂ and Mg⁺² in the constant-volume

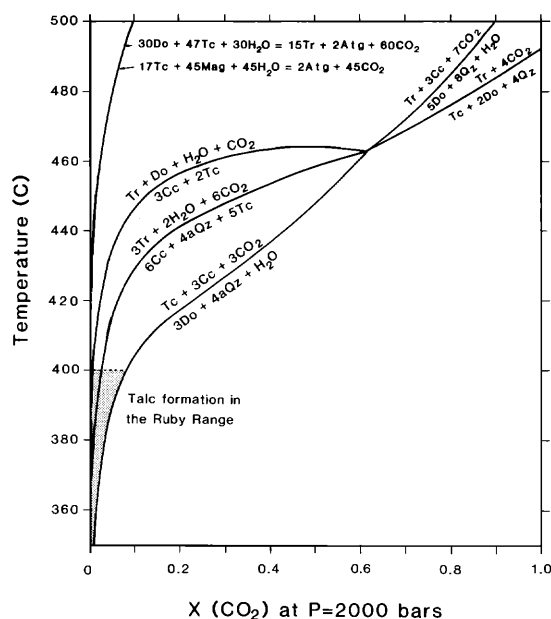


FIG. 12. Isobaric temperature- X_{CO_2} diagram showing the stability field of talc (stippled area) at $P_{\text{fluid}} = 2$ kbars (from Evans and Guggenheim, 1988). The bundle of curves can represent the talc stability for most of the deposits in the Ruby Range; the talc-magnesite and talc-dolomite curves (superposed) in the upper left part of the diagram represent phase relations for the Sweetwater mine. The interpreted conditions of talc formation in the Ruby Range is stippled. See text for further discussion. Mineral abbreviations are: aQz—alpha quartz, Atg—antigorite, Cc—calcite, Do—dolomite, Mag—magnesite, Tc—talc, Tr—tremolite.

talc-forming reaction would effectively dilute any liberated CO_2 so that X_{CO_2} approaches 0. For the case of pure dolomite being completely replaced by talc according to reaction (1), and using the minimum calculated fluid flux (see below), $X_{\text{CO}_2} = 0.0008$. Second, the limiting reactions involving talc and dolomite are asymptotic to the ordinate of the T - X_{CO_2} diagram at low temperatures. Therefore, at sufficiently low values of X_{CO_2} talc formation can occur at much lower temperatures.

The stability field of talc may be affected by other factors such as changes in pressure (e.g., Skippen, 1971, 1974; Slaughter et al., 1975; Eggert and Kerrick, 1981), the composition of talc (specifically X_{Mg} and X_{F} ; e.g., Valley et al., 1982; Abercrombie et al., 1987), and nonideal behavior of H_2O - CO_2 - NaCl solutions (Bowers and Helgeson, 1983). We expect that changes in the talc stability field due to the pressure effect will be minimal at pressures of less than 2 kbars. The composition of the talc at the Sweetwater mine is very near the pure end member with respect to Mg ($X_{\text{Mg}} = 0.994$; analysis by B. Evans, pers. commun.); analyses of F in the talc of the Ruby Range are currently not available. We have no direct evidence for the presence of NaCl or other dissolved components in this system (e.g., freezing point depression of fluid

inclusions, presence of NaCl daughter salts). There are no fluid inclusions in the talc (phyllosilicates typically are devoid of inclusions) and the fluid inclusions in the carbonates are difficult to interpret due to multiple generations, potential for leakage along cleavage planes, or reequilibration during recrystallization of the host carbonates.

The inferred conditions for talc formation in the Ruby Range are shaded in Figure 12. Most of the talc prospects of the Ruby Range can be represented by the talc-calcite curves in this figure, and the talc-magnesite relations are added to represent the unique occurrence at the Sweetwater mine. Our best estimates for the physical conditions of talc formation in the Ruby Range are $P < 2$ kbars, $T < 400^\circ\text{C}$ and probably much lower, and $X_{\text{CO}_2} = 10^{-4}$.

Mass Balance and Fluid Flux Calculations

The results of mass balance and fluid flux calculations are presented in Table 3. These calculations are based on the assumptions that reaction (1) is the dominant talc-forming reaction; talc formation is a constant volume process in this system; and Mg^{+2} , SiO_2 , and H_2O must be introduced and Ca^{+2} removed from the system. These assumptions are in accord with field and petrographic observations presented above. The conversion of 1 m^3 of the average high-grade marble composition to talc requires the addition of $1,170 \text{ kg}$ of SiO_2 and 194 kg of Mg^{+2} and the removal of $2,083 \text{ kg}$ of calcite. These compositional changes are integrated over the entire talc-forming process, from high-grade marbles (which probably underwent near-isochemical metamorphism during M_1), through dolomitization, development of talc-bearing marbles, and finally, formation of massive talc bodies.

The minimum fluid flux through the system can be estimated based on the experimentally determined solubilities of SiO_2 (Walther and Orville, 1983) and CaCO_3 (Fein and Walther, 1987). Given the total mass of silica required to transform the average high-grade marble to talc ($1,170 \text{ kg/m}^3$, from above) and the solubility of SiO_2 at the temperature and pressure of interest (400°C and 2 kbars), the minimum fluid flux is $4.80 \times 10^5 \text{ l}$ of water/ m^3 . At 400°C and 2 kbars this volume of water corresponds to a volumetric water/rock ratio of 600 (data from Burnham et al., 1969).

The solubility of calcite at the specified conditions is considerably lower than the solubility of quartz. The removal of $2,083 \text{ kg}$ of calcite (for the average high-grade marble composition) from the system requires $1.47 \times 10^8 \text{ l/m}^3$ of pure water, corresponding to a volumetric water/rock ratio of 1.86×10^5 . The water-rock ratios determined from calcite solubility data are extremely high and may be moderated if the solubility is increased by some other factor such as the presence of CO_2 in solution or changes in pH. If $X_{\text{CO}_2} = 0.02$ the solubility of calcite increases (Fein and Walther, 1987); the replacement of the average

TABLE 3. Results of Mass Balance and Fluid Flux Calculations

Mass balance—conversion of 1 m ³ dolomite or average high-grade marble to talc						
	Mg ⁺² (kg)	SiO ₂ (kg)	Calcite (kg)	Talc (m ³)	Volume (%)	
Mg conserved						
model reaction (1)		(+)1,245	(-)1,556	0.706	(-)29	
Constant volume						
Model reaction (1)	(+)157	(+)1,764	(-)1,556	1		
High-grade marble average	(+)194	(+)1,170	(-)2,083	1		
Minimum fluid flux in l/m ³ and volumetric water/rock ratio (W/R), (calculated at 400°C, 2 kbar) ¹						
	SiO ₂	W/R	Calcite	W/R	Calcite (<i>a</i> _{CO₂} = 0.02)	W/R
Model reaction (1)	7.0 × 10 ⁵	890	1.1 × 10 ⁸	1.4 × 10 ⁵	4.0 × 10 ⁷	5.0 × 10 ⁵
High-grade marble average	4.8 × 10 ⁵	607	1.5 × 10 ⁸	1.9 × 10 ⁵	5.4 × 10 ⁷	6.8 × 10 ⁵

¹ These conditions should provide a limit for the maximum solubility of SiO₂ in this system, and therefore, a minimum fluid flux; solubility data are from Walther and Orville (1983) for SiO₂, from Fein and Walther (1987) for calcite, volume data for water are from Burnham et al. (1969), and mineral volume data are from Robie et al. (1979)

high-grade marble by talc will require 5.35×10^7 l/m³ (or 6.76×10^4 W/R ratio). We have no independent estimate of the pH of these solutions, but some qualitative evidence is available. Sulfur may be a component in the solutions because accessory pyrite is found in some of the talc bodies. It is not likely that the solutions were extremely acidic due to the presence of accessory graphite. It is possible that dilute sulfuric, hydrochloric, or carbonic acids were present in the system. Even a minor decrease in the pH of the fluids would significantly decrease the calculated water/rock ratios. In the absence of hard constraints on calcite solubility in this system, we suggest that the minimum fluid flux in the system is best estimated by the SiO₂ solubility data and that a minimum estimate of the volumetric water/rock ratio is 600.

Timing of Talc Formation

Talc mineralization in the Ruby Range occurred during the middle Proterozoic, as interpreted from the overprinting of high-grade assemblages in Archean marbles (ca. 2,750 Ma, James and Hedge, 1980), and the lack of talc deposits in spatially related Phanerozoic siliceous carbonate rocks (e.g., Garihan, 1973; Tysdal, 1976). A regional retrograde thermal metamorphism dated at 1,600 Ma (Giletti, 1966) and emplacement of mafic dikes at 1,455 Ma and 1,130–1,120 Ma (Wooden et al., 1978) are the most likely thermal events that could be responsible for talc formation. These thermal events can be related to continent-scale orogenic events: accretion of arc-type terranes (1,780–1,630 Ma), extension associated with granite-rhyolite terranes (1,500–1,340 Ma), and extension associated with the Grenville orogeny (1,100 Ma; Bickford et al., 1986). In addition, a higher geothermal gradient may have developed during extensional tectonics associated with the opening of the

Belt basin (Schmidt and Garihan, 1986). The age of talc mineralization is middle Proterozoic, but the absolute age is only poorly bracketed by the age limits of 1,600 to 1,100 Ma.

Summary and Conclusions

The petrogenesis and timing of talc formation in the Ruby Range, southwestern Montana, have been determined using field relations, detailed mapping and petrography, and geochemical considerations. These studies have resulted in the following conclusions:

1. The occurrence of the talc deposits is restricted to Archean high-grade calcitic marbles that have been overprinted by dolomitization and a greenschist facies metamorphic event. Talc was formed in a constant volume process by replacement of dolomite and all earlier greenschist facies silicate minerals.
2. Talcification of the dolomitic marbles requires the metasomatic introduction of SiO₂, Mg⁺², and H₂O, and the removal of large amounts of CaCO₃. This is the dominant talc-forming process in the Ruby Range and may be a common mechanism in other carbonate-replacement deposits (e.g., Waterboro, Alabama; Blount and Vassiliou, 1980).
3. The composition of the metasomatic fluids is externally controlled due to the absence of mineralogic fluid buffer assemblages. To mobilize sufficient SiO₂ to form talc from the high-grade marbles, a minimum of 4.80×10^5 l of water/m³ of dolomite must be flushed through the system (a volumetric water/rock ratio of 600). This fluid flow is localized in layer-parallel fractures in the marble. The tremendous volumes of water passing through the system are sufficient to dilute X_{CO₂} to the point where it is effectively equal to zero.

4. Talc formation is interpreted as a near-surface process. This interpretation is based, in part, on the requirement of constant volume during talc formation. A maximum temperature of 450°C and maximum pressure of 2 kbars are considered likely for the formation of talc in this system. However, low X_{CO_2} values would permit talc-forming reactions to occur at much lower temperatures. Calcite as a product of talc-forming reactions has not been observed and was most likely removed from the system. The constriction of the talc stability field as a function of increasing pressure suggests that talc bodies large enough to be orebodies will be favored by a low-pressure environment of formation. Extremely water-rich solutions, formation of talc at relatively low temperatures, and removal of CaCO_3 from the talc-forming environment may indicate a relationship between talc mineralization and formation of surficial hot spring deposits.

5. The source of the large volumes of water and Mg^{+2} remains problematic, although numerous Mg-rich talc and chlorite deposits occur in the Archean rocks throughout southwest Montana (Berg, 1979). Harrison et al. (1974) have postulated an open seaway just to the west of the Dillon block during the opening of the Belt basin. It is possible that locally Mg-rich seawater, driven by thermal anomalies, could have penetrated the Archean basement along structurally controlled pathways to replace marble and gneiss with talc and chlorite deposits.

6. Talc formation clearly postdates the regional dynamothermal metamorphism that occurred in the Archean and predates the deposition of Phanerozoic sedimentary cover. A protracted period of thermal events is recorded between 1,600 and 1,100 Ma as determined by the resetting of K-Ar isotope ages and the emplacement of mafic dikes. These thermal pulses may be related to regional extension in the middle Proterozoic during opening of the Belt basin.

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EXHIBIT 157

Precambrian Geology and Bedded Iron Deposits of the Southwestern Ruby Range, Montana

By HAROLD L. JAMES

With a section on THE KELLY IRON DEPOSIT OF THE
NORTHEASTERN RUBY RANGE

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1495

*A synthesis of present knowledge of the Precambrian geology and mineral deposits
of the southwestern Ruby Range, Montana*



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III

PRECAMBRIAN GEOLOGY AND BEDDED IRON DEPOSITS OF THE SOUTHWESTERN RUBY RANGE, MONTANA

By HAROLD L. JAMES

ABSTRACT

The Ruby Range is one of a series of uplifted blocks in southwestern Montana that are cored by Precambrian crystalline rocks, mostly of Archean age. These uplifted blocks owe their origin largely to movement in Late Cretaceous and Tertiary time on steeply dipping range-bounding faults, and they are separated by broad valleys and basins containing locally deformed but unmetamorphosed strata of Phanerozoic age.

The Precambrian crystalline rocks of the southwestern Ruby Range, an area of about 100 square miles, can be divided roughly into three northeast-trending belts, progressively younger to the west. The oldest and most easterly belt consists of an ill-defined sequence of Early(?) or Middle(?) Archean older gneiss and schist that underlies, with structural conformity, a central belt underlain in turn by a rudely tabular mass of Middle or Late Archean quartzofeldspathic gneiss that forms the crest of the range for much of its length. The quartzofeldspathic gneiss is grossly layered and certainly of complex origin, derived in part from sedimentary precursors and in part from syntectonic granitic intrusions of at least two different ages. On a regional scale, this quartzofeldspathic gneiss forms a basement complex to an overlying sequence of metasedimentary strata that make up the most westerly of the three belts.

The Middle or Late Archean metasedimentary sequence, here named the "Christensen Ranch Metasedimentary Suite," consisted originally of miogeoclinal-type sedimentary rocks, now represented by dolomite marble, diopsidic and hornblende gneiss and schist, quartzite, mica and garnet schist, and banded iron-formation. These rocks are generally well bedded, and distinctive individual lithologic units can be traced for miles. The appearance of a conformable succession, however, is misleading; original stratigraphic order has in large part been destroyed by displacements on bedding-plane faults and possibly by nappe development early in the structural history of the area.

Amphibolite of Middle or Late Archean age is an abundant rock type, occurring as generally conformable screens and sheets, some as much as several thousand feet in thickness, in each of the three main rock groups. Most bodies are believed to have originated as mafic sills, of at least two, and probably of several, different ages. Ultramafic rock of Middle or Late Archean age occurs as small plutons in the "older gneiss and schist" unit and as pods and lenses in the quartzofeldspathic gneiss and Christensen Ranch Metasedimentary Suite; most of these bodies, if not all, were emplaced by plastic flowage and diatreme-type movement. Syntectonic Late Archean granite gneiss, some of it not readily distinguishable from older quartzofeldspathic gneiss, cuts the metasedimentary strata in a number of places and occupies extensive tracts near the range front in the southwestern part of the map area. Pegmatite of Late Archean and (or) Early

Proterozoic(?) age is abundant, both as sheets and dikes of simple quartz-feldspar composition and as tourmaline-bearing pods and lenses, many of which are rudely zoned. The youngest Precambrian igneous rocks are diabase dikes of Middle Proterozoic age that occupy fractures related to a northwest-trending fault system.

All rocks of the area, except for pegmatites and diabase dikes, are strongly deformed and metamorphosed to amphibolite facies. The dominant structures are northeast-trending isoclinal folds, which are refolded on north-trending axes; these may have been preceded by gravity slides and possibly nappe formation. The main orogeny, which was accompanied by syntectonic granitic intrusions, culminated in Late Archean time, about 2,750 m.y. ago. Later structural deformation consisted mainly of displacement on northeast- and northwest-trending faults, the latter active both in Precambrian time and during range uplift in late Mesozoic and Cenozoic time.

Known or potential mineral resources include talc (which has been mined in a number of places), graphite, and banded iron-formation. The iron-formation has been explored extensively in the Carter Creek area; these deposits are estimated to contain, to a depth of 300 feet, about 95 million tons of rock containing 28-29 percent iron recoverable as magnetite.

The Kelly iron deposit is in the northeastern part of the Ruby Range. Beds of iron-formation are contained in a conformable sequence of strata of the Christensen Ranch Metasedimentary Suite, here in normal stratigraphic order. A thick basal dolomite marble passes upward through garnet-rich strata into diopside-hornblende gneiss that contains the principal iron-formation, and the gneiss in turn gives way to a sequence of quartzite beds that also contain thin layers of iron-formation. These strata are folded into a broad, southeasterly plunging syncline, the buried axial zone of which has been squeezed up, diatreme-fashion, to form a body of lens-like cross-section that is cored by a mass of ultramafic rock. The iron-formation in this upthrust block, greatly thickened by plastic flow and internal folding, has been explored by test pits and drill holes, but despite a favorable composition, the economic potential is low; the quantity, to a depth of 300 feet, is estimated to be about 15 million tons of protore containing 33 percent iron recoverable as magnetite.

INTRODUCTION

The Ruby Range is one of a number of uplifted blocks in southwestern Montana from which younger strata have been stripped, wholly or in part, to expose a

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GENERAL GEOLOGY

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TABLE 3.—Partial ("rapid") analyses of iron-formation from the southwestern Ruby Range, Mont.
[In weight percent; <, less than. Analyses by Claude Huffman, Jr., project leader. Total Fe determined volumetrically and reported as Fe_2O_3 ; MgO , CaO , Na_2O , K_2O , and MnO by atomic absorption; P_2O_5 determined colorimetrically; total S and C determined by induction furnace]

	1	2	3	4	5	6	7
SiO_2	41.8	43.6	43.3	43.3	43.5	51.6	58.4
Al_2O_3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fe_2O_3	57.3	57.5	49.3	49.2	50.5	46.1	40.9
MgO	0.34	0.59	4.43	2.94	3.78	1.80	0.63
CaO	1.21	.92	1.23	1.52	1.32	0.99	.52
Na_2O	.01	.02	0.15	0.18	0.15	.01	.04
K_2O	.02	.04	.04	.05	.06	.01	.04
MnO	.04	.09	.27	.55	.42	.02	<.01
P_2O_5	.75	.26	.49	.71	.63	.77	.37
S	<.05	<.05	<.05	<.05	<.05	<.05	<.05
C	.11	.05	.05	<.05	.09	.05	.09
Total (Rounded)	102	104	100	99	101	102	101
Fe	40.1	40.2	34.5	34.4	35.3	32.31	28.61
Mn	0.03	0.07	0.21	0.43	0.33	0.01	0.00

Sample data (see also fig. 2):

1. Sample 11A-72: SW1/4 sec. 8, T. 7 S., R. 6 W., 3,300 ft S., 100 ft E. of NW cor.
2. Sample 12A-72: NE1/4 sec. 18, T. 7 S., R. 6 W., 1,750 ft S., 1,400 ft W. of NE cor.
3. Sample 13A-72: SW1/4 sec. 17, T. 7 S., R. 6 W., 1,300 ft N., 850 ft E. of SW cor.
4. Sample 14A-72: SW1/4 sec. 30, T. 7 S., R. 6 W., 500 ft N., 2,000 ft E. of SW cor.
5. Sample 15A-72: NE1/4 sec. 35, T. 7 S., R. 7 W., 1,600 ft S., 2,000 ft W. of NE cor.
6. Sample 81A-72: SE1/4 sec. 3, T. 8 S., R. 7 W., 1,700 ft W., 3,100 ft S. of NE cor.
7. Sample 82A-72: SW1/4 sec. 3, T. 8 S., R. 7 W., 1,100 ft E., 700 ft N. of SW cor.

MARBLE

Marble constitutes the most prominent component of the Christensen Metasedimentary Suite, within which it occurs as steeply dipping belts as much as several thousand feet in outcrop width. The rock is massive to well bedded and white, gray, or buff; bedding is marked by textural and compositional differences, in many places by ribs of quartzite and of white diopside. Exposed rock surfaces characteristically are speckled with bright-orange lichen. The texture varies, but most commonly it is fine- to medium-grained granular, weathering to smooth cusped surfaces commonly lightly sprinkled with loose grains of carbonate. Locally, however, the rock may be very coarse grained, individual crystals being as much as 1 in. in diameter.

Marble of the area typically contains small to moderate amounts of light-colored diopside and (less

abundant) tremolite, and scarce small flakes of graphite. Serpentine, in dark-green rounded blebs (presumably secondary after forsterite) is characteristic of certain beds, and phlogopite is abundant in some impure varieties of marble. Other minerals noted in some samples are quartz (as separate clastic grains in calcite marble and preserved in the interior parts of diopside-bordered ribs in dolomite marble), hornblende, plagioclase, scapolite, clinozoisite, and, very rarely, garnet. Heinrich (1960, p. 21) reported local abundance of thulite.

Most marble and other carbonate-bearing rocks in the area contain both calcite and dolomite, but in proportions, as estimated by staining tests and X-ray analyses, that range widely. The results, determined by an X-ray technique utilized by Gulbrandsen (1960) and refined by Royse and others (1971), for 32 randomly selected samples are summarized in figure 4.

Consideration of the analytical data in relation to the nature of material sampled leads to certain generalizations:

1. Most thick beds of relatively pure marble and diopside marble are dominantly dolomitic in composition, and some are virtually free of calcite. There are exceptions, however; for example, a 100-ft-thick bed of arenaceous marble that crosses Stone Creek in the SE¼ sec. 18, T. 7 S., R. 6 W. has a calcite-dolomite ratio of about 95:5.
2. Discrete layers of marble as much as 5 ft thick interbedded with diopside gneiss and other calc-silicate rocks generally are dominantly calcitic.
3. Carbonate-bearing gneiss and schist contain both calcite and dolomite in widely varying (and seemingly unpredictable) proportions. Much of this variation is believed due to the extent of dedolomitization reactions during metamorphism and to the relative initial abundance of dolomitic and siliceous constituents in the precursor rock.

In many places in the area, marble has been extensively affected by post-metamorphic hydrothermal processes, producing three different kinds of mineral associations:

1. Formation of talc and related minerals—Talc is widespread in the dolomitic marble units as seams, pods, and lenticular bodies, some of which are of economic significance (see further under "Mineral Resources"). The talc is light colored, locally bluish or greenish; associated minerals are chlorite and serpentine. Talc mineralization in places is accompanied by siliceous veining of the marble and by development of very coarse grain sizes of the constituent dolomite.
2. Formation of serpentine and cross-fiber chrysotile in silicate-rich marble at and near contacts with Middle Proterozoic diabase dikes—The chrysotile forms discontinuous veinlets as much as 0.5 in. across that are limited to zones a few feet wide, sporadically distributed along marble-diabase contacts. A number of occurrences have been explored by shallow test pits, as in secs. 35 and 36, T. 7 S., R. 7 W.; these reveal material of mineralogic interest but of little or no economic consequence.
3. Silicification along northwest-trending faults, which has produced masses of brown jasperoid as much as 800 ft wide along the Carter Creek fault and long screens of iron-stained silicified breccia 50 ft or more wide along the Stone Creek fault. The age of the silicification is not known for certain, but much of it appears to have resulted from warm spring activity that accompanied or post-dated late Tertiary movement on the faults. Minor amounts of azurite and malachite present in parts of the breccia along

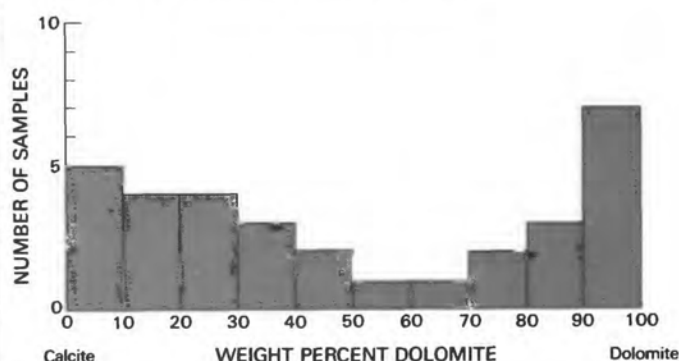


FIGURE 4.—Carbonate ratios of 32 samples of marble and other carbonate-bearing rocks of the Christensen Ranch Metasedimentary Suite, as estimated from X-ray analyses.

the Stone Creek fault have led to some exploration, including a short adit across the fault zone in the SE¼ sec. 21, T. 7 S., R. 6 W.

The stratigraphic significance of the marble remains uncertain. As stated previously, the facts of regional distribution in the Ruby Range, Gravelly Range, and Tobacco Root Mountains (which comprise a nearly continuous exposure of Precambrian rocks) indicate that dolomite marble immediately overlies a presumed basement of quartzofeldspathic gneiss. On this basis, the marble that is in immediate contact with, or chiefly enclosed in, the quartzofeldspathic gneiss of the southwestern Ruby Range is interpreted as the basal member of the Christensen Ranch Metasedimentary Suite, in-folded or in-faulted. It is to be noted that quartzite is scarce or lacking in this particular marble. Elsewhere in the area, however, notably in the refolded fold centering in sec. 24, T. 7 S., R. 7 W., marble is in immediate association with one or more beds of quartzite of mappable dimensions. Other belts of marble are in close stratigraphic proximity to iron-formation and schist. These diverse lithologic associations suggest that in fact marble occupies more than one, possibly as many as three, stratigraphic positions in the initial sedimentary sequence, of which only one (the basal unit) is preserved on a regional scale.

UNDIFFERENTIATED METASEDIMENTARY ROCKS

The strata assigned to this category are those which, in essence, form interbeds to the more prominent or more distinctive lithologic units, such as marble, that have been separately mapped. The undifferentiated strata are grouped as follows: (1) quartz-mica schist and quartzose gneiss, including sillimanitic, garnetiferous, and corundum-bearing varieties, derived from initial

TABLE 6.—Chemistry of the iron-formation of the Carter Creek deposit, southwestern Ruby Range, Mont., compared with other iron-formations

	1	2	3
SiO ₂	50.04	49.07	50.62
Fe (total)	31.77	31.65	30.84
Mn	0.04	0.42	0.46
P ₂ O ₅	.36	.16	.09

Sample data:

1. Iron-formation of the Carter Creek deposit. Average of analyses 1-4, table 2.
2. Archean iron-formation of the Yilgarn block, western Australia (Gole and Klein, 1981, p. 176).
3. Biwabik Iron-formation (Proterozoic), Mesabi district, Minnesota. Recalculated on an H₂O-free and CO₂-free basis from previously published data by Gole and Klein (1981, p. 176).

TALC

Talc seams, veinlets, and lenses occur in dolomite marble throughout the area, and deposits have been mined sporadically for more than 40 years. Locations of larger known deposits that have been explored or mined in the southern Ruby Range are shown in figure 7. The two most recently active mines in the region, the Treasure Chest mine and the Beaverhead mine, are just outside the area covered by the general geologic map (pl. 1). Details on individual deposits are given by Perry (1948), Okuma (1971), and Garihan (1973, 1974), and a comprehensive review of the occurrence and development of talc resources of southwestern Montana is provided by Olson (1976).

The talc of the area is cryptocrystalline, opaque to translucent, and generally white to pale green or olive gray. Contacts with the dolomitic host rock typically are sharp, and bodies tend to be elongate in the plane of bedding in the marble. Impurities generally are scarce, but small flakes of graphite, relict from the replaced marble, are common in a few deposits, and limonite derived from oxidation of pyrite is a minor additional deleterious constituent in some. Other associated minerals noted include serpentine (locally abundant), chlorite, quartz, and phlogopite. In a few deposits the host marble is coarsely recrystallized, but whether this coarsening of grain was penecontemporaneous

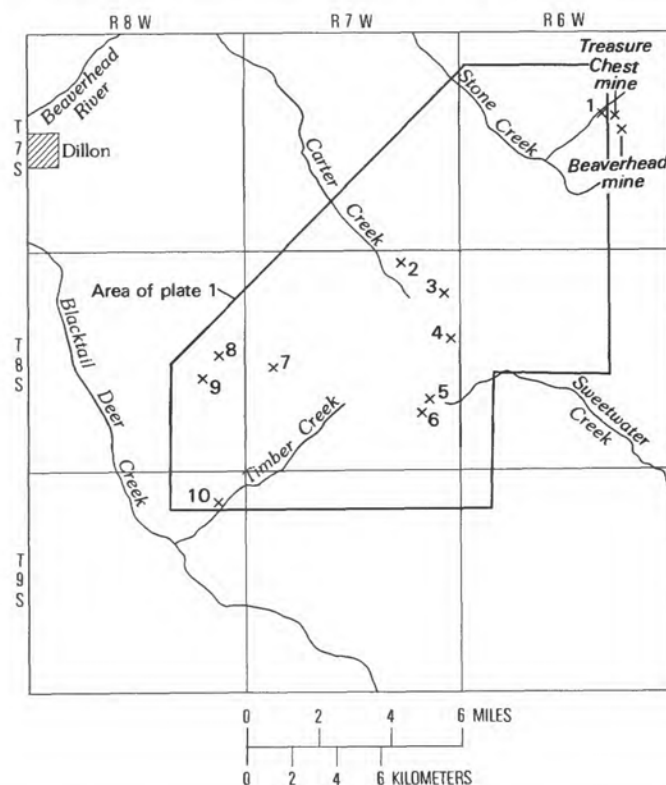


FIGURE 7.—Location of principal talc mines and prospects in the southern Ruby Range. 1, Treasure State; 2, Regal; 3, American Chemet; 4, Sweetwater; 5, Sauerbier; 6, Owens-McGovern; 7, Bozo-Zobo; 8, Banning-Jones; 9, Smith-Dillon; 10, Crescent.

with talc formation or whether it was formed earlier is not clear.

Much of the talc that has been tested is of "steatite" grade, specifications for which, according to Olson (1976), call for less than 1.5 percent CaO, less than 1.5 percent Fe₂O₃, less than 4.0 percent Al₂O₃, and only minute quantities of other impurities. Analyses of selected samples are given in table 7.

The lithologic control for localization of talc is absolute: all deposits are in dolomite marble. Structural control is less certain. Many of the larger deposits (for example, those at the Treasure State and Treasure Chest mines, the Beaverhead mine, the American Chemet prospect, and the main pit of the Sweetwater prospect) are in narrow bands of dolomite marble wholly enclosed in older quartzofeldspathic gneiss; locally, as at the Treasure State and Treasure Chest mines, virtually the entire marble unit has been replaced. Some of these marble bands are demonstrably synformal, as at the American Chemet and Sweetwater deposits; others may represent structurally emplaced tectonic slices. The Regal (Keystone) deposit, however, is in the axial zone of a synform of marble enclosed in schist, and

TABLE 7.—Analyses of talc from deposits in the southwestern Ruby Range, Mont.

[From compilation by Olson, 1976. tr, trace; n.r., not reported; <, less than]

	1	2	3	4	5
SiO ₂	62.25	62.06	61.78	57.72	60.40
Al ₂ O ₃	0.27	0.50	0.57	1.13	1.91
Fe ₂ O ₃	.71	.67	.75	0.48	0.27
CaO	<.05	<.05	<.05	1.34	.80
MgO	31.13	31.12	31.06	30.72	30.81
K ₂ O	.02	.01	.02	tr	.14
Na ₂ O	.06	.07	.08	tr	.20
H ₂ O ⁻	.14	.18	.17	n.r.	n.r.
H ₂ O ⁺	5.03	5.09	5.17	5.94	5.15
CO ₂	.00	.00	.00	n.r.	n.r.

Sample data:

- 1, 2, 3. Smith-Dillon mine. Analysis by Leonard Shapiro.
4. Keystone (Regal) mine. Analysis by Raymond G. Osborne Laboratories, Inc.
5. Treasure (Chest) mine. Analysis by Raymond G. Osborne Laboratories, Inc.

the Smith-Dillon deposit is in marble near a structural footwall of quartzite and granite gneiss. Aside from the Regal deposit, most talc bodies of significant size are in marble close to, or along a contact with, a chemically and structurally dissimilar rock type, such as quartzofeldspathic gneiss. Larger masses of marble, such as those occupying extensive tracts in the north-central part of the map area, are notably deficient in talc deposits.

The process of talc formation in dolomite involves the introduction of SiO₂ and H₂O and loss of CaO and CO₂, presumably through the agency of hydrothermal fluids. The source of the fluids and the timing of the event remain unclear. Some evidence of relative age is potentially available at the Regal mine, where the talc zone is crossed by an undeformed diabase dike of Middle Proterozoic age. The actual contacts are not exposed, however, so age relations are not now determinable. It is to be noted that dikes of this group, though structurally undisturbed, have been affected by retrograde metamorphism, typically resulting in formation of hydrated minerals such as chlorite. This alteration provides evidence, therefore, for post-dike introduction of low-temperature aqueous solutions on a regional scale. In the absence of evidence to the contrary, it is here

suggested that the talc deposits are an additional product of this epoch of regional retrograde metamorphism, which occurred in later (post-1,425 m.y.) Precambrian time.

GRAPHITE

Graphite, in the form of dispersed fine flakes, is a common minor constituent of marble throughout the area, and it is present as an impurity in some of the replacement talc deposits. The graphite deposits that have been of economic interest, however, are entirely different in character; these are monomineralic pods, lenses, irregular veins, and disseminations in quartzofeldspathic gneiss and pegmatite, found in a belt several hundred feet wide that trends northeasterly through the N½ sec. 31, T. 8 S., R. 7 W. into the SE¼ sec. 30 and the SW¼ sec. 29 of the same township. Deposits in this belt, where graphite was first discovered in 1899, were mined intermittently from 1902 to 1945. They have been described in a number of geologic reports (Winchell, 1910, 1911, 1914; Bastin, 1912; Perry, 1948; Ford, 1954, and Heinrich, 1960), and the Crystal Graphite mine in sec. 31, T. 8 S., R. 7 W. has been mapped in detail (Armstrong and Full, 1946; Armstrong, 1950).

The principal deposits are in a zone that extends southwesterly from a tight infold of marble, a structure that trends N. 60 E. and plunges northerly at about 45°, with closure in the SE¼ sec. 30, T. 8 S., R. 7 W. Lesser deposits occur on the south flank of the isoclinally infolded marble. The graphite, locally bladed and in radiating clusters, forms discontinuous steeply dipping pods and seams that transect both quartzofeldspathic gneiss and Late Archean pegmatite. Individual bodies typically are less than 1 ft thick (average, about 4 in.) and are traceable laterally and vertically for distances rarely exceeding a few tens of feet. The Crystal Graphite mine exploited such deposits by means of a shaft and several adits, over a vertical range of about 340 ft. The Bird's Nest mine, from which the first graphite of the area was produced in 1902, is about 0.75 mi northeast of the Crystal Graphite mine; it is in gneiss and pegmatite on the south flank of the marble isocline. Development, all of which was done more than 80 years ago, was from three adits, the longest of which was driven about 270 ft.

The origin of the deposits is somewhat problematical. They clearly are epigenetic, introduced into fractures in gneiss and pegmatite, the latter of Late Archean age. Ford (1954) concluded that the deposits were "epithermal," a view properly rejected by Heinrich (1960), who suggested instead that the mineralization was a process that began "in late pegmatite time." On the basis of isotopic analyses of the carbon, Weis and others (1981)

EXHIBIT 159

MEMORANDUM

To: Darin Lindsey, Barretts Minerals
John Parks, Barretts Minerals
From: Lisa Bithell Kirk, Sr. Geochemist
Date: 25 October 2000
Re: Appendix D: Final Regal PAR Characterization

CC
:

A more detailed description of the geology and mineralogy along each of the sampled channel transects was recorded during the second phase of sampling at the Regal Mine. Approximately 30 grab samples were collected to represent the range of mineralization along the bulk channel transects. The majority of these samples were studied for fiber content using Polarized Light Microscopy (PLM) methods. A select group of samples were submitted for mineralogical analysis at the MSU ICAL laboratory, to confirm serpentine and amphibole identification using petrographic and XRD methods. The goals of these geologic studies were to confirm field observations and mineralogy studies conducted by Barretts inhouse laboratories, as well as to shed light on the geologic processes of serpentine and amphibole mineral formation.

Two samples were also submitted to RJ Lee Group for Transmission Electron Microscopy (TEM) verification of PLM results.

At the time the Barretts Non-Ore Rock Management Plan was completed, final PLM, TEM, and mineralogy analyses were ongoing. This memo summarizes the results of these investigations and integrates them with the conclusions of the rock management plan. These results do not change the proposed PAR rock management plan. This memo should be considered Appendix D to the rock management plan.

Polarized Light Microscopy of Geology Samples

Twenty six grab samples representing the observed range of mineralization along the bulk channel transects were submitted for analysis of fiber content by polarized light microscopy (PLM). Results of these analyses are attached as Appendix D-1 and

summarized in Table 1. These results confirm the results of earlier testing, both in grab and bulk channel samples. Nearly all detected chrysotile lies within the management zone, although results from the lowest portion of the pit reemphasize the need for geologic assessment as a part of the operational management plan, particularly where the contact zone becomes subvertical in the lower pit.

Table 1a. PLM Results for Geologic Samples from Bench 6410, Barretts Regal Mine

Sample No.	Location	Within PAR Zone	% Chrysotile by PLM d.l. = 0.25%
Dike 1, 6410 Bench	Bottom Transect		
	Corresponding Transect NHWLBL1055E	0.0%	
	At pit level (excavated trench)		
NHWD1L1-3WG	3 feet west of contact	Y	0.25
NHWD1L1-9EG	9 feet east of contact	Y	0
NHWD1L1-26EG	26 feet east of contact	Y	0.5
NHWD1L1-41EG	41 feet east of contact	N	0.0
NHWD1L1-43EG	43 feet east of contact	N	<0.25
NHWD1L1-45EG	45 feet east of contact	N	0.0
NHWD1L1-55EG	55 feet east of contact	N	<0.25
6410 bench	Upper Transect		
	15 feet above pit floor		
	Corresponding Transect		
	Horizontal NHWLBL2060E	0.00%	
	Vertical NHWLBV010W	0.5%	
NHWD1L1-10WG	10 feet west of contact (in upper wall)	Y	26.0
NHWD1L1-5G	3 feet west of contact	Y	5.5
NHWD1L1-0G	Dike-marble Contact	Y	0.25
NHWD1L1-25G	25 feet east of contact	Y ⁺	1.5
NHWD1L1-40G	40 feet east of contact	N	0.75
NHWD1L1-70G	70 feet east of contact	N	0.0
*Contact becomes sub-horizontal due to dike contact with west wall in pit bottom			

Table 1b. PLM Results for Geologic Samples from Bench 6470, Barretts Regal Mine

Sample No.	Location	Within PAR Zone	% Chrysotile by PLM d.l. = 0.25%
Dike 1, 6470 bench	Lower Transect		
	Corresponding Transects west of contact NHWUBL1060W 0.25% East of contact NHWUBL1035E 1.0%		
NHWD1L2-88WG	88 feet west of contact	N	0.0
NHWD1L2-46WG	46 feet west of contact	N	0.0
NHWD1L2-40WG	40 feet west of contact	N	0.0
NHWD1L2-33WG	33 feet west of contact	N	0.0
NHWD1L2-31WG	31 feet west of contact	N	0.0
NHWD1L2-17WG	17 feet west of contact	N	0.0
NHWD1L2-0G	Dike-marble contact	Y	0.75
NHWD1L2-2EG	2 feet east of contact	Y	3.0
NHWD1L2-3EG	3 feet east of contact	Y	0.25
NHWD1L2-35EG	35 feet east of contact	N	0.0

Table 1c. PLM Results for Geologic Samples from Test Pits/Trenches North of Regal Mine

Sample No.	Location	Within PAR Zone	% Chrysotile by PLM d.l. = 0.25%
Dike 1, Test Pits/Trenches	Test Pit		
	Corresponding Transects west of contact TPH05W 0.0% vertical TPV3W, TP8W 0.0%, 0.0%		
D1TPOG	At contact	Y	0.0
	North Trench		
	Corresponding Transects Horizontal NTH15E25W 0.25% Vertical NTV15W, NTV 0, NTV 5E 0.0, 0.0, 1.25%		
D1NT3EG	3 feet east of contact	Y	0.0
D1NT5EG	5 feet east of contact	Y	0.0
	South Trench		
	Corresponding Transects Horizontal STH15E25W 0.25% Vertical NTV10W, NTV 0, NTV 10E 0.0, 0.0, 0.0%		
D1ST-GRAB	Composite of clasts east to west	Y	0.0
D1ST-15E	15 feet east	Y	0.0

TEM Analysis to confirm PLM Results

Two samples were reanalyzed by TEM (at the request of the MT DEQ) to confirm the accuracy of the PLM method for chrysotile weight percent estimation, due to its potential for form small fibers that might lie below the PLM detection level. The PLM and TEM results for samples D1NHW-3 and NHWD1L1-10G are summarized below. In both cases, the PLM results were conservative, showing somewhat higher concentrations than identified in the more expensive and time consuming TEM analyses. Laboratory reports for these analyses are presented as Appendix D-2.

Table 2. Confirmation of PLM Analysis using TEM Methods

Sample ID	PLM	TEM	Comments
D1NHW-3	1.0%	.768%	TEM analysis
NHWD1L1-10G	46.25%	37-45%	TEM NOB/Chatfield

Mineralogy Analyses

Detailed petrographic and X-ray diffraction work was conducted by Dr. David Mogk, Professor of Mineralogy at Montana State University. The results of his investigation are presented in Appendix D-3. The results of the detailed mineralogy analyses confirm the results of field investigation, PLM analysis, and TEM analysis of potentially asbestiform rocks (PAR) at the Regal Mine. This information therefore supports the rock management plan completed in July 2000.

Petrographic Test Results

Dr. Mogk identified serpentine mineralization in many of the marble samples, which were selected to allow study of the occurrence and genesis of the serpentine mineralization. Fine grained, platy lizardite occurred as disseminated fine grains or as massive "blebs" with associated cross-fiber chrysotile veins that rim or cross-cut the lizardite masses.

Dr. Mogk identified the amphibole hornblende intergrown with a non-fibrous, acicular actinolite in the mafic dike (Dike 1). These minerals, along with chlorite, occur as alteration minerals replacing primary pyroxenes. These results agree with those of the Specialty Minerals Laboratory, which identified non-fibrous ferro-actinolite intergrown with ferro-hornblende in a few specimens of the dike close to the contact zone. Subsequent analysis by RJ Lee Group confirmed the mineral identification as well as its non-fibrous nature.

One sample (NHWD1L2-12WG) from the dike (located 12 feet west of the contact, along a shear) contained a slip surface coated with fibrous anthophyllite. The rare

occurrence of this mineralization in this structure zone is reflected in the fact that the bulk channel sample collected in this immediate area (NHWUBLIW) averaged only 0.25% chrysotile, with no asbestiform amphibole minerals.

XRD Results

Further mineral identification work was completed by X-ray powder diffraction to verify the occurrences of serpentine and amphibole minerals. These data, which are provided as an appendix to this report, show that lizardite was the dominant serpentine phase in the Regal mine samples, although minor amounts of chrysotile were identified. Amphibole minerals included actinolite (non-fibrous, based on PLM analysis by RJ Lee Group) and hornblende; anthophyllite was not identified in XRD analyses.

Asbestiform Mineral Petrogenesis in the Regal Talc Deposit

The model for petrogenesis genesis of Archean talc deposits in the Ruby Mountains proposed by Anderson et al. (1990) is widely referenced and well accepted. This model, which is summarized by Dr. Mogk in his report (Appendix D-3), identifies 3 episodes of metamorphism including an initial regional amphibolite/granulite facies event (M1) that was followed by serpentine mineral formation during a regional retrograde greenschist facies metamorphic event (M2). A final event (M3) involved metasomatic dolomitization of the marbles, followed by talcification of dolomitized marbles and in many cases, all earlier calc silicate minerals including serpentine. A later, more localized serpentinization event may have followed talc formation, particularly in proximity to amphibolite dikes. The serpentine minerals at the Regal mine are clearly associated with the contact between the amphibolite dike and the marble, suggesting that serpentinization occurred post M3 at the Regal mine.

Geochronologic studies of crystalline rocks in the region provide the following constraints on the timing of metamorphic events:

1. The regional amphibolite/granulite metamorphism is certainly of Archean age, based on Rb-Sr whole rock studies by James and Hedge (1980), and in the recognition of 2.7 Ga metamorphic overgrowths on detrital zircons extracted from quartzites from across the region (Mueller et al, 1998).

2. A second high-grade event has been recognized in the Paleoproterozoic, based on K-Ar whole rock and mineral ages of 1.9-1.6 Ga (Giletti, 1966), new zircon growth in the Highland Range of 1.8 Ga (O'Neill et al., 1988), and recent $^{40}\text{Ar}/^{39}\text{Ar}$ hornblende and biotite ages in the range 1.7-1.8 Ga (Brady et al., 1998) adjacent to the talc deposits in the Ruby Range. Similar $^{40}\text{Ar}/^{39}\text{Ar}$ hornblende and biotite ages have been obtained in the Tobacco Root Mountains (Brady et al., 1994; Kovaric et al.,

1996). These $^{40}\text{Ar}/^{39}\text{Ar}$ hornblende and biotite ages indicate that the regional system cooled rapidly through the 525°C isotherm (for hornblende) and the 375-325°C isotherm (for biotite of varying composition) at ca. 1725 Ma (Brady et al., 1998) and that talc formation was not associated with this event. The 1.6 Ga K-Ar ages obtained by Giletti (1966) may simply represent the late stage cooling of the system related to this regional event (i.e. in the greenschist facies). Brady et al (1998) interpret talc formation as occurring after 1725 Ma based on these determinations (the association talc-calcite is not stable at 525°C under any crustal pressures).

3. The age of the talc-forming event has been interpreted as 1.4-1.3 Ga based on geologic evidence (Anderson et al., 1990), and based on $^{40}\text{Ar}/^{39}\text{Ar}$ white mica age of 1363 Ma obtained by Brady et al. (1998). Brady et al. (1998) also present stable isotopic evidence that supports the interpretation that infiltration of seawater resulted in the metasomatic reactions to produce dolomite, and subsequently talc. The seawater is interpreted as being derived from the opening of the Belt basin (Anderson et al., 1990; Brady et al., 1998).

At least two generations of NW-trending, unmetamorphosed mafic dikes from the Tobacco Root Range have been dated using Rb-Sr whole rock techniques by Wooden et al., (1978) at 1.4 and 1.1 Ga, also attributed to the opening of the Belt Basin.

Petrographic results summarized in Appendix D-3 indicate multiple events of serpentine mineral development. On a regional scale, calc-silicate minerals (e.g. olivine, diopside, tremolite) have been partially replaced or pseudomorphed by serpentine. This stage of serpentine growth probably occurred at the latest stages of the ca. 1725 Ma event, and certainly pre-dated the talc-forming event at ca. 1.4-1.3 Ga. Anderson et al. (1990) and Brady et al. (1998) show clear textural evidence that talc has locally replaced this first generation of serpentine. This serpentine is broadly distributed, but volumetrically subordinate in the high-grade marbles throughout SW Montana.

The association of fine grained carbonate, lizardite, and chrysotile in the PAR management zone at the Regal Mine is spatially controlled by metasomatic processes along a gradient (approximately 30 feet wide) proximal to the amphibolite dike. The degree to which serpentinization occurred was probably kinetically limited by the nucleation rate of the serpentine minerals, rate of fluid flux, and rate of consumption of required components and expulsion of excess components. The occurrence of lizardite in radial "blebs" structures in the marble near the Regal dike contact zone may have formed via open-space filling or volume replacement in these metasomatic reactions. It is clear in outcrop that local fracturing also played a role in making magnesium and silica rich solutions available for metasomatic reactions to occur. Volume changes related to mineral replacement may explain the formation of shrinkage cracks, which might have produced space for chrysotile mineralization to grow as cross-fibers along cracks and as rims of the observed lizardite blebs. Chrysotile obviously cross-cuts lizardite mineralization in thin section. The relative

timing of chrysotile development in massive veins in the contact, in rims on blebs, and in crosscutting veinlets is unclear. Most of the chrysotile is texturally late in the petrogenetic sequence, and it is possible that multiple fracturing events could have produced numerous, discrete generations of serpentine veinlets.

Alteration of primary pyroxenes by retrograde, metamorphic, hydration reactions resulted in the formation of hornblende. Hornblende is in turn partially replaced by actinolite, reflecting decreasing temperatures during the retrograde metamorphic event. The amphibole minerals are in turn partially replaced by chlorite.

References

Wooden, J. L., Vitaliano, C. J., Koehler, S. W., and Ragland, P. C., 1978, *The late Precambrian mafic dikes of the southern Tobacco Root Mountains, Montana. Geochemistry, Rb-Sr geochronology and relationship to Belt tectonics. Can. Jour. Earth Science*, 15, 467-479.

Brady, J. B., Cheney, J. T., Rhodes, A. L., Vasquez, A., Green C., Duvall, M., Kogut, A., Kaufman, L., and Kovaric, D., *Isotope geochemistry of Proterozoic talc occurrences in Archean marbles of the Ruby Mountains, southwest Montana, USA, Geol. Materials Research*, v1 #2, p. 1-44.

EXHIBIT 194

STATE OF SOUTH CAROLINA) COURT OF COMMON PLEAS
)
COUNTY OF RICHLAND) TRANSCRIPT OF RECORD
-----X
SARAH J. PLANT and PARKER)
PLANT,)
)
Plaintiffs,)
vs.) Case No. 2022-CP-40-01265
)
AVON PRODUCTS, INC., et al.,)
)
Defendants.)
-----X
FRIDAY, FEBRUARY 24, 2023
TRIAL VOLUME 3

B E F O R E:

The Honorable Chief Justice (ret.) Jean H. Toal,
Presiding Judge; and a jury.

Court Reporter: Bethanie Creppon (AM Session)

Court Reporter: Bobbi Fisher, RPR (PM Session)
SC Official Court Reporter III

A P P E A R A N C E S:
1 Theile B. McVey (Kassel McVey)
2 Jessica Dean (Dean, Omar, Branham & Shirley, LLP)
3 Ben Braly (Dean, Omar, Branham & Shirley, LLP)
4 Mark Buha (Dean, Omar, Branham & Shirley, LLP)
5 Rachel A. Gross (Pro Hac Vice)(Dean, Omar, Branham &
6 Shirley)
7 Attorneys for the Plaintiffs
8 Chris Schwegmann
9 Jill Herz
10 William Wilson, III
11 Attorneys for Defendant Mary Kay
12
13 Robert E. Thackston (Lathrop GPW, LLP)
14 Stephanie Flynn (Fox Rothschild LLP)
15 Nicolas J. Cherry (Fox Rothschild LLP)
16 Allyson Twilley (Fox Rothschild LLP)
17 Attorneys for Defendant Whittaker, Clark & Daniels,
18 Inc.
19 Elizabeth O'Neill (Womble Bond Dickinson LLP)
20 Theodore F. Roberts (Womble Bond Dickinson LLP)
21 Matthew "Todd" Carroll (Womble Bond Dickinson LLP)
22 Geoff Paschke (Womble Bond Dickinson LLP)
23 Attorney for Defendants IMI Fabi (USA) Inc.; IMI
24 Fabi, LLC; and IMI Fabi (Diana) LLC
25
26 James Insko (Gordon Rees Scully Mansukhani)
27 Victor Rawl (Gordon Rees Scully Mansukhani)
28 William H. Kleindienst (Gordon Rees Scully Mansukhani)
29 Attorney for Defendant Color Techniques

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1	E X H I B I T S			
2	(Exhibits on file in Clerk of Court's Office.)			
3	Plaintiffs' Exhibit			
4	No.	Description	ID.	REC'D
5	25	Dr. Ripley's C.V.	584	584
6	27	Dr. Longo's C.V.	471	471
7	35.1	Colorado School of Mines Document	402	402
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15	Dated 4/27/73			
16	3573	Characterization of Johnson's Baby	402	402
17	Powder Lot 228p Document			
18	3677	Exhibit H	452	452
19	3678	Summary Chart	454	454
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21	3680	Summary Chart	454	454
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23				
24				
25				

1 PROCEEDINGS

2 (The following proceedings commenced at 8:57 a.m.)

3 MATTERS OF LAW

4 THE COURT: All right. Court come to order. A
5 couple of housekeeping things: Juror No. 232 has been
6 excused, illness. And that means that the first alternate
7 will sit as a juror. The first alternate, what I've
8 got -- is 98 the first alternate?

9 MS. McVEY: I didn't bring my notes on the jury.
10 Hold on. I think you're right, but we're going to check.

11 MS. O'NEILL: That's what ours shows.

12 THE COURT: What's that?

13 MS. O'NEILL: That's what ours show is the first
14 alternate is 98.

15 THE COURT: Who is speaking? Okay. 98 is correct?

16 MS. O'NEILL: Yes.

17 THE COURT: All right. Very good. Now, I have --
18 y'all may be seated.

19 I have received the information from Ms. McVey sent
20 at 11:21 last night in which she outlines the cooperation
21 of Mary Kay. Apparently, there are very few disputes
22 between the parties, and we can easily resolve those. I
23 appreciate that more than I can say, Mr. Schwegmann and
24 the Mary Kay team. Thank you so much.

25 At that moment, you had not received, Ms. McVey,

1 that would authenticate them. That's our --

2 THE COURT: I want to just stop you right there.
3 I've gone back through my materials. You have been
4 provided with information by way of a chart of everything
5 that they've got. That's what I got initially. And I was
6 able to go to my flash drive and other things, as I'm sure
7 you are able to do, and find out what those documents are.

8 So, I can't have the record indicate that you
9 haven't been provided with these documents. You have been
10 provided with these documents, and my records verify that.

11 MS. FLYNN: It's the supporting information that we
12 don't have. And the supporting information that's even
13 listed in their chart doesn't indicate that those have
14 documents have been authenticated. And that's really the
15 issue with those. And there's also the 13336 --

16 THE COURT: Why did you not do this last week when
17 you first -- February 16th, you got a list from them of
18 these very things. I've got that in my trial notebook.
19 I've got that list myself, and I've tried the best I could
20 to go through both Mary Kay's and Whittaker, Clark &
21 Daniels' materials.

22 Evidently, you-all did not do that at that time. I
23 don't know whether you expect that removal to solve
24 everything, that you had that in your mind all the time,
25 but you didn't do what normally was done in preparing for

1 anything from Whittaker, Clark & Daniels. What's the
2 status now?

3 MS. McVEY: So Ms. Flynn responded with --

4 THE COURT: You've got to speak up.

5 MS. McVEY: Yes, ma'am. Sorry. Ms. Flynn responded
6 with -- I can show you her e-mail, late last night or
7 early this morning --

8 THE COURT: What time?

9 MS. McVEY: Maybe 12:30 or 1:00. I had gone to bed.

10 THE COURT: All right.

11 MS. McVEY: Essentially, there are still a good
12 number of objections. She's authenticated some of them --
13 or agreed to authentication to some of them and she's
14 disagreed on others. So, I think, at this point, we have
15 to just move forward with these witnesses, if we're going
16 to get through --

17 THE COURT: Your motion is to just admit the
18 Whittaker, Clark & Daniels matters. I will hear a very
19 brief discussion about this from you, Ms. Flynn.

20 MS. FLYNN: Yes, Your Honor. We have further
21 narrowed that list this morning. In the list that I've
22 provided that we still have issues with is down from 71 to
23 13. As to those 13, they are not our documents, and
24 they're not -- have not been authenticated insofar as we
25 can tell, and we've not been provided with the documents

1 a case, and that's why these things are submitted when
2 they're submitted.

3 So, I am not going to deal any more with any
4 objections about these things. I am admitting the
5 Whittaker, Clark & Daniels exhibits, in their entirety,
6 over your objection. And you may file, if you wish, a
7 list of the things you're talking about that you still
8 object to that you say are not authenticated. That comes
9 too late, in my view, in light of the very accelerated
10 time period we have to be on to finish this case. And the
11 two days we lost with a meritless removal that was led by
12 your client.

13 So, for all of those reasons, as I put them on the
14 record, I am admitting those exhibits, and we're going to
15 move on from that.

16 All right. The next thing we've got is a proposal
17 by you, Ms. McVey, as to how the day will progress today.
18 And you indicate Brody direct and cross, Brody redirect;
19 you indicate time periods for Longo direct and cross and
20 redirect, and Ripley direct and cross and redirect. I
21 will hear from defense about this proposal.

22 Who would like to speak first from the defense on
23 the proposal with respect to the times I've cut out in
24 your favor, with agreement by everyone, that this will be
25 okay as a way of proceeding?

1 being first duly sworn, testified as follows:
 2 THE WITNESS: Yes, I do.
 3 THE COURT: Thank you, Dr. Brody [sic]. Please be
 4 seated.
 5 Mr. Buha, before Mr. Brody [sic] introduces himself
 6 and spells his name for the court reporter, let me say to
 7 you, you have a gentle voice and speak quite quickly. Up
 8 the range and slow down.
 9 MR. BUHA: Understood. Thank you, Your Honor.
 10 THE COURT: Thank you, sir.
 11 DIRECT EXAMINATION
 12 BY MR. BUHA:
 13 Q Could you please introduce yourself to the jury.
 14 A Sure. My name is Bill Longo. I'm from -- live in
 15 Alpharetta, Georgia, which just is a -- one of the many
 16 suburbs that go around Atlanta.
 17 Q And, Dr. Longo, where do you work?
 18 A I work at a company called Materials Analytical
 19 Services, and they're located in Suwanee, Georgia, just
 20 another suburb outside of Atlanta.
 21 Q Are you a materials scientist?
 22 A Yes, sir, I am.
 23 Q And I've referred to you as Dr. Longo. Are you a
 24 medical doctor?
 25 A No, sir, I'm not.

1 failure analysis, and everything from trying to determine
 2 if the person -- if the ashes from a cremation is really
 3 that person in there, all the way to what kind of
 4 particulates are released.
 5 When we did work for the FAA in a plane crash, if
 6 there's any exotic compounds in there that are producing
 7 any type -- producing anything that you shouldn't be
 8 breathing in. So, it's all the way across the board.
 9 But what I mainly do for MAS besides -- is my main
 10 area of research for MAS -- and we all call it MAS; it's
 11 easier to say than "Materials Analytical Services" all the
 12 time -- is asbestos research for the last 33 years.
 13 Q What's your position at MAS?
 14 A I'm the CEO.
 15 Q And could you estimate for us how many samples --
 16 asbestos samples you -- MAS has analyzed over the last 33
 17 years?
 18 A Easily more than 400,000 individual asbestos
 19 samples. Just about every kind of sample you can think
 20 of, from human lung tissue to brakes from a DC-3 airplane.
 21 Q And what is AHERA?
 22 A AHERA was put in place in about -- is the -- by the
 23 -- essentially by the Environmental Protection Agency
 24 that's driving it. AHERA stands for the Asbestos Hazard
 25 Emergency Response Act, and it was geared towards schools

1 Q And can you describe for us your educational
 2 background?
 3 A Sure. I went to the University of Florida and got a
 4 degree in microbiology. Didn't get accepted into
 5 veterinary school, so I got a job as a lab technician in
 6 the materials science department, and then they asked if I
 7 wanted to come there for graduate school. So I got a
 8 masters in materials science and engineering and,
 9 eventually, got my Ph.D. in materials science and
 10 engineering.
 11 Q And can you describe for us -- at the laboratory
 12 that you work for now, can you describe for us what MAS
 13 does?
 14 A MAS is a -- sort of a consulting, forensic
 15 engineering typical laboratory that gets involved in all
 16 kinds of things. We do a lot of VOC testing, which is
 17 measuring volatile organic compounds that get released
 18 from products. The new car smell we all love, those are
 19 actually VOCs, all the compounds coming out of the rugs
 20 and stuff. Even though it smells great, because your mind
 21 triggers that it's a new car, it's not really that good
 22 for you. So, when you get a new car, drive around a
 23 little while with the windows open.
 24 We've currently been involved with a lot of
 25 asbestos -- that's probably what my main research is --

1 where you had to do a -- you had to go in and determine if
 2 there was asbestos present in the schools, and you either
 3 had to do industrial hygiene techniques to keep it from
 4 releasing or remove it.
 5 Q What would you say that, out of the 400,000 samples
 6 I believe you said MAS has analyzed, what would you say
 7 the bulk of that work was or in what context was the bulk
 8 of that work?
 9 A Primarily in construction products.
 10 Q And has MAS ever been a referee laboratory?
 11 A Well, for quite some years, we analyzed samples of
 12 construction products. This would be fire-proofing,
 13 acoustical plasters, and asbestos like -- I'm not saying
 14 this courthouse has any, but in schools and, you name it,
 15 they'd put acoustical plasters to sort of deaden the
 16 sound, and they like to spray it. So, they put asbestos
 17 in it so they could spray it.
 18 We were able to reverse-engineer these products and
 19 compare them to their formulas and tell you who made it.
 20 We did that for a lot of years. And then we became a
 21 referee lab for folks who wanted to get compensated for
 22 having the asbestos in the fireproofing or the acoustical
 23 plasters, and they would send it to our lab, and we would
 24 say, yes, it's W.R. Grace or, no, it's not W.R. Grace,
 25 it's USA Gypsum, that sort of thing.

1 these gizmos all attached there. That's where the sample
2 goes in. Electron beam goes through it. If you're
3 looking at something like this and you're looking -- of
4 course you're not, but if it's not too thick, the amount
5 of electron beam going through here -- electrons going
6 through here is going to be less than here. So, it builds
7 up a contrast, sort of like an x-ray. But if it gets too
8 thick, you can't see anything.

9 So if I put my hand, you get an x-ray, yeah, you can
10 see everything; if I start stacking a lot of hands on top
11 of them, you can't see anything. So, that's the downside
12 of electron -- TEM. The upside is you get very good
13 resolution. We have ones in our semiconductor labs that
14 would magnify one, two millions times. They're used for
15 semiconductors, not asbestos.

16 Q And just because it's going to come up, I think,
17 later today, you mentioned an acronym: ISO. What is
18 that?

19 A That's the International Standards Organization.
20 So, they put standards -- and standards is like a recipe
21 for doing a type of analysis. Start at A, get down to Z,
22 and we all analyze and use that same standard. If we're
23 using the same recipe to make the same chocolate cake, all
24 the chocolate cakes should be the same, depending if
25 they're all the same good cooks.

1 A Yes. I'd say 95 percent of the times I ever
2 testified is on behalf of plaintiffs.

3 Q Have there been occasions in which you have been
4 retained and you testified on behalf of defendants?

5 A Yes. I think maybe twice in court, but a whole
6 bunch of depositions on behalf of defendants.

7 Q And are these defendants in matters relating to
8 asbestos?

9 A Yes. I'd say about 90 percent of them is related to
10 asbestos.

11 Q And are you familiar with the image that we have on
12 the screen now?

13 A Yes.

14 Q Okay.

15 A I'm wearing -- I have the haircut that I was hoping
16 I was going to get before I got here. Yes. That's when I
17 was asked to testify in front of Congress about the best
18 method to use for analyzing cosmetic talc samples.

19 Q And when was that?

20 A December 10th, 2019, I think.

21 Q Dr. Longo, are you an industrial hygienist?

22 A Yes. I've been qualified as an industrial hygienist
23 many, many times in court.

24 Q Can you describe a little bit about your background
25 in industrial hygiene?

1 In this case, it's the -- so when somebody analyzes
2 the sample and says, I use this method, I know what they
3 did, and I know what to expect. Or they say, "Well, I
4 kind of pulled from here, pulled from here, pulled from
5 here," no, you don't know what they did. You can't really
6 analyze the data.

7 Q Dr. Longo, have you ever been published in the
8 peer-reviewed scientific literature related to any issues
9 about asbestos?

10 A Yes.

11 Q And about how many times have you been in the
12 scientific literature -- published in the scientific
13 literature?

14 A I think peer-reviewed publications, I may have a
15 dozen or so related to asbestos.

16 Q And you mentioned that the total number of asbestos
17 samples your laboratory's analyzed, how many samples of
18 cosmetic talc, approximately, has MAS analyzed for the
19 presence of asbestos?

20 A I think we're approaching about 400 samples from
21 various manufacturers of cosmetic talc products.

22 Q You mentioned that MAS is a consultant. Obviously,
23 we're here in a case. Have you worked or been retained as
24 an expert in litigation on behalf of plaintiffs before,
25 before this trial here?

1 A A lot of the work that I've done in modern research
2 and publications about asbestos, especially about exposure
3 to asbestos, has all been involved in industrial hygiene.

4 Now, I'm not a certified industrial hygienist. I
5 have taught other certified industrial hygienists how to
6 use the utility of using a transmission electron
7 microscope to solve industrial hygiene problems. I have
8 published in the literature in industrial hygiene
9 journals, both peer-reviewed and as just papers. I have
10 given presentations on exposure to asbestos in various
11 environments, include industrial hygiene gatherings that
12 include gatherings of plaintiffs' attorneys. It's also
13 included more in gatherings of defense attorneys of
14 asbestos, sort of like, okay, put this blindfold on and
15 walk out there and go talk. Just kidding. It was very
16 interesting.

17 So, I've been involved in industrial hygiene issues
18 in asbestos for the last 30-some years.

19 Q And you mentioned about 12 or so publications
20 related to asbestos. Have you been ever been published in
21 the scientific literature relating to issues of asbestos
22 and cosmetic talc?

23 A I have.

24 Q And are you familiar with the paper that I have on
25 the screen right now?

1 A Yes, I am.

2 Q Can you briefly describe a little bit about what

3 that paper was about?

4 A That paper was about mostly, I think, ovarian

5 cancer. But it was a lot about our analysis of cosmetic

6 talc and our findings in cosmetic talc, as well as a study

7 we did to see what the exposure would be using cosmetic

8 talc in what I would call a hygiene study where we took a

9 product and applied it, I think approximately three to

10 four grams -- three grams is about a teaspoon of talc --

11 and they took air samples on the person that was applying

12 it.

13 Now, they have respirators on. We're all doing this

14 very safe. It didn't measure what the exposure was.

15 Q And what -- to your understanding, what was the

16 source of the talc that was at issue in that paper?

17 A It was Italian talc.

18 Q And could you just briefly describe what some of the

19 findings were as a result of that study that was in that

20 paper?

21 A Yes, sir. The concentration of talc in this product

22 -- excuse me, concentration of asbestos in this product

23 was about 15 million tremolite fibers and bundles per

24 gram. We found that analyzing just the biggest tremolite

25 fibers and bundles that were released into the breathing

1 government bodies, independent laboratories, and corporate

2 internal documents about testing on the presence of

3 asbestos and talc?

4 A I have, yes.

5 Q Now, do you have opinions about the presence of

6 asbestos in talc from the following sources: From Italy,

7 Vermont, Montana, China, and Brazil?

8 A Yes.

9 Q And do you have opinions about the amount of

10 asbestos that's released into the air from the use of a

11 talc that contains asbestos?

12 A I do.

13 Q And to make sure we're clear about a few things

14 here, are you offering testimony about the sources of talc

15 in any of the particular products that Ms. Plant used?

16 A Well, it's not really an opinion. It's just a fact.

17 They used -- all these different manufacturers had a

18 source from a mine that -- for cosmetic talc. It's not

19 really an opinion. It's this is what they said they used.

20 Q And you don't have any knowledge or experience as to

21 what was the source that was in the products that Ms.

22 Plant used; is that fair?

23 A Well, the products that she used -- besides looking

24 at what they said they put in it, no, I don't have any --

25 I don't have any firsthand knowledge. I mean, I wasn't

1 zone of the person doing the work -- breathing zone is

2 getting an air sample that is within six inches of your

3 nose and mouth -- that they had exposures that, on

4 average, was approximately ranged from about one to two to

5 four fibers bundles per CC. And when we looked at all

6 size of asbestos fibers and bundles, it was almost eight

7 or nine fibers per CC. So, it's fairly significant

8 exposure.

9 Q We talked a little bit about the number of cosmetic

10 talc samples MAS has analyzed for asbestos, and the jury

11 heard a little bit about some products yesterday. Has MAS

12 analyzed samples of talc from Coty?

13 A Yes, sir.

14 Q From Avon?

15 A Yes, sir.

16 Q From COVERGIRL?

17 A Yes, sir.

18 Q Has -- and Gold Bond?

19 A We have.

20 Q And are you -- in the course of your work at MAS the

21 past 33 years, have you become familiar with the

22 scientific literature regulations and standards regarding

23 the various methods to test talc for asbestos?

24 A I have.

25 Q And have you reviewed testing of other laboratories,

1 personally there when it was dug up and put in a bottle,

2 but this is what we used -- and I'll just use it as an

3 example. We used Chinese talc. I'm very familiar with

4 Chinese talc. I've analyzed it. It doesn't matter what

5 the brand or manufacturer it is.

6 And I like to cook, so I'll go back to cooking. You

7 can make how many different cakes with the same kind of

8 flour? Doesn't matter what the cake is. You use this

9 type of flour -- if we're talking about that particular

10 flour, it could be, you know, a carrot cake, it could be a

11 chocolate cake, the vanilla icing on a cake. It doesn't

12 matter. They're using the same source from the different

13 manufacturers and you know what that source is, then you

14 can talk about it.

15 MR. BUHA: Your Honor, may I approach the witness?

16 THE COURT: Yes.

17 BY MR. BUHA:

18 Q Dr. Longo, are you familiar with the document I just

19 gave you?

20 A Yes, sir, I am.

21 Q And what did I just hand you?

22 A You handed me my current resume.

23 MR. BUHA: Okay. Plaintiffs offer Exhibit 27,

24 Dr. Longo's current resume and CV, into evidence.

25 THE COURT: 27.

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1 MR. BUHA: Yes.
2 THE COURT: All right.
3 Without objection?
4 MS. HERZ: No objection.
5 THE COURT: Admitted.
6 (Plaintiffs' Exhibit No. 27, Dr. Longo's C.V., was
7 premarked and admitted into evidence.)
8 MR. BUHA: And Plaintiffs would like to tender Dr.
9 Longo as an expert in materials science and engineering,
10 including on the asbestos --
11 THE COURT: Whoa, whoa, whoa.
12 MR. BUHA: Yeah, yeah, yeah. Sorry about that.
13 THE COURT: Materials science and engineering --
14 MR. BUHA: -- including on the asbestos content of
15 talc in various products and from the sources that we just
16 identified, the five talc sources. And the methods for
17 analyzing talc for the presence of asbestos.
18 THE COURT: Any voir dire?
19 MR. THACKSTON: I'm going to ask two questions.
20 THE COURT: All right, sir.
21 VOIR DIRE EXAMINATION
22 BY MR. THACKSTON:
23 Q Good morning, Dr. Longo.
24 A Good morning, Mr. Thackston.
25 Q Have you previously testified that polarized light

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1 and engineering in determining the asbestos content of
2 talc and -- by supply and by sources and methods for
3 analyzing asbestos in talc.
4 You may continue, Mr. Buha.
5 CONTINUING DIRECT EXAMINATION
6 BY MR. BUHA:
7 Q Dr. Longo, as we go forward today, will you offer
8 your opinions to a reasonable degree of scientific
9 certainty?
10 A Yes, sir.
11 Q And before we go forward, I'm going to ask you to
12 assume a few things, and then we can talk about those
13 assumptions.
14 So, first -- and I swear this will be the longest
15 question I'll ask today. I want you to assume that Ms.
16 Sarah Plant, at times, used products containing talc
17 supplied by Whittaker, Clark & Daniels, including Coty
18 body powders containing Italian talc in the late '90s to
19 early 2000s, Gold Bond powders containing Montana talc in
20 the mid to late 1990s, COVERGIRL pressed powders
21 containing Montana talc in the 1990s, and Avon body
22 powders containing Chinese talc in the mid to late 1990s.
23 Is that assumption in mind?
24 A Yes.
25 Q And without getting into details, do you have

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1 microscopy, PLM, is useless for finding chrysotile in
2 cosmetic talc?
3 MR. BUHA: Objection --
4 THE COURT: All right. Just a second?
5 Yes?
6 MR. BUHA: Objection. This is not a qualification
7 question.
8 THE COURT: All right. Yes. That's a
9 cross-examination question. Sustained.
10 BY MR. THACKSTON:
11 Q Well, so my other question is, do you intend to
12 testify today about using polarized light microscopy to
13 find chrysotile in cosmetic talc?
14 A Yes, sir. Absolutely.
15 Q Okay. Thank you.
16 THE COURT: Very good.
17 BY MR. BUHA:
18 Q As we go forward --
19 THE COURT: Just a second, Mr. Buha. Don't you
20 think we want to qualify him?
21 MS. McVEY: Yes.
22 MR. BUHA: I think that would be a good idea.
23 THE COURT: All right. I find that Dr. William
24 Longo, by reason of his training, education, and
25 experience, is qualified as an expert in materials science

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1 opinions about the asbestos content, if any, in talc from
2 those sources?
3 A All those sources have been shown over and over to
4 contain asbestos in various trace concentrations usually.
5 Q One more assumption before we go forward: I'm going
6 to ask that you assume that the talc in Mary Kay's
7 talc-containing products came from talc mines located in
8 Italy, Vermont, Montana, China, and Brazil. With those
9 assumptions in mind, do you have any opinions about
10 whether talc from those sources contains asbestos?
11 MS. HERZ: And, Your Honor, I understand this is a
12 hypothetical. I just want to assert the same objections
13 to this subject matter that were made before Dr. Longo
14 testified.
15 THE COURT: Thank you, Ms. Herz. That will be so
16 noted, and your position is protected.
17 MS. HERZ: Thank you.
18 THE COURT: You may continue, Mr. Buha.
19 BY MR. BUHA:
20 Q And do you have opinions about talc from those
21 sources?
22 A I do.
23 Q And, briefly, what is your opinion?
24 A Our analysis of all those different sources of talc
25 have shown various concentrations of asbestos. Some were

1 non-detects for certain types of asbestos, but we have
2 tested them all, and we have found asbestos in them.

3 THE COURT: Dr. Longo, you have a tendency to drop
4 your voice at the end of a sentence, which is a very
5 typical voice pattern. So, keep your voice up and speak
6 out. Thank you, sir.

7 THE WITNESS: Yes, Your Honor. Sorry.

8 BY MR. BUHA:

9 Q So, I think the jury heard a little bit about this,
10 so I'm going to just address it briefly, but can you
11 describe for us what is asbestos and what are the
12 different asbestos varieties?

13 A Yes, sir, I can. Asbestos just an industry term for
14 a mineral that forms in the ground billions and billions
15 of years ago, and it can be broken down into two types.
16 On the left-hand side, you have known what is the
17 serpentine group.

18 Serpentine because they say chrysotile is -- can be
19 very -- almost have -- their long bundles almost have a
20 snake-like appearance. There's other serpentines, but the
21 one that's asbestos is chrysotile. It's been known as the
22 white asbestos. Ninety-five percent of all the products
23 that have asbestos added to it in this country is
24 chrysotile.

25 And then we get to amphibole asbestos group, and

1 welding blankets, covers, because chrysotile is very
2 flexible and easy to weave like you're making a cloth.
3 Amosite, not so much. Crocidolite, the same thing; it's
4 very -- but it's not very used so much it doesn't really
5 have the utility for that.

6 Now, tremolite, actinolite, and anthophyllite are
7 brittle. It doesn't have high-tensile strength. It can't
8 be woven. Anthophyllite has been used -- and the history
9 of anthophyllite can -- I can only think -- find two
10 products.

11 In the early 20th century, it was used as a
12 filtering material because it's really good at acid, and
13 there was one product made by Johns-Manville that would
14 use anthophyllite from time to time because they're very
15 acid-resistant. For chrysotile, it's not.

16 So, tremolite, as far as I know, has never been used
17 in a product, and the same thing with actinolite, which
18 just is another form of tremolite. They're too brittle.
19 It's -- the more flexible, the more fibrous, the higher
20 the tensile strength, the more money it's worth. So
21 tremolite, anthophyllite, actinolite don't really have a
22 commercial value, except for one product.

23 Q Is asbestos mined out of the earth?

24 A Yes.

25 Q Is talc mined out of the earth?

1 that has two types: Amosite -- amosite is another trade
2 name. I had to break our analyst from calling it andesite
3 because that's asbestos -- asbestos mines of South Africa.
4 It's really grunerite-cummingtonite.

5 Then we have another amphibole that is used a lot --
6 not a lot, but the least amount for products is
7 crocidolite or the blue asbestos. It's actually blue.

8 And then we have what -- the amphiboles that we find
9 in cosmetic talcs. It's called an accessory mineral.

10 Tremolite, actinolite, and anthophyllite asbestos. It's
11 generated during the formation of talc in the various
12 locations around the world. And you'll have both
13 non-asbestos -- tremolite, anthophyllite, actinolite -- in
14 there, and you'll -- and if you have one, you'll get the
15 other. You'll find asbestos or what they will call
16 fibrous asbestos.

17 Q And what's -- what are the -- what's the difference
18 between commercial forms of asbestos and noncommercial
19 forms of asbestos?

20 A Commercial forms of asbestos is about almost
21 99.99 percent are chrysotile, amosite, and crocidolite.
22 The difference there is and why -- especially chrysotile
23 -- is that it's flexible, high-tensile strength. You can
24 weave it.

25 You'll find a lot of -- today, a lot of blankets,

1 A Yes.

2 Q What is an accessory mineral?

3 A When something forms like talc -- when talc forms,
4 you just don't get pure talc. You're always going to have
5 what they call accessory minerals, meaning, when the talc
6 is formed, other things get made along with it but at much
7 lower concentrations.

8 So, when talc is formed, you'll get things like
9 fibrous tremolite, actinolite, anthophyllite, and also
10 you'll get chrysotile.

11 Now, in some mines, the conditions aren't right to
12 make the amphiboles -- tremolite, actinolite,
13 anthophyllite -- so you'll see them, but not near the
14 concentration like you see mines like the Italian mine or
15 the Vermont mine. But what we're seeing now is all the
16 mines have some trace levels of chrysotile as an accessory
17 mineral.

18 So, I'm not a geologist, but there is -- a geologist
19 can tell you why, you know. It's all about temperature --
20 temperature --

21 MS. HERZ: Your Honor --

22 A -- temperature and ingredients.

23 MS. HERZ: -- although Dr. Longo admits he's not a
24 geologist, we object to the testimony about the geology.

25 THE COURT: And I think his training and experience

1 get all the talc out of there, but I can really decrease
 2 my detection limit by orders of magnitude.
 3 Q Before we delve a little deeper into the methods
 4 that MAS uses to analyze talc or asbestos, I wanted to
 5 give context of where this was all going. Have you
 6 recently reviewed a summary of some of your testing of
 7 talc from different sources -- mine sources?
 8 A I have.
 9 Q And it's been admitted as Exhibit 3804. Is this --
 10 the information on the slide now, is that consistent with
 11 what you've reviewed?
 12 A Yes, it is.
 13 Q And when it refers to testing of talc from --
 14 Italian samples of talc, how do you know whether a
 15 particular product contained talc from a mine in Italy or
 16 some other source? How would you go about figuring that
 17 out?
 18 A Well, you can sort of figure it out from the
 19 analysis, but usually, it's all started by getting
 20 information from the companies saying, "We used Italian
 21 talc for a certain number of years."
 22 I'll use Johnson & Johnson as an example. They
 23 pretty much used Italian talc all the way up to 1968.
 24 From 1968, they went to Vermont talc up until 2003. And
 25 in 2004, they went to Chinese talc. So, if we know the

1 A Yes.
 2 Q And that includes tremolite asbestos in the majority
 3 of those?
 4 A Occasionally you'll find anthophyllite, but the
 5 majority is tremolite asbestos.
 6 Q As to Vermont talc, is this consistent with your
 7 understanding that you found -- out of about 55 samples,
 8 that you found asbestos in about 74 percent of those
 9 samples?
 10 A Correct.
 11 Q And as to Montana talc, is this consistent with your
 12 understanding that you'd analyzed about 36 samples of
 13 Montana talc and found asbestos in all of them?
 14 A Correct.
 15 Q And does that include samples of Gold Bond?
 16 A It does.
 17 Q And you've -- how many samples of Brazilian talc
 18 have you analyzed?
 19 A Only three.
 20 Q And is it only chrysotile that you found in those
 21 three samples?
 22 A It is.
 23 Q And regarding Chinese talc, how many samples of
 24 Chinese talc have you found asbestos in?
 25 A 106 out of 112.

1 container -- and then we got to where I was analyzing it
 2 and I could start telling a little bit where it came from
 3 or it may be a blend.
 4 If I'm seeing all tremolite amphibole asbestos, then
 5 it's more than likely not from Italy. If I'm in Vermont
 6 and I'm seeing primarily anthophyllite asbestos with a
 7 little bit of iron in it, the only place I know that has
 8 that type of anthophyllite is Vermont.
 9 If I'm analyzing samples where I'm not finding very
 10 much amphibole asbestos or none at all in a case but I'm
 11 still finding chrysotile, I immediately start thinking of
 12 Montana and Chinese talc.
 13 But I wouldn't say that to the reasonable degree of
 14 scientific certainty, unless I absolutely knew, but I
 15 could pretty much guess from the analysis.
 16 Q And have you gone back and cross-referenced the
 17 particular products with the formulas and the vintages of
 18 the products to understand how many samples of talc from
 19 Italy, Vermont, Brazil, China, and Montana you've analyzed
 20 over the last few years?
 21 A Yes.
 22 Q And is this consistent with your understanding that,
 23 out of about 119 samples of products containing Italian
 24 talc, that you found -- or MAS found asbestos in about 79
 25 percent of those samples?

1 Q And what was the primary asbestos variety that you
 2 found in Chinese talc?
 3 A Chrysotile asbestos.
 4 Q And one thing I wanted to clarify is, how often did
 5 you find amphibole asbestos in Chinese talc?
 6 A About 13 percent of the time.
 7 Q And can you give us an understanding of, roughly,
 8 the range or the concentration of amphibole asbestos that
 9 you found in Chinese talc?
 10 A A lot of them are right at our detection limit,
 11 which is either one fiber or one bundle. And that
 12 concentration is in the range of finding one -- from our
 13 detection limit is between 5,000 and 9,000 asbestos
 14 bundles and fibers per gram. That's -- for us to find
 15 one, that's the concentration that has to be in there,
 16 using the method we're using. And I think the highest
 17 concentration we found was about 54,000 asbestos fibers
 18 and bundles per gram.
 19 Q I think we may go through this kind of quickly, but
 20 can you tell us the methodology that MAS uses for
 21 analyzing talc samples by TEM for asbestos?
 22 A Sure. It's basically a three-step process, and this
 23 three-step process is pretty consistent with most all the
 24 TEM methods, except for some of the older ones like Humani
 25 (ph) or Levels I, II, and III ones.

1 CERTIFICATE

2
3 STATE OF SOUTH CAROLINA
4 COUNTY OF LEXINGTON
56 I, the undersigned, Bethanie K. Creppon, Circuit
7 Court Reporter for the Second Judicial Circuit of the
8 State of South Carolina, do hereby certify that the
9 foregoing is a true, accurate and complete transcript of
10 record of all the proceedings had and the evidence
11 introduced in the hearing of the captioned cause, relative
12 to appeal in the Circuit Court for Richland County, South
13 Carolina, on the 24th of February, 2023.14 I do further certify that I am neither of kin,
15 counsel, nor interest to any party hereto.
16

17 February 25, 2023

18 s/Bethanie K. Creppon
19
2021 Bethanie K. Creppon
22 Circuit Court Reporter
23
24
25

1 CERTIFICATE OF COURT REPORTER

2 State of South Carolina)
3)
4 County of Richland)
5

RE: Plant v. Avon

6 I, Bobbi J. Fisher, Registered Professional
7 Reporter (RPR) and Official Court Reporter III for the
8 State of South Carolina, do hereby certify that the
9 foregoing is a true, accurate and complete Transcript of
10 Record of the excerpt proceedings had and evidence
11 introduced in the trial of the captioned case in the Court
12 of Common Pleas for Richland County, South Carolina, on
13 the 24th of February, 2023.
1415 Submitted: February 25, 2023
16

17 ____/s/ Bobbi Fisher, RPR ____

18 Bobbi J. Fisher, RPR

19 Official Court Reporter III

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Summary of MAS testing results of talc from Italy, Vermont, Montana, Brazil and China

TALC FROM ITALY (FONTANE MINE)

Product(s)	Vintage(s)	Source mine	Reference	Amphibole by TEM	Total amphibole	Chrysotile by PLM	Total
J&J (outside of the archive)	1927-1939 to 1960	Fontane	Decl. w/chart on J&J 9/21/2021	10 of 17	10 of 17 ¹	0 of 0	10 of 17
J&J (archive)	1960 to	Fontane	Decl. w/chart on J&J 9/21/2021	6 of 14	7 of 14	0 of 0	7 of 14
Cashmere Bouquet	1910s to 1920s	Fontane	Decl. w/chart on Cashmere Bouquet 6/23/2021	11 of 18	14 of 18	0 of 0	14 of 18
Cashmere Bouquet	1930s to 1940s	Fontane	Decl. w/chart on Cashmere Bouquet 6/23/2021	14 of 25	19 of 25	0 of 0	19 of 25
Cashmere Bouquet	1950s	Fontane	Decl. w/chart on Cashmere Bouquet	5 of 7	5 of 7	4 of 4	7 of 7
Cashmere Bouquet	1960 to 1967	Fontane	Decl. w/chart on Cashmere Bouquet	8 of 12	10 of 12	5 of 5	12 of 12
Avon Persian Wood, Wild Rose	1961 to 1962	Fontane	M71543 7/1/2022	0 of 2	0 of 2	2 of 2	2 of 2
Avon Persian Wood, Cotillion	1958 to 1961	Fontane	M71550 7/1/2022	0 of 2	0 of 2	2 of 2	2 of 2
Coty Airspun loose face powder	Pre-1963 to post-2000	Fontane	Decl. w/chart on Coty 5/19/2022	9 of 13	9 of 13	13 of 13	13 of 13
Coty Emeraude dusting powder	1963 to 1992	Fontane	M71494 4/28/2022	0 of 2	0 of 2	2 of 2	2 of 2

¹ The MAS chart dated 9/16/2021 identifies 18 J&J bottles from outside of J&J's archive (and 32 J&J bottles overall) containing Italian talc analyzed by MAS. Because sample #9 with a 1945 vintage may also contain California talc, it was removed from the tally.

Chanel No. 5	Two 1954-1976, five “pre late 1980s” ²	Fontane	Decl. w/chart on Coty 8/10/2020	7 of 7	7 of 7	0 of 0	7 of 7
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Samples with Italian talc tested that contained asbestos: 95 of 119 (79.8%)
Samples with Italian talc tested that contained amphibole asbestos: 81 of 119 (71.4%)
Samples with Italian talc tested that contained amphibole asbestos by TEM: 70 of 119 (58.8%)
Samples with Italian talc tested for chrysotile asbestos by PLM: 26 of 26 (100%)

TALC FROM VERMONT

Product(s)	Vintage(s)	Source mine	Reference	Amphibole by TEM	Total amphibole	Chrysotile by PLM	Total
J&J (outside archive)	1980, 1994, 1994, 1996	Hammondsville, Hamm, Argonaut	Decl. w/chart on J&J 9/21/2021	2 of 4	2 of 4	2 of 2	4 of 4
J&J (archive)	1970 to 1996	Hammondsville, Hamm, Argonaut	Decl. w/chart on J&J 9/21/2021	23 of 36	29 of 36	0 of 0	29 of 36
West Windsor Grade 66, 96	1989 to 2003	Hammondsville, Hamm, Argonaut	Decl. w/chart on J&J 9/21/2021	7 of 15	8 of 15	0 of 0	8 of 15

Samples with Vermont talc tested that contained asbestos: 41 of 55 (74.5%)
Samples with Vermont talc tested that contained amphibole asbestos: 39 of 55 (70.9%)
Samples with Vermont talc tested that contained amphibole asbestos by TEM: 32 of 55 (58.1%)
Samples with Vermont talc tested for chrysotile asbestos by PLM: 2 of 2 (100%)

TALC FROM SOUTHWEST MONTANA

Product(s)	Vintage(s)	Source mine	Reference	Amphibole by TEM	Total amphibole	Chrysotile by PLM	Total
Gold Bond	1996 to 2012	Treasure or Regal	Decl. w/chart on	0 of 11	0 of 11	11 of 11	11 of 11

² In the MAS chart dated 8/10/2020, twenty samples are designated as dated 2000 or earlier (samples #1-4, 8-21 and 23-24). Out of those 20, 7 can be identified as being before the date in the late 1980s when Cyprus/Luzenac began blending Italian talc with Australian talc as Supra A; prior to the late 1980s, WC&D sold Talc 1615 and Cyprus sold Supra to Chanel.

			Gold Bond 6/23/2022				
Gold Bond	2015 to 2020	Yellowstone	Decl. w/chart on Gold Bond 6/23/2022	0 of 10	0 of 10	10 of 10	10 of 10
Clubman	2006	Treasure or Regal	M71373 3/15/2022	0 of 1	0 of 1	1 of 1	1 of 1
Talc 1745	2002 to 2016	Treasure or Regal	M71523 6/10/2022	0 of 6	0 of 6	6 of 6	6 of 6
Pfizer MP retains	1985 to 1986	Treasure	M71549 7/1/2022	0 of 5	0 of 5	5 of 5	5 of 5
Avon Night Magic	1987	Beaverhead	M68231 1/2019	0 of 1	1 of 1	0 of 0	1 of 1
Dr. Gunter samples	N/A	Treasure/Regal (MP 44-26), Treasure ore, Yellowstone ore	Report 9/2/2022	0 of 0	0 of 0	3 of 3 (FE-SEM)*	3 of 3

Samples with Montana talc tested that contained asbestos: 36 of 36 (100%)

Samples with Montana talc tested that contained amphibole asbestos: 1 of 36 (2.7%)

Samples with Montana talc tested that contained amphibole asbestos by TEM: 1 of 36 (2.7%)

Samples with Montana talc tested for chrysotile asbestos by PLM: 33 of 33 (100%)

TALC FROM BRAZIL

Product(s)	Vintage(s)	Source mine	Reference	Amphibole by TEM	Total amphibole	Chrysotile by PLM	Total
Johnson & Johnson (Argentina)	2017	Brazil	Decl. w/chart on J&J 9/21/2021	0 of 3	0 of 3	3 of 3	3 of 3

Samples with Brazilian talc tested that contained asbestos: 3 of 3 (100%)

Samples with Brazilian talc tested that contained amphibole asbestos: 0 of 3 (0%)

Samples with Brazilian talc tested that contained amphibole asbestos by TEM: 0 of 3 (0%)

Samples with Brazilian talc tested for chrysotile asbestos by PLM: 3 of 3 (100%)

TALC FROM CHINA

Product(s)	Vintage(s)	Source mine	Reference	Amphibole by TEM	Total amphibole	Chrysotile by PLM	Total
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Chanel No. 5	2000s to 2014	Guangxi	Decl. w/chart on Chanel 8/10/2020	2 of 22	2 of 22	19 of 19	20 of 22
Guangxi mill (Segrave)	N/A	Guangxi	Decl. w/chart on J&J 9/21/2021	0 of 1	0 of 1	1 of 1	1 of 1
Guangxi crude (Sanchez)	N/A	Guangxi	Decl. w/chart on J&J 9/21/2021	0 of 1	0 of 1	1 of 1	1 of 1
Guangxi mill (J&J retain)	N/A	Guangxi	Decl. w/chart on J&J 9/21/2021	0 of 1	0 of 9	9 of 9	9 of 9
Supra H (Chanel retain)	2011 to 2013	Guangxi	Decl. w/chart on J&J 9/21/2021	0 of 1	0 of 0	18 of 18	18 of 18
Johnson & Johnson (JBP & STS, outside archive)	2004 to 2020	Guangxi	Decl. w/chart on J&J 9/21/2021	6 of 21	6 of 21	33 of 33	37 of 40
Johnson & Johnson (STS, archive)	2013, 2013, 2017	Guangxi	Decl. w/chart on J&J 9/21/2021	2 of 3	2 of 3	0 of 0	2 of 3
Johnson & Johnson (U.K.)	2002	Guangxi	Decl. w/chart on J&J 9/21/2021	0 of 9	0 of 9	9 of 9	9 of 9
Avon body powders ³	1997 of 2002	Guangxi	M71560 11/15/2022	0 of 9	0 of 9	9 of 9	9 of 9

Samples with Chinese talc tested that contained asbestos: 106 of 112 (94.6%)

Samples with Chinese talc tested that contained amphibole asbestos: 10 of 75 (13.3%)

Samples with Chinese talc tested that contained amphibole asbestos by TEM: 10 of 75 (13.3%)

Samples with Chinese talc tested for chrysotile asbestos by PLM: 99 of 99 (100%)

³ The report concerned 13 Avon samples, including 9 body powders (001 to 009), two eye shadows (010 to 011) and two blushes (012 to 013). Only the body powders are included here because they can be tied to Chinese talc.

EXHIBIT 238

ASPEX, LLC

113 S. Perry Street, Ste 206 #345
Lawrenceville, GA 30046
(770) 634-6033

March 1, 2023

Jessica Dean
Dean, Omar, Branham, and Shirley
302 N Market St, Suite 300
Dallas, TX 75202

RE: Jennifer Chamberlain Expert Report

Dear Mrs. Dean:

The following is an Expert Report containing my opinions regarding the exposure history of Jennifer Chamberlain with respect to her cosmetic talcum powder use as described by the documents provided by your firm as well as other documents and testing data.

This report is based on the information that was sent from your office, my educational background and training, my experiences and research into asbestos exposure issues as well as testing data published in peer reviewed scientific literature.

The information provided, and that I have reviewed for this report, is as follows:

1. Ex. 1 - Chamberlain, Jennifer 06-21-2022 305699_mini_N_Certified Copy
2. Ex. 2 - Chamberlain, Jennifer 07-11-2022 Vol. II 305699_mini_N_Certified Copy
3. Ex. 3 - Chamberlain, Jennifer Vol. III 07-12-2022 305872_mini_N_Certified Original
4. Ex. 4 - Chamberlain, Jennifer vol 4 07-13-2022 305873_mini_N_Certified Original
5. Ex. 5 - Chamberlain, Jennifer vol 5 08-16-2022 306036_mini_N_Certified Original
6. Ex. 7 - Serrano Jr., Teofilo 08-17-2022 306090_mini_N_Certified Copy
7. Ex. 8 - Chamberlain, Jerry 10-18-2022 306397_mini_N_Certified Copy
8. Ex. 9 - Chamberlin, Melinda 10-20-2022 306399_cond_N_Certified Original
9. Ex. 10 - Chamberlain, Ralph Vol I 08-02-2022 305813_mini_N_Certified Copy
10. Ex. 16 - Edridge, Carolyn 11-10-22 (Chamberlain) Depo - Cond
11. Chamberlain - consolidated cosmetic talc MSJ response Final

Avon talc source information:

12. Chart summarizing the Avon documents
13. Avon Basic Batch Formula for Sweet Honesty product 1978-1982
14. Avon Basic Batch Formula for Skin So Soft product 1978-1982
15. Avon Basic Batch Formula for Candid product 1978-1982
16. Avon Basic Batch Formula for Candid aerosol product 1978-1982
17. Avon's ingredient code 0747 was Talc 1615 Italian in Aug. 1977 to January 1980
18. Avon's ingredient code 0747 was Supra from January 1980 onward
19. Avon's ingredient code 0750 was Talco R 3.55 from Brazil in 1981

20. Avon's ingredient code 0752 was Olympic talc from Cyprus in 1976-1982
21. Avon's ingredient code 0752 allowed Omya talc Cosmetic C-O" from Vermont beginning in October 1982
22. Cyprus cosmetic talc product list (including Olympic, Supra, ALTALC 200)
23. Avon's ingredient code 0768 was Talc 2450 from August 1977 onward
24. Excerpt of Whittaker, Clark & Daniels deposition confirming 0768 is NC talc
25. Avon's ingredient code 0815 was Montana TR-2 or Talc 4608 from Charles Mathieu
26. subsidiary American Talc Company in 1971 to 1979
27. Avon's ingredient code 0815 was ALTALC 200 from December 1979 onward
28. Avon's raw talc information (how much of each code was used) June 29, 1976

Avon Talc and Related Documents:

29. Avon skin so soft ingredients Ex 02_Skin So Soft 12-1970 to 1-1972
30. Avon skin so soft ingredients Ex 03_Skin So Soft 1-1972 to 3-1976
31. Avon skin so soft ingredients Ex 04_Skin So Soft 3-1976 to 8-1978
32. Avon skin so soft ingredients Ex 05_Skin So Soft 8-1978 to 7-1981
33. Avon skin so soft ingredients Ex 06_Skin So Soft 7-28-1981
34. Avon skin so soft ingredients Ex 07_Avon Code 0747 1961-1982
35. Avon talc Omya Olympic specs 0752 Ex 10_Avon Code 0752 1976-1982
36. Avon talc WC&D to Avon 1978-1982 Ex 28_
37. Avon talc codes 0768 WC&D 2450 Ex 14_Avon Code 0768 1971-1982
38. Avon talc codes 0810, Mathieu Canadian 4602 Ex 15_Avon Code 0810 1970-1971
39. Avon talc codes in 1976 WC&D, Matthieu, Cyprus Ex 25_Avon on 6-29-1976 re grades used in 1976
40. Avon talc sources MT 0815 Mathieu TR-2 4608 Ex 20_Avon Code 0815 1970-1982
41. Avon talc sources NC, Regal 93 Ex 12_Avon Code 0766 1967-1971
42. Avon talc sources, products, ingredients Ex 01_Lisa Gallo Affidavit 2-13-2019
43. Avon talc, WC&D sales to Avon 1975-1979 Ex 27_
44. Avon talc, WC&D sales to Avon in 1978 by bags (Ex 27A)
45. Avon talc Code 0815 from American Talc Co and WC&D Ex 23_1972.07.17
46. Cyprus talcs Italy, MT products Ex 09_Cyprus cosmetic talc applications
47. NIOSH survey of MT talc processor American Talc Co. Alabama 1976 EX 22_1976.08
48. Talc codes 0815 American Talc Co. Ex 21_1975.05.13 0815 from American Talc Co
49. Talc sources MT, Berg, Willow Creek Ex 24_1979 Berg on Willow Creek
50. Talc sources NC Ex 13_1948 Van Horn on NC talc
51. Tests Talcs Canadian 4602 Metropolitan Ex 18_Lewin on Talc 4602 7-20-1972
52. Vermont talc mines Omya, Windham (Ham), Troy Ex 11_Deposition of Omya (Burns) 10-18-2012
53. WC&D talc sources CANADA 4602, Metro No. 1. Ex 17_WC&D refers to 4602 3-10-1970
54. WC&D talc sources CANADA Metro Ex 16_WC&D Board Minutes 12-15-1964
55. WC&D talc sources ITALY, NC, MT & Avon Ex 08_WC&D (St. George) depo 8-27-2021

Pfizer/Coty and Italian talc source information:

56. Deposition of Brian Kolman (Coty representative), October 17, 2018
57. Coty responses to interrogatories (Hug) February 19, 2016
58. Pfizer's responses to interrogatories (Schoeniger) January 13, 2017
59. Whitaker Clark and Daniels (WC&D) representative Theodor Hubbard March 2, 2016
60. Italian Talc in Coty powder documents
61. Pfizer Analytical Report, November 5, 1965

62. WC&D on discount for Coty September 7, 1972
63. WC&D on discount for Coty on June 1, 1973
64. Summary of sales of WC&D and Cyprus talc to Coty 1975-1985
65. WC&D sales records to Coty (1975-2004)
66. Cyprus sales records to Coty (1979-1990)
67. Coty L'Aimant dusting powder "batch card" April 10, 1979
68. Coty L'Aimant "master formula" July 8, 1987
69. Coty ingredient code 2-001-01-465 July 18, 1994
70. Coty Airspun Powder Translucent "Master Formula" June 10, 2003

Documents on Coty using talc from Madoc, Ontario in 1969-1970:

71. WC&D Sales Report – December 10, 1969
72. WC&D "Larry" (Driscoll) to Bob Smith March 16, 1970
73. CTFA memorandum March 12, 1976
74. Deposition of Dennis St. George (WC&D representative), March 2, 2021
75. Exhibit 3 to the deposition of Theodore Hubbard, March 2, 2016
76. J&J memorandum on Metropolitan talc November 1, 1967

Documents on Coty buying talc from northern Ontario in mid-1980s to early 1990s:

77. Cyprus call report regarding Coty July 11, 1991
78. Luzenac listing competitors purchases March 24, 1997
79. WC&D notes from September 28, 1998
80. Colgate specification on Beacon August 26, 1981
81. Revlon to Color Techniques May 28, 1986
82. Color Techniques data sheet for "RCT 1004CX"
83. Luzenac Memorandum December 12, 1997

Colgate and Cashmere Bouquet Documents

84. Colgate interrogatory responses (excerpt) June 16, 2016
85. Colgate representative Dr. Michael Burke (excerpt) August 19, 2021
86. Cashmere Bouquet formulas 1968-1970 (North Carolina)
87. Cashmere Bouquet formulas 1970-1975 (North Carolina/Montana)
88. Cashmere Bouquet formulas 1975-1978 (Willow Creek, Montana)
89. Cashmere Bouquet formulas 1978-1981
90. Cashmere Bouquet formulas 1981-1984
91. Cashmere Bouquet formulas 1984-1995
92. Cyprus call reports on Colgate, February to April 1976
93. NIOSH walk-through survey American Talc Co. August 24, 1976
94. Colgate raw material purchase specifications
95. Cyprus sales records to Colgate 1979-1987

Talc Testing Documents

96. Pfizer 124 tests of Talc 1615 by TEM 1976-1982:
97. Pfizer Tests (A) Table summarizing results of Talc 1615 tests
98. Pfizer Tests (B) Technician notebook entries for Talc 1615 tests
99. Pfizer Tests (C) Pfizer calibration curve 1976 (200 fibers is 0.1% by weight)
100. Pfizer Tests (D) Pfizer calibration curve 1976 (200 fibers is 0.1% by weight)

- 101. Pfizer Tests (E) Fibers means asbestos mineral fibers (example from 1976)
- 102. Pfizer Tests (F) Fibers means asbestos minerals (example from 1979)

Finished product testing documents; Cashmere Bouquet:

- 103. Cashmere Tests (A) Pooley on Coty and Cashmere Bouquet 1-12-1976
- 104. Cashmere Tests (B) Pooley on Coty and Cashmere Bouquet 5-4-1976
- 105. Cashmere Tests (E) Dr. Longo Declaration on Cashmere Bouquet testing 6-23-2021
- 106. Cashmere Tests (F) Dr. Longo chart summarizing Cashmere Bouquet results

North Carolina and Montana talc testing; Pfizer, Hazen, Fullam, CTFA, McCrone, MAS

- 107. Avon Tests Docs NC 1971.08.31 Cyprus tells Avon code 0768 (WCD 2450) has trace tremolite
- 108. Avon Tests Docs NC 1973.09.14 Avon reports 7 positives for code 0768 (NC) Travers
- 109. Avon Tests Docs NC 1979.02.16 Pfizer test of Talc 643 (North Carolina talc)
- 110. Avon Tests Docs NC 1979.07.23 Pfizer two tests of Talc 643 (North Carolina)
- 111. Avon Tests Docs MT 1968.01.24 Battelle (for J&J) finds 2% tremolite in Stone Creek MT talc
- 112. Avon Tests Docs MT 1972.06.12 ES Labs 399-1745-2755 chrysotile
- 113. Avon Tests Docs MT 1973.10.29 Hazen Research find chrysotile fibers in 15 Cyprus and Pfizer MT talcs
- 114. Avon Tests Docs MT 1979.02 to 1981 Pfizer TEM of 141 (1 to 10 fibers per 100 fields of view)
- 115. Avon Tests Docs MT 1979.07.17 Engelhard finds trace asbestos in Cyprus Montana talc
- 116. Avon Tests Docs MT 1988.07.20 CIMC finds 0.33-0.76% in three samples of Beaverhead fines
- 117. Avon Tests Docs MT Willow 1973.04.06 Avon detects tremolite in code 0815 talc
- 118. Avon Talc Test Spec Includes APAM 8.600-1 Test For Asbestos 1972
- 119. Avon Talc Spec Venezuela Talc 1986
- 120. Tests Italian, NC, MT Talcs (A) Pfizer test of Talc 1 and Talc 1615 on 12-8-1972
- 121. Tests NC Talcs (F) Table on 42 tests of Talc 643 (NC) 1978-1981
- 122. Tests NC MT Talcs (G) Technician notebook entries for Talc 643 (NC) 1978-1981
- 123. Tests NC MT Talcs (H) Talc 1 and Talc 643 is from NC
- 124. Tests NC MT Talcs (I) Berg on Willow Creek MT 1979
- 125. Tests NC MT Talcs (K) Pfizer Hicks memo summarizing tests of Montana talc 2-8-1991
- 126. Tests NC MT Talcs (L) MAS test of Avon sample with Beaverhead MT talc 1-2019
- 127. Tests NC MT Talcs -(C) Dr. Fullam report for WC&D 11-20-1973
- 128. Tests NC MT Talcs -(D) CTFA round robin 12-10-1973
- 129. Tests NC Talcs (E) McCrone on NC (Regal) and Cashmere Bouquet 2-5-1974
- 130. Montana Talc Code translation_1979.08.28 WCD 141 is Altalco 400 (MT) beginning in late 1979

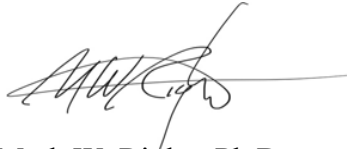
Madoc, Canada talc testing; J&J, Dr. Lewin, FDA, McCrone

- 131. Tests Canadian Talcs (A) Nov 1 1967 J&J on Metro 1 from Madoc
- 132. Tests Canadian Talcs (B) Six XRD tests of Talc 4615 in 1971-1976
- 133. Tests Canadian Talcs (C) July 18 1972 Dr. Lewin on Talc 4601
- 134. Tests Canadian Talcs (D) April 1973 FDA on Talc 4603
- 135. Tests Canadian Talcs (E) May 13 1976 McCrone on Talc 4615
- 136. Tests Canadian Talcs (F) Oct 1980 J&J on Madoc Canada talc

Penhorwood, Canada talc testing; Pfizer, McCrone

137. Tests Canadian Penhorwood Talc (B) 1983.07.26 McCrone to Colgate (RCT 1004C)
138. Tests Canadian Penhorwood Talcs (A) 1980.04 to 1981.09 Collection of 14 tests by Pfizer of RCT 1004C

Descriptions of product use, locations, circumstances for Jennifer Chamberlain along with other sworn testimony, are presented along with my opinions pertaining to her exposure, and are shown on the following pages of my Expert Report.



Mark W. Rigler, Ph.D.,
Principal Consulting Scientist

(Note: WCD and WC&D refer to Whittaker, Clark and Daniels, Inc.)

QUALIFICATIONS

My name is Mark W. Rigler and I am over 18 years of age. I hold a Ph.D. in Microbiology from the University of Georgia (1985) and a BS in Biology from Villanova University (1977). My doctoral training program included bacteriology, pathogenic bacteria, analytical chemistry, biochemistry, physical chemistry, nutrition, optical and electron microscopy (transmission and scanning) including energy dispersive x-ray analysis, electron diffraction, morphometry, immunocytochemistry, and cryo-microscopy. Prior to obtaining my doctoral degree, I was employed as a research technician in the Department of Agronomy at the University of Georgia utilizing electron microscopy methods to study ultracellular morphology. While obtaining my doctoral degree I received a research assistantship at the University of Georgia in the Department of Microbiology utilizing chemical analytical methodologies as well as microanalysis techniques and electron microscopy. My post graduate research work involved laboratory management and electron microscopy of biochemical processes utilizing cryo-electron microscopy. I received the Sigma XI Ph.D. Research Dissertation Award from the University of Georgia Sigma XI Chapter for my dissertation work, the Ruska Award from the Southeastern Electron Microscopy Society, and the Presidential Scholarship Award from the Electron Microscopy Society of America for my research work.

From 1989 to 2019 for nearly 30 years, I was employed by MAS also known as Materials Analytical Services located in Suwanee, Georgia. MAS is an independent testing and consulting laboratory which provides a broad range of testing services including analytical, materials, environmental, industrial hygiene, and emissions testing services. MAS has performed tens of thousands of tests for asbestos in air, water, materials and dust. MAS is an accredited certified asbestos analysis lab that is an ISO 17025 lab certified by the American Industrial Hygiene Association (AIHA) and, during my tenure at MAS, the National Voluntary Laboratory Accreditation Program (NVLAP) through the National Institutes of Standards and Technology (NIST). MAS is also certified by The American Association for Laboratory Accreditation (A2LA) for asbestos analysis. MAS is also certified for the analysis of asbestos in talc by the heavy liquid separation technique technique.

At MAS I held the positions of Branch and Departmental Manager, and Lab Manager (Biology, Materials Analysis, Industrial Hygiene, Microbiologicals) as well as Vice President, Senior Consulting Scientist, Technical and Quality Director for Microbiologicals, and Chief Science Officer. I am experienced in laboratory management, project design, implementation, and quality control. Additionally while managing the lab, I implemented a quality program designed for pharmaceuticals testing and analyses which included quality initiatives for Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP). During my tenure at MAS I performed consulting work for government agencies such as the Center for Disease Control, the National Institute of Health and for a variety of private clients in the automotive, chemical, and industrial manufacturing sector.

Since 1981 I have authored and co-authored numerous peer reviewed scientific papers and research

on the subjects of asbestos analysis, cellular ultrastructure, chemical exposures, particle analysis and exposures, standards setting, and electron microscopy. I have given scientific presentations at local and national scientific conferences regarding my work and have taught courses to industry associates and to university students. Additionally I was trained by and developed experience in industrial hygiene methodologies working with numerous Certified Industrial Hygienists at the MAS laboratory and in the field. My air sampling and exposure testing experiences are equivalent to those of most Certified Industrial Hygienists.

I am a member of various scientific and standards setting organizations including the American Society for Testing and Materials (ASTM) D22 committee on air quality. The committee designs, evaluates and writes standard methods for air sampling and analysis. I am also a member of American Industrial Hygiene Association (AIHA) and the American College of Occupational and Environmental Medicine (ACOEM). A membership in the ACOEM and AIHA is not attainable by any scientist who applies. Applicant's qualifications are thoroughly reviewed by the ACOEM and AIHA board prior to acceptance. I am also a member of the American Chemical Society, American Conference of Governmental Industrial Hygienists (ACGIH), Southeastern Electron Microscopy Society, Microscopy Society of America (MSA), American Society for Microbiology (ASM), and other scientific associations. A recent copy of my Curriculum Vitae is attached.

Since the 1990s I have testified in court on numerous occasions as an expert on asbestos related matters involving personal injury cases in various states including North Carolina, Florida, Washington, Oregon, and Missouri.

ASBESTOS, MATERIALS, AND CHEMICALS TESTING EXPERIENCE

Asbestos, Materials, Chemicals, Particles Sampling and Analysis

I am experienced in designing and managing hundreds of testing projects over nearly 30 years in the lab as well as numerous projects in the field. I am experienced in analyzing many types of materials as well as collecting bulk samples and air samples for particulate contaminants which include asbestos, dusts (whole and fibers), environmental fungi, environmental bacteria, and pathogenic bacteria. I am experienced in collecting and analyzing gases such as CO₂, CO, Cl, Br, S, H₂S, CS₂ and bulk chemical compounds that volatilize including; benzene, naphthalene, formaldehyde, glutaraldehyde, and acetaldehyde. I am experienced in the use of air sampling pumps (high and low volume, Anderson samplers and Biopumps), pump calibration and experienced in media selection including air sampling media for chemicals, particulates, dusts, fungi, bacteria and asbestos.

Chemical Analysis Methods

I am experienced in the methods of liquid-solid and liquid-liquid extractions and purge-and-trap methods for separating and concentrating volatile and semi-volatile chemicals. I am experienced in the use of chromatographic methods including thin layer chromatography (TLC) and gel

chromatography. I am experienced in gas chromatography (GC), flame ionization detection (FID), pyrolysis gas chromatography (PYR-GC), and gas chromatography-mass spectrometry (GCMS). I have used these methods for the analysis of a variety of chemicals associated with materials such as fabrics, coatings, fibers, films, polymers, and particles. I have used EPA, NIOSH, ASTM, and OSHA protocols for a number of studies as well as have designed numerous custom analytical procedures for the characterization of proteins, fats, and other chemicals in samples.

Chemical Emissions, Particle Testing, and In-Lab Analyses

In the lab, I am experienced in air sampling studies including sampling for emissions of particles and chemicals from products that have been housed in specially constructed emissions chambers in order to measure the release of specific chemicals and particles (such as asbestos) from hard, soft and semi porous surfaces and powders. I am experienced in testing gas and particle emissions from products using specially constructed stainless steel emissions chambers.

Field Sampling and Analysis for Chemicals, Mineralogical Particulates, Biologicals, and Asbestos

In the field, I am experienced sampling at projects sites in Georgia, Alabama, North Carolina and Florida involving air testing at residential, commercial, church, and some government buildings for airborne contaminants such as semi-volatile chemicals (aldehydes, diketones, etc.), dust particulates, and bioaerosols. I am experienced in analyzing the solids and liquid constituents (tars, nicotine) of cigarette smoke to assess product conformance to formulas as well as have analyzed particulate components such as tobacco product constituents including fibrous filter components such as crepe paper and crocidolite asbestos.

Tissue and Exposures Analysis for Mineralogical Particulates, Biologicals, and Asbestos

My testing experience since the 1990s includes performing analyses of human tissues for the presence of asbestos using the same histological tissue processing methods as clinical pathologists. These methods include tissue slide preparation and the histological examination of human tissue types. I am also experienced in tissue sample preparation for optical, scanning, and transmission electron microscopy. I am experienced in digesting human tissues such as lung, ovarian, fallopian tube, mesenteric, and lymphatic tissue to recover mineralogical particles including tremolite, actinolite, anthophyllite, chrysotile, amosite and crocidolite asbestos and talc particles which are then identified and quantified using transmission or scanning electron microscopy. Since the early 1990's I have performed tissue digestions on hundreds of samples.

Product Testing and Exposures Analysis for Chemicals and Asbestos

I am experienced in product testing to measure released chemicals and particulates, including studies of asbestos-containing products and bulk materials for the release of asbestos fibers and or chemicals into the air. These studies demonstrate, among other things, whether a manufacturer could have

anticipated the quantity of particulates (such as asbestos and talc) or chemicals released into the air from its products, and, the levels of particles or chemicals released under certain circumstances. These tests are performed under rigorously controlled laboratory conditions following industry or governmental standards.

I am experienced using specifically designed full size testing rooms at MAS to measure released chemicals and particulates from asbestos and chemical-containing products when those products are handled in a typical fashion. I am experienced using standardized analytical testing techniques to determine the amount of asbestos, particulates, or chemicals released into the air and dispersed into a person's breathing zone, their clothing, and their surroundings. I am experienced with MAS testing methods which include the same kind of testing methods routinely employed by, and available to, the asbestos and chemical industry in the 1960's and 1970's, including the use of current updated standardized testing procedures. My experience includes performing calculations and estimates of exposures to particulates such as asbestos and other inorganic particles, as well as chemicals. My calculations and estimates are based on results from MAS laboratory tests, data from the scientific literature, and from sworn testimony regarding personal exposures to particulates, such as asbestos, and to chemicals.

EXPERT REPORT REGARDING JENNIFER CHAMBERLAIN

SUMMARY OF JENNIFER CHAMBERLAIN'S EXPOSURE TO COSMETIC TALC POWDERS

General Use of Cosmetic Talc Powders

Jennifer Chamberlain was born in 1974 and testified that she remembers using body powders when she was seven or eight years old. Jennifer used a variety of body powders, facial powders, and foot powder on a daily basis. She remembered growing up as a child using body powder up until 2012 when she stopped using make up all together. The home she grew up in had one bathroom for all of the occupants and talc powders were used by her siblings and her mother in that same bathroom area. She used and was exposed to body powders sold by Johnson & Johnson, Cashmere Bouquet, Coty, and talc powders from various pharmacies such as Albion Pharmacy, Walgreens, Rite Aid, Walmart (Equate), and K-Mart. Additionally, she and her family used Gold Bond powder and Avon talc powders. Jennifer's mother Juanita was an Avon lady who sold Avon products throughout Jennifer's life. Jennifer used a variety of body and cosmetic powders including facial and makeup powders including Avon, Maybelline, Cover Girl, Revlon, L'Oreal and Clinique. She applied body powders from shaker containers and powder puffs and described the conditions in the areas where the powders were applied as cloudy and dusty.

Johnson & Johnson, Equate, and Rite Aid Baby Powder Talc

Jennifer testified that she remembers her mother using Johnson's baby powder on her as a child after her baths. Jennifer recalled that she used Johnson's Baby Powder 50 to 70% of the time and used knock pff brands like Equate and Rite Aid about equally. She began using Equate baby powder in approximately 1995 and stop using it just before her hysterectomy in 2021. When she use the Equate powder, she applied it to her breasts, genitals, into her underwear, and on her underarms.

She used the same talc powder brands when she was diapering her two children. In 1997 her first child was born. Jennifer testified that would use a bottle of baby powder every two weeks when diapering each of her two children 6 to 7 times per day. Her children were wearing diapers for 10 months to a year each.

Avon Beauty Dust Powders

Avon dusting powder and shaker powders were used by Jennifer and her family. They came in a variety of colored containers and fragrances. Jennifer's mother Juanita was an Avon lady who sold Avon products throughout Jennifer's life and applied the powders to her children. At around age 10 or 12, Jennifer began applying Avon talcum powder to herself. She applied powders in the bathroom and in her mother's room usually once or twice per day. She used the beauty dusting powders with the shaker bottles and puff applicators. The Avon brands that she remembered using included Timeless, Modern

Balance, Vanilla, Soft Musk, Sweet Honesty, Odyssey, and Josie. From the time she was seven or eight years old living with her mother, and after she moved out in 1993, she used Avon Sweet Honesty two or three times per week.

Avon and Coty Face Powder

The loose and pressed powders Jennifer used were made by Avon or Coty. When Jennifer was about 12 or 13 years old she started using Avon face powder. She used the powder at least once daily and used Avon and Coty powders interchangeably during the week, but she may have used Avon more. She continue to use Avon face powder until approximately 2012 for a total of approximately 25 years. When living at her parents home she applied face powder in the bedroom, the bathroom, and while in her mother's room. She remembered using Coty face powder when she was 7 or 8 years old but testified that she used it regularly when she was 12 to 14 years old. She used the loose Coty face powder every day or every other day and she used the pressed powder two or three times a week. She testified that the last time she used Coty face powder was in approximately 2012.

Jean Nate' Cosmetic Talc Powder

Jennifer Chamberlain's siblings Loretta, Jerry, and Melinda testified that Jean Nate' talcum powder was in the family's house and was used by Jennifer's mother and other family members.

Cashmere Bouquet Cosmetic Talc Powder

Jennifer Chamberlain used Cashmere Bouquet powder when she was 7 or 8 years old while living at her mothers house. When she used Cashmere Bouquet powder it was from the puff applicator instead of the shaker bottle. When she moved out of her mother's house (in 1993) she stopped using Cashmere Bouquet talc powder.

Gold Bond Talc Powder

Jennifer used at least three different types of powder on her feet; Gold Bond, Johnson's baby powder, and Johnson's baby powder, knock offs, but she used Avon the most often. Her mother would get Avon foot works talcum powder, which she and her siblings put in their shoes. When she lived with her parents, she use gold bond on her feet regularly because that's the powder her mother bought. She remembered using it when she was 7 or 8 years old and stopped using it when she moved out of her parents home in 1993. She also helped her father with his foot hygiene by sprinkling the Gold Bond powder on his feet and shoes about 5 times per week. Afterwards she would clean the power by vacuuming the carpet or by sweeping the kitchen floor. She starting applying the Gold Bond to her father's feet when she was 7 or 8 then stopping when she was 14 or 15, approximately in 1990.

Cover Girl, Revlon, L'Oreal, Maybelline, and Clinique Face Powder

Jennifer received a full set of Clinique with loose and pressed face powder, mascara, eyeshadow, blush and body talcum powder, as a Christmas present when she was 12 to 14 years old approximately from 1986 - 1988. She also used L'Oreal, Cover Girl, and Maybelline loose face powders regularly along with Avon powders. She wore face powders every day when she was 12 to 14 years old and by the time she was 17 or 18 she started purchasing makeup for herself, putting it on her face and around her eyes and nose. She carried Cover Girl, Maybelline, Revlon, L'Oreal, or Avon together in her makeup bag. She stopped using L'Oreal in 2012 when she stopped wearing make up generally.

BASIS OF OPINIONS

Attached as Appendix 1 is my Reference Documents containing historical and contemporary analytical reports on the presence of asbestos in talc samples. It includes testing methodologies and protocols that have been promulgated by scientific and regulatory bodies, published scientific literature, statements from scientific bodies and/or regulatory bodies about issues pertaining to microscopy and asbestos, including information on the talc sources in various products. The list is a list of documents and materials that I have reviewed, considered and critically evaluated in forming my opinions. Additionally in these documents are other sources that I reviewed to gain an understanding of the origins, sources and/or talc grades in the talc products that I have evaluated. The documents contains talc batch formulas and ingredient lists for various products, the manufacturer's internal coding system, the coding system for the supplier and vendors of talc, sales records, internal memoranda and other corporate records, testimony, and responses to discovery in litigation.

Attached as Appendix 2 is a set of tables summarizing information on the mine source(s) for various trade names of talc products that are referenced in this report. These are part of the information I have reviewed and rely on to form my opinions in this case.

Attached as Appendix 3 is a summary chart of analytical TEM methods and testing Standards for the identification of regulated asbestos.

TALC AND ASBESTOS DEFINED, TEST METHODS AND CONTENT OF THE TALC SOURCES AND PRODUCTS

Talc Defined and Occurrence

Talc is a soft, whitish, naturally occurring mineral which is part of the sheet silicate group. The pure talc substance ($\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$) has a crystal structure that is layered and consists of repeating silicate sheets surrounding a layer of brucite (MgO). It exists in two forms, platey and fibrous. It arises from geological processes that are associated with mixed minerals such as chlorite, amphiboles and serpentines, including asbestos. "The ores from which raw material talc powders are derived typically contain approximately 35% to 95% pure talc substance; thus, the term "talc" has been used to refer to commercial minerals having as little as 35% content of the pure mineral" (IWGCAP 2021)

Asbestos Defined

Asbestos includes the six regulated asbestos minerals which are chrysotile (the fibrous form of serpentine) and the fibrous forms of five amphibole minerals: tremolite, actinolite, amosite, anthophyllite, and crocidolite, some of which are found mixed with deposits of talc. The regulatory and standard setting organizations require the characteristics of an asbestos structure (fiber/bundle) to have a minimum length of at least 0.5 micrometers (AHERA, ISO, ASTM Standard setting bodies) or 5.0 micrometers (NIOSH OSHA regulatory agency) and an aspect ratio (length to width) of no less than 3:1 (NIOSH OSHA) or 5:1 (AHERA, ISO, ASTM). The sides of the asbestos structure should be substantially parallel and the chemistry and crystallinity should correspond to the asbestos type.

Size matters when it comes to hazardous elongated mineral particles such as asbestos because particles measuring 10 micrometers or less can get deep into the lungs when breathed. More narrow definitions of asbestos exist (aspect ratio 20:1 to 100:1, high tensile strength and flexibility, requirement of an asbestiform habit, population of fibers requirement, etc.) however they have been mainly applied as commercial definitions of asbestos and, if used, exclude an entire range of hazardous asbestos particles.

In collaboration with other microscopists and experts I published a peer reviewed paper in 2019 in the American Standard for Testing Materials Society (ASTM) journal titled, "Health Effects of Censored Elongated Mineral Particles: A Critical Review" describing the serious drawbacks of using narrow definitions of asbestos. Drawbacks include the following:

- High aspect ratio requirements (>20:1) exclude a large class of hazardous asbestos structures with aspect ratios less than 20:1. As early as the middle 1980s when the AHERA regulations were being promulgated by the EPA, a group of expert microscopists agreed that the aspect ratio should be at least 5:1.
- Tensile strength and flexibility are terms used to describe bulk asbestos (viewable with the naked eye) but tensile strength and flexibility cannot be measured on microscopic asbestos fibers and bundles and this description was originally drawn from the commercial definition of asbestos.
- Some methods refer to the need for a "population" of fibers to be examined prior to determining whether they are asbestiform however, the term "population" has not yet been defined in any of the standards for asbestos testing and is not a requirement for identifying asbestos fibers and bundles.
- The requirement for an asbestiform habit is intended to preclude cleavage fragments from asbestos fiber counts. All methods that use transmission electron microscopy (TEM) do not require an asbestiform habit, include short fibers (≥ 0.5 micrometers (um)), do not specify a minimum fiber width and, are best suited to detect cleavage fragments, short fibers, and thin fibers. (See Asbestos Analysis TEM Methods Comparison Table, see also AHERA 1987, ASTM D5755-09, ASTM D5756-02, ISO 10312 1995, ISO 13794 1998, IWGACP 2021: Interagency Working Group on Asbestos In Consumer Products (IWGACP) White Paper, and the IWGACP Scientific Opinions On Testing Methods for Asbestos in Cosmetic Products

Containing Talc. 2021.

- It has long been understood that asbestos is a common impurity in talc (IARC 2012 pg. 220 Table 1.1). The amount and type of asbestos varies depending on the mine but the fact that talc is not a pure substance in the ground and has a variety of common impurities, including asbestos minerals, is well documented. As far back as 1898 Dana states this, Rohl and Langer state this in 1976 as do Deer, Howie and Zussman in 2013).

XRD and PLM as Asbestos Testing Methods

Powder X-ray diffraction (XRD) has been used extensively for the analysis of talc. Though specified by the CTFA (Cosmetics, Toiletries and Fragrances Association), XRD alone or in combination with polarizing light microscopy (PLM) should not be used for unequivocally determining the presence of asbestos in cosmetic talc grades. The current XRD methodology for the analysis of asbestos in talc is limited and can only detect low levels of asbestos at a level of approximately 0.1 - 1.0% and is therefore only useful in limited situations. XRD can be even more limited, with detection limits as high as 5% when used historically with mixed minerals. Though XRD can detect low levels of amphiboles and serpentines in talc, powder X-ray diffraction for asbestos detection is severely limited due to its inability to detect the form of the asbestos.

XRD may detect tremolite but it would not provide information about the size, shape or form of the tremolite. However, it has long been understood that when tremolite is present it will be in both the fibrous and non-fibrous forms. (See Rohl and Langer (1976), Van Gossen (2004, 2007), IARC 2012 pg. 220 Table 1.1, NIOSH Current Intelligence Bulletin 62 pg. 152 Table 2). Therefore, while XRD testing finds tremolite, XRD can be used to conclude that tremolite asbestos is likely to be present. XRD can indicate the percentage of talc along with the other components present in the talc to determine whether the amount of talc meets the specifications for an industrial, cosmetic, or pharmaceutical grade talc.

TEM, SAED and EDS for Analyzing Asbestos in Talc

Unlike XRD, TEM is not limited in determining the form of bulk amphiboles like tremolite since TEM can perform selected area diffraction on single fibers and bundles of asbestos resulting in greater sensitivity to asbestos and a much lower limit of detection compared to XRD. The laboratory I worked for nearly 30 years, MAS, tested talc samples using three published analytical methods; ISO PLM, Blount PLM, and HLS TEM that will be described later in this report. Each of the three methods was more sensitive than the previous revealing the presence of asbestos in the talc samples due to the increased level of sensitivity. By way of reference, early testing done by Dr. S. Lewin of New York University was done using XRD. The low sensitivity of XRD missed asbestos in the talc product tested. Company records validated the presence of asbestos missed by Dr. Lewin when using more sensitive testing

Talc testing methodologies that include transmission electron microscopy (TEM), selected area

electron diffraction (SAED), and energy dispersive X-ray analysis (EDS) are accepted by the biomedical and mineralogical scientific community worldwide, and by standard setting agencies (NIST, EPA, ASTM, ISO) for the analysis and identification of asbestos in air, water and bulk materials such as talc.

HLS Method and TEM for Detecting Low and Trace Levels of Asbestos in Talc

Though there may be differences between laboratories that test talc for the presence of asbestos, major differences exist primarily because nearly all of the laboratories do not use the most sensitive test methods or use preparation methods that would give less than the best sensitivity. One of the best preparation methods for concentrating asbestos and separating it from talc is the heavy density liquid separation method (HLS) as outlined in the ISO 22262-2 standard. This method is specific for talc that may contain low or trace levels of asbestos. The HLS methodology has been around for decades and was performed on talc by Dr. F.D Pooley, Dr. A.M. Blount, the Colorado School of Mines, Dartmouth University, and talc industry scientists in the 1970s. The only lab I am aware of that is certified by the American Association for Laboratory Accreditation (A2LA, an ISO 17025 standard compliant body) that uses the HLS method is the MAS TEM lab in Suwanee GA (see February 4, 2020 presentation by W. Longo at FDA meeting, Washington, DC and MAS A2LA certification).

Using the HLS method and TEM allows for sensitivity down to a level of approximately 5,000 asbestos structures per gram of talc powder. The HLS method should always be utilized in cases where low levels of asbestos are suspected in cosmetic talc. (Rigler, MW, 3/24/2020, Comments to FDA regarding: Testing Methods for Asbestos in Talc and Cosmetic Products Containing Talc; FDA Public Meeting February 4, 2020 Silver Spring, MD). Also, a Congressional committee recommended to FDA that the HLS method be used for testing talc (see letter from the Chairman of the Congressional Committee on Oversight and Reform to the FDA March 3, 2020, (pg. 1.). The Chairman wrote; "...the Preliminary Recommendations" (of the FDA IWGACP subcommittee) "fail to include one key reform: samples must be prepared using the heavy liquid separation method (HLS)." Laboratories that do not use the HLS method and TEM for cosmetic talc samples will not be able to detect the lowest levels of asbestos in cosmetic talc.

Asbestos Concentration in Talc; Weight Percent vs Numerical Count of Fibers

The analytical sensitivity for asbestos qualification in talc can be reported in two different ways, by weight percent (wt. %) or by the number of asbestos fibers per gram (f/gram, etc.). Reporting the analytical sensitivity for asbestos by weight percent is very misleading since it is based on the theoretical mathematical calculation of one minimal fiber size which can give a computed analytical sensitivity in the millionths of a percent range. The misleading part of this is that the size of the theoretical fiber you use for the calculation impacts the final weight percentage. A large fiber size will give you one number and a small fiber size will give you another completely different number, which is hardly a reliable way to present asbestos content in talc.

It is much better to count the actual number of fibers found in the talc sample and calculate the total number of fibers per gram of talc. Otherwise, the TEM theoretical analytical sensitivity expressed in weight percent is meaningless and unreliable. For instance, a TEM average limit of detection of 0.000002% weight can have a numerical fiber concentration in the range of 10,000,000 fibers per/gram of talc or higher. (See pg.16 Interagency Working Group On Asbestos In Consumer Products (IWGACP) White Paper, IWGACP Scientific Opinions on Testing Methods for Asbestos in Cosmetic Products Containing Talc. 2021.

Blanks and Contamination

Controls must be used when performing any kind of sample testing. Laboratory blank control samples are used to confirm the absence of contaminants in talc samples tested. For talc testing, a control sample consists of a clean sample container or a blank filter prepared and analyzed along with the actual talc samples. If the control blank is found to contain asbestos, then the actual talc sample would be considered contaminated. No asbestos detected in a blank control sample signifies that the actual talc sample is not contaminated and that the finding of asbestos in the talc sample is accurate and reliable.

ASBESTOS IN TALC SOURCES AND COSMETIC TALC POWDERS

Talc Source Information

Based on the documents I was provided, Cashmere Bouquet sourced talc from Val Chisone, Italy up through about 1968 and, thereafter, Italian talc was used at times or as part of a blend with (a) North Carolina talc in the late 1960s to early 1970s, (b) Willow Creek, Montana talc from about 1971 to 1979 and (c) Beaverhead, Montana talc from 1979 onward. There is also an indication that for some time periods Montana talc was interchangeable with Canadian talc.

Based on the documents I was provided, Avon body powders approved the following talc sources at different times: North Carolina talcs (Regal Talc 93 or Talc 2450 Hitchcock), California talc (Supreme 325, 1585 Grantham, Death Valley, Desert talc), Alabama talc, Canadian talc from Madoc Ontario (Canadian 4602/Henderson) Italian talc from Val Chisone, Italy (Talc 1615/Supra/Supra A/Supra H), Montana talc from Beaverhead Montana (Olympic or Omya Talc) Montana talc from Willow Creek, Vermont talc (Vertal C-O) (Talc 66, Windsor), Spanish talc (Spantal), Brazilian talc (Talco R 3.5S/Magnesita S/A) and Chinese talc from Guangxi (Osmanthus Cosmetic Talc 200).

Based on the documents I was provided, Johnson and Johnson sourced talc from Val Chisone, Italy up through about 1946 to 1964. From 1964 to 1966 they sourced talc from the Hammondsville Vermont, mine and the Val Chisone Italian mine. From 1966 to 1979 they sourced talc from the Hammondsville Vermont mine and also used it from 1976 to 1979 from the same mine. In 1980 Johnson & Johnson sourced talc from the Hammondsville, Vermont, mine and the Val Chisone Italian mine. From 1981 to 1988 they continued to source talc from the Hammondsville Vermont mine. From 1989 to 1990 they sourced talc from the Hammondsville, Argonaut, and Rainbow Vermont mines. From 1990 to 2000

they sourced talc from the Hammondsville, Argonaut, Rainbow, and Hamm (Windam) Vermont mines. From 2000 to 2001 they sourced talc from the Argonaut, Rainbow, and Hamm (Windam) Vermont mines. From 2001 2003 they sourced talc from the Argonaut Vermont mine. From 2003 to 2009 they sourced talc from five different Chinese quarries or mines including; Zhizhua, Guping, Huamei, Shang Lang, and Tongzi. From 2009 to 2010, they sourced talc from the Zhizhua quarry in China. Talc was briefly used from 2010 sourced from the Argonaut Vermont mine and from 2010 to the present time talc was used from the Zhizhua China quarry. Talc suppliers over the time periods described include; Charles, Matthew, Eastern Magnesia Talc Company (EMTAL), Windsor Minerals, Cypress Minerals, Luzenac, Rio Tinto (f/k/a Luzenac) and Imerys (f/k/a Rio Tinto (f/k/a Luzenac)). (see J&J Interrogatories re talc mines locations, dates, test labs, and JBP mills (see Amended 2018 supplim in Rimondi 11-21-18).

Based on the documents I was provided, the talc in Gold Bond products was supplied by Barretts Minerals, Inc from 1996 through 2014 and distributed by Chattam, Inc. From 2014 through 2021 the talc for Gold Bond was supplied to PTI (Pharma Tech Industries) by Imerys. Barrett's Montana talc mines were Regal and Treasure, and the Imerys Montana talc mine was Yellowstone. Barrett's sourced the talc from 1996 until 2014 and Imerys sourced the talc from 2012 to 2020. (see Chattem (Gold Bond) ROGs - Talc 1745 1-24-2022).

Based on the documents I was provided, Coty sourced Italian, Alabama, and Montana talc for its talc powder products in the 1960s and 1970s. Italian talc 1615 was used in Coty Airspun loose powder products. Cody's Airspun Shimmer and Airspun Face Powder used talc 141 sourced in Alabama then Montana (see Coty (Kolman) depo excerpt 10-17-2018, Coty Interrogatories (excerpt) 2-19-16, Coty Airspun talc sources table 1965-1991). Coty was purchasing talc from WC&D in the 1970s and from Cyprus in the late 1970s and during the 1980s.

Based on the documents I was provided, it is my understanding that Lanvin and Charles of the Ritz made Jean Nate before Revlon began doing so in about 1987. There is information suggesting that Jean Nate' sourced Italian talc (talc 1615, Supra), Montana talc (1745), North Carolina talc blended with Montana talc, Korean (Orean) talc, and Canadian talc (RCT 1094CX, CosJ (Timato). (see WC&D sales to Charles of the Ritz in 1975 to 1981 and 1992-1987, see WCD/St. George deposition 8/27/2021 at 6:7-22, 67:13-17, see Revlon raw material specification Timato 1004CX COS J Canadian talc 10-20-2009, see also Burger, 1991 Article on global talc market)

Based on the documents I was provided, CoverGirl talc products primarily used Talc 141 in the pressed powders sourced from mines in Alabama and Montana supplied by Whittaker, Clark and Daniels, Cyprus, ImaFabi and other suppliers. (see Cover Girl (Noxell) sources Talc 141 AL or MT - interrogatories)

Talc Source Mines Have Been Shown To Contain Mixed Fibrous and Asbestiform Minerals

Talc mines possess, in addition to talc, mixtures of minerals such as chlorite, amphiboles, serpentines and accessory minerals. Geologists have been concerned with the removal of tremolite

and asbestos from talc since before the 1970s (see Battelle Memorial Institute studies that follow). In a letter to the Johns-Manville Corporation dated February 20, 1973, W.T. Caneer, Projects Manager Geology of the Colorado School of Mines Research Institute wrote, “The purpose of this letter is to reply to your question regarding the physical removal of 100% tremolite which may occur with talc. It is probable that some of the tremolite may be removed, but in my opinion one could not expect to remove all the tremolite from talc as it occurs in nature. My opinion is based on my knowledge of the mode of occurrence of tremolite in talc plus the results of related beneficiation studies which have been made at the Research Institute.” In an appearance before Congress in December 2019, geologist Dr. R.V. Metcalf of the University of Nevada, Las Vegas, testified that talc and fibrous asbestiform minerals occur mixed together in talc deposits and, “Talc and amphibole asbestos minerals can and certainly do co-exist at scales that cannot be mined in such a way as to exclude amphibole minerals from talc.” Geologist, Dr. R.B. Cook of Auburn University also stated that talc deposits arising from serpentinization, such as in talc mines occurring in Vermont, contain chrysotile and asbestiform amphiboles. Richard Zazenski, the Regulatory Affairs Manager for the talc mining company Rio Tinto Minerals, stated in a 2008 email that “Geologically, it doesn't make sense to me that you can have a mineral deposit that just contains "non-asbestiform" tremolite.” Additionally he said; “if a deposit contains non-asbestiform tremolite, there is asbestiform tremolite there as well.”

Hundreds of tests demonstrating asbestos in talc were withheld from regulators, users, and scientist for decades. (See Bird et al. 2022 and Musco 2017). Many of these tests became known recently resulting in increased testing and concern over other documents not made available.

A partial chronology of findings for mixed fibrous and asbestos minerals in Vermont, Montana, and Italian talc source mines follows.

Italian, Vermont, North Carolina, Montana, Canadian, Alabama, Chinese, California, and Brazilian Talc Source Mines Have Been Shown To Contain Fibrous Asbestiform Minerals

Italian Talc Ore and Processed Talc Have Tested Positive for Asbestos

In the 1950s, Johnson & Johnson was looking for ways to remove fibrous minerals (elongated particles) from their talc supply ores. In a 10-15-57 report to Johnson & Johnson from the Battelle Memorial Institute, Italian talc supplied to Johnson & Johnson from the Pinerolo region mines (Val Chisone) was found to contain 10% fibrous minerals. In a 1-24-58 report to Johnson & Johnson, the Battelle Memorial Institute stated that samples of Italian #1 and # 2 talc also tested positive for tremolite. A 5-8-58 follow-up report from Battelle on Italian #1 and #2 talc described the presence of amphibole tremolite at trace levels in the Italian talc. Also in a 1-24-60 report by Chase and Tangle of Battelle to Johnson & Johnson & Johnson, trace tremolite was found in nearly all Italian #2 talc ore float samples from 34 experiments after using various floatation regimens. The results from a set of pilot beneficiation runs on Italian #2 talc by Tangel of Battelle in 3-28-60 sent to W.H. Ashton of Johnson & Johnson, still showed the presence of trace tremolite in the beneficiated talc. Though platy talc yields were increased significantly in Italian #2 talc in these experiments, trace tremolite was not

completely removed. In fact, in an 11-11-72 letter to the United States Department of Health Education and Welfare (HEW), Johnson & Johnson stated the following, “We know of no process that guarantees total removal of all elongated particles from talc. They also wrote, “The Johnson & Johnson process for beneficiating Vermont talc, which we believe to be the most advanced in the field, will not guarantee a zero tolerance for elongated particles.”

Research by Battelle to remove the fibrous components from Italian and domestic talcs continued into the late 1950s and early 1960s and additional reports describing Battelle’s findings are included with the references attached to this report.

In a December 8, 1972 memo titled “Asbestos in Talc,” H.D. Stanley reported to Coty’s Technical Services Manager J.E. Clements that 1615 (Italian) talc contained tremolite fibers (asbestos).

In September 14, 1973, J.T. Travers, Director Exploration Research for Avon, reported to J.M. Anderson that 4 Italian 0747 talc samples tested positive for asbestiform minerals.

In December 27, 1973 the Colorado School of Mines produced a document to Johnson & Johnson titled, “A Procedure to Examine Talc for the Presence of Chrysotile and Tremolite-Actinolite Fibers.” In that document a procedure that demonstrated the usefulness of a two stage heavy density liquid method (HLS) for the separation of low levels of chrysotile and tremolite-actinolite fibers in talc samples. The heavy liquid method never appeared to be used for any routine talc batch testing to detect low or any trace levels of asbestos in talc powders.

In an August 1, 2017 report, the MVA laboratory tested talc ore samples from the Pinerolo Italian talc mines, a source of J&J talc from the 1940s to 1964. The samples from the Val Chisone Italian talc mines showed that the Italian sourced talc possessed trace amounts of anthophyllite asbestos as an accessory mineral.

To date, the MAS laboratory has tested approximately 93 samples of Italian talc. I was personally involved in this testing in that I was involved in creating the testing protocol used by MAS. MAS did not routinely test talc sold in cosmetic products until 2017. My role at MAS was to develop testing protocols that are still used to this day. Also, in over 68% of the tests I had additional involvement including, but not limited to, scientific review of all of the data, supervising and assisting the analyst, and quality assurance. I was an analyst early in my career at MAS but was in a more senior role when testing protocols for cosmetic talc began, so instead, I routinely provided analytical guidance in the lab during talc testing which included reviewing a sample under the microscope, evaluating chemical analyses, and answering technical questions.

MAS only reported regulated asbestos in talc samples. Asbestos exists as single fibers, bundles, clusters and matrices, all which must be counted if they meet the counting criteria as regulated asbestos. While there are single fibers found in Italian talc samples, most of the samples possessed bundles of asbestos fibers. There were hundreds of asbestos structures found in these samples. Since

the sample size is in the range of milligrams, the fibers found represent millions of asbestos fibers in a gram of Italian talc. When a method such as heavy density liquid separation (HLS) was used to concentrate amphibole asbestos and remove talc, and not some other types of asbestos (namely lighter, less dense asbestos types having a density similar to talc), 77% of the samples were found to contain amphibole asbestos. When the HLS concentration method was used to remove talc without removing chrysotile asbestos, 100% of the tests found asbestos. Talc powders sold in cosmetic products are highly processed and the asbestos in the talc is an impurity.

There is no requirement in all asbestos counting protocols to determine if the asbestos came from an asbestiform habit. However, there are multiple indicators that the asbestos structures found are not cleavage fragments from a non-asbestiform habit but rather asbestiform fibers and bundles. First, 60% of the structures found by MAS were bundles. Second, MAS findings of populations of fibers and bundles with substantially parallel sides are evidence that the fibers and bundles are not cleavage fragments. Further, AHERA regulatory rules have indicated that an aspect ratio of 5:1 is the best discriminator to differentiate an asbestiform fiber or bundle from a cleavage fragment. An evaluation of the asbestos found in Italian talc shows that 97% of the fibers and bundles have aspect ratios of 5:1 or greater. Other scientists have indicated that width is a helpful tool to differentiate asbestos fibers from cleavage fragments. Studies document that most often particles don't cleave from a massive rock into thin fibers. When a fiber is one micron or less in width, it is likely to be asbestiform. At least 90% of the fibers found in the MAS studies I was involved in fit this criterion and are asbestiform.

Italian talc testing spans six decades and involves talc from the same source used in products sold by five different companies. The talc samples tested came from various sources, however for each company's product some of the samples came from the company as opposed to coming from a Plaintiff or third-party source. The MAS test results demonstrate the likely existence of asbestos in any talc product using an Italian talc component.

As a scientist, I am concerned with the source of the talc product in the sample bottle, not the bottle that the talc comes in. Whether the sample is in a plastic bottle or cardboard box, or some other form, does not affect the likelihood of asbestos in the talc inside of the bottle. The specific packaging, labeling and writing on the product often helps identify what is in the product but is not otherwise relevant to the amount or type of asbestos that would be present. Rather, from this data what is most significant is whether the product in the package contained talc from the same source. MAS testing results are consistent with the findings of asbestos impurities documented in the published literature regarding Italian talc and, the results are also consistent with the extensive testing by others including industry tests, testing performed by talc producing companies and testing by reputable labs.

Vermont Talc Has Tested Positive for Asbestos

In a May 16, 1973 Johnson & Johnson communique from T.H. Shelly to Dr. F.R. Rolle, Shelly stated that Dr. Pooley found 0.05% of tremolite in Vermont talc after using a HLS heavy liquid method.

Another May 22, 1973 communique by Rolle to Shelly titled, “Proposed Spec for Analyzing Talc for Asbestos” stated that the heavy liquid method (HLS) may be “too sensitive” if used to separate asbestos from talc. As mentioned above, the heavy liquid method never appeared to be used for any routine talc batch testing to detect low or trace levels of asbestos in talc powders.

In a May 14, 1974 report, V. Zietz, the Windsor Minerals Manager of Research and Development described a flotation process to suppress chrysotile asbestos in beneficiated Vermont talc ore. This process had been developed to, “Provide the protection against what are currently considered to be materials presenting a severe health hazard and are potentially present in all talc ores in use at this time.” Included in that report were the findings, by RC Reynolds of Dartmouth University, of actinolite in 3 samples of Windsor 66 talc from the Hammondsville Vermont talc mine after using HLS and XRD (see Windsor Minerals J&J New Reagent Systems Zeitz Report 5-14-1974 pg 4 JNJJNMX68_000005041 and Table 2 pg. JNJMX68_000005043).

In a November 5, 1975 letter to Johnson & Johnson from Windsor minerals in Vermont regarding the testing of Vermont talc ores by the McCrone Lab, McCrone’s Senior Research Physicist reported that at least 9 of the talc samples they tested contained fibrous amphibole asbestos.

In a November 26, 1990 report to Cyprus’ Windsor Minerals Quality Control Manager, the McCrone laboratory found anthophyllite and chrysotile asbestos in 2 talc samples (samples 90-28 and 90-30).

In a March 25, 1992 Cyprus interoffice memo regarding the geology and mineralogy of Vermont talc ores, R.C. Monro stated, “The other serious mineralogical contaminant in the talc ores of Vermont is the fibrous variety of the amphibole minerals, tremolite and actinolite (hydrous calcium iron magnesium silicates) which have been classified as asbestiform minerals by OSHA and EPA.” Monro further stated that, “As a result, all tremolite, the fibrous varieties of all amphiboles and chrysotile asbestos in talc ores are a source of great concern to all talc producers and especially to marketers of cosmetic products.” He reported that “There is certainly visible tremolite and actinolite in specific zones of the Vermont deposits – fibrous tremolite was identified by the writer in exposures and cores at the East Argonaut and Black Bear mines. Cyprus staff report past tremolite in the Hammondsville and Clifton deposits.” (same reference as above). He noted “Tremolite in these deposits is encountered in the contact zone between the talc and surrounding schist; in ‘grey zones’ in the vicinity of the contacts and associated with the chlorite/amphibole waste zones within the talc ores that are locally termed ‘cinders.’” (same reference as above).

In 2018, the MVA laboratory tested talc ore samples from Vermont mines, a source of J&J cosmetic talc from 1966 to 2003. The MVA report dated April 23, 2018 regarding the Argonaut Vermont talc/ore sample analyses showed that the Vermont talc mine possessed trace amounts of anthophyllite, tremolite, and actinolite asbestos as accessory minerals in the talc.

North Carolina Talc Has Tested Positive for Asbestos

A 1948 North Carolina Department of Conservation and Development Bulletin “Talc Deposits of the Murphy Marble Belt,” reported the “presence of tremolite and its iron-bearing relative actinolite” in the Murphy talc. (see Van Horn 1948 pg. 25). It states “In the Murphy marble, tremolite is found in sizes from microscopic particles to bladed crystals up to 20 inches long. It occurs as individuals and as oriented and unoriented aggregates in all parts of the marble formation. Tremolite replaces and is replaced by talc and most of the other accessory minerals, demonstrating several different stages of formation ...” See the Hitchcock Corporation property (where Whittaker, Clark and Daniels (WCD) obtained Talc 2450) in reference above. The author reports tremolite or “tremolite needles” both above and below the “talc zone.” (See pg.12). Referring to the Nancy Jordan talc mine operated by the Hitchcock Corporation, it states “minute tremolite fragments show in some of the talc when observed under the microscope.” (See pg. 42).

In an August 31, 1971 letter from Louis Murino of talc supplier Cyprus Minerals, Dr. J.T. Travers, Director Exploration Research for Avon, stated that there was trace tremolite in North Carolina talc 0768 (WD 2450).

In the December 8, 1972, a memorandum from Mr. Stanley to J.E. Clements, reported that “microscopy shows an occasional fiber of tremolite” in a sample of “Lo Micron” talc. The photomicrograph images also show talc fibers. Talc 1 is Lo Micron talc, a North Carolina cosmetic talc supplied by WCD. (WCD/St. George deposition 8/27/2021 at 63:18-64:1).

Also in a September 14, 1973 Avon memo, Dr. Travers of Avon reported to J.M. Anderson that 7 North Carolina Avon 0768 (WD 2450) talc samples talc samples tested positive for asbestiform minerals.

In February 5, 1974 R. Shimps of the McCrone testing lab reported to J.P. Simpko of Colgate Palmolive that 2 samples of talc tested positive for chrysotile. One (1) sample was from the Regal North Carolina mine and contained 0.0001 - 0.001% chrysotile and the other, a Cashmere Bouquet talc sample also tested positive for chrysotile asbestos.

From July 1978 through July 1981, various lots of talc 643 from North Carolina tested positive for asbestos fibers. (see reference; Tests NC Talcs (F) Table on 42 tests and Pfizer notebook entries for Talc 643). In over 30 samples (far more than half of the total set that I have reviewed), Pfizer technicians reported 1 to 150 fibers per 100 fields of view. Talc 643 consisted of North Carolina cosmetic talc supplied by WCD. (WCD/St. George 8/27/2021) see 61:24-62:3; WCD Marketing Guide 1/16/1978).

Montana Talc Has Tested Positive for Asbestos

When Battelle Memorial Institute (“Battelle”) ran floatation tests on Italian #2 talc for Johnson &

Johnson in 1958, Battelle also reported results of samples of talc from “Stone Creek” Montana mine. (Battelle to J&J January 24, 1958). The Stone Creek mine talc was identified as coming from Montana (see Table 1). Battelle reported 2% tremolite in Stone Creek mine talc in Table 1.

An April 6, 1973 test request for differential thermal analysis (DTA) by the Avon laboratory showed that Avon Montana sourced talcs 0747 and 0815 had tested positive for 1% tremolite by X-ray analysis. DTA however did not confirm the result. DTA has not been an accurate analytical testing method for detecting low concentrations of asbestos in talc.

On September 14, 1973, Dr. J.T. Travers, Director of Exploration Research for Avon, reported to J.M. Anderson that 5 Montana 0815 talc samples tested positive for asbestiform minerals. It also noted 3 positive findings in Talc 399. Talc 399 consists of Montana talc from Pfizer’s mines.

Hazen Research, Inc. provided an October 29, 1973 report to Johns-Manville entitled, “Determination of Content of Asbestos Type Minerals in Talc Samples.” (Hazen Research October 29, 1973). In 11 samples of “Mistron Vapor” containing “Mont” talc, Hazen reported chrysotile present by TEM testing including multiple samples with “more than trace quantities.” See Table VI (MTC 000591). Mistron Vapor was reported as containing Montana talc ore. (Cyprus Price List October 1, 1972). Hazen found chrysotile in Microtalc MP 12-50 and WCD SF 399 (Mont). Microtalc MP 12-50 was a Montana talc sold by Pfizer and distributed by WCD as Talc 399. (Pfizer Bulletin 75-9 April 2, 1972 at pg. 2 PFZ01162_012296)).

A November 20, 1973, report from Richard Stevens of Ernest Fullam, Inc. contains results of testing of 6 talc samples. (Fullam to WCD November 11, 1973). WCD provided talc samples for round robin testing, including (a) Montana-Ferry (WH-073), (b) Montana-Pfizer (WH-009), (c) North Carolina (WH-037) and (d) Vermont (WH-033). See Ex. 41, LoGiudice/WCD/0171. The results reported (a) 5,200 chrysotile fibers and 29,450 amphibole fibers per milligram (5,200,000 chrysotile and 29,450,000 amphibole fibers per gram of talc) in WH-073 from Willow Creek, Montana, (b) 450 chrysotile fibers and 18,000 amphibole fibers per milligram (450,000 chrysotile and 18,000,000 amphibole fibers per gram of talc) in WH-009 from Pfizer’s Montana source, (c) 6,000 chrysotile fibers and 20,850 amphibole fibers per milligram (6,000,000 chrysotile and 20,850,000 amphibole fibers per gram of talc) in WH-037 from North Carolina and (d) 675 chrysotile fibers and 3,225 amphibole fibers per milligram (675,000 chrysotile and 3,225,000 amphibole fibers per gram of talc) in WH-033 from Vermont. (See pg. LoGiudice/WCD/0174).

A July 17, 1979 memo by E.J. Triglia reported to G.A. Hemstock of Engelhard Minerals that talc from the Cyprus Beaverwhite Montana talc mine tested positive for trace amounts of asbestos.

In 1979, tremolite and chrysotile were noted at the Willow Creek Montana talc mine by R.B. Berg of the Montana Bureau of Mines and Geology (see Berg pg. 45) and was later verified by the Cyprus Laboratory to be fibrous tremolite (asbestos) (April 6, 1984 memo). CIM (Cyprus Industrial Minerals) stated that one of the purposes of the study was to address “the presence of tremolite

within the ore body.” (See pg. 2 Montana 0407). “A detailed study of the tremolite occurrence was made in 1984 in order to determine if the tremolite was zoned and whether selective mining methods could be employed to mine the talc and not touch the tremolite.” (See pg. 8 Montana 0413). “The tremolite was present in 16 holes.” Cyprus Research Lab “verified the specific mineral tremolite was present and is the fibrous variety.” Cyprus concluded that “tremolite occurs along 80 percent of the strike path of the ore body” and the concentration of “tremolite in these occurrences ranged from a trace to 20 percent.”

A July 20, 1988 Cyprus testing report for numerous talc samples from the Beaverhead talc mine in Montana showed positive results for the presence of actinolite asbestos. (Tests MT Talc 1988.07.20 Beaverhead Fines)

In a February 8, 1991 Thorp, Reed, and Armstrong memo from B.V. Hicks regarding a summary of tremolite testing of Montana talc; detectable levels of tremolite were found in numerous (46) finished talc product samples in 1979, 1988, 1989, and 1990. Also, 114 drill cutting samples from the same period (Hicks memo February 2, 1991). Hicks expressed concerns that, “there is a problem with the finished product. The current procedure allows shipment of finished product before test results are sent back. Therefore, if the figures in the chart are representative of all the finished product, some finished products with detectable levels of tremolite are being shipped.” (pg. 3 PFZ001162_05755).

I have reviewed laboratory notebook entries of Pfizer technicians produced in relation to Montana talc mining. Hundreds of tests report the presence of fibers or bundles as shown in tests of Pfizer Montana ore (Summary of testing 1987-1992 in Tests MT Talc - Pfizer Montana Ore Summary TEM/SAED in 1987 to 1992). There are numbers of fibers ranging from 1 fiber to 1,000s of fibers and there are times when dozens of bundles are reported. The width of the fibers are under 1 micron demonstrating they are not likely cleavage fragments. Pfizer was monitoring the “Treasure mine tremolite fiber situation” conducting testing that included testing by TEM and XRD to determine the “extent of our problem with these detrimental minerals.” (Tests MT Talc 1988.07.29 Pfizer document). The detrimental minerals are identified at the start of the document as tremolite and chrysotile i.e., “concerns involving tremolite and chrysotile mineralization of our Treasure mine.” The context of Pfizer’s records, in addition to the notation of fibrous talc when found in the laboratory notebooks, suggests that the fibers found in Pfizer’s laboratory notebooks are asbestos fibers.

Pfizer had over 1,000 samples for evaluating Montana talc using TEM. No concentration method was used and the detection level was limited. Pfizer did make it clear that it had the ability to detect fibers down to 0.001%. However, in the lab notebooks they only evaluated down to what they reported as 0.01% (see Tests Talcs Pfizer 1973.11.19 Pfizer detection limit 0.01 to 0.001% 11-19-1973). Typically, Pfizer would report non-detects to customers if fibers or bundles were not found at the level they reported as 0.01% but, in the notebooks, they acknowledge that this was an acceptance level which corresponds to the fact they indicated their ability to detect below the

“accepted” level. Moreover, at different times Pfizer indicated you could find under 60 fibers and later, under 200 fibers and still be less than 0.1% so results indicating talc with less than 0.1% could actually have high levels of fibers. To make matters worse, Pfizer admitted that their calculations had mathematical and other errors resulting in undercounting the fibers present by up to 3%. (see Pfizer characterization of 0.1% by weight 1975-1983 and Pfizer talc tests calibration and limits 1976.07.16, 1976.07.26)

Moreover, the Pfizer technicians were instructed to only look at 100 fields of view from non-concentrated talc samples which limited the detection of fibers and bundles. For comparison, during my MAS tenure and senior management of talc projects, HLS concentrated talc samples were analyzed which significantly improved the detection limit for asbestos fibers and bundles. We also used high magnification at 20,000X to analyze talc samples for asbestos. The high magnification was used to increase the likelihood of detecting small asbestos fibers. Pfizer technicians did not use higher magnifications such as our 20,000X, they used a much lower magnification of 3,000X (see Pfizer talc tests - 3000x magnification 4-29-1982). This made it very likely that small thin fibers were missed during the Pfizer analyses. The amount of asbestos found in some of the talc ore samples analyzed by Pfizer (which were then processed and blended) is very high, some talc samples showing hundreds of fibers. Over 200 MAS tests found fibers and bundles in talcs sold as cosmetic talc. In multiple instances Pfizer’s notebooks recorded findings of fiber “bundles”, high aspect ratios, and fibers narrower than 1 micrometer. As noted above this indicates these fibers are both regulated asbestos and rules out the likelihood that any significant portion of the fibers cleaved from a non-asbestiform habit. The Pfizer testing is consistent with the testing by MAS although MAS used superior methods with better accuracy and sensitivity.

Ontario, Canada (Madoc and Penhorwood) Talc Has Tested Positive for Asbestos

In an November 1, 1967, Canadian talc evaluation, Johnson & Johnson found 1% tremolite and trace serpentine in a sample of “Metro #1” talc from the Henderson mine in Madoc, Ontario. (See Tests Canadian Talcs (A) November 1, 1967 J&J on Metro 1 from Madoc), Table II (pg. JNJAZ55_0000012430).

In an August 31, 1971 letter from Cyprus Mines to Avon’s Dr. J.T. Travers, Cyprus reported finding 5% tremolite in a sample of Avon 0810 Canadian talc (see Tests Avon Talc, Cyprus tells Avon code 0768 (Whittaker, Clark and Daniels (WCD) 2450) has trace tremolite, Murino to Travers see pg. 2 pg. AV_LEBRECHT-0029252). Per above, Avon Code 0810 was Talc 4602. Avon estimated 6-8% tremolite in Canadian talc. (Avon Memo to WR Chaney, from CS Rowland; Re Tremolite in Talc Program, March 14, 1972).

Between 1971 and 1976, in WCD’s Talc 4615 from Canada, multiple analysts (Dr. S. Lewin of NYU, E.S. Laboratories, and Dr. S. Brown of Princeton University) found 3% to 10% tremolite by X-ray diffraction in 6 of 6 samples and chrysotile in 3 talc samples. (see Tests Canadian Talcs (B) Six XRD tests of Talc 4615 in 1971-1976).

In a July 18, 1972, letter, Dr. Lewin reported to Mr. Bixby of Metropolitan Talc and Mr. Dippold that he found 1 - 2% tremolite and 1 - 2% chrysotile in Talc 4601 by x-ray diffraction (Tests Canadian Talcs (C) July 18 1972 Dr. Lewin on Talc 4601 July 18, 1972).

On July 20, 1972, Dr. Lewin reported to Mr. Bixby that sample C-2-RM contained 15% tremolite and 10% chrysotile by x-ray diffraction. (see Tests Talcs Canadian 4602 Metropolitan Ex 18_Lewin on Talc 4602 7-20-1972). The sample C-2-RM consisted of Talc 4602. (See WC&D talc sources CANADA 4602, Metro No. 1. Ex 17_WC&D refers to 4602 March 10, 1970)

Dr. Weissler of the FDA wrote to Mr. Roesch of WCD on April 19, 1973 that the FDA's analysis of WCD's "sample of an industrial talc" indicated "the presence of chrysotile." (see FDA letter from Weissler to WCDs Roesch re industrial talc sample has chrysotile 4-19-1973). WCD acknowledged that WCD found "a small amount of chrysotile contamination" in the same sample (See FDA letter from WCD stating they found chrysotile in the industrial talc they're sending to FDA 4-6-1973). Handwritten notes in that document indicate the sample was of Talc 4603 "Canadian Talc."

On April 13, 1976 the McCrone laboratory reported finding 10-20% tremolite by X-ray diffraction in a sample of Talc 4615. (see Tests Canadian Talcs (E) April 13 1976 McCrone on Talc 4615). McCrone wrote that by optical microscopy 5 - 10% (of the 10 - 20% tremolite) appeared fibrous.

In an October 1980 report, Johnson & Johnson analyzed a sample of Cantal 325 Talc (Madoc) from Canada Talc Industries (see Tests Canadian Talcs (F) Oct 1980 J&J on Madoc Canada talc). Optical mineralogical examination revealed "a high concentration of rod-shaped amphibole (tremolite) particles (See pg. 1 JNJ 000065269). In the same report J&J recommended to Canada J&J the "talc source be dropped from further consideration."

I have reviewed 14 Pfizer notebook entries dated in 1980 to 1981. (see Tests Canadian Penhorwood Talcs (A) 1980.04 to 1981.09 Collection of 14 tests by Pfizer of RCT 1004C). In analyzing 100 fields of view by TEM Pfizer analysts reported (a) 2 fibers on April 7, 1980 (with the average fiber of 0.4 um wide and 3.0 um long), (b) 12 fibers on May 12, 1981, (c) 4 fibers on May 12, 1981, (d) 2 fibers on July 9, 1981, (e) 3 fibers on July 9, 1981, (f) 1 fiber on July 13, 1981 and (g) 2 fibers on September 17, 1981.

In a July 26, 1983 report, McCrone wrote to Colgate that it tested a sample of RC 1004C twice by TEM with SAED and found chrysotile asbestos on both occasions. (see Tests Canadian Penhorwood Talc (B) 1983.07.26 McCrone to Colgate (RCT 1004C) 7-26-1983). Photomicrographs showed long, thin chrysotile fibers (See pg. COL 00691-692). Colgate identified the sample 1004C as Canadian Talc that was "available from Beacon CMP Corp." (see Coty Talc Sources (X) Colgate on Beacon Canadian talc 1004C (talc M6831) 8-26-1981).

Alabama Talc Has Tested Positive for Asbestos

Avon's testing repeatedly found asbestos in Alabama talc. Testing done by Professor Ypma from the University of Columbia found in 75% of the test (9 of 12) between 0.1 - 2% asbestos in talc sourced from Alabama. (see Tests NC Talc 1973.09.14 Avon reports 7 positives for code 0768 (NC) Travers 9-14-1973). These results were verified optically. The most sensitive microscopy technique (TEM) was not used, and no concentration preparation method was used. Even with these significant limitations, asbestos was repeatedly found. United Sierra also tested Alabama talc by XRD and found up to 1% tremolite. (see Avon Memo to CS Rowland, from HY Saad; Re Talc - Supply and Asbestos Situation, 12-3-1971).

MAS tested 2 samples of Avon talc (Avon Somewhere 1966 talc and Avon To A Wild Rose talc) during the time frame that Avon specified either Alabama talc or talc from California for their talc products. (MAS M71543 Avon Tests 2022.07.01 Report and MAS M71550 Avon Tests 2022.07.01 Report). The results are consistent with Alabama talc and show the presence of chrysotile asbestos in both samples.

Chinese Talc Has tested Positive for Asbestos

The MAS laboratory has done testing on Chinese talc used in Johnson's Baby Powder and other products. Amphibole asbestos, including tremolite and actinolite asbestos, have been found in a number of Johnson's Baby Powder samples and chrysotile asbestos has been found in numerous Chinese talc samples (see MAS Analysis of Johnson & Johnson's Historical Product Containers and Imerys' Historical Railroad Car Samples from the 1960's to the Early 2000's for Amphibole Asbestos, 2nd Supplemental Report, 2-1-2019 and MAS M71166 Supplemental Report Off-The-Shelf 2020 JBP Talcum Powder Analysis 9-29-2020).

In 2019, Johnson and Johnson recalled a lot of its baby powder when the FDA found asbestos fibers in its Chinese sourced talcum powder (see FDA Enforcement Report Johnsons Baby Powder 2-22Z 8PC Executive Summary 2020 (recall Johnson's baby powder).

Brazilian Talc Has tested Positive for Asbestos

A Brazilian talc source mine tested positive for asbestos in 2011. In a 5-19-11 email, D. Van Orden of the RJ Lee lab reported to D. Hicks of Johnson and Johnson that 2 samples of 42 Brazilian talc tested positive for chrysotile asbestos (see Brazilian talc Hicks email re chrysotile found in 2 Brazilian talc samples P1.0025)

In 2020, MAS tested Brazilian talc from Johnson's Baby Powder sourced from Brazil. The sample tested positive for chrysotile asbestos. (see MAS M71040 Supplement 1 Johnson's Baby Talco Analysis)

California Talc Has tested Positive for Asbestos

United, Sierra, a Division of Cypress Minerals, supplied talc mined in California, such as talc from the the Grantham mine which was shown to contain tremolite. United Sierra talcs sold to Avon were tested and found to be unsuitable for use in cosmetic talcs due to “high asbestos (tremolite) content, 5 - 10%.” The Grantham mine has “high tremolitic talc” and its use could be “embarrassing” if used in cosmetic talc. Testing by XRD demonstrated levels from 2 - 45% tremolite and the talc would have passed as an industrial grade talc (see Avon document, Subject: Talcs – Supply and Asbestos Situation, see also Johns-Manville Memo to FD Richards, from S Speil; Re Tremolite in Grantham talc, 8-9-1971, "Grantham mine talc contains a large percentage of tremolite..."). Supreme 325 talc used in Avon cosmetic products contained 2% tremolite (see Tests CA talc Avon Memo to GA Sprott, from JJ Travers; Re Asbestos and Talc, 11-4-1971 (talc 0755 = Supreme 325 CA talc has 2% tremolite, see also United Sierra Cyprus Lab Report re Grantham crude talc high tremolite 3-27-1972

Asbestos Found in a Cosmetic Talc Production Facility

Asbestos was found in a talc product facility and reported in October 1972 by J. Dement of NIOSH who performed a walk-through of the Avon products Springdale Ohio manufacturing cosmetics facility. Dement collected samples of talc and analyzed them for silica and asbestos. Five (5) talc samples were analyzed for asbestos and free silica using optical microscopy and x-ray diffraction (XRD). Two (2) of the talc samples contained small amounts (< 1.0 - 2.0%) of tremolite asbestos and 1 talc sample was confirmed to have been possibly contaminated with chrysotile asbestos.

Asbestos Found In Cosmetic Talc Powders 1960s - 1970s

In 1968, Cralley published a study of 22 cosmetic talc products showing that all of them contained from 8 to 30% fibrous mineral components. The fibrous components were mainly fibrous talc but the presence of fibrous chrysotile, tremolite and anthophillyte (asbestos) was “probably” due to the presence of these same fibrous minerals in talc deposits. Cralley’s findings were part of a FDA symposium held August 3, 1971 to discuss the issue of asbestos in cosmetic talc. In a January 12, 1976 Johnson & Johnson memo to the Talc Advisory Group, test results from Dr. Fred Pooley showed that Cashmere Bouquet body powder contained approximately 1% fibrous anthophillyte asbestos. Later in a May 4, 1976 Johnson & Johnson memo, more results from Dr. Pooley showed that Cashmere Bouquet body powder contained approximately 4% fibrous anthophillyte asbestos.

Additional findings of asbestos in cosmetic talc powders follow.

Coty Cosmetic Talc Powders Have Been Shown To Contain Asbestos

Coty was an operating division of Pfizer from 1963 to 1992. From the 1960s to the 1990s Coty used Italian talc in its Coty Airspun loose face powder. In the memo dated January 12, 1976 by Johnson

& Johnson to the Talc Advisory Group (already described above), results from Dr. Fred Pooley also showed that Coty Airspun face powder contained approximately 1% fibrous anthophyllite asbestos and later in the same May 4, 1976 Johnson & Johnson memo (also described above), results from Dr. Pooley showed that Coty Airspun Face Powder contained 12% fibrous tremolite asbestos.

Testing was performed in 2021 by the MAS laboratory using PLM, HLS and TEM on Coty Airspun loose talc products. In a report dated September 7, 2021 MAS project M71202, data from 5 sealed Coty Airspun samples; Soeil D'or, Rosey Beige 070-22, Honey Beige 070-32, Suntan 070-30 and Translucent powders were presented. All 5 samples tested positive for chrysotile asbestos. Four (4) of the 5 samples contained tremolite cleavage fragments and 3 of the 5 were positive for tremolite asbestos.

Testing was also performed in 2021 by the MAS laboratory using PLM, HLS and TEM on 6 additional Coty Airspun loose talc products. In a report dated December 12, 2021 MAS project M71443, data from 5 sealed samples and 1 unsealed Coty Airspun sample were presented. Four (4) samples of Face Powder Golden Sun, 1 sample of Beauty Powder Muted Beige and 1 sample of Face Powder Translucent were analyzed for asbestos. All 6 samples were positive for chrysotile asbestos. One (1) of the 6 Coty samples contained tremolite/actinolite asbestos.

Testing was also performed in 2022 by the MAS laboratory using PLM, HLS and TEM on 2 additional vintage Coty Airspun loose talc products. In a report dated April 22, 2022 MAS and a Report dated April 28, 2022, data from the 2 sealed samples of Coty Airspun powder were presented. Regulated asbestos fibers were identified in both containers, a tremolite asbestos bundle in 1 of the 2 and chrysotile asbestos bundles in 2 of 2 (see Longo declaration re Coty 5-19-22)

Jean Nate' Cosmetic Talc Powder Products Have Been Shown To Contain Asbestos

In an August 8, 1972 document, Dr. A. Weissler, Acting Director of the Division of Colors and Cosmetic Technology for the FDA, Dr. S. Lewin of New York University reported the presence of small percentages of tremolite in 2 Jean Nate' cosmetic talc powders; Jean Nate' Spray Bath Powder and Jean Nate' Talc. Dr. Lewin's findings were followed up in a July 31, 1973 memorandum from Dr. Weissler to Dr. Robert Schaffner, Director of the Office of Technology for the FDA.

More recently from May 2019 to August 2020, the MAS Laboratory examined 15 historical Jean Nate' cosmetic powder products. Five (5) of the products tested positive for tremolite asbestos and all 15 tested positive for chrysotile asbestos. (see MAS Jean Nate' Reports. MAS Report M71031 to M71038 dated July 31, 2020, MAS Report M71138 dated August 6, 2020, MAS Report M70293 dated August 7, 2020, and MAS Report M70629 dated August 19, 2020)

Gold Bond Talc Powder Products Have Been Shown To Contain Asbestos

In 2021 and 2022, the MAS Laboratory examined 21 Gold Bond talcum powder samples and 6

Montana Microtalc 1745 samples (see Longo Declaration June 23, 2022). The 21 Gold Bond samples encompass the 1996 to 2020 time period. The six Montana Microtalc 1745 samples in encompass the time period 2002 through 2016. All 21 of the Gold Bond samples and all 6 of the 1745 Montana Microtalc samples tested positive for asbestos.

Johnson & Johnson Historical Cosmetic Talc Products Have Been Shown To Contain Asbestos

On February 1, 2019, the MAS laboratory issued a Second Supplemental Report by Drs. W.E. Longo and M.W. Rigler entitled, “The Analysis of Johnson & Johnson’s Historical Product Containers and Imerys Historical Railroad Car samples from the 1960’s to the Early 2000’s for Amphibole Asbestos.” This Supplemental Report provided the testing results for 72 talc samples of which there were 57 separate Johnson & Johnson (J&J) powder samples, including 34 Johnson’s Baby Powder (JBP) samples, 23 Shower to Shower (STS) containers, and 15 separate cosmetic talcum powder samples from Imerys that were labeled “Railroad Car.” These 72 historical containers and samples of Johnson’s Baby powder (JBP) were analyzed by using polarizing microscopy (PLM), analytical transmission electron microscopy (ATEM), and heavy liquid separation (HLS) for the possible presence of amphibole asbestos fibers and fibrous talc. Many of the J&J containers analyzed were supplied by J&J from their historical inventory. The source of the talcum powder for these J&J historical samples came from both the Italian (1960 to 1967) and Vermont talc mines (late 1960’s, 1970s, 1980’s, 1990’s and early 2000’s).

Results from the 57 historical J&J talc samples tested showed that 42 of the JBP/STS talc containers were positive (73% positive) for amphibole asbestos and possessed significant amounts of amphibole asbestos fibers/bundles per gram of talc. Asbestos concentrations ranged from approximately 4,400 amphibole asbestos fibers/bundles per gram to 268,000 amphibole asbestos fibers/bundles per gram of talc.

Additionally from the 72 samples, MAS analyzed 15 historical Imerys railroad car talc powder samples from the late 1980’s to the early 2000’s. Of the 15 Imerys railroad car samples, 8 were positive for asbestos (53% positive). The amphibole asbestos concentration range of those samples was from approximately 4,400 asbestos fibers/bundles per gram of talc to 59,000 fibers/bundles per gram of talc.

Of the 72 talc samples from the 1960s to the 2000’s that were tested, 84% were also positive for fibrous talc. Of the talc samples that tested positive for fibrous talc, the talc fiber numbers ranged from 290,000 talc fibers to 1,020,000 talc fibers per gram of talc

J³ Lab Verified Asbestos In Historical Johnson & Johnson Talc Samples Tested by MAS

The 16 historical Vermont talc sourced J&J Shower to Shower talc samples that were also a part of the 72 J&J samples, were also tested for amphibole asbestos by MAS and an additional lab, the J³ Laboratory, using the ISO 22262-2 heavy liquid and ATEM methods as a way to verify the MAS

results. A July 13, 2018 J³ Laboratory report showed that of the 16 historical Vermont talc J&J/STS containers analyzed, 11 containers were found to be positive (69% positive) for anthophyllite solid solution series asbestos. However, 5 samples were reported to be below the J³ detection limit (BDL). When MAS analyzed these same 16 samples, 9 of the 16 STS sample containers were verified to contain asbestos using ATEM. Two (2) of the J³ tested STS samples were then verified by MAS to contain amphibole asbestos using the Blount PLM method and 4 of the 5 BDL J³ samples were also determined to be positive for amphibole asbestos by using the Blount PLM method. For the 11 STS positive samples from the 16 STS containers the J³ results were only reported in weight percent but, by using the J³ report data (weight analyzed by ATEM, filter size, ATEM count sheets) the standard TEM calculation for the number of anthophyllite solid solution series asbestos fibers/bundles per gram was determined to range from approximately 7,000 anthophyllite asbestos fibers/bundles per gram to 95,000 fibers/bundles per gram of talc powder.

Cashmere Bouquet Cosmetic Talc Products Have Been Shown To Contain Asbestos

Since cosmetic talcum powder manufacturers used some of the same talc source mines (Vermont, Italy, Montana, etc.), cosmetic talc powder products made by other manufacturers were tested for asbestos by the MAS lab. In a September 25, 2018 report by Drs. W.E. Longo and M.W. Rigler entitled, “Analysis of Colgate Palmolive Cashmere Bouquet Cosmetic Talc Products For Amphibole Asbestos Supplemental Expert Report,” the MAS lab showed results for the presence of amphibole asbestos in 38 Cashmere Bouquet historical talc powders. Using the most sensitive analytical ATEM method and the heavy liquid separation method, 28 Cashmere Bouquet talc samples out of the 38 Cashmere Bouquet talcum powder samples tested positive for amphibole asbestos (74% positive). Results ranged from 3,600 fibers-bundles of amphibole asbestos per gram of talc to 474,000 fibers-bundles of amphibole asbestos per gram of talc. Both regulated tremolite series and anthophyllite series asbestos were found in the Cashmere Bouquet cosmetic powders. In addition to tremolite series and anthophyllite series amphibole asbestos, 32 of the 38 Cashmere Bouquet talcum powder samples contained fibrous talc.

Additionally, in a March 24, 2019 report by Drs. W.E. Longo and M.W. Rigler entitled, “Analysis Of Cashmere Bouquet Cosmetic Talcum Powder Products For Amphibole Asbestos Expert Report”, the MAS laboratory reported results after testing 20 additional historical Cashmere Bouquet talc powders for the presence of amphibole asbestos. Using the heavy liquid separation method and the Blount/PLM analysis, 15 of the 20 samples were found to be positive for the presence of amphibole asbestos. Using the most sensitive analytical ATEM method and the heavy liquid separation method on 5 of the 20 Cashmere Bouquet talc samples, results showed that all 5 of the cosmetic talc samples tested positive for the presence of amphibole asbestos (100% positive). The amount of a amphibole asbestos ranged from approximately 5,400 fibers-bundles of amphibole asbestos per gram of talc to 25,200 fibers-bundles of amphibole asbestos per gram of talc. Only regulated amphibole tremolite series asbestos structures were found. Overall, 20 of the 20 samples analyzed were positive for amphibole asbestos (100% positive).

To date, MAS has tested 91 samples of Cashmere Bouquet and found asbestos in 79 samples. (Longo Declaration 6/23/2021 and Chart 6/23/2021). Results from the Cashmere Bouquet talc samples tested reveals that regulated asbestos types (100%) were found. MAS results are consistent with other analyses of Cashmere Bouquet. This testing demonstrates to a reasonable degree of scientific certainty that individuals who used Cashmere Bouquet products would have been routinely and regularly exposed to asbestos. Additionally, the individuals who used Cashmere Bouquet talc products had asbestos exposure that was substantial and well above background or ambient levels.

Avon Talc Based Cosmetic Powders Have Tested Positive For Asbestos

In a March 12 & 26, 2019 report entitled “Avon talcum powder analysis with both automated Field emission scanning electron microscopy (FESEM) & ATEM MAS project #M66289”, the MAS laboratory reported on the analysis of two Avon samples from original containers, both were Avon Unforgettable talcum powder. Samples were prepared using the ISO 22262–1 PLM method without heavy liquid separation (HLS), and for amphibole asbestos by the Blount HLS/ISO-PLM method and the most sensitive analytical ATEM method (TEM SAED EDS) after preparing the samples using the HLS concentration method. Additionally, samples were analyzed by FESEM and EDS elemental mapping. In the first Avon Unforgettable talc sample M66289–001, tremolite asbestos was found at a concentration of 15,100 asbestos structures per gram. In the second Avon Unforgettable talc sample M66289–002, tremolite asbestos was found at a concentration of 5,710 asbestos structures per gram.

In a March 24, 2019, report by Drs. W.E. Longo and M.W. Rigler entitled, “Analysis of Avon Night Magic Talcum Powder,” the MAS laboratory analyzed a sample of Avon Night Magic of a 1987 vintage. (MAS M68319 Report 1/2019). It was determined the sample contained Beaverhead, Montana talc. Using the most sensitive analytical method, analytical transmission electron microscopy (TEM SAED EDS), and the heavy liquid separation method (HLS), the results showed a concentration of 4,240 bundles of actinolite asbestos per gram of the Avon talcum powder sample.

On July 12, 2019 the J3 Resources laboratory reported on the analysis of four Avon Cotillion cosmetic talcs (samples AV-2, AV-3, AV-4, AV-5) for this presence of asbestos. Samples were prepared and analyzed quantitatively using three ISO methods; ISO 22262-1 PLM microscopy, ISO 22262-2 Analytical Transmission Electron Microscopy (ATEM) after gravimetric reduction, heavy liquid separation (HLS), and by ISO 22262-3 X-ray powder diffraction (XRD). XRD results showed that amphibole minerals were detected in three of the four Avon Cotillion cosmetic talc samples (AV2, AV-3, AV-4). PLM detected 1% anthophyllite asbestos in one of the four Avon Cotillion cosmetic talc samples (AV-4). ATEM following heavy liquid separation identified 0.00256% tremolite asbestos in Avon Cotillion talc sample AV-2 and 0.330% anthophyllite asbestos in Avon Cotillion talc sample AV-4.

On December 17, 2019, talc from an original container of Avon Cotillion talc was analyzed for the

presence of asbestos by the Asbestos TEM Laboratory. The sample material was prepared using the heavy liquid separation technique (HLS) to concentrate minerals heavier than 2.85 grams/cc using a heavy liquid (lithium metatungstate). TEM, with SAED and EDS analysis was performed. PLM analysis was also performed of the non-concentrated talc sample to identify the minerals present but without determining the asbestos concentration. TEM confirmed 26 anthophyllite asbestos structures in the talc powder with 7 fibers > 5um in length. PLM showed numerous fibers with optical properties consistent with anthophyllite asbestos.

In a September 5, 2021, report entitled “MAS project M71171 Talcum Powder Analysis Of Avon And Clinique Talc From Original Containers”, the MAS laboratory reported on the analysis of 2 Avon samples and four other talc samples. The Avon samples were Scamper Lily powder and Daisy Dreamer powder. Samples were prepared using the ISO 22262–1 PLM method without heavy liquid separation (HLS), and for amphibole asbestos by the Blount HLS/ISO-PLM method and TEM with SAED and EDS after preparing the samples using the HLS concentration method. The powder samples were also analyzed for chrysotile asbestos using the Colorado School of Mines (CSM) HLS sample preparation method then analyzed by the ISO 22262–1 PLM method. Amphibole asbestos was not detected above a limit of approximately 45,000 asbestos structures per gram of talc for each of the two Avon talc samples. Chrysotile asbestos was detected in the two Avon talc samples ranging from 147,000 – 281,000 fiber/bundles per gram of talc.

In a July 1, 2022, report entitled “MAS Project M71543 Talcum Powder Analysis Avon Splits”, the MAS laboratory reported on the analysis of 3 samples of Avon talc from the 1960s; Avon To A Wild Rose (sample #9), Avon Persian Wood (sample #14) and Avon Somewhere powder (Sample #36). Samples were prepared using the ISO 22262–2 heavy liquid separation method to concentrate and detect amphibole asbestos and the PLM and CSMP New York ELAP method with HLS (CSMP) heavy liquid separation method to detect chrysotile asbestos. Both PLM and TEM with SAED and EDS were used to analyze for the presence of amphibole and chrysotile asbestos. Amphibole asbestos was not detected above a limit of 107,000 asbestos structures per gram of talc for each of the three samples. Chrysotile asbestos was detected in all three samples at an average level of 133,000 bundles per gram of talc.

In a July 1, 2021, MAS report entitled “M71550 Historical Avon Splits: Wild Rose 1965, Cotillion 1961 & Persian Wood 1958 Talcum Powder Analysis” the MAS laboratory reported on the analysis of 3 historical split samples of Avon talc from the late 1950s to the 1960s; Avon To A Wild Rose (sample #6), Avon Persian Wood (sample #32) and Avon Somewhere powder (sample #44). Samples were prepared using the ISO 22262–2 heavy liquid separation method to concentrate and detect amphibole asbestos and the PLM and CSMP New York ELAP method with HLS (CSMP) heavy liquid separation method to detect chrysotile asbestos. Both PLM and TEM with SAED and EDS were used to analyze for the presence of amphibole and chrysotile asbestos. Amphibole asbestos was not detected above a limit of 47,000 asbestos structures per gram of talc for each of the three samples. Chrysotile asbestos was detected in all three samples at an average level of 133,000 bundles per gram of talc.

Other Talc Based Cosmetic Powders Have Been Shown To Contain Talc Fibers and Tremolite

Pierce et al. evaluated 6 historical talc samples sold between 1940 and 1977 manufactured by Avon, Coty, Colgate Palmolive and Centaur (1 Coty, 2 Avon, 2 Cashmere Bouquet and 1 ZBT talc powder product) which included; 1 facial powder 3 talcum powders, 1 baby powder and 1 “beauty dust” powder. A majority of the fibers found in all of the samples were talc. Accessory minerals, such as tremolite cleavage fragments, were found in 3 of the 6 talcs by ATEM (analytical transmission electron microscopy).

Use of Industrial Talc in Cosmetic products

Published scientific literature (IARC, USP) including numerous trade and industry documents have created definitions for what is considered cosmetic grade talc in order to differentiate it from pharmaceutical and industrial grades of talc. While the definitions are not uniform, they specifically require; (a) a lack of asbestos and (b) a minimum of impurities such as arsenic. There are various other impurities associated with talc in addition to asbestos minerals including chlorite and dolomite as examples. To be considered cosmetic talc, definitions have said that more than 90% of the product must be talc instead of these other impurities. Many companies were selling talc based cosmetic products but not actually using cosmetic grade talc (see Tests FDA Talcs 1973.07.31 FDA on 195 samples). Data from the FDA and internal documents show evidence that talc used from Grantham, Madoc, Italian and North Carolina sources were routinely industrial grade talcs (see Johns-Manville Memo to FD Richards, from S Speil; Re Tremolite in Grantham talc, 8-9-71, United Sierra Cyprus Lab Report re Grantham crude talc high tremolite 3-27-1972 (Gallo Lebrecht declaration EX. I (120-121), Tests Talcs Canadian 4602 Metropolitan Ex 18_Lewin on Talc 4602 7-20-1972, Tests Avon Talc, Cyprus tells Avon code 0768 (WCD 2450) has trace tremolite 8-31-71), .

OSHA Finds Asbestos in Some Consumer Talc Based Cosmetics

In March of 2018, D.T. Crane of the Occupational Safety And Health Administration’s (OSHA) Salt Lake Utah laboratory reported to the US Food and Drug Association (FDA) on 10 different talc bearing materials that were submitted for analysis for the presence of asbestos using optical microscopy (PCM/PLM), scanning electron microscopy (SEM), and energy dispersive X-ray analysis (EDS). Eight of the samples were commercial cosmetics (seven of which were analyzed) and two were talc powders. The cosmetics included eyeshadow, pressed powder, highlight, and contour powder. All samples were found to contain fibers and four of the samples contained tremolite asbestos fibers.

SAI Laboratory Finds Asbestos in Some Consumer Talc Based Cosmetics

From 2015 to 2019, Fitzgerald et al. at the SAI laboratory examined the talc from numerous off-the-shelf cosmetics products by PLM, ATEM, EDS, and SAED (selected area electron

diffraction). The SAI lab found asbestos in a number of those products including; Justice Shine Shimmer Powder, Claire's Black Shiny Makeup Kit Light Tan Compact powder, and Claire's Bejeweled Heart eyeshadow. The SAI Lab results were published on the FDA website as well as presented to scientists at a February 2020 FDA meeting concerning asbestos in talc.

AIRBORNE ASBESTOS FROM COSMETIC TALC POWDER EXPOSURE

MAS Laboratory Finds Airborne Asbestos In Hygiene Exposure Studies Using Johnson & Johnson Talc

The MAS lab has also performed hygiene exposure studies to determine the amount of asbestos in the air during the use of Johnson's Baby Powder. The January 2018 MAS study by Drs. W.E. Longo, M.W. Rigler, and W.B. Egeland entitled, "Below the Waist Application of Johnson & Johnson Baby Powder" involved the application of approximately 4 grams of Johnson's Baby Powder to the lower body of an investigator while measuring the exposure levels of airborne amphibole asbestos during this application process. Using the NIOSH 7400 and 7402 methods, the PCME personal airborne amphibole asbestos exposure ranged from 1.8 fibers/cc (f/cc) to 4.5 f/cc of tremolite asbestos. The bystander airborne amphibole asbestos exposure was 0.13 f/cc to 0.31 f/cc of tremolite asbestos. This study has since been published In the Journal of Occupational and Environmental Medicine (JOEM).

In addition to the MAS Below the Waist Hygiene Study, MAS performed a hygiene study by Drs. W. E. Longo, M.W. Rigler, W.B Egeland, and M. Bennett with Johnson's Baby Powder entitled, "Johnson's Baby Powder Application to a Baby during Diaper Change." In this January 2019 study, approximately 0.6 grams of Johnson's Baby Powder was applied to only the diaper area of a baby doll while measuring the exposure levels of airborne amphibole asbestos to both the investigator as well as in the breathing zone of the baby doll. Using the NIOSH 7400 and 7402 methods, the investigator's PCME personal airborne amphibole asbestos exposures ranged from <0.50 f/cc to 0.78 f/cc of tremolite asbestos. For the baby doll, the two personal air sample asbestos exposures ranged from 1.6 f/cc to 3.0 f/cc of tremolite asbestos. The bystander airborne amphibole asbestos exposure was 0.12 f/cc to 0.3 f/cc of tremolite asbestos.

Both the MAS "Below the Waist Hygiene Study" and the MAS diaper exposure study, "Johnson's Baby Powder Application to a Baby during Diaper Change" demonstrate that the typical use of an amphibole asbestos-containing talcum powder would cause significant exposures from airborne amphibole asbestos (tremolite series and/or anthophyllite asbestos) to either the person using the product or to a bystander and to others using these types of products. Both studies produced exposure results that were consistent with the predicted J&J exposure range in a J&J document entitled "Adding TEM to the Global Talc Specification" which was authored by Dr. Timothy J. McCarty who was the Director of Toxicology at Johnson & Johnson at the time. In that document J&J provided hypothetical consumer asbestos exposure estimates while using J&J talcum powder.

For diapering a baby they predicted an exposure range of 0.16 f/cc to 0.18 f/cc. For an adult they predicted an exposure range of 4.5 f/cc to 9.3 f/cc. I have reviewed the published literature and internal J&J documents and the MAS analytical results are consistent with these documents.

Airborne Asbestos From Talcum Powder Agrees With Published Studies and Industry Tests

Talc used in cosmetics and body powders has been found to contain talc fibers as well as asbestos fibers and bundles. In the early 1970s, Dr. Fred Pooley, in a 10-2-72 report, determined the amount of talc and powder particles from a Johnson & Johnson talcum powder product in the vicinity of an infant on a table located in a 12' x 15' x 15' room. Results showed that when using a container of Johnson & Johnson talcum powder the dust cloud produced talc powder particles at a level of 58 particles/cc of air in the area of the infant and the adult applying the talc. Assuming, as did Dr. Rolle on 2-12-73 when he cited the 10-2-72 study by Dr. Pooley, that if only 1% of the particles were asbestos, the amount of asbestos would be approximately 0.6 asbestos fibers/cc (f/cc) of air in the area of the infant and the adult applying the talc.

Also in the early 1970s, Dement et.al. of NIOSH performed a study entitled, "Fiber Exposure During Use Of Baby Powders." Nine (9) commercial talc powder products were analyzed for fiber content and 7 of the powders were determined to be fibrous. Two (2) of the fibrous powders were Johnson & Johnson cosmetic powder products. Both of the Johnson & Johnson cosmetic powder samples contained between 10,000 and 18,000 fibers per milligram of talc (10 million to 18 million fibers per gram of talc) measuring greater than 5 μ m in length. The powders were then used during a simulated exposure test in a 4' x 5'10" x 7'7" room in which a doll was diapered. Air was collected within 10 inches of the baby doll's breathing zone and from the breathing zone of the diapering individual. Powdering was performed during diapering for 5 or 15 seconds. Results showed that for both of the powders the exposure was 1.8 to 2.25 f/cc for the mother and 0.9 to 1.8 f/cc for the baby. The study did not identify whether the fibers were talc fibers or asbestos fibers.

Johnson & Johnson also performed talcum powder usage studies in the late 1970s to determine the amount of talcum powder used by men and by women, and then comparing exposures to diapering a baby. In a 2-8-77 Johnson & Johnson 2636 study, powdering times were assessed using a full 9 ounce container of Johnson's Baby Powder after showering. The average powdering time for the women was approximately 1.5 minutes and the average adult exposure concentrations of the powder was 1.61 mg/m³ and 0.21 mg/m³ for diapering. Woman used an average of 8 grams of Johnson's Baby Powder while men used an average of 13 grams.

More recently Gordon, et.al. published a study in 2014 that quantified the release of amphibole asbestos from a cosmetic talc product dispensed with a shaker (perforated) top and from the use of a talc product that contained a powder puff applicator. In their study using a container with a perforated top, a commercial talc powder product containing 0.1% anthophyllite asbestos by weight was applied to the neck, torso and the arms of the investigator in a bathroom size chamber at a rate of 0.37 grams over 1 minute. Results showed "*for the talc user, the average PCM fiber concentration*

in his breathing zone during application was 4.8 F/cc (3.1, 7.3, 3.9, and 4.9 F/cc). The asbestos to total fiber percentage as determined by TEM was 40% and the asbestos concentration in the breathing zone of the talc user during application was 1.9 F/cc. For the bystander the PCM fiber concentration was 1.35 F/cc (0.9 and 1.8 F/cc) and the TEM derived percentage of asbestos was 35%, which results in a bystander asbestos concentration of 0.5 F/cc.”

Also in Gordon’s study, a commercial talc powder product containing 0.05% anthophyllite asbestos was applied to the neck, torso and the arms of the investigator located in a bathroom size chamber. The investigator used a powder puff to apply talc powder at a rate of 6.25 grams over 1 minute. Results showed that, “for the talc user, the average PCM fiber concentration in his breathing zone during the 5 minute sampling period was 20 F/cc (23.6 and 16.5 F/cc). The asbestos to total fiber percentage as determined by TEM was 21%. Therefore, the asbestos concentrations in the breathing zone of the talcum powder user were 5 and 3.5 F/cc. The short term sample in the breathing zone of the applicator had a PCM value of 60 F/cc. Using the TEM-derived percentage of asbestos of 10%, the result for the short term sample was an asbestos concentration of 13 F/cc. For the bystander, the PCM fiber concentration was 11.7 F/cc (13.7 and 9.7 F/cc). Using the minimum TEM-derived percentage of asbestos of 36% results in a bystander asbestos concentration of 4.9 and 3.5 F/cc.”

The results from all of these studies show that the use of talcum powder products containing asbestos would cause significant exposures from airborne fibers and asbestos to either the person using the product, to bystanders, and to others using these types of talcum powder products.

The Talc in Residential Indoor Air is From Cosmetic Talc

Talc has not been shown to be present as a component of indoor residential air in any published scientific literature. According to The National Toxicology Program (NTP) Board of Scientific Counselors Report on Carcinogens and the International Association for Cancer Research (IARC), the source of talc in a residential indoor setting would be from products that contain talc such as products containing cosmetic talcum powder.

FDA Advises Consumers to Stop Using Certain Body Powders, Face Powders, Eye Shadows and Other Talc Powder Based Makeups

In March, June, September, and October of 2019, the FDA advised consumers to stop using certain talc based cosmetic products, including certain body powders, face powders, eye shadows and other talc powder based makeups because those products had tested positive for asbestos. Manufacturers had recalled certain lots of their talc based products including Johnson’s Baby Powder, Claire’s and Beauty Plus Global Inc. eyeshadow, blush compact powder, and contour makeup.

CONCLUSIONS

My opinions regarding Jennifer Chamberlain’s exposure to Avon talcum powder products are based

on the following: my review and evaluation of the information on the Avon talcum powder product talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Avon talcum powder products at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources (including analyses I collaborated on); the nature of Jennifer Chamberlain's exposure as described in her testimony represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Avon talcum powder products that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Avon talcum powder products sourced from Italy, North Carolina, California, Montana, Brazil, Vermont and Ontario, Canada.

My opinions regarding Jennifer Chamberlain's exposure to Cashmere Bouquet talc are based on the following: my review and evaluation of the information on the Cashmere Bouquet talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Cashmere Bouquet at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources (including analyses I collaborated on); the nature of Jennifer Chamberlain's exposure as described in her testimony represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Cashmere Bouquet talc that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Cashmere Bouquet talc sourced from Italy, North Carolina and Montana.

My opinions regarding Jennifer Chamberlain's exposure to Johnson and Johnson talc powder are based on the following: my review and evaluation of the information on the Johnson and Johnson' powder talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Johnson and Johnson powder at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources (including some Italian based talc analyses I collaborated on); the nature of Jennifer Chamberlain's exposure as described in her testimony represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Johnson and Johnson powder that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Johnson and Johnson powder sourced from Italy, Vermont and China.

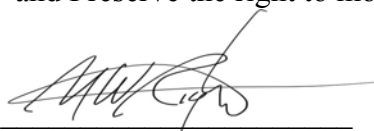
My opinions regarding Jennifer Chamberlain's exposure to Jean Nate' talc powder are based on the following: my review and evaluation of the information on the Jean Nate' powder talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Jean Nate' powder at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources; the nature of Jennifer Chamberlain's exposure as described in her testimony

represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Jean Nate' powder that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Jean Nate' powder sourced from Italy, Montana, North Carolina and Canada.

My opinions regarding Jennifer Chamberlain's exposure to Coty talc powder are based on the following: my review and evaluation of the information on the Coty powder talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Coty powder at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources; the nature of Jennifer Chamberlain's exposure as described in her testimony represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Coty powder that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Coty powder sourced from Italy, Alabama and Montana.

My opinions regarding Jennifer Chamberlain's exposure to Gold Bond powder are based on the following: my review and evaluation of the information on the Gold Bond powder talc sources during the relevant years of use; the geological literature on the sources of the talc supplying Gold Bond powder at the time; the testing of the talc ore, processed talc and finished products containing talc from the same sources; the nature of Jennifer Chamberlain's exposure as described in her testimony represented to me; and my education, experience and training. It is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had regular and repeated exposure to asbestos and talc from the Gold Bond powder that was on and around her during her lifetime. Additionally it is my opinion to a reasonable degree of scientific certainty that Jennifer Chamberlain would have had exposure to asbestos contained in Gold Bond powder sourced from Alabama and Montana.

All of the opinions expressed in this report are held within a reasonable degree of scientific certainty, and I reserve the right to modify this expert report if additional information becomes available



Mark W. Rigler, Ph.D.,
Principal Consulting Scientist

APPENDIX 1

REFERENCE DOCUMENTS

1. AHERA EPA - Part 763 Asbestos (TEM Section Only) (use TEM morphology, chemistry (EDS), crystallinity (SAED) and count all structures with substantially parallel sides measuring ≥ 0.5 microns long with 5:1 aspect ratio)
2. AMA Analytical Services Certificate of Analysis 300396 for FDA, Task 3 Analysis of Official Samples, CLIN 1 - 8 Samples, Claire's JoJo SIWA, 4-25-19; First Revision, 4-30-2019 (Chrysotile found in JBP, detection limit of 10 million asbestos fibers per gram per gram (asbestos fiber measuring $0.5 \times 0.04 \mu\text{m}$) – per FDA white paper 2021 appendix)
3. AMA Analytical Services Certificate of Analysis for Three D-58 Talc Powder Samples For the United States Food and Drug Administration (FDA) Office of Cosmetics and Colors Finds Chrysotile Asbestos 10/11/2019
4. Anderson - Commentary by Egilman and Steffan regarding Anderson's Assessment of Health Risk from Historical Use of Cosmetic Talcum Powder. New Solutions. 2018 Nov;28(3):400-409. doi: 10.1177/1048291118794166.
5. Anderson, et al, Assessment of Health Risk from Historical Use of Cosmetic Talcum Powder. Risk Anal. 2017 May;37(5):918-929. doi: 10.1111/risa.12664
6. Andrion, A et al., Malignant Peritoneal Mesothelioma In A 17 Year Old Boy. Evidence Of Previous Exposure To Chrysotile and Tremolite Asbestos. Human Pathology. Vol 25, 6 1994 (17 year old boy used talcum powder, excessively, millions of asbestos fibers found in his lung tissue)
7. Asbestos Analysis TEM Methods Comparison Table
8. Asbestos and Talc Fiber Exposure Tables 1960-2000s - Johnsons Baby Powder and Shower to Shower, Rigler 2021
9. Asbestos in Cosmetic Talc, SC Pennisi, Avon Products, April 1992 ("Avon talcs are asbestos free", we use the most advanced techniques, TEM, XRD... Avon tests one out of every 10 talc receipts now (see Reardon memo 10-5-89 and Reardon 1-15-91 discussing testing, asbestos free, and non-detectable asbestos)
10. Asbestos. Background Material. Major References from 1969, 1972, Summary Report of 15th Sedatives Panel Meeting, Undated; AV_PIPES-0001007-1012 (Describes earliest asbestos related disease cases, first asbestosis case in 1900, Carcinomas, mesothelioma, asbestos types and uses)
11. ASTM D5755 Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading (use TEM morphology, chemistry (EDS), crystallinity (SAED) and count all structures with substantially parallel sides measuring ≥ 0.5 microns long with 5:1 aspect ratio then report number of asbestos structures per unit of weight (i.e. fibers/gram))

12. ASTM D5756 Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Mass Surface Loading (use TEM morphology, chemistry (EDS), crystallinity (SAED) and count all structures with substantially parallel sides measuring ≥ 0.5 microns long with 5:1 aspect ratio then report weight % asbestos)
13. ASTM D6620-19 Standard Practice For Asbestos Detection Limit Based Counts (analyze 100 blank control filters to determine contamination detection limit probability)
14. ASTM D7712-11 - Standard Terminology for Sampling and Analysis of Asbestos (amphibole asbestos - orthorhombic anthophyllite series, monoclinic cummingtonite/grunerite series, tremolite actinolite series)
15. ATSDR Toxicological Profile for Asbestos. US Department of Health and Human Services, Public Health Services, Agency for Toxic Substances and Disease Registry. September 2001 (ambient worldwide asbestos levels range by PCM is $10e-4$ to $10e-8$ f/cc, Urban $10e-4$ by TEM and $10e-6$ by PCM, Rural $10e-5$ by TEM and $10e-6$ by PCM)
16. Avon - Frequency of Asbestosforms in Current Codes, Avon Products; AV_PIPES_0011785-AV_PIPES_0011788 (Avon talcs tested by McCrone and Dr. Ypma were, Italian (0747), Alabama (0755), North Carolina (0768), Montana (0815) talcs (all positive), Pfizer Talcs is alternate source 1972 (asbestiforms are found in most talcs)
17. Avon - Photo of Supreme 325 Talc Bags, Pasadena, 1962 (shows group of women, children, one man with a woman who appears to be leading the group at a plant facility with a large sign that says "in 1962 we processed over 700 thousand pounds of powders in this equipment" and there is a placard on the wall that says powder mixing room and numerous bags of supreme 325 talc in the same room with Avon 5218 plaintiffs exhibit sticker - In 1962 Supreme 325 was California talc, in 1970s it was Montana talc)
18. Avon Abstract (Draft) Determination of Asbestos in Talcs by IR & DTA, 9-25-1973 (Marked up version and description of the infrared IR and DTA methods For talc analysis used by the Avon lab signed by WL, Talc samples were spiked with tremolite and chrysotile as standards see Table I Minerals, found in cosmetic talcs in significant quantities 1-30% and table II DTA analysis of talc minerals)
19. Avon Alternate Source Evaluation, 0-0773-1 Talc #1621 (Italian), 1977-1998 (MSDS for Talc number 1621, talc imperial BC, code 0773 Supplied by Luzenac distributed by WC&D, includes all testing specifications and a long list of all products it used in cosmetics such as eyeshadow, aerosol talc, Day long powder, blush, Cheek gloss... various other tests including for ...Sierra Talc Mexico....Testing of code 0747 (Italian) Japan Naigai talc showed 1% fibrous tremolite per McCrone)
20. Avon Analytical Laboratory Requisition & Report, AJN No 22256, 6-28-1976 (Tremolite $>10\%$ amphiboles by IR...FDA requirement...table of 9 talcs tested... It was decided by J Travers and R Kaplan that talcs from Cyprus and the Alabama Talc would not be analysed)
21. Avon Analytical Laboratory Requisition & Report, FDA Compliance - asbestos content, Chrysotile content DTA and Tremolite by Infrared, 5-19-1976 (21 samples tested, 1 sample, #610, A.C. 0768 Supplied by WCND was found to possibly contain tremolite)

22. Avon Analytical Research Laboratory Requisition & Report for Job 17137, 4 talcs Approved for Avon Use, 1-16-1974 (Analyses of talc codes 0755, 0765, 0760, 0766... 0765 and 0755 shared considerable amount of tremolite >10%, code 0765 has been discontinued, code 0755 must be an old Singapore, since recent samples of code 0755 previously, showed no tremolite ... Code 0760 and 0766 showed no detectable tremolite (1.0% limit)
23. Avon Annual Report, 1962 (With an emphasis on research and quality capabilities)
24. Avon Basic Batch Formula for Candid aerosol product 1978-1982 (talc sources: Italy, NC, MT, substitutes Brazil, Spain)
25. Avon Basic Batch Formula for Skin So Soft product 1978-1982 (talc sources: Italy, NC, MT, substitutes Brazil, Spain)
26. Avon Basic Batch Formula for Sweet Honesty product 1978-1982 (talc sources: Italy, NC, MT, substitutes Brazil, Spain)
27. Avon Candid ingredients 1976 to 2001 (talc sources: Italy, NC, MT, substitutes China, Brazil, Spain)
28. Avon Cool Confidence ingredients 1990 (talc sources: Italy, NC, MT, substitutes Brazil, Spain)
29. Avon Cotillion ingredients 1965 to 1995 (talc sources: Italy, NC, MT, substitutes CA, AL, VT, Canada, China, Brazil, Spain)
30. Avon Cotillion_1965.02.01 0755 (AL/CA talc) with 0747 (Italian talc) substitution allowed 2-1-1965 (Talc source: CA, AL and Italian, J3 lab's Lee Poye and TEM Analysis Lab's Matk Bailey found anthophyllyte asbestos in Avon Cotillion talc samples)
31. Avon Email to S Pagoulatos, et al, from J Teal; Re Talc Memo, 4-12-2001 (As a reaction to media reports and public perception re asbestos in talc, Avon's Corporate position on body talcs was sent out to OBU leaders by Susan Kropf, "To minimise vulnerability to Avon's image and sales, we want to quickly move away from selling body talcs and switch to a body powder, a mixture of mica and cornstarch 15% 80%"... Switch to the new formula as soon as they work through their inventories (projected by 1Q 2002))
32. Avon Faraway ingredients 1994 to 2001 (talc sources: China (Osmanthus))
33. Avon Feeling Fresh ingredients 1990 (talc sources: MT, substitutes NC, MT, Brazil)
34. Avon Formula - By Batch, 2505 Cotillion Talc #56082, 11-20-1964, Pasadena Revision, 2-1-1965 (Uses 0755 talc Alabama, Sierra, with note on formula says "Italian talc, code 0747 may be used however talc code 0755 is preferred ")
35. Avon Formula - By Batch, 2512 Unforgettable Talc #56321-A, 6-1-65; 2593-1 Unforgettable #57094-C, 7-3-1967 (Unforgettable talc Uses 0755 (Alabama talc) in the formula in 1965, Uses 0766 regal 93 talc (NC) in 1967)
36. Avon Formulas - 1952-1961 Avon product formulas (talc sources: 0747 Italian talc) (Quantance Beauty Dust, To A Wild Rose Beauty Dust , Flowertime Talc, Cotillion Body

Powder, Baby Talc, Bright Night Body Powder/Beauty Dust, Nearness Body powder/Beauty Dust, Forever Spring Body powder/Beauty Dust, Elegante Beauty dust/Body powder, Topaz Powder Sachet, Topaz Talc)

37. Avon Formulas - 1963-1966 Avon product formulas (0755 AL, CA with 0747 Italian talc Substitute option)
38. Avon grades used in 1975 (talc sources: 0747 Italian, 0755 AL, CA, 0768 NC Regal, 0770 MT, 0773 (1621) Italian, 0780 AL, 0815 MT (Willow Crk) 6-29-1976
39. Avon Handwritten Memo re Asbestos in Talc - discussion with V Reardon, 1-15-1991 ("We don't claim our Talc is " asbestos free", we just say "non-detectable" by standard CTFA method J4.1 X-ray diffraction, Pros and cons of XRD and TEM discussed (Conflicts with Pennisi April 1992 now. TEM can get to 1 fiber/mg talc =1,000 f/g = 1 ppb asbestos)
40. Avon ingredient 4602 Canadian talc and 3 other talcs (0761 Desert, 0775 Talc 549, 0777 Sierra CA talcs) discontinued 1972.02.25 2-25-1972
41. Avon ingredient code 0747 Italian was Supra from January 1980 onward
42. Avon ingredient code 0747 was Talc 1615 Italian in Aug. 1977 to Jan. 1980
43. Avon ingredient code 0750 was Talco R 3.55 from Brazil in 1981
44. Avon ingredient code 0752 allowed Omya talc Cosmetic C-O from Vermont beginning in October 1982
45. Avon ingredient code 0752 was Olympic MT talc from Cyprus in 1976-1982
46. Avon Ingredient code 0755, 0815 Talcs American Talc Co 5-13-1975
47. Avon ingredient code 0768 was NC Talc 2450 from Aug. 1977 onward
48. Avon ingredient code 0815 was Montana TR-2 or Talc 4608 from Charles Mathieu subsidiary American Talc Company in 1971 to 1979
49. Avon ingredient code 0815 was MT ALTALC 200 from Dec. 1979 onward
50. Avon Ingredient Specifications, Code No. 0755 (listing Alabama or Sierra Talc), 6-26-1961 (0755 Alabama talc From Sierra talc company sold by Charles Matthieu)
51. Avon Ingredients Code 0747 Italian talc from 1961 to 2000
52. Avon ingredients Code 0749 Spanish talc from 1982 to 1990
53. Avon Ingredients Code 0750 Brazilian talc in 1981
54. Avon Ingredients Code 0762 Chinese talc Osmanthus from 1992 to 1998
55. Avon ingredients Code 0766 Regal 93 NC talc from 1967 to 1971
56. Avon ingredients Code 0768 is 2450 NC talc from 1971 to 1987

57. Avon ingredients Code 0790 is Windsor 66 Vermont talc 1970
58. Avon ingredients Code 0810 is Canadian 4602 talc from 1970 to 1971
59. Avon Laboratory Notebook 2224, W Luckewicz, 3-30-72 to 11-13-1973 (Asbestos (tremolite) in Talcs by IR status report, Talcs 0780 (AL/MT 141), 0761 (CA Sierra) Unforgettable talc, J&J Shower to Shower talc, and were each spiked with a small percentage of chrysotile asbestos and IR was performed on them)
60. Avon Laboratory Notebook 2447, W Luckewicz, 10-24-72 to 11-13-1973, AV_PIPES_0010868-10879. (0747 Italian talc showed chrysotile by DTA)
61. Avon Laboratory Notebook 2634, W Luckewicz, 5-21-73 to 12-16-1974 (Talc 0780 (AL/MT141) was spiked with from 1 to 7.5% tremolite and analysed by IR method developed by Avon in 1973)
62. Avon Letter to JJ Travers, Avon Products, from AF Alsobrook, Arthur D. Little; Re Proposal for a study of the talc industry, 9-25-1970 ((Avon) operates plants in California, Illinois and Canada at which talc products are prepared for use in the company's cosmetics and other toiletry items. Avon needed 25 year supply of cosmetic talc and was investigating sources, mines, mills and setting up more mills)
63. Avon Memo re Talcs from England, AJN22077, Rep 3412-35, Alabama Talc, Code 7550, 6-11-1975 (7 talcs analyzed by IR for Tremolite, one sample code 07550 Alabama talc showed small amount 0.5-1.0% tremolite, handwritten signed by WL)
64. Avon Memo to B Woods, from R Kaplan; Re DTA Acquisition Considerations for Control Laboratory Analyses of Talc, 4-13-1976 (Purchase a DTA instrument for the analysis of talc to be located in the Spring Dale or Morton Grove site... Reduce the amount of samples tested... A certificate of analysis would suffice under the certification program...)
65. Avon Memo to B.D. Crosby, from J.B. Rushton; Re Talc Use Levels, 7-3-1979 (Re Normal Use Levels of Respirable Cosmetic Talc; Preliminary Study by R.I. Aylott, G.A. Byrne, J.E. Middleton and M.E. Roberts of Inveresk Research which has just been published in the June issue of the International Journal of Cosmetic Science. Financed by CTPA and UK similar to another J&J financed study in the US (Aylott et al used Mg levels from cyclone to characterise talc in air, did PLM for talc particle sizing)
66. Avon Memo to CG Christie, from RA Arzapalo; Re Revised Specifications for Talc, 3-29-1972 (The asbestos-free requirement has not been added, as of now, to the testing (Control) specifications)
67. Avon Memo to CG Christie, from RA Arzapalo; Re Visit to Whittaker, Clark & Daniels on Talc Specifications, 7-10-1972 (WC&D is approved vendor for five Talcs (Codes 0761 Sierra, 0768 NC, 0770 MT, 0773 Suprafino Italy and 0780 AL(then MT))....WC&D Doesn't regularly analyze for asbestos.... a "form of certification" is issued for each type that is shipped)
68. Avon Memo to CP Randa, et al, from SN Zia; Re Talcs, 2-25-1972 (Re 4 talcs that must be replaced, Desert talc 507 code 0761, talc 0549 code 0775, Sierra talc 0777, Canadian 4602 code 0810 then, a group of 11 authorized talcs is shown. replacement codes: W. S. By 0765,

then use 0747, 0755, 0760, regal 93 = 0766, 2450 = 0768, #399 = 0770, 1621 = 0773, 141 = 0780, use 0790, Northern = 0815)

69. Avon Memo to CS Rowland, from EG Shay and JJ Travers; Re Talc Status Report, 12-19-1972 (Talc beneficiation, current sources, "is the removal of tremolite traces possible or practical? Charles Mathieu (American title company) feel it would be economically unfeasible to try to eliminate the last of 1% of tremolite...also, Avon studied starch substitutes in 1972)
70. Avon Memo to CS Rowland, from HY Saad; Re George Gera's Talc Report, 10-28-1971 (investigation of talc sources for Avon... WS talc is code 0765 supplied by Charles B Crystal... Product development pursuing the replacement of talc #399, code 0770 used in all our powder packs and eyeshadows... Approving talc #141, code 0780 for use in aerosol talcs... Saad to Gera memo re preferable to use other talcs instead of Italian... Seriously consider the use of Windsor talc 0790 in all our talc beauty dusts... Saad to Gera memo re if Windsor is approved, drop United Sierra talc)
71. Avon Memo to CS Rowland, from HY Saad; Re Talc - Supply and Asbestos Situation, 12-3-1971 (Summary table of the Avon talcs analyzed by x-ray diffraction: code 0747 (Italian), 0755 (Alabama), 0777 (Sierra), 0790 (Windsor), 0810 (Canadian), 0815 (Montana), 0768 (North Carolina), 0760 (Lo-Micron), 0761 (Desert 507), 0780 (Talc 141), and United Sierra (Cyprus) California floated. This report is based on Dr. Ypma's two analysis of December, 1970 (E-1) and November, 1971 (E-2), and United Sierra, December, 1970 (U.S.)-AL talc showed 1% tremolite, Sierra talc 4-10% tremolite, Canadian 6-8% tremolite)
72. Avon Memo to CS Rowland, from JJ Travers; Re Avon Action - Asbestos in Talc - Dr Lewin's Report and FDA, 11-9-1972 (Avon's list of items to do in the event Dr Lewin's report is published and FDA publishes proposed regulations for talc asbestos levels i.e. Modify the definition of fibre, disregard tremolite asbestiform minerals, assemble expert panel, do nothing or release statements regarding Avon eliminating talcs with a significant level of asbestoforms, Develop substitute product to minimise or eliminate inspiration of particles, etc)
73. Avon Memo to CS Rowland, from Y Gressel; Re Review of Potential Hazards of Aerosol Talcs, 3-23-1972 (Also, Van Ordstrand (II) believes that tremolite is the main agent responsible for the lung tissue damage seen in pneumoconiosis. 4 distinct talc hazards, aspiration in children, industrial exposure, benign and malignant tumors from chronic exposure)
74. Avon Memo to Dr JJ O'Neill, from RS Wilsher; Re Report on Talc Meeting with Professor Ypma, 10-12-1971 (Asbestos may be found in any given talc deposit, Ypma was Columbia U professor and Dr Travers of Avon was there)
75. Avon Memo to EF Milardo, from CP Randa; Re Talc, RI, 6-29-76; Avon Memo to CP Randa, from JJ Kamrowski; Re Raw Talc Information, 6-29-1976 (2 memos here.... 1976 talc suppliers were WCD, Mathieu, Cyprus....replace Alabama talc code 0755 with Olympic talc code 0752 and is the prime alternative for the current blend of 50% code 0747 Italian and 50% either code 0815 Northern talc or code 0768 talc #2450 (NC).

76. Avon Memo to GA Sprott, from JJ Travers; Re Asbestos and Talc, 10-4-1971 (Codes 0755, 0761, 0768 and 0810 contain trace tremolite (<1 – 12%), FDA and issues with the perception of asbestos in Talc and steps that Avon needs to take. see also Swigert memo dated 3-14-72 stop using Sierra CA 0761 and Canada 0810 talc)
77. Avon Memo to GA Sprott, from JJ Travers; Re Long Range Plans for a Source of Good Talc, 6-19-1972 ("We have only one good domestic talc available to us, namely North Carolina 2450, our code 0768"... "by marginal is meant that the talc cannot be used alone, but can be used in blends with either Italian (0747) or North Carolina 2450")
78. Avon Memo to GA Sprott, from JJ Travers; Re Talc - Colorado School of Mines Research Institute Visit, 6-5-1972 (The purpose of the visit was to ascertain the magnitude (time and cost) of a program a) to find a suitable talc and b) to develop processes to process it into a high quality product, "The elimination of talc from some sources due to asbestiform minerals content". CSMRI have been conducting a program during the past two years with the same goal as ours, for a competitor (most probably Johnson and Johnson, the only company included in their list of sponsors which could be considered a competitor)
79. Avon Memo to J Travers, from RW Holmes; Re Talc-Asbestos Situation in the UK, 3-22-1973; Talc Project Report, JB Rushton, March 1973 (Talc Project Report attached with Avon talc results and evaluations of asbestos in Talc, Italian, Chinese, French talc, Also evaluation of OM PLM, TEM, XRD, SEM, IR, TGA, DTA, HLS methods)
80. Avon Memo to JB Ward, from JJ Travers; Re Talc Analysis - 0765, 1-3-1972 (Re Talc 0755 (Alabama) is very poor, 20 - 25% tremolite, do not use)
81. Avon Memo to M Dickens, from V Reardon; Re Proposition 65 Team - Asbestos Analysis of Talcs, 4-1-1991; McCrone Project MA60416 (Avon talc as tested by TEM by McCrone, 0747 Italian Cyprus and 0752 Olympic Cyprus test meet federal exposure requirements of 0.1% asbestos limit includes bench sheets. Recall that McCrone SOP required at least 10 asbestos structures to trigger quantification by TEM in 1991, Det lim =0.0006 wt%, count 20 GS, sample 0.110 mg)
82. Avon Memo to RA Arzapalo, from W Luckewicz; Re Asbestos (Tremolite) in Talcs by IR - Status Report, 8-8-1973 ("asbestos is the general term used for the fibrous varieties of a number of different silicate minerals"... Positive identification can only be carried out by... Polarizing light microscopy PLM and XRD. 0761 Sierra CA, 0768 NCand 0810 Canadian talcs contained tremolite see Avon Lab Notebook 2224 3-30-1972 - 11-13-1973)
83. Avon Memo to RM Casciano, from CG Christie; Re CTFA Talc Subcommittee Meeting, 9-17-1974 (DTA XRD should be used for screening talc for asbestos, however there are numerous pitfalls and limits of detection... TEM SAED is needed.
84. Avon Memo to RM Casciano, from Y Gressel; Re Asbestos and Talc, 12-10-1971 (Weisler of FDA re meeting in 1971 with 40 Scientists regarding investigating asbestos in talc. Cralley of NIOSH presented his 1971 paper results - 22 cosmetic talcs contained fibers, mostly talc but some asbestos. Lewin consulting for WCD said use XRD. A table of analytical methods was provided by Rolle of J&J: OM, SEM, TEM, XRD with detection limits)

85. Avon Memo to S Pennisi, from T Eagle; Re Steatite and cosmetic talc, 12-16-1987; Talc, Kirk Othmer Encyclopedia (Describes Talc from the encyclopedia, "minerals commonly associated with talc; tremolite... Serpentine... Anthophillyte". Vermont Talcs found near Ludlow, Chester and Windsor occur in relatively impure form... California Talcs occur in and around death Valley and vary widely from very pure to tremolitic. The presence of tremolite has adversely affected... New York and California Talcs because of the controversy surrounding tremolite and asbestos as a health hazard)
86. Avon Memo to V Reardon and T Gill, from J Teal; Re Revision of Fibrous Amphibole Testing, 10-5-1989 (Regarding testing 1 in 10 talc samples... Dangerous liability position... Jeopardize the safety of our consumers... Cost is insignificant to do this testing... certificates of analysis would put Avon in "dangerous liability" (instead of testing 1 in 10 samples)
87. Avon Memo to W.J. Swigert, et al, from E.F. Milardo; Re STOP USING Talcs #0777 (Sierra CA), #0761 (Desert 507), #0810 (Canadian), #0765 (W.S.), 3-14-1972
88. Avon Memo to WR Chaney, et al, from RC Reardon; Re Avon Screening of Talc, 3-9-1976 ("Over the last three years Avon has analyzed 455 samples of talc representing every shipment for our use as well as every sample for R&D evaluation...)
89. Avon Memo to WR Chaney, from CS Rowland; Re Hazards of Aerosol Talc, 3-28-1972 ("As you know, we are working to free our products from any evidence of asbestos minerals" includes an analysis results Table Of Mineral Analysis Currently Used Talcs including 0747 Italian, 0755 Alabama, 0760 North Carolina, 0766 regal, 0768 North Carolina, 0770 Talc #399, 0780 talc 141 alpine, 0790 Windsor, 0815 Montana, 0761 desert 507, 0765 talc WS, 0777 sierra cascade 200, 0810 Canadian. Tremolite found in AL, NC, Canadian, CA Sierra and Desert talcs and most appeared to be industrial grade talcs)
90. Avon Memo to WR Chaney, from CS Rowland; Re Tremolite in Talc Program, 3-14-1972 (Re 4 Talcs (3 CA, 1 CAN)) contain tremolite over 1% and include 0777 Sierra, 0810 Canadian, 0761 desert 507, 0765 talc WS. see also memo to CP Randa 2-25-72 re talc replacement codes)
91. Avon Night Magic ingredients 1986-1989 (94-95% MT Olympic talc, blended with alternate talcs blend #2 (0768&0815 50-50) or Talc 3300, or talc blend #1 (0747&0815 50-50) or Brazilian or Spanish talc)
92. Avon Occur ingredients 1967 to 1995 (1967-1969 85% Regal 93 or 2450 NC talc then in 1970-1976 blends of 50-50 (0747 (Italian) or 0768 (2450 NC) and 0815 (MT Northern) or 0810 (Canadian)) then variations of these blends to include Brazilian and Spanish talc up to 1995 and similar blends in other Avon talcs including: Topaz, Where's My Heart, Cotillion, Rapture, To A Wild Rose, Unforgettable, Hawaiian White Ginger
93. Avon Products Basic Batch Formula and Processing Standard for 2-2401-1 Skin-So-Soft #58854-A, 12-1-1970 50-50 mix of 0747/0768 (Italian TGA or NC 2450) and 0815/0810 (Northern MT or Canadian)
94. Avon Products Ingredient Specifications for Code 0755-1, Alabama or Sierra Talc, 5-27-1971 API 0020332-1 (0755 Alabama talc from Sierra Talc company sold by Charles

Matthieu)

95. Avon Products Ingredient Specifications for Code No 0755-1, 9-18-1970 API 0020332-1 (0755 is Alabama talc from Sierra talc company sold by Charles Matthieu)
96. Avon Products, Inc's Supplemental Objections and Responses to Plaintiffs' Second Interrogatories to Avon, Pipes v Johnson & Johnson, et al, Oklahoma, 11-15-2018 (describes Avon codes shipped in the United States from 1979 to 1987 as Altalc 200 (Olympic MT talc code 0752), Supra talc (Italian talc code 0747), Suprafino talc (low micron Italian talc code 0773 and Altalc 400 (AL talc 141 code 0780). Also code 0758 is Italian talc ethylene oxide treated...)
97. Avon Raw Ingredient Codes December 7, 2021 deposition exhibit (Table 0747 Italian, 0749 Spanish, 0750 Brazil, 0752 Olympic MT, 0755 AL or CA, 0766=0768 Regal NC, 0810 Canadian, 0815 MT=TR-2= Altac 200)
98. Avon Raw Ingredient Specification and Methods revision Request, Fibrous Amphibole testing of talcs, 9-19-1989 (for codes 0747, 0752, 0755, 0773, 0780, 3945... Control lab recommendation: "eliminate or reduce the frequency of fibrous amphibole testing" specification is 1 in 10 tested... We currently perform tremolite test by IR... Vendors are willing to send certificates of analysis...) AV_PIPES_0008453
99. Avon Raw Material Analytical Reports for Brazilian Talc, Code 0750, 12-11-78 to 9-21-79; Memo to AG Rich, from L Banevicius; Re Operation Independence, 5-14-1980 (Multiple Reports for Magnesita Brazilian talc sample 0750 slight tremolite indication, Magnesita Brazilian talc sample 0750 tremolite positive, ...Talco Alvo, Talco Pluma Especial, numerous samples by CTFA J4-1)
100. Avon raw talc information (how much of each code was used) June 29, 1976
101. Avon re Declaration of Gary M. Marsh, Ph.D., FACE, In Support of Defendant Avon Products, Inc.'s Motion for Summary Judgment Or, in the Alternative, Motion for Summary Adjudication, Mae K. Moore v J&J 10-8-2021 (retired professor of bio statistics and epidemiology Univ of Pitt, mainly reports that in mine/miller cohorts over 30+ years, no increase in the mesotheliomas but these are not long-term users of fine talc in small spaces. There are three categories of commercial talc: pharmaceutical >99%, cosmetic 90–99%, industrial 75–95% (Drechsel et al., 2018; Hildick-Smith, 1976; IARC, 2010)
102. Avon re Email to M Lam, Avon, from S Grexa, Cosmetic Specialties; Re Talc Codes, 6-1-2009 (Use the MVA lab in Georgia, Jim Millette for asbestos in talc analysis)
103. Avon re Letter to CL Goldman, Avon, from Dr PS Elias, Dept of Health and Social Security, UK; Re Work done using XRD for asbestos analysis in talc to 1%, 8-24-1971
104. Avon re Letter to James Donovan, OSHA Compliance Office, from JJ Travers, Avon Products; Re Response to your questions regarding Avon talcs, 9-21-1976 (Cyprus was providing Olympic MT talc to Avon and testing it using a 10:1 AR ratio for asbestos (in 1983)
105. Avon re Letter to N Estrin, CTFA, from JJ Travers, Avon; Re Analyses of all lots tested over last three years, 3-12-1976 (Re Release of all data to the FDA regarding the results of

- Avon's talc testing over the past three years (1970 to 1973)...250 samples tested by XRD for chrysotile by McCrone, data for chrysotile & IR for tremolite by Avon, all 250 negative by these methods)
106. Avon re Letter to T Kumar, Avon, from RJ Zazenski, Luzenac America; Re Luzenac America Asbestos Certification, 10-3-2000; Cyprus Industrial Minerals Letter to Customers Re: Cyprus Talc Products and Asbestos Regulations, 2/3/87; AV_STD_006030; AV_STD_006037-6038. (Supra H and imperial 1886LBC talc do not contain "detectable" quantities of asbestos or asbestiform minerals XRD, PLM, SEM/EDX or TEM/SAED) October 2000, Cyprus used 10:1 aspect AR for asbestos fibers/bundles)
 107. Avon re Letter to W Luckewicz of Avon, from RJ Hinch, McCrone; Re Analysis of Avon Talc Samples 13A and 13B, 12-18-1987 (Luckewicz is Avon chemist, CTFA J4-1 analysis XRD PLM, report marked up by hand with XRD asbestos detection limit 0.5%, TEM 0.003% \$500 per sample)
 108. Avon re Plaintiff's Fourth Amended Notice of Videotaped Deposition of Defendant Avon Products, Inc. and Request for Production of Documents, Moore v J&J 10-22-2011 (Production of formulas, docs, for Avon products)
 109. Avon Skin So Soft formulas (updated with source mines) (Table) (mine sources includes Regal & Hitchcock NC, Fontane Italy, Willow creek and Beaverhead MT, Henderson Madoc Canada, Brazil and Spain)
 110. Avon Skin So Soft ingredients 1970 to 1996
 111. Avon skin so soft ingredients Ex 02_Skin So Soft 12-1970 to 1-1972
 112. Avon skin so soft ingredients Ex 03_Skin So Soft 1-1972 to 3-1976
 113. Avon skin so soft ingredients Ex 04_Skin So Soft 3-1976 to 8-1978
 114. Avon skin so soft ingredients Ex 05_Skin So Soft 8-1978 to 7-1981
 115. Avon skin so soft ingredients Ex 06_Skin So Soft 7-28-1981
 116. Avon skin so soft ingredients Ex 07_Avon Code 0747 1961-1982 (1961-1980 Italian talc (and 1615 talc) from Mathieu, then 1980-1982 Italian Supra talc from Cyprus Ind Min)
 117. Avon Skin So Soft talc formulas December 7, 2021 deposition exhibit (Table)
 118. Avon Source mines in the raw ingredient codes (Skin So Soft 1967-1982) (Table)
 119. Avon Statement of Corporate Responsibility, 3-14-2018 (protect the safety of Avon consumers)
 120. Avon Sweet Honesty ingredients 1974 to 1999
 121. Avon Talc Chart summarizing Avon product information (Sweet Honesty, Skin So Soft, Candid)

122. Avon Talc Code 0755 1961.06.26 (Code 0755 talc is AL or Sierra) 6-26-1961
123. Avon Talc code 0755 1970.09.18 Code 0755 talc is AL or Sierra 9-18-1970
124. Avon Talc code 0755 1971.05.27 (Code 0755 talc is AL or Sierra) 5-27-1971
125. Avon talc Code 0815 from American Talc Co and WC&D Ex 23_1972.07.17 7-17-1972
126. Avon talc codes 0768 WC&D 2450 Ex 14_Avon Code 0768 1971-1982
127. Avon talc codes 0810, Mathiew Canadian 4602 Ex 15_Avon Code 0810 1970-1971
128. Avon Talc Codes Ex 16_1976.06.29 Avon raw talc information 6-29-1976
129. Avon talc codes in 1976 WC&D, Matthieu, Cyprus Ex 25_Avon on 6-29-1976 re grades used in 1976
130. Avon Talc Ex 01_Sweet Honesty batch formulas 1978-1982 3-14-1974
131. Avon Talc Ex 02_Skin So Soft batch formulas 1978-1982 12-1-1970
132. Avon Talc Ex 03_Candid batch formulas 1978-1982 7-24-1981
133. Avon Talc Ex 04_Candid AEROSOL batch formulas 7-24-1981
134. Avon talc Omya Olympic specs 0752 Ex 10_Avon Code 0752 1976-1982
135. Avon Talc Sources AL Ex 15_Avon 0815 is ALTALC 200 in 12-1979 to 1982. 12-3-1979
136. Avon Talc Sources MT Ex 14_Avon 0815 is 4608 (Montana TR-2) from Mathieu from 1971 to 1979
137. Avon Talc Sources NC Ex 11_Avon 0768 is NC Talc 2450 from 1977 to 1982
138. Avon Talc Sources NC Ex 12_Avon docs stating 2450 is from NC 12-14-972
139. Avon Talc Sources NC Ex 13_WC&D depo (stating 2450 is from NC) 3-2-2021
140. Avon Talc Sources Brazil Ex 07_Avon 0750 is Brazilian talc in 1981-1982
141. Avon Talc Sources Italy Ex 05_Avon 0747 is 1615 Italian talc from 1977-1980
142. Avon Talc Sources Italy Ex 06_Avon 0747 is Supra Italian talc in 1980-1982
143. Avon Talc Sources Italy, MT, Korea Ex 10_Cyprus cosmetic talc list
144. Avon talc sources MT 0815 talc from Mathieu TR-2 4608 Ex 20_Avon Code 0815 1970-1982
145. Avon Talc Sources MT Ex 08_Avon 0752 is Olympic MT talc in 1976 to 1982
146. Avon Talc Sources MT Ex 09_Avon 0752 is Olympic MT or Omya (VT) talc in late 1982.

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147. Avon talc sources NC, Regal 93 Ex 12_Avon Code 0766 1967-1971
148. Avon talc sources, products, ingredients Ex 01_Lisa Gallo Affidavit (in Lebrecht) 2-13-2019 sources include Italy, MT, NC
149. Avon talc test spec includes APAM 8.600-infra red IR test for asbestos
150. Avon talc WC&D to Avon 1978-1982 Ex 28_
151. Avon Talc, 12-14-00; Talc in Avon Products, 12-20-2000 Toxicological history of talc (American Cancer Society in other medical societies recommend adults use cornstarch versus talc to reduce risk of ovarian cancer... Avon history of talc & PR issues surrounding asbestos in talc... a marked up document and a revised draft Q&A talking points document re talc in Avon products, "Avon vigorously double checked all talc and no talc is sold if even a trace of asbestos fibre is detected", fibre is crossed through safety measures for consumers is also crossed through)
152. Avon talc, Summary of WCD to Avon 1977-1982
153. Avon talc, WC&D sales to Avon 1975-1979 Ex 27_
154. Avon talc, WC&D sales to Avon in 1978 by bags (Ex 27A)
155. Avon talc, WCD sales to Avon 1975-2004
156. Avon Talcs, Codes, Names & Suppliers; AV_PIPES-0086378-86379 6-11-1975 (ALSO INCLUDES USES Codes include 0747 Italian, 0755 Alabama, 0760 talc, 0761, talc/desert talc 507, 0765 talc WPS, 0766 regal NC talc #93, 0768 NC talc 2450, 0770 Talc #399, 0773 Talc #162/(low micron Italian), 0775 Talc 549, 0777 (see page 3), 0780 Talc #141, 0790 talc (Vermont grade 66))
157. Avon Teletype on Code on 0815 MT talc (Sierra CA talc had been found to contain tremolite) 7-17-1972
158. Avon Teletype to LJ Richards, from LB Copeland; Re Talc - Can use Sierra talc , not Alabama 0755 10-8-1971
159. Avon Teletype to WH Adam, et al, from SN Zia; Re Talcs, RI Codes 0761, 0777, 0810 rejected, 1-11-1972 ("Effective immediately the subject codes are deleted from all formulas, use existing stocks to depletion")
160. Avon Timeless ingredients 1974 to 1999 (blends of Italian and NC talc and or MT, talc or 95% 0752 Olympic MT talc and later, MT talc could be replaced with Brazilian and or Spanish talc)
161. Avon Topaze ingredients 1961-1981 (1960s 0747 Italian talc or Regal 93 NC talc then in 1970s 2450 NC or #66 VT talc, or 50-50 0747 Italian and Northern MT talc or 50-50 0747 Italian 0768 2450 NC and 0815 Northern MT or 0810 Canadian talc, or 95% Olympic MT talc or 2450 NC talc then in 1980s blends of 2450 NC and Northern MT talc or replace 0752

- Olympic MT with 95% 2450 NC or 95% Brazilian or 95% Spanish talc
162. Avon Unforgettable 1965.06.01 0755 AL talc with 0747 Italian talc substitution allowed 6-1-1965
 163. Avon uses Vertal CO talc 5-26-1993
 164. Avon, AV PIPES, similarities Between Formulas Used in Products (Sharon) Pipes Allegedly Used. With yellow exh tag 12-7-2018 (Table, 1967 to 1989, product codes for North Carolina, Italian, northern, Canadian, Montana, Olympic, Brazilian, talcs and products they were used in)
 165. Battelle Report to J&J (excerpts) re CA, VT sources have fibrous talc 2-29-1956
 166. Battelle Report to J&J re Italian #1 and #2 talc, Tremolite found 5-9-1958
 167. Battelle Report to J&J re Italian Talc Flotation - Tremolite found in Italian #2 talc 7-31-1959
 168. Battelle Report to J&J re Italian Talc Flotation 1-31-1960 - Tremolite found in Italian #2 talc floats
 169. Battelle Report to J&J re Italian Talc has Tremolite 10-15-1957 Italian talc properties, 10%fibrous particles
 170. Battelle Report to J&J re Italian Talc Pilot Benefication Report 3-08-1960 tremolite found in J&J Italian #2 talc
 171. Battelle Report to J&J re Talc Benefication, Tremolite in Montana and Italian talc 1-24-1958
 172. Battelle Report to J&J re Talcs from Italy, MT, NV 5-23-1958
 173. Battelle Report with letter to J&J re Italian Talc Pilot Benefication Report 3-28-1960 tremolite found in J&J shelf product & #2 Italian talc
 174. Baur X, etal, Asbestos, asbestosis, and cancer: The Helsinki criteria for diagnosis and attribution. Critical need for revision of the 2014 update. Am J Ind Med. 2017;60:411–421.
 175. Baur, X, etal. Malignant mesothelioma: ongoing controversies about its etiology in females. Am J Ind Med. 2021: 1-5.
 176. Biaxial minerals optical properties including birefringence
http://webmineral.com/determin/biaxial_minerals.shtml#SpcBr3af3 (table of specifications for biaxial Minerals)
 177. Bird, T, etal, A Review of the Talc Industry's Influence on Federal Regulation and Scientific Standards for Asbestos in Talc. NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy 2021, Vol. 31(2) 152 169
 178. Blount 1991 paper and typed sample list and letter to Luzenac's Dr Refregie and JNJNL61_000095945 Newark Museum CIH says all talc contains asbestos

179. Blount AM, Amphibole Content of Cosmetic and Pharmaceutical Talcs, Environmental Health Perspectives 1991
180. Blount AM, Detection and Qualification of Asbestos and Other Trace Minerals in Powdered Industrial Mineral Samples. In Process Mineralogy IX: Applications to Mineral Beneficiation, Metallurgy, Gold, Diamonds Ceramics, environment and health 1990 (HLS method for asbestos detection in talc...Windsor J&J JBP VT talc sample was sample I)
181. Body Powder: Myth or Reality? Alain Khaiat, Ph.D., V.P. R&D Asia Pacific JN61-00094976-95028 (talc properties, geology, uses, safety, exposure calculations, corn starch properties in talc)
182. Brazilian talc Hicks re J&J report investigation re chrysotile in Magnesita talc P1.0037
183. Brazilian talc Hicks re Magnesita Qualification as Global Talc Source powerpoint P1.0027
184. Brazilian talc Magnesita talc samples sent to RJ Lee.JPG
185. Brazilian talc Magnesita talc sterilization process powerpoint JNJTALC001076499
186. Brazilian Talc, Imerys email regarding urgent need for new South American talc supplier IMERYS095079
187. Bristol-Myers Squibb BMS Interrogatory Response re COTR acquisition and Jean Nate 3-8-2021
188. Burger, 1991 Article on global talc market (CYPRUS has 40% of world talc market with mines in MT (Yellowstone, Beaverhead), VT (Argonaut, Black Bear, Hamm,Hammondsville, Rainbow, Troy and including Vermont Talc and Windsor Minerals), AL (Alpine, Malaga Spain). PFIZER is largest talc producer in North America, had CA operation that closed in 1987 but operates out of Barretts MT (Treasure Chest mine plus 2-3 others). LUZENAC (Steetly Talc Inc. at one time) Steetly was formerly in Penhorwood Ont Canada Township. CANADA TALC in Madoc Ontario. BRAZIL has the largest talc mines in Brumado, Bahia
189. Burke, Michael Deposition excerpts, Colgate-Palmolive corporation, regarding Cashmere Bouquet talc sources, Montana, Italy, North Carolina 7-10-2018
190. Campbell of Bureau of Mines supports asbestos fiber counting not mass weight - Pfizer's Crosby memo to Norwood re notes from American Ceramic Society meeting 1979 5-7-1979
191. Campbell, et al., Bureau of Mines 1977 Silicates and Their Asbestiform Varieties Information Circular/8751 (5:1 Aspect ratio best for diffrentiating fibers and bundles from cleavage fragments, asbestiform describes commercial grades of bulk asbestos)
192. Caneer of Colorado School of Mines regarding mixed minerals in talc and tremolite 2-20-1973
193. Cashmere Tests (A) Pooley TEM on Coty and Cashmere Bouquet talcs 1-12-1976 (1% fibrous anthophillyte in Italian/MT Cashmere Bouquet and Coty Italian Airspun talc)

194. Cashmere Tests (B) Pooley TEM 3:1AR on Coty and Cashmere Bouquet 5-4-1976 (11% tremolite in Coty Airspun, 4% anthophillyte in Cashmere Bouquet talc)
195. Cashmere Tests (E) Dr. Longo Declaration on 91 MAS Cashmere Bouquet testing 6-23-2021 (Italian talc)
196. Cashmere Tests (F) Dr. Longo chart summarizing MAS Cashmere Bouquet results (Italian talc)
197. Chanel Talc Sources (A) 2021.09.15 Chanel responses to Interrogatories in Moore (excerpt) 9-15-2021 (Chanel bought 1615 Italian talc for bath powders in 1960-1990 from; WCD (1975-1990), Cyprus (1979-1990) and Luzenac (1989-1990))
198. Chanel Talc Sources (B) 1969.12.10 WC&D sales report 12-10-1969
199. Chanel Talc Sources (C) 1970.03.16 WC&D order for Chanel 3-16-1970
200. Chanel Talc Sources (E) 2021.08.02 Chanel responses to Requests for Admission 8-2-2021 (AGI is American ground Italian talc and from Val Chisone region in Italy as is Supra talc)
201. Chanel Talc Sources (F) 1997.12.12 Luzenac grades table by ore source (cosmetic Supra A-USP)
202. Chanel Talc Sources (G) Chanel raw material specifications 1982-1999 (Supra A Italian 0.5% asbestiform - asbestiform free specs)
203. Chanel Talc Sources (H) 2017.10.12 WC&D rep Dennis St. George (excerpt) 10-12-2017 (WCD sold 2.4 and 2.8 million pounds of 1615 Italian talc to Chanel from 1975-1982)
204. Chanel Talc Sources (I) Cyprus sales to Chanel 1979-1994 (sales of 1705 Supra talc (50:50 Italian:Australian))
205. Chanel Talc Sources (Wyatt) Chanel corp rep depo (excerpt) 3-6-2020 (1615 Italian talc was used by Chanel from 1970s-2000)
206. Chanel Talc Sources Master Batch Records (1974-2007) (bath and dusting powders with 1615 AGI Italian and Supra talc)
207. Chanel Tests (C) Dr. Longo Declaration on MAS Chanel tests 8-10-2020 (42 Chanel talcs tested, 36 were Chanel No. 5 body powder spanning 1930s to 2010s sourced from Italy, Australia, China. 18/20 (90%) Italian or Italian/Australian Chanel talcs were positive for asbestos. 22/22 Chinese Chanel talcs were positive for asbestos.
208. Chanel Tests (D) Dr. Longo chart summarizing MAS Chanel test results 8-10-2020
209. Chanel WCD sales to Chanel 1976-2004
210. Chart Summarizing Jean Nate sales information
211. Chart summarizing some Avon talc and source documents (Sweet Honesty, Skin So Soft, Candid)