In the Matter Of:

VF OUTDOOR, LLC

vs

COCONA, INC.

DR. CHARLES A. DANIELS

December 07, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VF OUTDOOR, LLC, Petitioner, vs. COCONA, INC., Patent Owner.	)	CASE IPR2018-00190 PATENT 8,945,287

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THE DEPOSITION OF DR. CHARLES A. DANIELS
FRIDAY, DECEMBER 7, 2018

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The deposition of DR. CHARLES A. DANIELS, called by the Petitioner for examination, taken before me, the undersigned, Sarah R. Drown, a Registered Professional Reporter and Notary Public within and for the State of Ohio, taken at the offices of Cady Reporting Services, Inc., Western Reserve Building, 1469 West 9th Street, Suite 440, Cleveland, Ohio, commencing at 8:57 a.m., the day and date above set forth.

Job No. MP-200299

APPEARANCES:

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W I T N E S S I N D E X

E X H I B I T I N D E X

DR. CHARLES A. DANIELS

of lawful age, called by the Petitioner for examination, having been first duly sworn, as hereinafter certified, was examined and testified as follows:

EXAMINATION OF DR. CHARLES A. DANIELS

BY MR. GERGELY:

Q Good morning, sir.

A Good morning.

Q Please state your name.

A Dr. Charles Daniels.

Q What do you do for a living?

A Well, at the current time I have a small consulting business which is basically me. I do some consultation work on polymer materials and a portion of my time is spent on matters such as this as a testifying or technical expert in various cases.

Q How did Cocona find you for this case? Was it through a finder service?

A Yes, I believe it was.

Q Do you know which one?

A IMS.

Q Are your bills being routed through IMS, or were they paid a flat fee and you're now

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sending your bills to counsel?
A No, I'm paid by IMS.
Q You've given a deposition before?
A Yes.
Q So you know the ground rules?
A I do.
Q So just briefly, your counsel may be making some objections, but you have to answer subject to those objections, unless he instructs you not to answer, say on grounds of attorney-client privilege or a similar type of objection.
MR. GERGELY: I'm going mark exhibits using the witness' last name and then 1, 2, 3. Why don't we call this Daniels 1.
- - - - -
(Petitioner's Exhibit Daniels 1 was marked.)
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Q Sir, I've handed you what's been marked as Deposition Exhibit Number 1.
Is this your declaration that you submitted in this case?
A It is.
Q How was it prepared?
A It was a collaborative effort.

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Q Did you do the first draft or did counsel?
MR. SONG: Objection. Calls for privilege, work product.
MR. GERGELY: Well, I think the process isn't -- I'm just asking if he did the first draft.
MR. SONG: You're calling for specific information as to work product and attorney-client privilege communications.
MR. GERGELY: Well, I disagree. What's the privilege?
MR. SONG: You're asking him about how the document came together.
MR. GERGELY: Right.
MR. SONG: That's getting into substance.
MR. GERGELY: No, it's not.
MR. SONG: Because you're getting into component pieces of the document.
MR. GERGELY: No, I'm just asking as a matter of process who did the first draft.
MR. SONG: All right. I'll allow the witness to answer.
MR. GERGELY: I appreciate

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that.
A Well, actually, there weren't any drafts. I mean it was the subject of really a lot of conversations. So when we arrived at this, it was just a compilation of all of the various conversations that we had on the subject matter.
Q Right. But do you recall who actually typed the first draft? Was it you or was it counsel?
MR. SONG: Objection. That's going to call for privilege and work product.
MR. GERGELY: Are you instructing the witness not to answer?
MR. SONG: I'm instructing the witness not to answer.
Q Sir, is Mr. Song representing you today in this deposition?
A He is.
Q Sir, would you describe yourself as a polymer chemist?
A I think that's a fair description, yes.
Q Do you have any expertise with respect to the behavior of particles?
A Yes.

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Q What is that?
A Well, when I began my career way back when, I was actually the principal scientist for a characterization laboratory, which I had a specific role which was in particle size and surface area and kinds of analyses, developing methods to measure those.
Q What was the name of that lab?
A It was actually called at the time BFGoodrich Company and was in the chemical division of the BFGoodrich Company specifically broken into various parts. Tires and aerospace and chemicals.
Q You were measuring particle size?
A Yes. We had the challenge to develop methods to automate and get higher precision measurements of particle size of a variety of materials because they were utilized in compounds and actually in some cases were the result of production processes that we developed.
Q How would you measure particle size?
A Well, there are a number of ways. Today most methods are based on laser light scattering techniques, but there have been a number of

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methods that have been employed over the years, including devices that today are incorporated in measuring your blood cell counts.

Q So like a Coulter counter?

A Precisely.

Q So Coulter counters, those were available back, say, at the time of this invention at issue in this case, 2005?

A They were. They had actually started to become replaced by other let's say easier to utilize methods, but yes, a Coulter counter and what it morphed into was certainly available.

Q How about surface area of particles, how is that measured?

A Well, we had a catalyst group that predominantly used these methods. They were kind of next door us. They used gas adsorption methods. So it's based on a technique known as BET.

Q What does that mean?

A Well, it's name after three scientists, and I believe it's Brunauer, Emmett, Teller. And basically what you attempt to do is measure the amount of gas that's absorbed onto conditioned particles and from that be able to calculate

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the surface area of the materials.

Q How about pore volume, would you ever calculate pore volume?

A Yes. Our pore volume analyses in the laboratory in which I worked were predominantly done by an intrusion method called mercury porosimetry. And it's just what it sounds like.

You know, pressurized mercury and drive it into the pores of the substance that you're interested in. And from that you could calculate how much is taken up by the mass of materials that you were testing.

Q Any other metrics you would measure for particles?

A Well, you would look at porosity distribution, because not every particle is the same as every other, and particle size itself is really a measure of the distribution of particle sizes. So you would get a distribution of the sizes, the breadth of the sizes, whether there was one or two or more populations present. It got kind of intricate, depending upon what systems you were looking at.

Q So are you referring to, say, the micropores,

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the mesopores, and the macropores?

A Yeah. You were actually looking at the volume in between particles. If they were stacked together or compressed, you were looking at the pores between what we call primary particles. It became a science quite onto itself.

Q Sir, in your declaration on page 7, you list the materials that you reviewed --

A Yes.

Q -- in connection with your declaration, is that correct?

A That's correct.

Q Did you review any additional materials preparing for today's deposition?

A No. I think later in the document I cite a specific exhibit in this section in which we're talking about doing some experimental work. So I kind of left it there, it was a specific thing. But no, this captures all of the pertinent documents.

Q So you met with Mr. Song to prepare, though, for today, correct?

A Yes.

Q Did he show you any additional documents beyond what's on this list?

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A I don't believe --

MR. SONG: Objection.

THE WITNESS: Sorry.

MR. SONG: Calls for privilege, work product. I'll allow the witness to answer.

A No, I don't believe so.

MR. GERGELY: Yeah, I mean, technically it's not under the Federal Rules of Evidence. Documents shown to a witness are not privileged.

A No.

Q Okay. How about: Did you review any transcripts in the case?

A Well, the ones that are listed here. The transcripts of depositions --

Q Correct.

A -- for example?

Q There's been a couple depositions taken this week.

A Oh. No. No. No. I think the only one I reviewed in any detail was Dr. Albert's deposition. I don't believe any of the others are cited or I have seen or examined.

Q Do you know that there's another expert that's

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been retained by Cocona in this case named Mr. Calen [phonetic]?

A I've never met him and I don't know anything about it.

Q Okay. But have you heard that?

A Yesterday Mr. Song mentioned that there was another expert, but just in passing.

Q Okay. So you've never talked to him?

A No, I have not.

Q Have you talked to anyone at Cocona in this case, say Dr. Haggquist or Mr. Bowman?

A No.

Q Sir, I'd like to draw your attention to your declaration on page 13 at paragraph 39.

A Yes.

Q For about three and a half pages or so you provide a discussion of the differences between absorption and adsorption. Why did you do that?

A Well, I believe that Dr. Haggquist's '287 patent is based on technology that utilizes materials that adsorb and some of the patents cited as allegedly being talk about absorption. And distinction I believe is important in order to understand the science of one versus the

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science of the other.

Q Okay. I appreciate that.

MR. GERGELY: Just go off the record for a second.

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(Discussion held off the record.)

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BY MR. GERGELY:

Q Now, sir, in paragraph 39 you state, "These two processes produce different end points, mass changes, and degrees of reversibility."
Do you see that?

A I do.

Q What do you mean by "different end points"?

A Well, let's talk about adsorption first.

In an activated particle or one which can adsorb a material, they'll start at a point where there's zero or near zero utilization of the activated surface by materials for which this was designed to adsorb. So in the case we'll talk about moisture because it's the easiest one.

So you start out with a clean surface of a high surface area, pick a number. 3,000 square feet per gram in a room in a fairly nice

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sized home but in a gram of material. And it has pores and it has capacity. And when the process starts, you go from basically nothing on the surface in the way it adsorbs material to a surface which can eventually become I'll use the word saturated, although that can be confusing in the two processes.

But you use up all of the available surface area and potentially it may stop. Its surface area is consumed. But the material of interest, the adsorbing particle, doesn't undergo any other kind of chemical change, it doesn't swell to any noticeable degree. Anything that happens is the outside volume. The outside surface may get thicker microscopically, but that's it. It's still a solid and there's your end point.

In an absorbing material, the other side of the fence, you can start out with any physical form. It could be a film, it could be a powder, it could be a gel, it could be a pellet.

And let's talk about a hydrophilic material, one that loves water. What will happen with that is you get a moving front of

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the water passing through the solid particle and into the solid particle. And that solid particle starts to at a molecular scale relax. New volume is created within it because there's an interaction between what its absorbing in the molecules of the active substance, the substance of interest.

That may end up being totally dissolved. It may be like taking a few grams of sugar and putting it in warm water and stirring it around and the sugar absorbs the water, disperses in the water, and now it's gone to the naked eye.

So the endpoint is different. You've now created molecules that will move around a lot more freely. They're surrounded by the materials. And that's important, surrounded by the materials that they absorbed, and it's not a surface phenomenon.

It may be a long answer, but I hope the movie version of it is much more illuminating.

Q And then you also refer to "mass changes."
What do you mean by "mass changes"?

A Well, in an adsorbent particle, certainly when I put something on it, because the surface is active, the weight of the system may go up

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slightly, depending upon how much of that is absorbed.

When I absorb a liquid, and let's just say I get to the stage where it's swelling, maybe it's a cross length material of some hydrophilic nature, it's going to take not only volume from using water as an example, but that mass will be additive to the particle that it's absorbing into. So the sum of this new mass will be all of that stuff and a lot more water because a lot more can get in as it moves into the particle.

Q So for an adsorbing substance, how do you measure, say, how much water is adsorbed?

A Well, that's a challenging chemical measurement. You have to do it either by some measure of the surface area that's free prior to what's free after.

If you have a really, really good balance, you might be able to measure the mass change, but it's going to be relatively small compared to let's say the absorbent system, which is just going to increase in volume and increase in mass by a lot more.

Q Okay. But for both systems there is a mass change, correct?

A Yes. This is a magnitude of the mass change that is different.

Q Okay.

A By orders of magnitude.

Q And then "degrees of reversibility." What is that?

A Well, it is much simpler to take an adsorbent particle back to its native state, because the way I'm going to -- again using water as an example -- remove it, it might be heat, it might be vacuum, but it's just going to have to come off of the surface.

It doesn't have to in the case of the absorbent system come all of the way out of the middle, as well as the surface, as you remove the substance and try to get back to its original form.

And in many, many cases in the absorbent case you don't get back to -- if I started with a particle, I might end up with a lump or a film. If I remove the water and I still have the film, I don't get back to the original physical nature from which I may have started.

So, for example, when I leave my cup of coffee out and all of the coffee evaporates, which I hope no one ever does, you end up with this sort of crusty thing on the bottom of your coffee cup if you use sugar. It doesn't look like the original sugar physically.

Q You say, "Absorption is a process in which a fluid is dissolved by a liquid or a solid."

A You can also do it with a gas. You can also do it with a gas.

Q So the fluid is actually dissolving in absorption?

A In absorption -- well, it depends on which one you want to call the solute or the solvent. Let's talk about it in words a lot of sugar and a little bit of water.

If I put the water in there, then the water is being dissolved by the sugar. If I take a little bit of the sugar and I put it in the water, the water is the other way around.

But you end up with a solution in any case, which is homogeneous. The absorbed case is still heterogeneous because you can -- there's distinct areas that are let's say carbon, and distinct areas which are the absorbed moisture.

Q In your sugar water example, either the -- so the sugar has to be soluble, correct, in order to dissolve the water?

A The water has to be soluble or the sugar has to be soluble in the water.

Now, there are systems, some hydrophilic polymers in this case, where the complete solution process may not take place because they're crosslinked. Then they'll just simply swell.

Q Right. So there are hydrophilic polymers that are insoluble, correct?

A Yes. To the naked eye they are insoluble, right.

Q So how is that working?

A Well, in those cases what you have is a network. The network is in a solid state more or less collapsed. As the water enters, the network begins to expand and it imbibes then this water until such point as the molecules can't stretch out any farther and they've taken up all the fluid that they can.

Q That network, is that a 3D network?

A Yes.

Q So what's the surface of that 3D network?

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A The surface of the 3D network. I'm not sure what you mean by that.
Usually when you have a swollen hydrophilic polymer it looks like a gel, like a hair gel or a gelled deodorant or something of that sort. So the surface is really a reflection of the container it's in. It assumes the smooth.
Q Well, let me give you a specific example.
A Sure.
Q Like a Sephadex bead. What is the surface of a Sephadex individual bead?
A Well, it's the chemical itself. It's the chemical itself.
Q So both the exterior and the interior?
A Yes. When it starts out, it's probably fairly homogenous and the bead contains the chemistry of whatever the Sephadex composition is.
Q So water with respect to Sephadex is adhering both to the outside and the inside?
A Well, it will start on the outside and move to the inside and various chemical groups will reorient themselves in order to interact with the water.
Q You state, "Adsorption, on the other hand, is a process in which atoms, ions, or molecules from a substance (e.g., gas, liquid, or dissolved solid) adhere to a surface of the adsorbent."
Do you see that?
A Yes.
Q You go on to state, "Adsorption is a surface-based process wherein a film of adsorbate is created on the surface while absorption involves the entire volume of the absorbing substance."
A Yes.
Q What do you mean by "a film of adsorbate is created on the surface"?
A Well, again standing back from it, what you would see is a layer around the surface of the adsorbed particle, the adsorbent. We'll use water as the adsorbent because it can be an example. So the surface is enriched with these water molecules, which again standing back from it, look like it might be a film.
Q Okay. Say, for example, activated carbon, the water molecules will penetrate the perimeter of the particle as well, correct?
A They'll go into the pores because that's part of the surface. And an important part of the surface because it's not just the outer circumference, it has to take into account all of the ups and downs and ins and outs.
Q In activated carbon, how deep do those pores typically go into the particle?
A I've never measured that. So I don't know.
Q I mean are they -- you know, if an activated carbon were, say, 10 microns in diameter, is it fair to say that those cracks go down near to the middle?
MR. SONG: Objection. It calls for speculation.
A I honestly don't know. I've never made that kind of measurement.
Q Okay. Have you seen activated carbon particles depicted?
A Well, we've actually see them under the microscope. Yes.
Q You can see them?
A Yes.
Q Were you able to obtain a high resolution so you could actually see those pores beneath the surface of the material?
A We could see the pores but not -- if I took the particle and tipped it on end, we were unable to see them in terms of their penetration distance. So that's why I can't answer your question.
Q Sir, I'm handing you an exhibit that was marked in Dr. Haggquist's deposition. It was Haggquist 4.
MR. SONG: I'm going to object to the exhibit as to scope. It was not cited or referenced in the witness' direct testimony. The document was not identified in the deposition notice for Dr. Daniels. The document has not been authenticated. It lacks foundation.
Q Sir, this document was marked during Dr. Haggquist's deposition. I would like you to turn to the second page.
Do you see the image there depicting --
A Yes, I do.
Q -- a particle of activated carbon in cross section?
A Yes, I do.
Q Do you see the text that says "Large and small organic molecules" at the top?
MR. SONG: Objection. It's beyond the scope. The document was not

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cited or referenced in the witnesses' direct testimony. It is not identified in the deposition notice. It has not been sufficiently authenticated under 901, 902. Lacks foundation.

MR. GERGELY: Counsel, you can have a standing objection.

A I'm sorry. Where are you?

Q I was asking a question about the image. Do you see where it says "Large and small organic molecules" at the top?

A I do.

MR. SONG: Sorry, Mr. Gergely. So you'll stipulate to a standing objection as to those grounds previously stated?

MR. GERGELY: Yes. You don't have to keep repeating.

MR. SONG: I appreciate that.

Q Is this a fair depiction of an activated carbon pore?

A Well, honestly I don't know. I've never seen this document before. As I've said to you earlier, not having actually done a

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cross-sectional analysis of an activated carbon particle, I really have no basis for comparisons.

Q Okay. Have you in the course of your work as a person of ordinary skill in the art, have you seen scientific articles depicting activated carbon in this manner, with these deep pores?

MR. SONG: Objection, vague and ambiguous as to "scientific articles."

A I don't recall having seen anything that looked like this, no.

Q Okay. What have you seen in terms of what the activated carbon pores look like in scientific articles?

MR. SONG: Objection, vague and ambiguous as to "scientific articles."

A My recollection -- and I have not examined a lot of articles on cross-sectional measurements of activated carbon. My only recollection is what is in the first let's say top portion of it, the pores themselves. I've not seen any references that actually look like what's depicted here.

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Q When you're saying "pores themselves," you're referring to the text?

A The text?

Q Yeah. You said something about the pores on the top. What did you mean by "pores on the top"?

A Maybe it's easier to point to it. What I'm talking about is this just general area right in here.

The interior portion, again, is not something I'm familiar with, whether that's an accurate depiction.

MR. SONG: I'm sorry to interrupt. Peter, do you have a copy of that for me?

MR. GERGELY: I don't. I assumed that your counsel was sending you the exhibits.

Q So, just for the record, you were pointing to the image itself?

A I was pointing to the image itself in the top portion of the image and not anything much below that, because, as I said, I don't have a point of reference and I have not looked at this document before. So I'm not even certain,

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you know, where it came from or what it's intended to represent.

Q Regardless, you'll agree with me that in the case of activated carbon that's porous, the adsorbate is penetrating below the perimeter of the activated carbon?

A Yes. Yes.

MR. SONG: Objection, vague as to "perimeter."

Q Sir, is the perimeter the outer surface?

A Yeah. I think I used the word "circumference."

Q Okay. Let's use "circumference."

A Yes. So I believe my answer still stands. Yes, the particles, using perimeter as the measure or the indication of the sort of outside most -- outermost surface, certainly they will penetrate below it.

Q Okay. I appreciate that, sir. Thank you.

MR. SONG: I'm sorry. Did you mark that as D2?

MR. GERGELY: I marked it as Haggquist 4. So it's a deposition exhibit in Haggquist.

MR. SONG: So are you --

MR. GERGELY: But we should

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probably also mark it in this deposition, just to be --

MR. SONG: Clear?

MR. GERGELY: Yeah. I'm just trying to think how we're going to do this.

MR. SONG: I think we were at D2, if you wanted to continue that nomenclature.

MR. GERGELY: Yeah. Do you have any issue with attaching the original to Haggquist and then attaching a copy to Dr. Daniels' deposition?

MR. SONG: Attaching Dr. Haggquist's entire deposition to --

MR. GERGELY: No. No. No. No. No. This is Haggquist 4, which has an original sticker on it.

MR. SONG: Okay.

MR. GERGELY: We can put another sticker on it and attach a copy to his deposition.

MR. SONG: That's fine.

MR. GERGELY: Okay. I appreciate that.

MR. SONG: So that will

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just be number 2, then?

MR. GERGELY: Yes.

So we're going to put "Daniels 2" on this one.

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(Petitioner's Exhibit Daniels 2 was marked.)

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MR. GERGELY: Just for the record, we've marked Haggquist 4 also as Daniels 2. This is the document entitled "What is the Activated Carbon?"

We've agreed between counsel that we'll attach the original to Dr. Haggquist's deposition and a copy to Dr. Daniels'. I appreciate that.

MR. SONG: That's fine.

BY MR. GERGELY:

Q Sir, in paragraph 40 you state that "There is scientifically supportable evidence that, by definition, discriminates between processes that proceed by absorption versus adsorption. Adsorption is a process controlled by the surface activity and pore volume of the active substance."

Do you see that?

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A Yes.

Q And then you state that "The active substance has a defined limit of its adsorptive capacity."

You go on to state, "By contrast, an absorptive substance often has an infinite capacity for the substance absorbed."

Do you see that?

A Yes.

Q What do you mean by "infinite capacity"?

A Well, because of the absorptive substance -- I'm going to talk again in a case of something that isn't physically held together, a noncrosslinked version of an absorptive substance.

It will absorb as much of the fluid around it as exists, in the sense that at some point the molecules of that absorptive substance will essentially disperse their way throughout the fluid.

So if this fluid, for example, was half a liter or a liter -- half a liter and I put an absorptive substance in there, sugar, the molecules of sugar will be essentially small compared to the molecules of water in a half

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liter. So a very good approximation of that would be that there's an infinite amount of water compared to the small amount of sugar.

If I added more water and more water and more water, it's still a solution of sugar, it's just more and more and more and more dilute.

Q I see. But it's not an infinite capacity, there are some --

A How deep is the ocean, I guess? I don't mean to be coy. My point is that there is something in solution science which says infinite dilution, which means there is so much more of the solute, the liquid water in this case, compared to the solvent -- solute.

There's so much of the solvent, the water, compared to the solute, the sugar, that, for all intents and purposes, you can't even find the sugar.

Q When you started your answer, you actually carved out cross-linked materials.

A Right.

Q Why did you do that?

A Well, because in cross-linked materials there's this other restriction, which is the physical

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network. At some point, even though water can come in and go out because it's not static, it's dynamic, the amount of space between the cross-linked molecules is going to be determined by how heavily connected one molecule is to the other.

So if there's a tight network, it will only have this much capacity, a smaller capacity. If it has a loose network, it has a larger capacity. And then of course my extrapolation, if it has no network, it just simply disperses.

Q But in the case of Sephadex, for example, that's a cross-linked dextran, correct?

A Yes.

Q That does have a finite capacity for water?

A It would be an example of one that has a finite capacity.

Q And then you go on to state that "Its capacity is not controlled by its surface area or pore volume, but rather by the thermodynamics of the interaction of the polymer with the" adsorbed "and dissolved vapor or liquid."

What does that mean?

MR. SONG: Objection. I

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think you said "adsorbed" just now and I believe the word is "absorbed."

MR. GERGELY: Oh, yeah, yeah, yeah. Thanks for the correction.

Q I'm just reading the last sentence of paragraph 40.

MR. SONG: Not to be nitpicky.

Q To be clear, it says "absorbed" with a B.

So what did you mean by that last sentence?

A Okay. Every time a substance -- well take the cross-linked example that you've centered at.

Every liquid or vapor is not like every other in terms of how it interacts with, for example, Sephadex. If it likes water, then the interaction between the water and the polysaccharide that you're talking about is going to allow those molecules to relax more and more and more because there's more places for the water to interact with the molecules.

But let's say it's a substance that doesn't like it. So it may and probably does adsorb -- absorb, sorry, absorb less and then just stop, because each solvent in terms of its

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interaction with the polymer molecules would be different.

So a good solvent, lots of swelling; a poor solvent, hardly any; and an intermediary solvent, of some capacity somewhere in between.

Q Well, for example, in Sephadex -- do you know what the mechanism of action is in Sephadex, how that water enters the matrix of the pores?

A Well, if you take the Sephadex -- it depends on, again, whether it's on the water vapor or we're talking about liquid water. So you choose and I'll see if I can explain it to you.

Q How about water vapor?

A Okay. Well, the water vapor molecules are going to approach the Sephadex molecule and penetrate through the surface into the interior and will happen over and over and over again, until eventually the Sephadex becomes essentially what we would call saturated with the water. So it makes its way between molecules into the interior.

Certainly there's a physical phenomenon there at the very start, because it's a solid material at the beginning but it's going to be more occurring on the molecular level and

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interacting with the molecules of the Sephadex, not just the pores of the Sephadex.

Q How does the water, say an activated carbon, how does it interact with the pores?

A Well, because it's an active surface, there's usually some chemistry there which creates a polarity, an attractive electrical force, and then polar molecules, like water, would be easily attracted to the surface.

Q So, for example, would that be like a hydroxyl group in the activated carbon interacting with the water?

A A hydroxyl group, an oxygen of some chemical functionality could certainly do it.

Q Okay. Is that true for other active particles as well, say, for example, silica gel or zeolites?

A If they're activated and you're looking to use those in moisture absorption, I would certainly expect the surface to contain some polar molecules, such as an oxygen in some form or another, in some functional group or another that would allow a bond, predominantly I guess by hydrogen bonding. It's a logical way to do it and subtract the water.

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Q You mentioned hydrogen bonding in active particles. You called out activated carbon, silica gel, and zeolite.
Do you know how Sephadex works in terms of the water attaching to the matrix?
MR. SONG: I'll object.
The witness referred to activated silica gel and zeolites in his prior answer.
Q Sir, I had asked you about activated carbon, silica gel, and zeolites, and you postulated that all of those materials contain some sort of polarity in the pores and through hydrogen bonding or some other similar mechanism the water is attaching to those pores. Is that correct?
A That's what I said.
Q Okay. I'm asking you: Do you know how Sephadex works in terms of how -- what kind of bonding is occurring between the water vapor and the Matrix?
A Again, if Sephadex is in fact a polysaccharide-like molecule, it certainly does have functional groups which are both oxygen containing and OH containing. So certainly hydrogen bonding is one of the driving forces

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for the absorption of the fluid.
Q So the mechanism of action is the same but you characterize it with respect to Sephadex as absorption and not adsorption, is that correct?
A Well, the distinction is that while the activated species in an adsorbent process, that would happen at the surface in the pores and not the interior, in the Sephadex it would happen throughout the entirety of the material.
So there is a distinction in terms of how many and how much and where and as I said in an earlier section, the end result.
Q But Sephadex traps water, correct?
A I believe it's safer to say that Sephadex absorbs water.
Q Does it also trap it?
MR. SONG: Objection, asked and answered.
Q Well, for example, when Sephadex takes in water, you could put a bead of Sephadex on the table and it would retain the water within it, correct?
A It would -- again, depending upon how much Sephadex relative to the water. It will contain the water.

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Q Is that water being trapped in that matrix?
MR. SONG: Objection as to "trap." It's vague.
A I would say it is dissolved in rather than trapped in. It's not motionless.
Q Why do you say it's dissolved?
A Well, because that water molecule may actually be able to move around the various sites and places, because you have a more flexible molecule in there and it's a dynamic process.
In hydrogen bonding, for example, in a molecule the size of Sephadex is a dynamic process. It's not just click, click, click, click, click, click. They're all stuck in one stop. They change quite often because of the influx of additional water.
Q Now, sir, in paragraph 42 you state, "The processes of absorption and adsorption are fundamentally different." You say, "Absorption can be, in polymer systems, either endo or exothermic."
Do you see that?
A Yes.
Q What do you mean by that?
A Well, when you interact at the absorption stage

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of a polymer with a liquid, you can have a situation where either heat is absorbed or heat is released.
Q You say "Adsorption is always exothermic."
Do you see that?
A Yes. Heat is always released.
Q Okay. And then is desorption the opposite of adsorption?
A Yes.
Q And then is it fair to say if absorption is exothermic, in desorption the process will be endothermic?
A What -- I'm going to have to ask you to clarify.
Are we talking about something that underwent absorption?
Q AD.
A AD?
Q Yeah.
A So something that underwent adsorption and I want to return it to its original state, so I would to desorb?
Q Correct.
A I have to add heat. So that's a process that requires heat. So it's endothermic.

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Q Got it. Okay.

And then you state that "Absorption proceeds at a rate that depends upon the concentration difference between the vapor being absorbed, and the amount already absorbed."

What does that mean?

A Well, a solution process is driven by the concentration difference between the outside and the inside of the substance being dissolved.

So when I initially try to dissolve or swell a system, the driving force is higher because of the bigger difference in concentration. And so it starts out quickly and it goes slowly until it essentially reaches its endpoint. Its equilibrium or endpoint.

It may never reach an equilibrium point as long as there's a concentration gradient between what's on the inside and what's on the outside.

A swollen system with these networks, we may have a mistaken impression that once it's swollen it stops. That's not exactly the case. There's an exchange. There still remains a

Page 43

driving force to take things in. And if it's overcapacity, things go out.

So it's dynamic and you always have this free energy difference between the system that's got the swollen polymer and the solvent on the outside.

Q And then you state, "Equilibrium is never reached, since there always exists a driving force for absorption. By contrast, adsorption reaches equilibrium."

Could you explain those two statements?

A Well, in the case that I just mentioned, the absorptive process, we approach equilibrium very, very, very slowly but never get there because we still have all of this stuff trying to figure its way into its final state, if it's ever going to get there. Which you still have this dynamics going on.

So at the molecular level, while it may seem like there's an equilibrium, as long as there's a concentration difference, you're more than likely not going to reach an equilibrium state.

In the case of the adsorptive process, once you take out all of the areas of the

Page 44

pores, there's no more room.

Q And then is the substance in that latter case said to reach equilibrium?

A I would call it an equilibrium because it's simply reached a state where it has no more capacity.

Q Is that depicted or measured sometimes as the adsorption-desorption isotherm?

A Yes.

Q There are several classic adsorption-desorption isotherms for adsorptive materials, correct?

A Yes.

Q Those are known and described in the literature?

A Many are.

Q You would be familiar with what those look like, say a Type I or a Type II or a Type III?

A Well, yeah. Sometimes they have various stages, if you will. Yeah.

Q Right. Sometimes the curve looks different, correct?

A Yes.

Q Regardless, those are classic adsorption-desorption isotherms for adsorptive substances, correct?

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A Correct.

Q You would know what those look like, correct?

A I probably would. I haven't studied them in quite awhile.

Q Can you explain what the adsorption-desorption isotherm is?

MR. SONG: I object. That's beyond the scope.

You can go ahead and answer.

A Well, generally what you're looking at is the thermal reaction or process that takes place when you reach this approaching equilibrium or approaching saturation state. So isotherm means constant temperature -- or constant heat.

Q Is it fair to say that when an adsorptive substance reaches equilibrium there's an equal amount of material being adsorbed as desorbed?

MR. SONG: I object. That's outside the scope.

You can answer.

A Well, are you asking if it's considered dynamic at the molecular level? Is that what you're saying?

Q Well, earlier in your testimony you had mentioned dynamic. So I'm trying to figure

Page 46

out: When that equilibrium is reached, what's happening? Is material being adsorbed and desorbed or simply no more material can enter the system?

A Well, the amount of material that can enter the system doesn't change. I may exchange partners with some other molecule that comes in and bumps me out. Okay. If you want to call that dynamic at that level, that's fine.

Q But when an adsorptive material reaches equilibrium, what is happening with the system in terms of the adsorbate and the solute?

MR. SONG: I object as to the scope, vague as to "what is happening with the system."

You can answer.

A Well, it depends on, again, the system we're talking about. If we're talking about something that's free moving because it's not crosslinked, then it's going to move around in the system until -- until. It's not as a result of stirring, it's a result of molecular motions that take place as a result of the fact that things like Brownian motion take place within molecules or among molecules. And so

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they move around. They're not sitting in one spot. You can't point your finger at a given molecule.

In the case of the swollen system, again, if you have a gel that's cross-linked, heavily cross-linked, you're still going to have water molecules entering in and passing through and leaving and exchanging positions with those but on a different scale. It's going to be on a scale that has to do with the molecules of the substance, not the surface area of the substance.

Q So in an absorbing system, is this adsorption-desorption equilibrium ever reached?

A Only when you get to the capacity of the system or the -- I've said that backwards.

Only when the system reaches its capacity to hold the fluid. It takes a long time to get there. You approach it very slowly. You approach it rapidly at first and very slowly after that because you still have penetration going on and relaxation going on.

So that's sort of an --

THE WITNESS: Can I use the word "asymptote"? Would you be able to spell

Page 48

that?

A If we're looking at weight gain, it's going to go like this.

Q Okay.

A It's going to approach it slow.

Q So would the curve be convex?

A It would be upward. Weight gain.

Q It would be asymptotic?

A Yeah.

Q It would steeply rise and tail off?

A And tail off.

Q Okay. Got it.

In an adsorptive system, what would the curve look like?

A Adsorptive?

Q With a D.

A Oh. Okay. You're still going to approach it slowly, but how far along you get in terms of amount is going to be determined by the surface area of the substance. So it's surface area limiting -- or pore volume limiting.

MR. SONG: Do you want to take a break? It's five to 10.

MR. GERGELY: Yeah. Do you want to do it now?

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MR. SONG: That's fine.

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

- - - - -

(Recess taken.)

- - - - -

BY MR. GERGELY:

Q Sir, can a substance both absorb and adsorb?

A Depending upon what form it is in, there are materials which can be both. If it's activated, the driving force mechanism is the adsorbent. If it's not, its counterpart would be the absorbent.

Q So can you give me an example of a material that would both absorb and adsorb?

A Well, I'll give you an example of one that could be one or the other. A silica gel, for example, can be an absorbing substance if it's not activated, its surface isn't activated. If its surface is activated, then it's more likely to be an adsorbent substance.

MR. GERGELY: Can you mark this as Daniels 3.

- - - - -

(Petitioner's Exhibit Daniels 3 was marked.)

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- - - - -

Q Sir, I've handed you what's been marked as Daniels Exhibit 3.

Is this a document you reviewed in connection with your declaration?

A No. I've not seen this before.

Q It's a document that's of record in a case that was submitted with the petition.

So you didn't review all of the documents that were submitted with Dr. Oelker's declaration?

A I certainly didn't review this one.

Q Okay. Well, it's a fairly lengthy document, so I'm not going to ask you to review the whole thing, but I would like to draw your attention to page 39.

A Okay.

Q Under "Sample composition," it says, "Due to the linear partition isotherms, gel filtration is remarkably independent of sample concentration."

What does that mean to you with respect to Sephadex?

A I really don't know. I don't, as I say, have a lot of familiarity with the document. So I'm

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not exactly sure what's meant by that.

Q Okay. I understand.

You didn't review it, so you're not familiar with what that would mean?

A Yeah.

Q Did you know what a linear partition isotherm is?

A Off the top of my head I don't.

Q Okay. Let's put this one away, then.

Sir, on over to 43 in your declaration, you continue with the differences between adsorption and absorption and you state, "Materials such as activated carbon particles and porous aluminum oxide can be activated by heat and chemical treatment to alter the surface chemistry to act as adsorbing species."

Do you see that?

A Yes.

Q Are there some naturally occurring adsorbing materials?

A Naturally occurring adsorbing materials?

Q Right. That don't have to be activated by heat or chemical treatment.

A I guess it depends on the degree of adsorption. I imagine it's possible, but normally the

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things that we are more familiar with is effective adsorbing materials are activated in one way or another.

Q When you say "activated," you mean by heat or chemistry?

A Generally those are the two methods.

Q What about graphite, is that an active particle?

A In its natural form, normally we don't consider graphite to be an active material in this. I mean it's capable obviously of having high surface area, but it's not -- it's not its normal utilization.

Q Do you know whether or not Dr. Haggquist disclosed graphite as an active particle in the Haggquist patent publication?

A I don't recall.

MR. GERGELY: This is also preexisting. Can you mark this as Daniels 4.

- - - - -

(Petitioner's Exhibit Daniels 4 was marked.)

- - - - -

Q Sir, I'm handing you a document. It was previously marked as Haggquist Deposition Exhibit 6 and we've also put a Daniels Exhibit

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4 sticker on it.

A Yes.

Q Is this a document you've reviewed in connection with your declaration?

A Yes.

Q Sir, drawing your attention to paragraph 4 of the document, which is in the specification.

A Okay.

Q Do you see where the inventor provides a definition of active particles as being "active because they have the capacity to adsorb or trap substances, including substances that may themselves be a solid, liquid, and/or gas"?

A Could you point me to which paragraph --

Q Paragraph 4.

A Oh, 4. I'm sorry.

Q Yeah. Do you see in paragraph 4 where the inventor states "Active particles are active because they have the capacity to adsorb or trap substances, including substances that may themselves be a solid, liquid, and/or a gas"?

A Yes.

Q Is that a fair definition of "active particles"?

MR. SONG: I'll object as

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to use of the term "definition" is vague.
A Well, certainly they're active, yes.
Q Do you agree with the inventor's definition there?
MR. SONG: Object as to the word "definition." It's vague.
A I agree that in the context of Dr. Haggquist's citing these examples that yes, they're active.
Q Going on over to paragraph 28.
A Okay.
Q Do you see where Dr. Haggquist states "Active particles are particles that have pores or traps, and have the capacity to adsorb substances in solid, liquid, and/or gas phases, and combinations thereof."
Do you see that?
A I do.
Q Do you agree with that?
A Yes.
Q And then he goes on to state that the "pores can vary in size, shape, and quantity, depending on the type of active particle."
Do you see that?
A Sure.
Q Do you agree with that?

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A Yes.
Q Then he states, "For example, some particles naturally have pores, such as volcanic rock, and other particles such as carbon may be treated with extreme temperature and an activating agent such as oxygen to create the pores."
Do you see that?
A Right.
Q Do you agree with that?
A Yes.
Q Okay. There are some active particles which naturally occur that do not have to be treated with heat or chemistry to be active, correct?
MR. SONG: I object to mischaracterizing the document.
A Well, obviously because you have pores in a naturally occurring material it will have some degree of activity. You can't deny that.
Q And then on over to paragraph 30, do you see where Dr. Haggquist lists out some examples of active particles?
A Yes.
Q Okay. He lists graphite as an active particle.
Do you see that?

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A Yes.
Q Okay. Do you agree with him that that's active?
A As long as it has the requirements that he talks about, which is the presence of these pores, it will have some degree of activity.
Q Okay. What about the pores makes the material active?
A Well, it's simply creating higher surface area.
Q And then aluminum oxide, activated alumina, are you familiar with that substance?
A Yes.
Q What is it used for?
A It's used for fillers. It's used in some cases for fire retardants. In other combinations.
Q Is it used in chromatography?
A It can be I'm sure if it has porosity. Almost anything with pores can be used in chromatography.
Q Is that also true of activated carbon, can it be used in chromatography?
A You can. It's not normally. Well, not of the kind of chromatography that we currently -- they're better materials, let's put it that way.

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Q Okay. But in the past it --
A It has been. Sure.
Q And then silica gel.
A Yes. Yes, I see it.
Q What is silica gel used for?
A Well, in common practice silica gel is used as a drying agent.
Q You would consider that an active particle?
A Well, in the sense that it -- I mean, again, if it has a certain amount of surface area, it's certainly going to actively function as an active -- boy, that's a terrible sentence. It will function as an active surface. Active material.
Q How about soda ash, is that also a porous material?
A Normally it is, yes.
Q You would consider that active?
A It does have pores and certainly would have some degree of activity.
Q Is that treated with heat or chemistry to create those pores?
A Well, soda ash, any of those products that are products of combustion generally are or have seen some high temperature exposure. So heat

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has played a role.
Q In creating pores?
A Well, certainly in creating the structure that creates the active ash particles. Sure.
Q In the list there is a material which is parenthesized as cinoxate. I'm not going to read the entire IUPAC name into the record. What is cinoxate?
A I believe that's an acronym for the cinnamic acid material. It's a powder.
Q Does it also exist in liquid form?
A I don't recall what the melting point of Cinnamic acid is off the top of my head.
Q And then zeolite, is that the volcanic material?
A Yes.
Q That's naturally occurring?
A Sure.
Q You have to answer "yes" or "no."
A Oh, sorry. Yes.
Q How about titanium dioxide, is that naturally occurring?
A It is.
Q And then molecular filter type materials, what molecular filter type materials beyond this

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list are considered active?
A In chromatography they use something called molecular sieves, and those are used to remove impurities from substances, things that are colored that you want to get rid of the color from. And they consist of a variety of materials, all of which I don't recall their chemical makeup. But they're widely available.
Q Is Sephadex a molecular sieve?
A It could be.
Q Back to your declaration. So we were on paragraph 43. In your declaration you said, "Contrastingly, an absorbing substance such as silica gel or a crosslinked polyacrylic acid substance imbibes a liquid such as water, causing the particles to swell microscopically to macroscopically." Do you see that?
A Yes.
Q So you characterized silica gel as absorbing. Why is that?
A Primarily because of the common use of silica gel in its ordinary form. The packets of drying agent that you get in certain products

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or in a jar that you're trying to dry something. What happens is the moisture actually penetrates through and on a molecular level penetrates the silica gel particle. So we classically call silica gel in its most ordinary form an absorbing substance.
Q You say absorbing with a B?
A Absorbing with a B.
Q But silica gel in its ordinary form is porous, correct?
A It has pores, sure.
Q Okay. Is silica gel adsorbing material as well?
A Well, at the start -- and, again, I think anything that has particulate nature, just using the diagram here, you're going to see adsorption at the surface. I mean it's sort of the initial process. Whether it goes into and completely penetrates is the distinguishing difference between something that's purely absorbent from something that's purely adsorbent.
In the case of silica gel, it reaches a certain capacity. In some cases they actually have colorants in them to indicate that they've

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gotten as much water in them as they can possibly hold.
So it depends on, again, how much of the interior volume on a molecular level you're going to use as to whether or not you can distinguish it from an adsorbent to absorbent substance.
Q So does silica gel in its ordinary form when it's absorbing water, does it actually swell?
A It can. Most of the time if it's a really heavily cross-linked version of it it kind of sits there and you attempt not to let it turn into a sticky substance. That wouldn't be making it a useful material.
Q Okay. But does it swell on some level?
A It will swell on a molecular level.
Q Is that why you're saying it's an absorbing substance?
A Yes.
Q Have you seen it also characterized as an adsorbing substance?
A I have seen it characterized that way.
Q Have you seen Sephadex characterized as both absorbing and adsorbing?
A I'm not as familiar with Sephadex, so I don't

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know the answer to that question, whether it's been characterized one way or the other. I have read people -- I have read articles where people call it one or the other, but I'm not as completely familiar with it. So, you know, I can't answer that question. I just don't know.

Q In paragraph 44 you state, "As an example, an adsorptive process can be used to remove water and organic materials from a vapor stream, and the active substance can be regenerated in its original particulate physical form."

Do you see that?

A Yes.

Q Can you give me an example of that?

A Sure. Activated carbons, for example, can be utilized in this adsorptive process and at some point be regenerated. In other words, you can reheat them and drive off most, if not all, of the substance that they've adsorbed and you can continue to use them. Or you can repeatedly use them.

Q In contrast, an absorbing substance cannot be dehydrated?

A Oh, you can dehydrate it, but your likelihood in many cases, particularly these hydrophilic

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materials that are materials that are cited in other patents, those things don't easily return to their original particulate form.

They tend to actually begin to flow to change their physical form and you have to do some other mechanical means to again attempt to get them back to their starting point, physical form.

Q You were rubbing your hands together --

A Yes.

Q -- when you said "mechanical means." I think in your declaration you referred to "pulverizing."

A Pulverizing, grinding. Some form of breaking them down into a much finer physical shape and size.

Q You wouldn't view that as regeneration, correct?

A I wouldn't view it as regeneration to the exact starting point from which it came. That was the contrast I was trying to make.

Q Okay.

A The sugar example.

Q So in paragraph 47 of your declaration, on the next page, you state, "An absorptive material

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will not be capable of regeneration to its original physical particulate form without a secondary step of size reduction (e.g. pulverizing) which has little chance of producing its initial particle size and particle size distribution."

A In the most common forms of the absorptive materials, that's correct. You end up in a state which is physically different from which you started.

Q Okay. How about Sephadex? Do you know if Sephadex can be regenerated to its original state?

A I don't know.

Q Did you investigate that at all in this case?

A No.

Q If it could be regenerated to its original state through drying, would that be consistent with an adsorptive substance?

A Well, it would be consistent with the regeneration of an adsorptive substance. Again, I don't -- I'm not as familiar with the functionality of the Sephadex to know whether or not you're actually seeing enough of the penetration of the let's say water molecules to

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the interior to have it meet that threshold of behavior as well. It depends on how heavily cross-linked it is.

Q Sir, turning your attention back to Daniels 3 on page 32.

A Okay.

Q It's actually -- its original page is 32. For the board's purposes, it's 31 to 57.

A I see that.

Q The paragraph is titled "Storage and drying of Sephadex --

A Right.

Q -- of the G-series."

A Yes.

Q The author states that "After use, Sephadex can conveniently be stored in the swollen state (preferably under refrigeration) after addition of a bacteriostatic agent." And then they go on to say, "However, once swollen it can be dried and restored to its original state by the following procedure" and then a protocol follows.

Do you see that?

A I do.

Q Would that be consistent with regenerating the

Page 66

particle to its original state?
A Again, I haven't actually performed this process, so I don't know whether it actually gets back to the original state -- I mean original and exact state from which it started. The implication is that this procedure would get you there.
Q Okay. Thank you.
A That's as much as I know.
Although if you carefully read it, there is a piece at the very end. It says, "Clumps appearing during this process do not matter, as they will disperse during reswelling of the gel material."
And that says somewhat to me that the original state, again, has some required reduction of the size you get after you remove the absorbed, adsorbed, or both material from the Sephadex. So while it can be done, it isn't an automatic process. You have to do something additional. You do produce clusters of material that are large.
Q Right. And then the author states, "A very slow shrinking procedure will prevent clump formation."

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Do you see that?
A Yes, I do see that.
Q So they're not pulverizing or mechanically grinding the material to get it back to its original state?
A Not in this. Not in that procedure. That is correct.
Q And then they're removing the water through dehydration, correct?
A Yes.
Q That's also true with respect to activated carbon and silica gel, for example? Those materials are dehydrated to return them to their original state, correct?
A They are.
Q For example, silica gel, isn't the most common dehydration procedure to simply put it in the microwave oven?
A Or some oven, yes. Sure.
Q And then with other materials are they simply put into a lab oven?
A Put them in a lab oven, an air circulating oven, a vacuum oven so that you get as complete a removal of the material as possible.
Q Is all of that water removed in that process or does some sort of stay behind?

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A I've never measured that. So I don't know the answer to your question.
Q Okay.
MR. GERGELY: Can you mark that as 5.
- - - - -
(Petitioner's Exhibit Daniels 5 was marked.)
- - - - -
MR. SONG: I'll object to the exhibit. It's outside the scope and outside of the declaration and the witness' direct testimony. It's not identified in the deposition notice. It has not been authenticated under 901 or 902 and lacks foundation.
Q Dr. Daniels, I've handed you what's been marked as Daniels Exhibit 5. It's an excerpt from a textbook entitled "Introduction to Organic Laboratory Techniques: A Microscale Approach."
MR. SONG: Is there a question pending?
MR. GERGELY: I'm leading up to it.
Q First of all, do you know any of these authors, these gentlemen; Pavia, Lampman, Kriz, or Engel?

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MR. SONG: I'll object to the question as outside the scope. It's not cited or referenced in the witness' direct testimony. It is not identified in his deposition notice. The document has not been authenticated to 901 or 902. The document lacks foundation and the document constitutes hearsay.
MR. GERGELY: Yeah, Counsel, you can have a standing objection on those lines.
MR. SONG: Thank you.
Q So back to my question.
Do you know any of these gentlemen?
A (Indicating.)
Q No, you don't?
A I don't.
Q Sir, drawing your attention to page 698.
A Okay.
Q First of all, this chapter deals with column chromatography. Do you see that?
A Yes.
Q So on over to 698 -- actually on 697.

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Do you see where on 697 at the bottom titled "Interactions" the author talks about the different ways that materials were adsorbed?

A Yes.

Q And then he refers to non-polar compounds. And then they state that "The most important interactions are those typical of polar organic compounds." And then he refers to "dipole-dipole type" or some type of direct interaction; coordination, hydrogen bonding, or salt formation.

Do you see that?

A I do.

Q Are you familiar with those types of forces?

A Yes.

MR. SONG: Objection, calls for speculation based on the document.

Q You're familiar with hydrogen bonding, correct?

A Yes. Yes.

Q And then on over to 698, do you see the call-out which states "The more polar the functional group, the stronger the bond to alumina (or silica gel)"?

A I see that call-out.

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Q Is that how silica gel or alumina is binding water, through hydrogen bonding?

MR. SONG: Objection. It calls for speculation to the extent it relies on the document.

A Well, you know, I'm not exactly sure what system he's talking about, because obviously I haven't read this particular chapter. So I don't want to speculate as to what system he's specifically referring to in the box there.

Q Below the box he states at the end of the paragraph, "For any adsorbed material, a kind of distribution equilibrium can be envisioned between the adsorbent material and the solvent. This is illustrated Figure 12-2."

And then 12-2 is on the next page.

A Okay.

Q He entitles that "dynamic adsorption equilibrium."

Do you see that?

A Yes.

Q Do you know what he's referring to?

MR. SONG: Objection, calls for speculation based on the document.

Q Sir, as a personal of ordinary skill in the art, do you know what the author's referring to here?

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A Yes.

Q What is he describing?

A My understanding of this is -- and this is fairly well-known and I think I referred to this earlier on. The dynamics of an adsorption process would be such that -- even on the left-hand side where it appears that all of the active sites, at least in that field, are occupied.

An RX substance can replace an RX substance and interchange with it. It doesn't change the capacity of the field surface in the box, it just says that every process has some degree of dynamic character. One molecule bounces into another. Take a snapshot and it looks like that. If you wait a few little seconds or whatever, you take another snapshot and it looks like that.

Q So the arrows reflecting movement -- first of all, RX material is what? Is that a reactive material?

MR. SONG: Objection. It calls for speculation.

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A I don't know what he's referring to in this particular substance. What RX is, it obviously in some way or another adsorbs to the surface of the solid.

MR. SONG: Can we go off the record for one moment?

MR. GERGELY: Sure.

- - - - -

(Discussion held off the record.)

- - - - -

A If we're back on the record --

Q Yeah, we're back on the record.

A It says "adsorbed molecules." So that's obviously what RX is.

Q Do you understand the arrow moving towards the left would reflect adsorption and the arrow moving to the right would reflect desorption?

MR. SONG: Objection. It calls for speculation.

You can answer.

A Okay. That's the way I would draw it. If I were looking at one of the RX molecules moving towards the surface, I would follow the arrow whose tip is toward the left.

If I were following the movement of the

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molecule or substance RX that was coming off and having been replaced, it would follow the arrow to the right.

In typical chemistry, when the lengths of the arrows are the same, it means an equilibrium process. That is to say I'm not changing anything on the right or the left every time I take the snapshot.

Q That equilibrium is what's graphed as the adsorption-desorption isotherm, correct?

MR. SONG: Objection, calls for speculation.

A That's where you get to.

Q So the answer's yes?

A The answer's yes.

Q Okay. Thanks.

Sir, I would like to draw your attention to page 717, which is -- the section is 12.14 "Gel Chromatography."

A Okay. I'm there.

Q Do you see where the authors state that "The stationary phase in gel chromatography consists of a cross-linked polymeric material. Molecules are separated according to their size by their ability to penetrate a sievelike

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structure. Molecules permeate the porous stationary phase as they move down the column. Small molecules penetrate the porous structure more easily than large ones"?

Do you see that?

A Yes.

Q Is that a fair description of what Sephadex is doing?

MR. SONG: Objection, calls for speculation.

A I don't -- I'm having hard time answering that question, simply because I'm not certain what application you're putting this Sephadex in when you ask that question.

Q Well, Sephadex is a porous material, correct?

A Yes.

Q The water either in vapor form or liquid form enters that pore structure, correct?

A It can.

Q On over to the next page, do you see under the bold title "Sephadex" the author states that "Chemically, Sephadex is a polymeric carbohydrate that has been cross-linked"?

Do you understand that?

A I do.

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Q Is that consistent with your understanding?

MR. SONG: Objection, calls for speculation.

A Yes. I believe a Sephadex is a polymeric -- I use the word polysaccharide. Polysaccharides are sugars. Sugars are carbohydrates. We're all saying the same thing.

Q And then the authors state, "The degree of cross-linking determines the size of the 'holes' in the polymer matrix." They go on to state, "In addition, the hydroxyl groups on the polymer can adsorb water, which causes the material to swell."

Do you see that?

A I see it.

Q You had mentioned earlier in your testimony that you had heard of Sephadex as being described as having the ability to adsorb water, at least in certain references, correct?

A Yes.

Q Is this such a reference?

MR. SONG: Objection, calls for speculation.

A It appears to be his understanding of the Sephadex utilization.

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Q Okay.

MR. GERGELY: Let's do 6 and 7 at the same time.

- - - - -

(Petitioner's Exhibit Daniels 6 was marked.)

- - - - -

(Petitioner's Exhibit Daniels 7 was marked.)

- - - - -

MR. SONG: I'm going to object to Exhibit 6. It's outside the scope. It's outside of the reference in the witness' direct testimony. It's not identified in the deposition notice. It's not been sufficiently authenticated under 901 or 902. It lacks foundation. It constitutes hearsay and any testimony thereon constitutes speculation.

As to exhibit Daniels 6 or exhibit Daniels 7, I object that it is outside the scope and outside of the reference to the witness' direct testimony. It has not been identified in the deposition notice. It has not been sufficiently authenticated under 901 or 902. It lacks foundation. It constitutes hearsay and any questions derived or answers derived thereon constitute speculation.

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Q Sir, I've handed you what's been marked as Daniels Exhibit 6 and Exhibit 7.

MR. GERGELY: Counsel, you may have a standing objection with respect to this document and we will authenticate it in the case.

MR. SONG: I'm sorry, Counsel. You're referencing both documents, Daniels 6 and Daniels 7?

MR. GERGELY: Correct.

Q So, sir, Daniels 6 is an abstract of a publication, Daniels 7 is the publication itself. I would like to draw your attention to page 59 of the document.

A Of the document?

Q Of the Daniels 7, which is the lengthier document.

A 59.

Q Do you see where the author states that "Sephadex G-50 beads are commonly used for desalting and gel exclusion chromatography"? Do you see that?

A I see that.

Q Would you agree it's accurate?

MR. SONG: Objection,

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calls for speculation.

A I think I've said before I'm not entirely familiar with the utilization of the Sephadex beads or their various parameters. So it would be a pure speculation on my part to acknowledge that it's a commonly used one. I just simply do not know.

Q And then the authors go on to state, "In solution, these beads swell and trap water both within the bead, and on the surface of the bead in a microfilm, when placed in liquid." Do you see that?

A I see that.

Q Do you have any reason to doubt the veracity of that statement?

MR. SONG: Objection, calls for speculation.

A I don't have any reason to agree or disagree. I've not seen this rather large document, so I'm not exactly certainly in what context he's asserting the action of the Sephadex beads. So it wouldn't be right for me to speculate on how it's being used.

Q All right, sir.

MR. GERGELY: You know, we're

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getting close to 11. Do you want to take another short break?

MR. SONG: Sure.

- - - - -

(Recess taken.)

- - - - -

(Petitioner's Exhibit Daniels 8 was marked.)

- - - - -

MR. SONG: I'm going to interpose an objection to Daniels 8. It's outside the scope. The document is not cited or referenced in the witness' direct testimony. It's not identified in the deposition notice. It has not been authenticated under 901, 902. It lacks foundation. It constitutes hearsay. Any answers or questions derived from the document call for speculation.

Q Sir, I've handed you what's been marked as Daniels 8, which is an article entitled "Water Sorption in a Dextran Gel" by Texter, Kellerman, and Klier. Do you see that?

A I do.

Q Do you know any of these gentlemen?

MR. SONG: Objection.

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Outside the scope. It's not cited or referenced in the witness' direct testimony. It's not identified in the deposition notice. It has not been authenticated under 901 or 902. It lacks foundation. It constitutes hearsay. Any testimony derived therefrom calls for speculation.

MR. GERGELY: Counsel, you can have the same standing objection.

MR. SONG: Thank you.

Q Do you know any of these gentlemen?

A I do not.

Q Sir, I'll represent to you that in this paper the authors were studying Sephadex. Do you see the second line in the "abstract" where the authors state that "Water-vapor adsorption (desorption) isotherms at three temperatures are reported"?

A I do see that.

Q So when the adsorption-desorption isotherm is reached, is that a state of equilibrium?

A Basically.

Q Sir, turning your attention to 192 of the document.

A 192.

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Q About two-thirds of the way down there's a paragraph that starts "We report herein the results of near-infrared and water-vapor adsorption (desorption) studies on the state of adsorbed water in a model carbohydrate system, a dextran gel (Sephadex type G-15 gel, Pharmacia Fine Chemicals, Inc.)."

Do you see that?

A I do.

Q The authors states that "the swelling molecular sieve has found wide usage over the past fifteen years in many biochemical purification and chromatographic procedures."

Do you see that?

A I see that.

Q Do you have any reason to doubt the veracity of those statements?

MR. SONG: Objection, calls for speculation.

A I'm not familiar with this document at all, so I have no reason to either accept it or doubt it. I would need to read the entire thing and try to understand in what context he's making the statements.

Q Sir, draw your attention to Table 2 on page 201.

The authors report "equilibrium amounts of adsorbed water and frequencies."

Do you understand what that means?

MR. SONG: Objection, calls for speculation.

A Well, I understand the "equilibrium amounts of adsorbed water" portion. The rest of it, "frequencies" and the like, I'm not at all aware of how he's doing this.

Q So what does "equilibrium amounts of adsorbed water" mean to you as a person of ordinary skill in the art?

MR. SONG: Objection, it calls for speculation.

A It means the amount of water that's adsorbed when a system reaches equilibrium. I'm just deconvoluting his title.

Q Sir, on over to the next page -- or excuse me, to page 203.

A Yes.

Q Do you see where the authors report under "Isotherms and sorption heats" that "The adsorption-desorption isotherms recorded at three different temperatures are illustrated in Figure 6"? And they state further that "Extrapolation of the desorption isotherms indicates that 5 milligrams of water per gram of gel is irreversibly bound to the gel." And that "Most of this water is removed, however, by the dehydration treatment described in the experimental section."

Do you see that?

A I do.

Q Is that consistent with returning the material to its original state?

MR. SONG: Objection. It calls for speculation.

A Well, I would have to read the document again completely from start to finish to understand what it is they're attempting to show here and how they reach that conclusion. I can't by just simply looking at the graph understand where he gets he masses and all of the other explanation that he's presented in that paragraph. I just don't know.

Q But you see Figure 6 where the authors report the adsorption-desorption isotherms for water on dextran gel --

A I do.

Q -- at various temperatures?

A I see that.

Q Those temperatures are reported in Kelvin, correct.

A They are.

Q In degrees Celsius what is 284 Kelvin?

A You have to subtract 273 from each of those numbers.

Q Okay. So it would be 15, 26, and 56 Celsius?

MR. SONG: Would the first one be 11?

A The first one's 11.

Q Okay. That's why I'm a lawyer.

So it would be 11 Celsius, 26 Celsius, and 56 degrees Celsius?

A That's right.

Q The graph that's shown above which reports the adsorption-desorption isotherms for water on the gel, that's one of the classic adsorption-desorption isotherms, correct?

MR. SONG: Objection, calls for speculation.

A It's what they would look like, sure.

Q Is that the Type III adsorption-desorption isotherm?

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A I don't remember whether it's Type II or Type III. I would have to go back and look. It's been a long time since I've seen them.
Q This graph actually shows that the adsorption starts out slow and then increases in speed, correct?
A It does.
Q That's consistent with absorption, correct?
A Well, absorption can happen at various rates, there's no question about that. Again depending on the surface area of the material we're talking about.
Q So earlier in your testimony you mentioned that absorption proceeds asymptotically, correct?
A Absorption?
Q Absorption with a B.
A Yes. Yes.
Q So this graph is not such an asymptotic relationship, correct?
A No. It would go the other way. It would be -- asymptotic would be it starts out at a rate faster than it approaches equilibrium. So it tails of.
Q So an asymptotic relationship is the opposite of what's shown on this graph, correct?

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A Well, see, this isn't -- this isn't time on the axis at the bottom. This is partial pressure. This is concentration. So it's not a time curve.
Q So what you were referring to before is a time curve --
A Yes.
Q -- correct?
Regardless, you would agree with me that this is a classic adsorption-desorption model, correct?
MR. SONG: Objection, calls for speculation.
A Well, as I say, I don't remember which type they are, but it's typically what happens with varying partial pressures of the water in this particular case.
Q On over to 204, do you see where the authors depict in Figure 7 the "adsorption heat (exothermic) of water on dextran gel as a function of water coverage"?
A Yes.
Q They actually refer to that as "The heats of adsorption and desorption" in the text above.
A I see that.

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Q Is that consistent with adsorption?
MR. SONG: Objection. It calls for speculation.
A I really can't answer it. I don't know how he's measured this, what his sensitivity is. So when I look at those values, I just have no basis by which to judge whether or not that's consistent with adsorption.
Q And then below in the -- well regardless, he reports it as a heat of adsorption, correct?
A That's how it's reported.
Q He reports it as an exothermic process, correct?
A Yes.
Q Okay. And then below he reports "Desorption heats" and that's the material leaving?
A Yes.
Q He reports that as endothermic, correct?
MR. SONG: Objection. It calls for speculation.
A He reports it that way, yes.
Q And then below that Figure 8, he actually has text which he refers to the "State of the adsorbed water."
Do you see that?

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A I see the text, yes.
Q On over to page 206.
A Yes.
Q Do you see at the top of the document he's proposing a mechanism of action of the adsorbed water molecules participating in two or more hydrogen bonds involving gel hydroxyl groups and/or ether linkages?
MR. SONG: Objection. It calls for speculation.
A I see he says that.
Q That hydrogen bonding mechanism, that's the same hydrogen bonding mechanism that occurs, for example, you mentioned in silica gel?
MR. SONG: Objection. It calls for speculation.
A If that's the operative mechanism. Most hydrogen bonds are similar to one another. It depends on the substances involved. A hydrogen bond's a hydrogen bond.
Q So the answer's yes?
A Yes. The answer's yes.
Q Now, sir, the prior art that's at issue in this case, you've read that? You read the Dutta and Halley references?

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A Yes.
Q Do you know Dutta or Halley?
A Neither one.
Q Sir, would you agree with me that sometimes in scientific articles or publications authors sometimes use "absorbing" and "adsorbing" interchangeably?
MR. SONG: Objection, vague as to "scientific articles."
A I would agree that there are people who use them sometimes interchangeably and sometimes incorrectly.
Q Now, sir, in paragraph 80 of your declaration.
A Okay.
Q So on page 34.
A I have it.
Q You state with respect to Dutta that the hydrophilic absorptive particles swell to several thousand times their own weight with water.
Do you see that?
A Yes.
Q Do you know if that's true with respect to Sephadex?
A I don't.

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Q As applied in Dutta, do you know if that's what's actually happening?
A With respect to Sephadex are you asking or?
Q Correct.
A I believe that's what he's implying, yes.
Q No, I meant in his actual use of Sephadex in his material. Is he actually swelling those particles to several thousand times their own weight?
A I would have to go back and look at the document to be sure.
Q Well, for example, do you recall if he prior to putting those particles into the polyurethane, whether he soaked those particles in a buffer or water?
MR. SONG: Objection. Counsel, I would ask if you're going to ask him about the reference, I would ask that you kindly give him a copy of it.
- - - - -
(Petitioner's Exhibit Daniels 9 was marked.)
- - - - -
Q Sir, I've handed you what's been marked as Daniels Exhibit 9.
A Yes.

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Q Is this a copy of the Dutta reference that you reviewed?
A It is.
Q Do you see anywhere in the reference where he soaks the Sephadex material in water or a buffer solution prior to mixing them into the polyurethane?
MR. SONG: Counsel, do you have a specific passage? Maybe you could point it to him.
Q Well, for example, the Example 1A, which is on page 17.
A 17. Example 1A?
Q Yeah, Example 1A.
Well, why don't we do 1B, because I think that's the one that's at issue.
A Okay.
Q In 1B he doesn't report soaking those particles in water or a buffer prior to using them, correct?
A I don't see that he does that, no. Not in 1B.
Q And then he reports an absorption capacity of about 24 grams per gram.
Do you see that?
A I see that.

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Q So that's not several thousand times its own weight, is it?
A No.
Q What is it?
A Depending on how much he started with, probably a gram of material he puts in he's able to absorb 24 times as much per gram.
Q That's capacity, not necessarily what's actually happening with the material as it's used in this polyurethane, correct?
A I believe what he's talking about here is that Sephadex by itself having that capacity.
Q It's not actually reported in this document how much of the solution is being taken up by Sephadex, correct?
MR. SONG: Objection. The document speaks for itself.
A Well, maybe I'm misunderstanding your question. What I read is it has 36 grams of hydrophilic urethane solution and one and a half grams of dextran. So 1.55 grams of the dextran is added to the 36.8.
Q Right. But it's not reported how much of that polyurethane is actually entering into the dextran, correct?

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MR. SONG: Objection. The document speaks for itself.

A How much of the urethane is entering into the dextran?

Q Correct.

A There's no report of that.

Q Nor is there any report in this document of how much water vapor is entering those particles, correct?

MR. SONG: Objection. The document speaks for itself.

A No. At this point in Example 1B he's really just giving you the capacity of the Sephadex. He doesn't report how much actually does enter it.

Q So you can't conclude from this document how much or to what degree those Sephadex particles are swelling, can you?

A In Example 1B?

Q Correct.

A In this paragraph, no, you can't.

Q Can you anywhere in the document?

MR. SONG: Objection. The document speaks for itself.

A I don't see -- let me look at this table.

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Well, he reports in Table 1 the -- I don't know how much of it he attributes to transmission or absorption, but he does say that the -- in the case of the Sephadex, the test area, 6730 is his value of the water vapor transmission.

Q Okay. But he's not reporting how much water is actually being taken in by the Sephadex, correct?

A Not specifically to the Sephadex, no.

Q You called that the 6730 result for the water vapor transmission rate.

Do you see that versus the control that's an improved water vapor transmission rate?

A It's a little bit, yeah. It's not major.

Q Okay. It's about 20 percent?

A That's 12 out of 55. Whatever that works out to be. About 20 percent.

Q Do you know how much improvement was being reported in the '287 patent?

A I don't off the top of my head.

MR. SONG: Counsel, you can have him refer to it if you'd like.

- - - - -

(Petitioner's Exhibit Daniels 10 was marked.)

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- - - - -

Q Sir, I'm handing you the '287 patent, which was previously marked as Haggquist 5 and now we've also placed a Daniels 10 sticker on it.

MR. GERGELY: Counsel, I don't have an extra copy with me, so you'll have to follow along.

Q Sir, is this the '287 patent that you reviewed in this case?

A It is.

Q Now, sir, turning your attention to Figure 2.

A Yes.

Q Do you see where the authors present -- well, they call it MTVR. Do you understand that as meaning MVTR?

A Yes.

Q At least with respect to the inverted cup method, there are relatively modest increases in MVTR?

A Except when you get to the higher loadings of carbon, yes. It depends on what level you're talking about.

Q At least the authors presented the lower loading of carbon as being representative of an improvement, correct?

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A You're talking about example 1 versus a -- level one versus a control?

Q Examples 1, 2, and 3.

A Oh, 1, 2, and 3. Okay.

Yes, it's an improvement. It's a small level, but it's an improvement, yes.

Q When you really start putting more carbon into it, you see more of an improvement, at least with respect to the inverted cup method.

Do you see that?

A I see that.

Q Do you know the difference between the inverted cup method and the up cup method?

A I don't recall. Well, I don't want to speculate. I remember which way we used to do it, but I don't remember whether that's the up or the invert. So ...

Q Do you know what method Dutta was using? Was he using the up cup method or the inverted cup method?

MR. SONG: Objection. The document speaks for itself.

A I don't recall which method he was using, the up cup or the inverted cup.

He just said he was using D570, but I

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don't see it specified as using the up or the inverted. On page 15.

Q Well, do you see, for example, on "Comparative Example 2" on page 19 he's referencing "ASTM E96-Method B"?

A This is in Dutta?

Q Correct.

A Which paragraph? I'm sorry. Which page?

Q Well, in --

A Oh.

Q In the comparative example he's using ASTM E96-Method B.

A Right.

Q Do you know what that is?

A Yes.

Q Is that an accepted method?

A It is.

Q Over on pages 16 and 17, he's discussing his testing procedure for WVTR. He doesn't appear to call out the specific ASTM test he's using, but does that appear to be ASTM 96?

A I believe that's correct.

Q Do you see anything in this document indicating that he did the incorrect test for WVTR?

A Well, you can run it a couple of ways, but this

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is an accepted method.

Q Okay. That's all I'm trying to confirm.

Sir, back to paragraph 80 of your declaration. You state that "This swelling -- or large change in particle size -- is the key to how the invention of Dutta works."

But you'll agree with me Dutta doesn't report how much the particles are actually swelling, correct?

MR. SONG: Objection. It mischaracterizes the document.

A It says in the particular passage that I cited that it's capable of swelling to a large volume several times. Several times to several thousand times its own weight.

Q But, sir, as applied in Dutta, he doesn't report how much those particles are actually swelling, correct?

A Not in the table.

Q And then you go on to state that "A POSITA understands that, in Dutta, the hydrophilic particles swell and thereby switch the membrane, creating holes or channels that allow water vapor to move across the membrane."

Do you see that?

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A Yes.

Q First of all, that's your conclusion, correct, that's not what Dutta states? Is that right?

A Right. We have seen references, even as we were discussing this morning, where the creation of holes as a result of the swelling process. That's a scientific principle.

Q Well, the holes that were referred to in the organic chemistry microscale textbook I showed you were actually holes in the Sephadex particles themselves. They were pores, correct?

A Right. Yes.

MR. SONG: I'll object as being outside the scope in terms of referencing the organic chemistry book. The document was not cited in the witness' testimony. It was not identified in the deposition notice. It has not been authenticated. It lacks foundation. It constitutes hearsay and calls for speculation.

Q Sir, in paragraph 80, the holes you're referring to, are you applying that the Sephadex particles are actually tearing holes in the membrane?

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A No. The size of the holes in this particular case that I'm talking about are not microscopic holes, they're channels. They're microscopic passages or passageways, not tearing apart the membrane.

Q But that's your conclusion as to the mechanism of how Dutta works?

A Well, it's my conclusion as to how hydrophilic particles would work and since Dutta utilizes those, that's my conclusion as to how Dutta's materials would function.

Q Okay. So just to be clear, the holes are in the particles, not the membrane, correct?

MR. SONG: Objection, vague as to I guess the location or configuration of the holes in the question.

MR. GERGELY: That's what I'm trying to clarify with the witness.

Q You're referring to holes or channels that allow water vapor to move across the membrane. I want you to be clear for the record.

Are the holes or channels in the Sephadex particles, or are the holes and channels actually being created in the membrane?

A No. The holes and channels that I'm talking

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about are in the hydrophilic particles within the membrane if they're included in the membrane.

Q Okay. Because if there are holes being created in the membrane, the water vapor transmission rate would go up extremely high, correct?

A Yes. And you're not relying on that, you're relying on the hydrophilic material in my explanation of the location of the channels and holes.

Q In your view, how would activated carbon or silica gel if it was an active particle, how would that promote water vapor transport across the membrane?

A Because it serves as a surface capable of adsorbing the moisture and enhancing the ability of the construction to attract moisture.

Q Isn't that how Sephadex is working too? It's enhancing the ability of the structure to attract moisture?

A Yes, but one is by absorption and the other is by adsorption. So that result may be that you're improving the amount of water that moves. Both patents claim the same thing. The

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question really is what's the underlying scientific principle by which that's created. That's the distinction I'm trying to make.

Q Okay. The claims of the '287 patent aren't limited to a particular scientific principle, are they?

MR. SONG: Objection, vague as to claims, if you're referring to a specific claim.

A It's actually a combination of claims in terms of the construction, as well as the active materials and their function. So I may not be understanding your question.

Q Yeah. I'll move on.

A Okay.

Q In paragraph 81, at the end of 81, you said, "Dutta actively discouraged the use of nonabsorbent particles for the purpose of increasing WVTR."

Do you see that?

A Yes.

Q He actually suggested that these other particles be included in the film, correct?

A Yes, but for other reasons.

Q So he's not actively discouraging the reader

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from using those particles, correct?

MR. SONG: Objection.

A Well, I think we're playing with words here. We're not -- let me see if I can make a distinction.

Dutta doesn't propose the use of nonabsorbent particles for improving water vapor transmission. In fact, he doesn't even encourage the use of absorbent particles in the sense of the '287 patent. He puts in the nonabsorbent particles for another reason.

Q These nonabsorbent particles he states are inert, correct?

A Inert.

Q Inert.

You understand inert to mean chemically inert, correct?

A Physically and chemically inert. They are fillers. They take up space.

Q Activated carbon is inert, correct?

A I'm sorry. You would have to be more specific. In what sense?

Q Well, activated carbon is described, for example, in MSDS sheets as being inert, correct?

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A Chemically.

MR. SONG: Objection.

A Chemically inert.

MR. SONG: Sorry. Objection, lacks foundation.

Q Do you know one way or the other whether Dutta was referring to these particles as chemically inert?

MR. SONG: Objection, calls for speculation.

Q Well, I'm asking because you're speculating that when Dutta meant inert. You're attaching a particular meaning to it. Does he say what he means by the word inert?

MR. SONG: Objection. Mischaracterizes the witness' testimony. Calls for speculation.

You can answer.

A I can answer.

Try one more time with the question.

Q Dutta doesn't say how these particular particles are inert, he just describes them as inert?

A I agree.

MR. SONG: Objection. The

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document speaks for itself.
A I agree. He doesn't -- he doesn't describe the nature of inertness, if you will.
Q And then Haggquist in both the Haggquist publication and the '287 patent, he describes silica as being an active particle, correct?
MR. SONG: Objection. Mischaracterizes the document referenced. Lacks foundation. If counsel would like to specifically reference a document, that would be acceptable.
Q Well, silica is -- that's a shorthand for silicon dioxide, correct?
A Yes.
Q Is it a shorthand for silica gel?
A It depends on what form it's in. It's shorthand for any combination of -- the combination of silicon and oxygen. So yes, it's an active substance.
Q And then he also lists carbon black.
Do you see that?
A Yes.
Q And he lists titanium dioxide, correct?
A Yes.
Q Titanium dioxide is listed by Haggquist in both

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his publication and his patent as an active particle, correct?
A I guess my understanding of what Haggquist is referring to is either an activated version or one which has been proven to be active, yes.
Q The author of Dutta is not telling the reader to avoid these other materials, correct? He's actually saying that they can be incorporated into the film?
MR. SONG: Objection. Argumentative. Mischaracterizes the document.
Q He's not telling the reader to avoid these, correct?
MR. SONG: Objection. Mischaracterizes the document. Argumentative.
A He's not telling you to not use them, but he certainly is describing when they are used what their function would be. So the short answer is he's not discouraging their use, he's encouraging their use as a filler.
Q Now, in paragraph 86 you state that "The claims are also not anticipated in Ground 1 because the Petition does not show how Dutta meets the 'first thickness' and 'second thickness.'"
Do you see that?

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A Yes.
Q What do you mean by that?
A Well, Dutta doesn't talk about a first and second thickness, which is explicitly called out in the '287 patent.
Q Well, Dutta certainly talks about the thickness of the film, correct?
A He talks about the thickness of the film. He doesn't talk about them being comprised of two distinct or two separately applied thicknesses.
Q You understand the board has construed first in thickness to not necessarily be limited to a two layer invention, correct?
A I understand what the board construed, yes.
Q So are you saying that the board is wrong?
A I believe with respect to reading and examining the '287 patent that he specifically mentions the importance in the construction in a first and second layer. First thickness and second thickness set of layers.
Q You're familiar with the file history, and I'll get you a copy of it.
Did you read the entire file history?
A Not the entire file history.
Q Did you read portions?

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A Yes.
MR. GERGELY: What did we mark the patent as?
MR. SONG: 10.
- - - - -
(Petitioner's Exhibit Daniels 11 was marked.)
- - - - -
Q Dr. Daniels, I'm handing you what's been marked as Daniels 11, which was previously marked as Haggquist 11 as well.
It's a document entitled "Arguments submitted with the filing of a request for continued examination."
Is this a document you reviewed in connection with your declaration?
A I believe I did see this, yes.
Q This may be the wrong one. Why don't you just keep that one in front of you. We'll probably get to that later.
A Okay.
- - - - -
(Petitioner's Exhibit Daniels 12 was marked.)
- - - - -
Q All right. I've handed you what's been marked as Daniels 12, which was previously marked as

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Haggquist 13.
A Okay.
Q Is that a document that you reviewed in connection with your declaration?
A I believe so.
Q Drawing your attention first to claim 28 on page 6.
Do you see where the inventor's counsel amended the claim to state that the "liquid-impermeable breathable cured base material" comprises a first thickness? Or "comprising a first thickness."
Do you see that?
A I do.
Q And then the inventor's counsel also adds in with respect to the second element "a plurality of active particles in contact with the liquid-impermeable breathable cured base material, the plurality of active particles comprising a second thickness."
Do you see that?
A I do.
Q And then counsel also adds a limitation that "the first thickness is less than an order of magnitude larger than the second thickness."

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Do you see that?
A I do.
Q Do you understand that the underlined text is the amendment that was added?
A Yes.
Q Do you see on page 17 where the inventor is trying to overcome an obviousness rejection over Spijkers and Haggquist's speculation?
A Yeah, I don't see -- oh, yes, I do see Spijkers. Okay. I'm sorry. Yes.
Q Do you understand that the inventor was making these arguments to overcome an obviousness rejection?
A Yes.
Q The applicant refers to the amended claims, including 28. And then he states that the "cured base material solution comprises a first thickness and the plurality of active particles comprises a second thickness."
Do you see that?
A Yes.
Q Then he states that "the first thickness being less than an order of magnitude larger than the second thickness."
A Correct.

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Q You understand order of magnitude means 10X?
A 10 times.
Q Then they go on to state that "Support for these claim amendments may be found at, for example, Paragraph 49, which states that the Example 1 membrane comprise a thickness of about 1 mil, or 25.4 microns (the first thickness)."
Do you see that?
A Yes.
Q You understand that 1 mil is 25.4 microns?
A Yes. A thousandth of an inch.
Q "And paragraph 50, which states that the activated carbon used in such a membrane comprises Asbury 5564 powdered coconut activated carbon."
Do you see that?
A I do.
Q They reference an "attached Product Data Sheet for Asbury 5564 powdered coconut activated carbon, the particle size for the Asbury 5564 powdered coconut activated carbon comprises about 10 microns (the second thickness)."
Do you see that?
A Yes.

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Q Okay. So the inventor and his counsel stated that the particle size for Asbury 5564 was about 10 microns.
Do you see that?
A That's what was stated.
Q Do you understand that to be the diameter of Asbury 5564?
A I believe that's what was intended here, yes.
Q And then in parentheses the vendor and his counsel states that the particle size comprises the second thickness.
Do you see that?
MR. SONG: Objection, mischaracterizes the document.
A I believe that's how it could be interpreted, yes. Yes.
Q Okay. And then simple math tells us that the second thickness, 10 microns, is less than an order of magnitude of the first thickness, correct?
A I'm sorry. Which math are you doing now? The 10 microns the second thickness is?
Q Oh. Well, the first thickness is less than an order of magnitude larger than the second thickness. It's about two and a half times

Page 114

greater, correct?
A That's what it states, yes.
Q Ultimately do you understand that the claims were amended to have the first thickness at least two and a half times greater than the second thickness but no greater than an order of magnitude thicker? Correct?
A That's what the '287 patent claims.
Q So the range is -- or the ratio is about 2.5 to 10, first thickness to second thickness, right?
A That's what the patent claims.
Q So when we refer to this 2.5 to 10 ratio, do you understand what I'm saying?
A Two and a half times to an order of magnitude. Right.
Q So when these activated carbon particles are put into a polyurethane solution and made into a film, how do they lay down? Do they lay down in a perfect monolayer, or do they clump and aggregate?
A Well, my belief is and from what I've observed, we'll get to it in a later part of my experimental section, I see a cluster of particles and I understand it to be a plurality or multiplicity of a number of particles.

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Q So does that make sense to you as a person of ordinary skill in the art?
A Does?
Q Well, the fact that activated carbon is clustering rather than laying down in a monolayer.
A Yes.
Q Can you estimate what the degree of that clustering is? Like, for example, is it -- what would be -- we know what a monolayer is. A monolayer would be a perfect layer of single particles?
A Right.
Q What would you describe a layer comprised of a cluster of particles?
MR. SONG: Objection, calls for speculation.
A I really don't know. It would depend upon a number of factors, the process in particular in terms of how many of them pile on top of or next to or are associated with. So I really don't have a basis for estimating that.
Q Well, if activated particles are being put into a polyurethane solution and they're clustering in some form or fashion, the thickness of those

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particles is going to be greater than 10 microns, correct?
MR. SONG: Objection. Incomplete hypothetical. Calls for speculation.
A Well, I think it all depends upon a number of factors. One, when somebody says that a particle size of a substance is 10 microns, that's usually reported as the average, which means there are bigger ones and there are smaller ones.
So how they pack when they cluster will depend upon a number of things. How it was applied, what you started with. It's very difficult to -- it would be pure speculation to try to estimate what that cluster looks like dimensionally.
Q Well, the inventor and his counsel didn't report a range here. He says it comprised "about 10 microns."
Do you see that?
A I understand that.
MR. SONG: Objection. It mischaracterizes the document. Argumentative.
Q Well, did he report a range for Asbury 5564?

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A No. What I see is one number.
Q Okay. Were you able to get a copy of that product data sheet?
A The Asbury 5564?
Q Right.
A No. I've not seen it.
Q I'm asking because in the document they refer to an attached product data sheet, but I'll represent to you that I've been unable to locate that document for whatever reason. It appears that it wasn't submitted.
Have you ever seen a copy?
A I don't believe I've ever seen a copy.
Q So let's assume that the inventor's characterization is accurate that these particulars were 10 microns.
If they're clustering together, wouldn't the thickness of that particle layer be greater than 10 microns?
MR. SONG: Objection. Incomplete hypothetical. Calls for speculation.
A Well, it would be a pure guess on my part.
Q Give me your best judgment, because we know -- I mean, let me ask you this: To get them to

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lay down in a perfect monolayer, how difficult would that be?

A Quite.

Q Would you agree with me that a person of ordinary skill in the art would assume that these particles are laying down in some sort of clustering fashion?

A I believe that's a realistic model, yes.

Q If the particles are being laid down in a clustering fashion and if they're 10 microns each, that particle layer is going to be greater than 10 microns. Would you agree with me on that?

MR. SONG: Objection. Incomplete hypothetical. Calls for speculation.

A I think the odds are that if one is on top of the other, you're going to end up with a dimension bigger than 10 microns.

Q If your first thickness is 25.4 microns and your particle is 10 and you got this clustering phenomenon going on, which is what's expected by a person of ordinary skill in the art, that thickness ratio wouldn't be met unless second thickness means particle size, correct?

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MR. SONG: Objection. Incomplete hypothetical. Calls for speculation. Vague as to "clustering" and vague as to "configuration."

A All I can tell you is, first of all, I understand this was a correction in an addendum. So where the 10 micron thing comes from, I have no idea.

But if you take two 10 micron things and put them on top of each other, you're going to end up with 20 or something slightly less if they're tipped. Right? So the ratio would be considerably less than the 2.5.

Q If the definition of second thickness means particle size, that ratio would be met, correct?

MR. SONG: Objection. Calls for speculation. Vague as to "particle size." Lacks foundation.

Q Well, let me ask you more directly.

If second thickness means particle size and you're dealing with a 10 micron particle and you're dealing with a first thickness of 25.4 microns, the claimed ratio of 2.5 to 10 will be met if second thickness means particle size, correct?

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MR. SONG: Objection. Calls for a legal conclusion. Mischaracterizing as to particle size as construed. Incomplete hypothetical. Calls for speculation. Lacks foundation.

Q You can answer.

A Okay. That conclusion is reached if every particle is 10 microns. And I submit to you that that is not the case and we have no proof of that and I've not measured the particle size of this particular substance independently.

And it would be extraordinarily rare if you have a product such as this, all of whose particles are 10 microns and no other, none larger, none smaller.

Q Well, here the inventor said that the particle size was 10. So let's take them at face value.

Would you agree with me that if second thickness means 10 microns, in the case of this example in the patent, that that 2.5 to 10 ratio would be met, correct?

MR. SONG: Objection. It calls for a legal conclusion. Incomplete hypothetical. Lacks foundation.

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A Okay. If and only if, okay, if it were 10 microns, dealing with that number alone, any clustering of those particles would obviously create a dimension that's thicker than 10 microns and the ratio wouldn't be met.

Q If the second thickness means particle size, the ratio would be met, correct?

MR. SONG: Objection. Lacks foundation, "the second thickness means particle size." Incomplete hypothetical. Lacks foundation.

Q You can answer.

A Well, again with the provisors if and only if, yes.

MR. GERGELY: Why don't we do a break for lunch? So like an hour, is that good?

MR. SONG: Whatever you want.

- - - - -

(Recess taken.)

- - - - -

BY MR. GERGELY:

Q Sir, back to your declaration, paragraph 95 on page 41.

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A Yes.
Q You said that you thought Dutta taught away from the claimed invention because the film is substantially smooth.
Do you see that?
A Yes. Yes.
Q Well, Dutta was just saying that one side is substantially smooth, correct?
MR. SONG: Objection. Counsel's testifying.
A Well, he did say that the -- one of the surfaces is substantially smooth. And that is different from what you would expect with the active particles in the Haggquist invention.
Q Dutta actually said that those Sephadex particles were partially embedded, correct?
MR. SONG: Objection. Mischaracterizes the document. Calls for speculation. Please refer to the particular document, Counsel.
A Well, yeah, let's look at that if you have a moment here.
Exhibit 9, right?
Q Yes.
A The top of page 11, it says, "In order for the

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polymer film to be air impermeable, it is necessary that hydrophilic absorbent particles are at least partially embedded in the polymer resin."
Q Okay. So the inventor's not suggesting to totally bury them, he's just saying that they have to be at least partially embedded, correct?
A Yeah. And it goes on to say so "at least one surface of the film is substantially smooth by being free of the particles." Yes.
Q So that doesn't say that both surfaces have to be substantially --
A No, it doesn't say both surfaces certainly have to be.
Q In terms of exposing the particles, did you review Dutta's disclosure of an alternate embodiment which has two discrete layers?
MR. SONG: Objection. It calls for speculation. If counsel would like to point to a specific passage --
A Yes, could you --
Q Page 12, lines 23 through 30.
A Yeah, he said that that's -- preferred method is the blending. There's an alternative

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method. And in his words, "a layered arrangement of the polymer resin and the hydrophilic absorbent particles."
Q Did you review that passage prior to today?
A Yes.
Q Nonetheless, you felt that Dutta taught away from a two layer arrangement?
MR. SONG: Objection. It calls for a legal conclusion as to "taught away."
Also I'll object to the extent it's inconsistent with the prior line of questioning.
Q Well, sir, as I understand your testimony, you're saying you believe Dutta teaches away from the combination of Dutta with Haggquist because Dutta suggests that the Sephadex particles be at least partially embedded and so that at least one layer -- excuse me, one surface is substantially smooth, correct?
A Right.
MR. SONG: Objection. It calls for a legal conclusion as to "teaching away."
Q Would you agree with me that the passage we

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just looked at on page 12 would actually suggest that the particles can actually be layered on top of the polymer resin?
MR. SONG: Objection. It calls for speculation.
A The wording does indicate that while a preferred method is -- called it homogenous. There is an example that he cites where you could create a useful product where you sprinkle active particles on top of the resin -- on tope of the film.
Q In that case the particle would be exposed to the air, correct?
MR. SONG: Objection, calls for speculation.
A Well, I don't know what they would look like, but, you know, when he says "distributed over the film," again, are we talking about uniformly or partially embedded, totally embedded? I don't want to read into his thoughts.
Q Okay. You also reviewed the Halley reference, correct?
A Yes.
MR. SONG: Is this from

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Haggquist also?
MR. GERGELY: No.
Would you mark that as Exhibit 13.
- - - - -
(Petitioner's Exhibit Daniels 13 was marked.)
- - - - -
Q Sir, I've handed you what's marked as Daniels 13.
Is this the Halley reference you reviewed in connection with your declaration?
A I believe it is, yes.
Q In paragraph 98 you state that you believe that "Halley does not disclose 'active particles,' 'first thickness,' and 'second thickness.'"
Is that right?
A Correct.
Q We can get to active particles later, but is your issue with first thickness and second thickness the same analysis as your analysis of Dutta, that these materials are mixed together rather than forming discrete layers?
MR. SONG: Objection. It mischaracterizes the witness' testimony. Vague and ambiguous as to the word "issue."
A My belief is that Halley doesn't rely on the

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presence of a first and second thickness.
Q Okay. Is that based on what you believe to be the correct claim construction?
A Yes.
Q You understand that the board has taken the position that first and second thickness do not necessarily mean two discrete layers? You understand that, correct?
A With respect to the Haggquist patent?
Q Correct.
MR. SONG: Objection. Sorry a little late. Calls for a legal conclusion as to "claim construction." It mischaracterizes "first thickness" and "second thickness." It lacks foundation.
A Well, as I said, I understand what the board interpreted, but my reading of this patent, he being Dr. Haggquist, is that he finds that to be an important and functional structure in the product that he's describing in his invention.
So briefly said, the board has their opinion and I have mine when I read this patent.
Q Okay.
A And that's what I've expressed.

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Q So if the board's construction is correct, would Dutta and Halley both show a first and second thickness?
MR. SONG: Objection. It lacks foundation. Incomplete hypothetical. Calls for speculation.
A I'm a little confused. Are you asking me if the board interprets, let's say, Halley's patent as citing to --
Q No. No. No.
A -- or is it --
Q Well, the board has a claim construction which you're taking issue with, correct?
A Correct.
Q If the board's construction is correct, would Dutta show first and second thickness?
MR. SONG: Objection. Incomplete hypothetical. Calls for speculation. Lacks foundation.
A I'm not certain how we get there. Are you talking about with respect to the what I'm going to call a nonpreferred construction that we just discussed in Dutta?
Q No. The preferred one.
A The preferred one.

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Q Yeah.
A It's not clear to me how we would interpret that as being a two layer.
Q Right. I'm asking you. The board has construed the first thickness as possibly including the active particles. So if the board's construction is correct, would Dutta show that first thickness and second thickness?
MR. SONG: Objection. Incomplete hypothetical. Lacks foundation. Calls for a legal conclusion as to "construction."
A I have a difficult time with that, simply because the foundation for the claims in the Haggquist patent clearly show a two-step process by which he constructs his workable examples. Unfortunately I'm biased by what I saw under the microscope as well. We'll leave that alone for a moment. We'll get there.
Q Yeah. Well, those aren't in the patent. Those are --
A I understand.
Q Those are commercial embodiments.
A I understand. I understand. So we'll just set that aside.

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I can't get to a two layer construction per your question if the board is correct. I mean a two component construction, I'm okay with those words. Two layer, I don't see how you get there.

Q Well, I think the way the board is getting there and what Dr. Haggquist and his attorney told the PTO was that the second thickness was based on particle size. If that logic holds, would there be a first and second thickness disclosed by both Dutta and Halley?

MR. SONG: Objection. Asked and answered. Incomplete hypothetical. Lacks foundation. Calls for speculation.

A I guess my answer still remains the same. I don't see how you can get there based on the claim constructions of either Halley or Dutta compared to the claim construction in Haggquist. It seems to be pretty explicit in Haggquist what he's trying to do, what he's accomplished.

So I don't -- I think the attempt on the part of the board is to misconstrue what Haggquist said, or misinterpret it at least. And, you know, if that's allowed then, well,

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there you have it, but I don't agree.

Q Okay. With respect to active particles, Halley does disclose admittedly some active particles, correct?

MR. SONG: Objection. Vague as to "active particles." It mischaracterizes the document.

Counsel, if there's a specific passage, a reference, that would be appreciated.

Q Well, I understand you're contesting that carbon black is active, correct?

A My contesting is this way. It's an important distinction to talk about the degree of activity. And I think I made the point in my declaration.

There's a distinct scientific, commercial, and functional difference between an activated carbon particle on it's literally activated, versus one that has a high surface area and can be interpreted or construed as being active. They're not interchangeable and never should be.

Q Well, let's take a look at the list in Halley on page 3.

A Page 3. Okay.

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Q So Halley states that "A preferred particulate solid is carbon particles. Other particulate solids include inorganic particulate materials, pigments, metal oxides, metal salts or metal particles. Further particulate solids include particles of titanium dioxide, zinc oxide, iron oxide, aluminum oxide, silica, talc, mica, tin or silver."

Do you see that?

A I do.

Q Titanium dioxide is one of the particles that Dr. Haggquist disclosed as an active particle, correct?

MR. SONG: Objection. It mischaracterizes the document referenced. Calls for speculation.

A Titanium dioxide was called out as an example in the Haggquist patent. And my interpretation of it and I think the intended interpretation of it was that it was a high enough surface area material to be considered an active particle.

What I looked for and didn't find in Dutta or in Halley -- let's talk about Halley. Let's stick with that for the moment -- is any

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reference in this that calls out the importance of an active -- by name active material, a so labeled active material. I mean, we can agree that some of these materials can be active, but the functionality of activity in my reading of this document is not specified.

Q Well, if Haggquist says titanium dioxide is active and that was known in the art, according to his patent publication, by definition isn't titanium dioxide an active particle for purposes of this analysis?

MR. SONG: Objection. It mischaracterizes the document referenced. If counsel would like to refer to the Haggquist application for the specific language, that would be acceptable, otherwise it calls for specification.

Q Well, we've been through the list in Haggquist and he lists titanium dioxide as an active particle, correct?

A Yes, he does.

If Halley had specifically stated that these were active particles and the active particle portion of his invention was critical to its function, that would be one conclusion

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you would directly come to.
But simply saying because I can have titanium dioxide in my composition of my material doesn't necessarily mean I've included it, because its intention is to be an active particle contributor to the functionality of the material.
There's titanium dioxide in your toothpaste and in your vinyl siding. It's not there because it's an active particle. It's an active particle by definition because it has a measurable surface area, but its function is totally different.

Q Well, you're talking about purpose versus properties, correct?

A I am.

Q Okay.

A I am.

Q I'm talking about properties. Because we can equivocate about intent and purpose all day long, but the properties would be active, correct?

A I understand that. I cannot and will not speculate on what Halley's intention was for utilization of titanium dioxide or any of these

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others unless he specifically tells me that it was there for this purpose or that purpose. Because it's there doesn't necessarily -- isn't necessary for me or a requirement for me to assume it's there because it's an active particle. I think that's calling for an assumption on my part quite frankly I'm not capable of making.

Q Irrespective of purpose, would you agree that titanium dioxide is an active particle as defined by Haggquist?

MR. SONG: Objection. Lacks foundation. Mischaracterizes the document. Calls for speculation.

Q In terms of its properties.

A It is among that list of materials that Haggquist cites as active particles. So we can make the assumption that that's how he was describing it in that list of active materials.

Q Is the same true with respect to the zinc oxide, aluminum oxide, silica?

A Well, I have to go back and look at Haggquist, but if they're cited in Haggquist as active particles, they're there for a reason because they're active particles.

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Q Okay. Now let's talk about Black Pearls 2000, which is the specific particle that Halley used.
Would you agree with me that Black Pearls 2000 has a high surface area?

A You know, I've never seen a specification sheet for Black Pearls 2000, so I really can't answer your question.

Q Would you agree with me that Black Pearls 2000 has been described in the literature as adsorbing water?

MR. SONG: Objection. Vague as to "the literature." Calls for speculation. Lacks foundation.

A I've not and I don't recall the direct reference between -- that you're citing that stipulates that Black Pearls 2000 absorbs or adsorbs water. I've not seen that specifically, so I can't speculate.

Q Did you review the Wang reference that Dr. Oelker cited with her petition -- with her declaration?

A No. Specifically I did not with the Wang reference.

Q Do you know what I mean by "pore volume"?

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A Yes.

Q What's the metric for expressing pore volume?

A Usually in volume units per gram of material.

Q Like a cubic centimeter per gram?

A Something like that is fine.

Q Okay. Or maybe -- yeah.

A Yeah.

Q Do you know what the pore volume is for activated carbon?

A I've only seen approximations of those and they can range all the way up to, as I said earlier this morning, to several thousand square feet. That's a terrible measure.

Q Well, that's surface area though, right?

A I'm sorry. Surface area. Pore volume -- pore volume is what you're asking about?

Q Yeah. Pore volume's different.

A Sorry.

Q That's three-dimensional?

A No. No. I don't know off the top of my head know the typical pore volume of an activated carbon. I wouldn't want to be guessing.

Q Okay. With respect to surface area, have you ever reviewed Dr. Haggquist's declaration from the file history where he states that active

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particles have a surface area of up to 1,000 meters square per gram?

MR. SONG: Objection. Mischaracterizes the document. Calls for speculation. Lacks foundation.

Q Let's take a look at that.

A Is that one we've already examined?

Q I don't know that we have.

- - - - -

(Petitioner's Exhibit Daniels 14 was marked.)

- - - - -

Q I've handed you what's been marked as Daniels Exhibit 14. It was previously marked as Haggquist Deposition Exhibit 7.

A Okay.

MR. SONG: Is that one of the petitioner's exhibits?

THE WITNESS: Yes.

MR. GERGELY: No, it was not. This was introduced during Dr. Haggquist's deposition.

MR. SONG: I'll just object as to scope. The witness has not cited or referenced the document in his direct testimony, the document has not been identified

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in the deposition notice. It lacks authentication. It lacks foundation. It constitutes hearsay. It potentially calls for speculation. The witness has not had an opportunity to read the document.

Q Sir, I'll represent to you that this declaration was from the file history of the '287 patent.

MR. SONG: Sorry to interrupt. Peter, may I have the same standing objection?

MR. GERGELY: Yes, of course.

Q Sir, drawing your attention to paragraph 6 of Dr. Haggquist's declaration.

A Okay.

Q He says, "An active particle is an organic or inorganic material that has the capacity to adsorb or trap substances, including substances that may be a liquid and/or gas. It is the complex surface of the particles, sometimes on the order of 1,000 meters square per gram in surface area, that give the active particles their capacity to adsorb."

A Okay.

Q Would you agree that those are accurate

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statements?

MR. SONG: Objection to the extent that it is incomplete and that there are two sentences remaining in that paragraph and that paragraph constitutes a complete statement.

A Well, I've read what has been written so far and so far we're okay.

Q Okay. You threw out a number before. You said something like several thousand.

A Square feet.

Q So you're referring to square feet?

A Square feet.

Q Which is different from meters squared?

A Different from meters squared, yeah. Remember meter is approximately 3 and a fraction feet.

Q Got it.

In paragraph 7, Dr. Haggquist goes on to say that "The term 'active particle' is used throughout the industry to refer to all or any type of active particles comprising an organic or inorganic material which has the capacity to adsorb or trap substances."

Do you see that?

A I do.

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Q Do you agree with the accuracy of that statement?

A I think that's fine.

Q And then he goes on to state, "As all organic or inorganic active particle materials operate similarly by trapping substances in an active particle surface, it is known in the art that an active particle used in an example process or mixture may be replaced by any other active particle to obtain a substantially similar result."

Do you see that?

A I see that.

Q Do you agree with the accuracy of that statement?

A I think that's a practice that's been done, yes.

MR. GERGELY: Can we mark this one as 15.

- - - - -

(Petitioner's Exhibit Daniels 15 was marked.)

- - - - -

MR. GERGELY: This one as 16.

- - - - -

(Petitioner's Exhibit Daniels 16 was marked.)

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- - - - -

Q Dr. Daniels, I'm handing you what's been previously marked as Haggquist 8 and 9 and we've marked the Daniels 15 and 16, which are two articles by Wang.

MR. SONG: Are both of those exhibits petitioner's exhibits?

MR. GERGELY: The first one is.

MR. SONG: Which one is the first one?

MR. GERGELY: The first one is --

MR. SONG: Daniels 15?

MR. GERGELY: VF Exhibit 1028, which is really Daniels 15.

MR. SONG: So I'm going to object to Daniels 16. It's outside the scope. It's not cited or referenced in the witness' direct testimony. It is not identified in the deposition notice. It constitutes hearsay. It has not been authenticated under 901 or 902. It lacks foundation. It calls for speculation to the extent he answers questions based on Exhibit Daniels 16.

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Q Sir, did you have a chance to -- well, I think you already answered this. You said you did not review Wang prior to doing your declaration?

A Right.

Q The Wang article, which is Daniels 15 -- take a look at Section 2.1.

Do you see under 2.1 where the author states that "Black Pearl 2000 (BP) has a surface area of 1,475 meters square per gram and a particle size of 15 nanometers"?

A Yes, I see that.

Q So would you agree that that is a relatively high surface area as compared to activated carbon?

MR. SONG: Objection. Vague, ambiguous as to "relatively high." Calls for speculation.

A Well, I don't have a reference point, again, on the activated carbon piece, but I guess if you're asking does it approach the 3,000 meters squared per gram claim of an activated carbon, is that your reference point?

Q Well, in Dr. Haggquist's declaration, which we just looked at, he said active particles have a surface area up to 1,000 meters square per gram.

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A 1,000 meters square. Sorry. Right.

Q So this reference states that Black Pearl 2000 has a surface area of 1,475 meters square per gram.

A Okay.

Q I'm asking you: Is that relatively high as compared to what Dr. Haggquist discloses as being active?

MR. SONG: Objection. Vague and ambiguous as to "relatively high." Calls for speculation. Lacks foundation.

A It's just shy of one and a half times as much to be quantitative.

Q And then on over to the next page, which there's a Figure 2 and then there's text below Figure 2. Are you with me?

A Yes.

Q The author states in the text, "From the viewpoint of tailoring surface properties, BP powder in possession of high surface area and capability to adsorb water offers a better contact with electrolyte ionomer than does VC."

Do you see that?

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A I see that.

Q So this author is stating that BP, Black Pearl, has a capability to adsorb water.

Do you see that?

A Yes.

Q Okay. Are you aware of any reference which states that Black Pearls 2000 does not adsorb water?

MR. SONG: Objection, calls for speculation.

A As I said earlier, I have really not a lot of background information on the properties of Black Pearl 2000. So to answer your question, no, I've not seen anything.

Q You're not what?

A I have not seen anything that suggests it could not and so forth.

Q Sir, take a look at Daniels 16, which is the other Wang article.

A Okay.

MR. SONG: Same objections I stated as to Daniels 16.

MR. GERGELY: Yes.

Q Sir, I'd like to draw your attention to Section 3.1 of the document. It's on --

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A Okay.
Q -- page 4911.
A Got it.
Q There's a section called "Physical properties of carbon powder."
A Uh-huh.
Q In the text the author states, "The surface area varies greatly from 62 meters square per gram for Acetylene Black to 1501.8 meters square per gram for Black Pearls 2000."
Then the author goes on to state, "This can be explained by the tremendous difference in pore volume and pore size distribution. The Black Pearls 2000 reveals smaller particle size and larger pore volume as compared to Acetylene Black, from which we can deduce that the MPL made of Black Pearls 2000 involves more micro-pores than that of Acetylene Black."
Do you see that?
A I see that.
Q Earlier I was asking you about pore volume and in Table 2 the pore volume of Black Pearls 2000 is described as 2.67 cubic centimeters per gram.
Do you see that?

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A I do.
Q In your experience as a person of ordinary skill in the art, is that a relatively high pore volume as compared to activated carbon?
MR. SONG: Objection, calls for speculation. Vague and ambiguous as to "relatively high."
A Again, I don't have a reference point with respect to the various pore volumes that are capable of being produced in activated carbon, so I would have to see much more information to place Black Pearls 2000 in the field of pore volumes of activated carbon. It would be at this point just a guess as to whether or not I think that's high, medium, or low.
Q Okay. Are you aware of what the pore volume is for any active particle that we've discussed today?
MR. SONG: Objection. Vague as to "any pore volume." Calls for speculation. Lacks foundation.
A The answer to your question is no. I hope we all understand that the pore volume of a material when it's measured is specific to that material. Every substance of a given chemical type may have a range of pore volumes and even within the sample may have a range of pore volume. So this is a nominal value for this particular sample of Black Pearls 2000. Whether they're all like this, I have no idea.

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Q Will you agree that based on the Wang articles we've seen that Black Pearls 2000 has been described as a porous material?
MR. SONG: Objection. The documents speak for themselves. Calls for speculation. Lacks foundation.
A Well, the fact that you can measure a pore volume I think pretty much predisposes it to have porous structure.
Q Would you agree that in Daniels 15 Wang has described Black Pearls 2000 as having the capability of adsorbing water?
MR. SONG: Objection, calls for speculation. It mischaracterizes the document.
A In the previous reference we looked at?
Q Correct.
A Yes, he did say that.
Q Okay. At the bottom of 98 in your declaration --

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A Oh, I'm sorry.
Q Sorry. Yes.
A No problem. Too many numbers.
Q Daniels Exhibit 1, your declaration, paragraph 98, you state that "Indeed, a POSITA understands that carbon soot is too small to be processed into activated carbon, and Dr. Oelker fails to acknowledge this high-relevant fact."
Do you see that?
A Yes.
Q What do you mean by "too small"?
A Well, I think we just saw an example of the lampblack or that type of carbon product. And it doesn't create a highly porous high surface area material relative to other structures. As we've read, the surface area depends on the size and the size of the pore volume.
This particular version of carbon you're looking at something that's on the low end of the spectrum, simply because it doesn't have the physical features to be functional and have a high pore volume.
Q Well, we know that Black Pearls 2000 has a surface area higher than what Dr. Haggquist claimed for active particles, correct?

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MR. SONG: Objection. It mischaracterizes the document. It calls for speculation. It lacks foundation.

A The numerical values associated with that particular Black Pearls 2000, as I said, was about just shy of one and a half times what Dr. Haggquist cited in his reference.

Q Okay.

A Okay.

Q With respect to pore volume, we know that Wang described Black Pearls 2000 as having a pore volume of 2.67 cubic centimeters per gram, but you're not aware of what the pore volume may be for other active particles, say activated carbon or silica gel or anything else, correct?

MR. SONG: Objection. Lacks foundation. Calls for speculation.

A Right. I would only be guessing as to what those pore volumes or those surfaces areas are without actually seeing some hard data on the materials.

Q Right. So you can't say that Black Pearls 2000 has a relatively small pore volume without seeing other data, correct?

A I can't place it, as I said, on the spectrum of

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high versus low versus medium without seeing other data.

Q So back to your declaration. When you say that carbon soot is too small to be processed into activated carbon, what do you mean? Do you mean by --

A Physical size.

Q The diameter is small?

A Right. Physical size.

Q Because Wang -- well, what did Halley say the size of these particles were?

MR. SONG: Objection, calls for speculation.

Q Well, are you -- I think in his preferred embodiment he said that the Black Pearls 2000 was something on the order of was it 13 or 15 nanometers?

MR. SONG: Objection. Calls for speculation. Mischaracterizes the document. If you would like to refer to the document, you may do so.

MR. GERGELY: Sure. Why don't we take a look at Halley.

Q So page 7 of Halley.

A Page 7.

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Q It looks like under "Example 1" he says that the "mean particle size 13 nanometers."

MR. SONG: Are you at line 20?

MR. GERGELY: Yeah.

A Yes.

Q So is that what you were referring to as being too small to be processed into activated carbon?

A 13 nanometers or carbon soot? I was referring to carbon soot.

Q Oh, okay. Well, in paragraph 98 you were referring to carbon black or soot in Halley. So I guess what was your thought on what she was referring to or what Halley was referring to?

MR. SONG: Objection. It calls for speculation.

A I'm a little confused here. I thought it was pretty specific. When I said that carbon soot is too small, I'm specifically referring to carbon soot.

Q Just generally?

A Just generally.

MR. SONG: Objection.

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Q I understand. So you're not necessarily referring to Black Pearls 2000, right?

MR. SONG: Objection. Mischaracterizes the witness' testimony.

A I did not call out Black Pearls 2000 in this specific -- in that specific sentence, no.

Q Understood. So what is the diameter size of carbon soot?

A Pretty small. I don't know exactly what it is, but it's extremely small.

Q Can you give me a range?

A I can't. All I know is if you've ever gotten it on you, it penetrates very quickly. It's a very small particle, but I don't know the exact -- I've never measured it, but it's small.

Q Is it less than a micron?

A That would be a total guess. I really don't know.

Q Okay. Well, you're taking the position that it's too small and so I'm trying to get a handle on what "too small" means.

A I understand, but since I don't have a size to give you, it would be a wild guess on my part as to what that carbon soot diameter is without

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actually doing the measurement.
Q Well, I guess that's what I'm trying to get at. How can you conclude that carbon soot is too small to be processed into activated carbon unless you know how big it is?
MR. SONG: Objection, argumentative.
A My point is that it is one of the finer -- finest versions of carbon. In fact, very difficult to handle at all relative to the carbon blacks that are usually incorporated in other materials. So if I had a number, I would give it to you, but it would be a total guess on my part.
Q Okay. Well, what type of particle would be large enough to be processed into an activated particle?
MR. SONG: Objection. Outside the scope. Calls for speculation. Lacks foundation.
A I'm not a carbon black particle expert with respect to size and pore volume correlations, so, again, it would be pure speculation on my part to be able to define for you what that critical level is without actually seeing some

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hard data.
Q So we have your conclusion, but you can't tell me how small is too small or how large is acceptable, is that right?
MR. SONG: Objection, asked and answered.
A That what I said. I said unless I had some numbers to go by, it would be a complete guess on my part where the demarcation line would be to be either too small or too large.
Q Do you believe that 13 nanometers is too small?
MR. SONG: Objection, asked and answered.
Q That being the diameter of Black Pearls 2000.
A I think in the case of the Black Pearls 2000 you have an average particle size of around, what did we say, 13 microns.
Q Nanometers.
A Sorry. 13 nanometers. And we've already said that there are citations which call out the fact that it can absorb water. So my guess is the 13 nanometers average particle size and the water absorption characteristics of Black Pearls 2000 says it must work in terms of absorbing water. How much, I don't know. How

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quickly, I don't know.
So, again, putting it into context of is it too small, too large, or just right, it's a little bit of a Goldilocks phenomenon I'm trying to deal with here. I don't know where the demarcation lines lie with respect to optimum performance or acceptable performance, unless I would see that kind of information for various varieties of the carbon black materials.
Q Sir, turning your attention to Halley --
A Okay.
Q -- which is Daniels 13. I'd like to draw your attention to Table 1 on page 8.
A Okay.
Q Do you understand Table 1 to be disclosing a control and then three experiments with the added Black Pearls 2000?
A Yes.
Q As I understand what you're saying, Table 1 is not relevant because the MVTR ranges are outside the claimed range, is that right?
MR. SONG: Objection. Calls for speculation --
A I don't believe --

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MR. SONG: Legal conclusion.
THE WITNESS: Sorry.
A I don't believe I said that about Table 1. What I said about Table 1 was that there's some peculiarities in how the material responds to the increase in particle percent weight.
In the first place these numbers are not very different from one another, whether it's 17,000 or 16,000 or 14,000. We'll leave that alone for a moment.
But if you accept the direction in which they go, it seems to suggest that if I put more in I get poor or lower MVTR or no change at all.
So the point I was making with respect to my criticism, particularly of Oelker's interpretation of Table 1, was with the MVTR values are nearly invariant, depending upon the amount of carbon black that you put in or the samples 1 through 3.
My point is if the carbon is allegedly improving the MVTR, you would expect to see something fairly consistent and directionally increasing with the amount of carbon black

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contained in the material. And that's not seen.

Q Well, it appears to go up, then down, then up.

A Well --

MR. SONG: Objection. There's no question pending.

A Okay. It may appear to be that way, but you've got five times as much in sample 3 than you have in sample 1. And you have a whole lot more than the control. Okay. The control is lower than the group of three. So if the carbon black is really enhancing the MVTR performance, it's not doing it very effectively.

Q Well, in terms of percentage, Halley is adding -- do you understand the particle weight as a percentage of the membrane to be .3 percent in the first example?

A Yes.

Q And then the second example is .65, right?

A Correct.

Q And then the third example is 1.5?

A Right.

Q In each three of those examples, as compared to control, the MVTR is an improvement over the

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control, correct?

A I will grant you that.

MR. SONG: Objection. Vague as to "improvement."

Q You said he's not doing it very effectively, but in terms of particle loading, these percentages are significantly lower than what Halley -- excuse me, than what Dr. Haggquist was doing, right?

MR. SONG: Objection. Vague as to "significantly lower." Lacks foundation. Mischaracterizes Haggquist's testimony.

A I guess I'm missing the point. Let's not compare apples and oranges, because within Halley's construction you're starting out with a known composition of the control, to which he is adding various amounts. I think it's unfair to say well, I'm getting a better value here without considering the fact that the material of construction is different in the Haggquist patent versus this.

So if we take each of those by themselves, certainly the control versus that with the additional carbon is lower. I think

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that's probably outside the normal experimental error.

As you proceed through the samples 1, 2, and 3, I'm not seeing the improvement that I would expect if this material of choice were really doing the enhancement that Halley expects or tries to get you to believe should have happened. And that was the point I was trying to make.

Q And then Table 2, I think you pointed out that the MVTR is actually going down in the experiment versus control, that there's no improvement, correct?

A Well, again it depends upon what the accuracy and reproducibility of the measurements are, none of which were ever disclosed in the patent application. So I don't know whether that difference is real or whether that difference is within experimental error. But there again you're not seeing the big difference if you accept those as averages or reproducible results.

And that's the other point. Are these one-off measurements a series of three, a series of five? You just don't know. So you

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take the numbers at face value when you compare them to one another. Nothing seems to be happening.

Q And then in Table 3, which is the "fabric & membrane & dots," all of the experiments versus control independently show an improvement over the control, correct?

A The values are higher, but again, there's this odd happening that you seem to reach a value in the 7700 range and then you drop off at one and a half parts, which is inconsistent with more is better.

Q Well, Dr. Haggquist didn't claim more is better, he just claimed an improved MVTR, correct?

MR. SONG: Objection. Calls for speculation. Mischaracterizes the underlying testimony.

A Well, let's go back to the fundamentals here. We're adding this material allegedly to provide increased surface area to improve the amount of adsorbed moisture. I'm just focusing on each set of experiments independent from one another.

I look at those numbers and I say I'm not

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seeing the improvement you would anticipate comparing one amount to more to even more. If that's what it's doing and that's the intention to which it is being added -- for which it's being added, you're not seeing the improvement. You can't argue with the numbers.

Q Well, I guess I will argue with the numbers.

A Okay.

Q In terms of Haggquist, in his up cup method of measuring MVTR, he was showing improvements similar to what Halley was showing, correct?

MR. SONG: Objection. Mischaracterizes the underlying document. Lacks foundation. Calls for speculation. Counsel's testifying.

A I would have to go back and look at Haggquist's numbers.

Q Okay.

A But, I mean, this is a more extensive study with respect to amounts than I think -- especially since there's several iterations. That would be which exhibit again?

Q Oh, Halley -- excuse me. Haggquist was -- excuse me. It was Daniels 10.

A 10. Okay.

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Q So take a look at Figure 2 in Daniels 10.

A Figure 2.

MR. SONG: Can we have a break now? Do you want to finish a couple more?

MR. GERGELY: No, that's fine. Let's take a break. Let's take a break.

- - - - -

(Recess taken.)

- - - - -

BY MR. GERGELY:

Q So, sir, why don't you take out the '287 patent, which is Daniels 10, and then compare it to Table 3 on Halley, which is Daniels 13.

A Okay. So, again, we're comparing Figure 2 '287, correct?

Q Yeah.

A Against table which?

Q 3.

A 3. Okay. All right. Well ...

Q I would like to draw your attention to Figure 2 of the Haggquist '287 patent, specifically the control and the inverted cup method.

Do you see that?

A Okay. Control in the inverted cup, 6356.

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Q Yes.

A Okay.

Q In the next example he adds 20 grams of carbon, 10 grams of surfactant?

A Right.

Q And he sees a modest increase to 6631.

Do you see that?

A I do.

Q That's, what, on the order of 4 or 5 percent?

A Yes.

Q And then in the next example he adds 40 grams of carbon and 20 grams of surfactant, and then he gets another increase over control of about, what, about 800 grams per meter square per day versus control?

A Versus control.

Q Is that roughly, what, a --

A 12 percent.

Q A 12 percent increase?

A Yeah.

Q And then in his next example he loads even more carbon in. 80 grams of carbon, 40 grams of surfactant and he sees an increase of about 320 versus control, correct?

A Yes.

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Q So he's back down in the 5 percent improvement range, right?

A Right.

Q Now drawing your attention over to Halley, Table 3, he adds about .3 percent on a weight percentage basis of carbon particles and he sees an increase of about 1400 versus control.

Do you see that?

A Yes.

Q So that's over 20 percent, correct?

A Correct.

Q And then he adds yet more in the next experiment and he sees about the exact same improvement, about 20 percent.

Do you see that?

A Yes.

Q And then in the last experiment he adds yet more and then he actually see a decrease versus the last experiment but still an improvement.

Do you see that?

A I do.

Q So in the last experiment he's about 10 percent better than control, right?

A Yeah. That's fine.

Q So as compared to Haggquist's up cup -- excuse

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me, inverted cup method, the improvement over control in Haggquist is actually better than what -- excuse me.

The improvement over control in Halley is actually better than what Haggquist reported for his inverted cup method --

MR. SONG: Objection.

Q -- is that correct?

MR. SONG: Sorry. Objection. Vague as to the term "better." Incomplete hypothetical as to the experimental conditions of Halley. That calls for speculation.

Q Well, on a percentage basis Haggquist is getting -- excuse me.

On a percentage basis Halley is getting better result than Haggquist, correct?

MR. SONG: Objection. Incomplete hypothetical. Vague and ambiguous as to the term "better results." Calls for speculation.

A Okay. I think you can't ignore and I think there's a tendency to do so. First of all, we don't even know specifically the composition structure characteristics of the urethane. We

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seem to be just focusing on amount of carbon black outcome.

I think it's improper to do that, number 1, because I have no assurance and no knowledge that the material upon which the second layer in Haggquist's case or the additional carbon in Halley case -- we are comparing apples and oranges here.

I mean clearly they both are attempting to show that the amount of carbon black within this grouping has an effect on moisture vapor transmission, but to compare these values in Halley against these values in Haggquist ignores the impact of the other materials within the composition. So it truly is an apples and oranges comparison.

If you want to look at within a group, within a construction, we can discuss whether it's going up or whether it's going down, but to either compare values or percentage increase, it seems to be to ignore the fact that there's more in there that has an effect on the moisture vapor transmission rate than just simply the carbon black.

Q Well, would you agree with me that Halley showed a similar trend to what Haggquist showed in terms of as more carbon was put in, you saw an improvement, and then when yet more carbon was put in in the last example of each reference, the MVTR actually dropped?

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MR. SONG: Objection. Vague as to the type of carbon being referenced in the question. Calls for speculation. Lacks foundation.

A Well, the first thing is I don't know whether --

Q Well, I'm asking you because earlier you were saying that Halley's results were equivocal because there was no clear trend of improving MVTR as you loaded more carbon in. I'm just simply trying to point out to you and would you agree that that same trend is actually shown in the Haggquist '287 patent?

MR. SONG: Objection. Calls for speculation. Mischaracterizes the document not. All of the control groups were discussed in the '287 patent. I'm sorry. Not control group. Not all of the groups and tests were discussed in the Haggquist patent. Incomplete hypothetical.

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A Well, there's a couple things that are not understood with respect to the Halley patent. I don't know whether they're using the up cup or the inverted cup method, number one.

Number two, he has three data points compared to his control, Haggquist has more. The amounts used in the Haggquist patent are considerably different amounts of carbon black versus that in the Halley patent.

The substrate issues which I mentioned are still not described specifically in one case versus the other in terms of how they compare.

So in order for me to say that the trends are the same or the percent changes are more in one versus the other presupposes that I know a whole lot more than I'm being told.

Q Well, on a percentage basis relative to the weight of the material, would you agree with me that Black Pearls 2000 appears to be much more effective than activated carbon?

MR. SONG: Objection. Vague and ambiguous as to "much more effective." Lacks foundation. Calls for a legal conclusion.

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A I don't think you can conclude that independent of the other materials within the construction of the membrane that he's testing. It's not there just passively. We've seen claims that they're microporous materials. And so I think you have to take the entire system into account before you can make claims that one is more effective than the other.

And I think the same applies in attempting to compare numbers, absolute numbers in one with the other, because there are too many unknowns with respect to the overall composition in one case versus the other.

So I hate to keep using the example, but to me it's an apples and oranges comparison. We can only look at what happens within a given set of information, in a given set of compounds in Halley. Whatever happens, happens. And the same thing in the '287 patent, whatever happens, happens.

Trends in one, trends in the other shouldn't be compared to one another unless you have a whole lot more information and can understand some rationale as to why.

One and a half parts maximum in the

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Halley patent, way out of the range of the first and second experiments controlled in number 1 in the '287 patent. So we're talking about totally different ranges and we're -- I'm being asked to interpolate between these levels and compare them. I just think that's pure speculation without knowing more about the overall construction.

Q Well, the reason I'm asking you this line of questions is because you were critical of the Halley data. Let's set Halley aside for now.

On Figure 2 looking at control versus experiments 1, 2, and 3, on the inverted cup method, what does it tell you about the MVTR improving slightly as the carbon is added in greater amounts and then in the third experiment it tails off when the most carbon is put in?

MR. SONG: Objection. Incomplete hypothetical. The question ignores several of the experimental tests in the figure.

A Well, I will level the same criticism of the data cited in the '287 patent with respect to reproducibility and error bars. I don't know

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them in the '287 patent and I don't know them in the Halley patent.

So whether 7155 is different from 6673 depends upon how many times I run the experiment in my a priori knowledge of whether or not this is a 5 to 10 percent error in his actual measurements or a real 5 to 10 percent difference. I don't know that in either case.

So all you can do is speculate on trends and I think it's an unfair case to do that, especially if you're trying to say well, this one's more effective than that.

Q So if I understood your testimony, your same criticisms of Halley with respect to reproducibility, you could also level those same criticisms at the '287 patent, correct?

MR. SONG: Objection. It mischaracterizes the witness' testimony. It calls for speculation.

A What I'm saying is I have the same lack of information with respect to -- I don't know how reproducible one set of data are in one patent versus the other, whether Haggquist's measurements are more, reproducible with a tighter span than Halley's, or the reverse.

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And the limited set of data here in the Halley situation seems to me to suggest without having more data that there's a lack of -- there's a lack of certainty on my part as to whether there's any trend at all.

Q Now back to your declaration, which is Daniels 1.

A Okay.

Q In paragraph 99 you say that "Second, a POSITA would understand Halley, like Dutta, to involve hydrophilic matter (a hydrophilic coating) that operates solely by absorption and swelling, but with the addition of particulate solids added for strength and abrasion resistance."

Do you see that?

A Yes.

Q The hydrophilic coating is the polyurethane, correct?

MR. SONG: Objection, calls for speculation.

A No. The hydro -- oh, I'm sorry. Yes, with the addition of the particulate solids. No. Stop.

The hydrophilic matter is the combination of the hydrophilic material and the membrane material rendering the whole thing hydrophilic.

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And what I'm contrasting there is the addition of particular solids for strength and abrasion resistance, not for added moisture vapor transmission enhancement.

Q It -- oh, sorry. Go ahead.

A Halley's position is the particulates were added for strength and abrasion. To what does he add it? To what have they been added? This hydrophilic composition, which consists both of the hydrophilic additives and the polyurethane, I guess, material in which it's mixed.

Q Why are you describing Black Pearls 2000 as the hydrophilic additive? Where do you get that from?

A I'm not talking about the Black Pearls 2000 being a hydrophilic additive. I'm talking about some of the other --

Q You're talking about the polyurethane as being hydrophilic, correct?

A Polyurethane is hydrophilic. And also in Dutta -- or rather Halley talking about materials which are not only the hydrophilic urethane for the membrane but also to which he's added -- where am I looking at those.

Q Well, drawing your attention to page 2, lines 24 through 35.

A Right. Okay. You've got the substrate. The porous membrane. Polyethylene. Correct?

Q Yeah. It looks like it could be a number of things.

A Suitable polymers in terms of the hydrophilic polymer material would be -- could be polyurethanes, could be polyesters, polyethers, et cetera.

Okay. So I'm not sure where we're getting to addition of the Black Pearls 2000 as a hydrophilic material. I'm just talking about polymer one --

Q Okay.

A -- on the substrate.

Q So in Haggquist the base material he was using was polyurethane, though, correct?

A Yes.

Q So that is, likewise, hydrophilic?

A Yes.

Q Okay. And Haggquist is adding in activated carbon, which is, what, hydrophilic or hydrophobic?

A Well, it's an adsorbent material. It could be classified as being a hydrophilic. That would make sense.

Q In Halley, Halley is using polyurethane material and adding in Black Pearls 2000. So he's using a hydrophilic base and then he's adding in some material which we can debate about whether it's adsorbent or not, correct?

A Correct.

Q So what's your point you're making in paragraph 99 and 100?

A My point is that the intention of adding of those particular solids were specifically called out by Halley to add strength to the overall structure and abrasion resistance. That was the rationale for adding it.

Q Okay.

A He says that in paragraph 15.

Q I see.

But a person of ordinary skill in the art would be aware of the literature which describes Black Pearls 2000 as adsorbing water, correct?

MR. SONG: Objection. Calls for speculation. Vague as to "the literature."

Q Well, we looked at the Wang references, correct?

MR. SONG: Same standing objection as to Daniels 16.

A If you accept Wang, again, which I didn't review the detail, who alleges that Black Pearls 2000 adsorbs water. That's his contention. Fine.

But in Halley, when he's talking about adding the particulate solid material, he doesn't saying he's doing it for that purpose. He says he's doing it for improvements in physical properties, flexile rigidity, tensile and abrasion resistance. So if he's getting a freebie, he certainly doesn't acknowledge it.

Q Well, sir, a person of ordinary skill would read Table 3 as showing improved MVTR when those Black Pearls 2000 particles are added, correct, versus control?

A You see an improvement, right.

Q Sir, under paragraph 104, you state that "Halley makes no mention of the criticality of the ratio of the dimensions of the composite structure layers. These ratios are described as imperatives in the '287 Patent."

Where does it say that in the '287

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patent, that that's imperative?
A I've got an unbound copy of it and I lost a page of it. So let me find it.
Q Uh-oh.
A There it is.
Q We got it in the right order?
A I think so.
Q So the question was: Where in the '287 patent does the inventor describe the ratios as an imperative?
A Well, in column 9 he describes an example he made where he's attempting to make some specific dimensions of the film and the substrate.

And he says in column 10 under the claims, "A second thickness wherein the first thickness is at least two and a half times larger than the second thickness but less than an order of magnitude larger than the second thickness."

So he cites it there for certain.
Q Okay. So in the claims, but I'm saying anywhere in the spec does he say that these ratios are critical or important?

MR. SONG: Objection,

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vague as to "critical or important."
Q Well, in your declaration you said that the ratio is described as an imperative, and I'm asking you where in the specification apart from the claims is it described that the ratio is imperative?
A It's my interpretation if somebody says it has to be between A and B that that's important. That's how I reached that conclusion.
Q Now, sir, you had mentioned column 9.
A Yes.
Q Well, let's start on column 8.

Do you see in column 8, example 1 Dr. Haggquist states "Polyurethane solutions were combined with protective activated carbon"?
A Yes.
Q He says, "The protected activated carbon was suspended in the polyurethane solution and the mixture was applied to a nylon woven fabric."
A Right.
Q Do you see that?

And that the nylon woven fabric is not part of the cured base material, is it?
A No, not in that example.

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Q Okay. Then it says, "The mixture was dried and cured in an oven, where at least a portion of the protective substance was removed (e.g., evaporated off), resulting in a membrane coated on a substrate, the membrane having a thickness of one mil."

Do you see that?
A Yes.
Q So what's your understanding of what the mixture is? Is the mixture the polyurethane and the activated carbon?
A In example 1, that's my understanding of it.
Q And then when it says "the membrane having a thickness of one mil," is the membrane the activated carbon and polyurethane mixture that's cured?

MR. SONG: Objection, vague as to "polyurethane and activated carbon mixture."
Q Well, it says, "resulting in a membrane coated on a substrate, the membrane having a thickness of one mil."

So what is your understanding of what the membrane includes?
A My understanding is that if we accept the fact

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that the substrate in this particular case is the nylon woven fabric, then the membrane has to be the composition resulting from the mixture of the activated carbon in the polyurethane.
Q Okay. And then on over to the next column, under column 9 the inventor states, "Membranes were also produced by drawing down the mixture on release paper. These membranes were cured and dried in an oven and then removed from the release paper yielding a self-supporting membrane. This membrane was one mil thick."
A Right.
Q What is your understanding of what is included in that mixture?
A Well, let's see what he did in this particular case.

I believe it's the same mixture he was referring earlier.
Q The activated carbon and the polyurethane?
A Well, in this particular case he actually produces a membrane of a mil thickness and then he casts an additional mixture over the top and cures and dries it. So that mixture contains the active layer in the second case when he's

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doing the drawdown over the top of the produced membrane. What's in the original membrane in -- if we're still talking about the same example, would have to be the urethane and the protected carbon.

Q So what's your understanding of what's being done here?

A I think what he's trying to do is produce a two layer structure. So he's producing a cured base layer of approximately 1 mil in thickness. Over the top of that he's using a drawdown bar, space it 1 mil, where he applies a layer, cures it and it shrinks because it evaporates and cures. So he has essentially then a two layer structure.

Q But does he say anywhere in here that it's a two layer structure?

A Does he say that he produces a two layer structure specifically in that example?

MR. SONG: I'm sorry to interrupt. For clarification, are you referring to the specific example 1 or the entire document?

MR. GERGELY: I'm referring to what we're looking at, lines 14 through,

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say, 33.

A He doesn't specifically say he creates a two layer structure here. My presumption is he's attempting to follow the diagram at some point here in Figure 1, which shows the construction of the two layer product.

Q Do you know that?

A With respect to?

Q Back up to column 9, you said that on lines 14 through 18 your assumption was that that membrane was the polyurethane plus the activated carbon, correct?

MR. SONG: Objection. Mischaracterizes the witness' testimony. Vague as to "assumption."

Q Well, it says, "drawing down the mixture on release paper."

Do you see that?

A Yes.

Q Is there any other mixture in here besides polyurethane and activated carbon?

A No. The polyurethane, the carbon, and the protective surfactant is the mixture that he continues to refer to in example 1.

Q Okay. So is it your contention that he's laying down a base of polyurethane and activated carbon and surfactant and then putting another layer of polyurethane activated carbon and surfactant on top of that?

A That was my understanding.

Q Could one also read this as creating a single layer simply comprised of polyurethane and activated carbon?

MR. SONG: Objection. Calls for speculation. Lacks foundation.

A Not if it's done in a two-step process.

Q So let's go with your assumption that this is a two layer membrane.

Lines 14 through 18 states that the membrane is 1 mil thick, correct?

A Yes. Yes.

Q And then if there is a second layer being created with a 1 mil drawdown rod on top of that, the bottom layer would be 1 mil thick and the top layer would be 1 mil thick, correct?

A No. The top layer would be thinner than that because his finished dimension in the first layer would be 1 mil thick. He cites that.

In the second layer using a 1 mil drawdown, you create a 1 mil uncured layer

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which is then going to shrink in thickness once it's cured and any volatile materials are driven off. So the thickness is going to be less than 1 mil, the second layer. Simply because of the mechanics and drawing it down to 1 mil, that creates the initial precured thickness.

I used to do this all the time in making drawdowns. When you heat up the films and cure it, it shrinks.

Q So how much would it shrink?

A Well, it's --

MR. SONG: Objection. Vague as to "how much." Calls for speculation. Lack of foundation.

Q Is it disclosed in this document how much it shrinks?

A It doesn't tell you specifically how much it shrinks, but it's reasonable to assume that it's going to shrink so that it fits within these parameters of two and a half to 10 with respect to the ratios of the two layers.

You're going to get significant shrinkage when you get that evaporative loss. It doesn't specifically measure it, but it's a reasonable

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conclusion to come to that that's his final product outcome.

Q But he doesn't say that in this document, correct?

A He doesn't --

MR. SONG: Objection. Mischaracterizes the witness' testimony. Lacks foundation.

A He doesn't specifically measure it, but it's -- within reason you know it's certainly going to be thinner. And to the degree it shrinks, I think it's a reasonable assumption, given the components, that it's going to be a product that satisfies his two and a half to one order of magnitude construction.

Q Based on what?

MR. SONG: Objection. That's beyond the scope of the witness' testimony. I'll instruct him not to answer.

MR. GERGELY: He was just offering this up. I'm just following up with him.

MR. SONG: I'm going to instruct the witness not to answer. It's outside the scope.

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MR. GERGELY: That's improper. You're instructing him not to answer?

MR. SONG: I'm instructing him not to answer at this point. He testified as to example 1. He was not retained to opine on those specific ratios. So this line of questions falls outside the scope of permissible testimony under the applicable rules.

MR. GERGELY: All right. I guess you proceed at your own risk by doing that.

MR. SONG: Very well, Counsel.

I'm sorry to interrupt. If you would like to call the board, that's fine, and if we're unable to contact the board, just due to the time and the day, in the event our objection gets overruled, we'll certainly make him available subsequent, but currently I'm instructing him not to answer.

MR. GERGELY: Well, he offered up his opinion on what these columns mean and now you're trying to shut him down on

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that. I think that's inappropriate.

MR. SONG: Dr. Daniels is opining solely on example 1 during your line of questioning. You're tying to expand that into more generality that his declaration simply does not touch. So this line of questioning is going to fall outside the scope.

MR. GERGELY: Well, actually, I'm asking him specifically about example 1. He said that he believes that it would meet the claim limitations. So I'm asking him based on what.

MR. SONG: He's telling you that based on his -- based on his experience as a POSITA, once that curing and drying is done, in example 1, it will fall within that range.

MR. GERGELY: I'm asking him based on what.

MR. SONG: I'm going to instruct him not to answer. Anything beyond that -- anything beyond him opining on example 1 is going to fall outside the scope of his testimony.

Q Well, let me ask you this: How can I test the

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veracity of what you're saying?

MR. SONG: Objection. That's argumentative. I instruct the witness not to answer that.

MR. GERGELY: That's not argumentative.

Q How do I test the veracity of what you just said in terms of documentary evidence?

MR. SONG: Objection, asked and answered. As a POSITA, the witness has already answered the question.

MR. GERGELY: All right. Let's call the board.

It's your objection. It's your instruction not to answer. This is your deal. You have to call the board and get them to agree with you to stop the deposition.

I'll remind you that under board practice the only way you can tell a witness not to answer is for privilege.

MR. SONG: And when the scope of testimony -- or scope of the examination falls outside of direct.

MR. GERGELY: All right. So call the board and let's see if they agree with

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you.

- - - - -

(Off the record.)

- - - - -

MR. SONG: So if we don't go down this line of questioning and we're not able to get on the phone with the board today, when we are able to get on the phone with the board, in the event that they deny the request to limit the testimony as I'm instructing the witness, we will agree to reproduce Mr. Daniels.

MR. GERGELY: Right. So are you going to pay for my air travel, my time, my hotel, and all of my other out-of-pocket expenses that are incurred as a result of this?

MR. SONG: No, we're not saying that. We will agree to reproduce the witness, though, in the event that our request is denied.

MR. GERGELY: Well, thanks, but I don't necessarily agree to your offer because, you know, given the time frames that we're working under, I would suggest that you simply allow the witness to answer the question

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subject to objections and if you think it went beyond the scope, you can certainly move to strike. That seems like a much more reasonable approach, rather than dragging the witness and myself back to Cleveland for what will amount to be 15 more minutes of questioning.

MR. SONG: All right. Counsel, your comment is noted.

Can we break briefly?

MR. GERGELY: Sure.

- - - - -

(Recess taken.)

- - - - -

BY MR. GERGELY:

Q Now, sir, I understand you did some technical analysis in this case --

A Yes.

Q -- of sample products.

The first material was called "TNF Laminate Our Print"?

A Yes.

Q Do you know anything about the chain of custody of that material?

MR. SONG: Objection. "Chain of custody" is a legal conclusion.

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Q Well, let me ask you this: Do you know when it was made?

A I don't know when it was made.

Q Do you know who made it?

A I believe in Dr. Haggquist's second declaration he said he did.

Q Do you know how he stored it?

A I do not.

Q Would that be important to you?

MR. SONG: Objection, vague and ambiguous as to "important."

A Well, to the extent we tested it, the first thing we did -- I did was make sure that they were in the original wrapping or packaging. I didn't see any damage, so my assumption was that between the time they were shipped and by the time I got them, nothing had changed in them.

The kinds of properties we were going to measure, if there was any kind of substantive damage or substantive change, it would have been visible under the microscope. We didn't see any. So clearly it's important, but we try to verify independently that nothing had happened.

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Q Dr. Haggquist testified in his deposition that he believed that this print was made somewhere between the time of the provisional patent application and sometime in the 2011 or 2012 time frame.

Assuming this material is six to seven years old, do you have any concerns about whether it degraded over time?

MR. SONG: Objection. It assumes facts not in evidence. Vague and ambiguous as to "concerns."

You can answer.

A Okay. Obviously that's important. And so what would you do to assure yourself that there wasn't anything in the way of degradation or otherwise changing of the integrity of the material?

You would look for the presence of small cracks, water damage, or any of those kinds of things. It would be very apparent when you put it under the microscope of a magnification. We didn't see any of that, so I felt confident that we were looking at something that was stable and undamaged.

Q In paragraph 111 you say, "Based on my analysis

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as well as other information provided to me and my years of experience with materials analysis and elemental analysis, it is my opinion that both samples practice Claim 27 of the '287 Patent."

Do you see that?

A Yes.

Q Did you do anything to verify the thicknesses of the layers?

A No. We couldn't do that, but as I said in Dr. Haggquist's second declaration, he asserted that the thickness is met in the specification of the '287 patent. And also the moisture vapor transmission specification. We didn't run that test independently. We relied upon Dr. Haggquist's data which suggested that it did.

Our objective here was to try to determine the chemical and physical composition of the layer structures and address that point. The rest of those kinds of experiment were really more difficult to do and outside the capability and actually the intent of our testing in total.

Q It would have been relatively easy to take a cross section of this material and measure the layers, wouldn't it?

MR. SONG: Objection. Vague as to "relatively easy." Incomplete hypothetical. Assumes facts not in evidence.

You can answer.

THE WITNESS: Thank you.

A We actually tried to do that. Unfortunately what happens is in a microscope when you take a sharp edge and try to cut it, there's a couple things that happen. It's particularly as a result of the fabric to which it's adhered. That tends to fray. It tends to interfere with your ability to support the fabric and look at it on edge.

I, like you, thought it would be easy to do. Our attempts to do it, we couldn't discern the existence of layers. In fact, we couldn't get enough definition to really be able to do that.

So it was obviously a system that was going to take some much more elegant kinds of sectioning to be able to do that.

Q So you were not able to independently verify that the thickness ratios was met?

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A No, we could not do that.

Q Looking over at paragraph 115, you say that "I was able to see the particles of the pattern from the active layer (the print layer) on the fabric piece."

A Yes. Yes.

Q Help me out here. What is a particle here? Could you point out a particle for me?

A Yeah. What you're looking at is this dot or pattern of particles in figure -- the figure that just comes after paragraph 115.

So if you look very closely, you'll see small structures, large structures, individual structures, agglomerates of structures.

So what we attempted to do was to see if we could see independent particles. And you could see some off to the left there in white that are stuck on the surfaces of these much larger structures.

And that particular micrograph shows individual particles and you can also see these black areas that are holes. I'm pointing to it. I don't know if I'm helping you. But these definitely represent pores, the lack of solid material in them.

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Q So anything that shows up on this micrograph as gray or black you would say is a pore?

A They look to be pores in the overall structure. If we go to some later photographs, you'll see, particularly the one at the bottom of page 52. We're looking at a dot, but here we're look at it at a lower magnification. And it's pretty clear that that dot, which appears as sort of that structure in the center, has within it a group of smaller particles and within those are these pores or holes.

Q I see some white dots, but I don't see any pores.

Where would the pores be?

A Right in here. Right in here. The things that look more black than the surrounding field.

Q Oh. Could those just be spaces between the particles?

A Probably not, because in a number of these cases you'll see it's surrounded by the other material. If you look very closely, you'll see that there's material around those dots, around those pores, around those holes. And so they are more than likely pores within a given series of particles.

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Q And then back to the high-res micrograph on 51.
A Yeah. Same thing.
Q Could you point out the scale? I don't understand the scale. Is 20 microns each hash mark?
A 20 microns is each hash mark.
Q Okay.
A So you got structures in there that range from just under 20, maybe half that, to on up from there as they appear as clusters of particles.
Q I see what you're describing as clusters, but I don't see the individual pores.
A Well, let's look at -- maybe if I come around it might be easier for you.
Q Yeah.
A In here.
Q You would say that those are pores?
A Uh-huh.
Q Okay.
A This looks like one because it's surrounded by a solid material. It's not the result of boundaries of materials.
Q Okay. Well, I guess what I'm asking is: How do you know that this solid material isn't just an agglomeration of particles?

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A It could very well be, but within that agglomeration of materials you're still going to have pores at the surface.
Q But you pointed out a specific example as being a pore, and I said, "How would you know that's not a space between the agglomerate?"
A You would see more of the boundary of the particles.

This looks like a boundary of a particle right in here. That looks likes two things stuck together. Two particles adhered together. So that one with a curved shape looks like a boundary. That looks like it's right in the particle itself.

Q Okay.
A So that's how we differentiate it.

MR. SONG: That's probably not going to show up great on the transcript.

THE WITNESS: Yeah.

Q You did some spectroscopy with respect to the samples?
A We did some elemental spectroscopy. And in that particular case, it's pretty easy to do when it's in the SEM because you can simply focus in on a given area.

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And then if you will look at the secondary ion spectrometry, which we call energy dispersive x-ray spectrometry, in each one of those peaks that you see on the figure on page 55 represents certain types of x-ray absorptions and relaxations, excitations that correspond to elements that you can identify.

And then below, although it's very hard to see, you can actually look at the map. So the yellow, for example, might be a location of the carbon line, but we call it the K-alpha absorption area.

So you could look across the particles and tell where the elements are. You could tell grossly what the elements are comprised of by looking at the spectrum. So we did both experiments.

Q So I notice there's a bunch of different elements in here.
A Yes.
Q There's it looks like titanium, calcium, platinum?
A Yeah. The platinum is kind of a ringer, because the platinum many times is used as a coating on these samples. So it's an artifact

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of remaining experiments, it's not real.

But there's a large carbon line which is way off to the left, that pink sort of carbon symbol. And then you have oxygen, you have sodium, aluminum, silicon, phosphorus, a few other things.

Q What is sodium and magnesium attributable to?
A Well, you've probably got a couple of things. You notice that the -- from the elemental composition -- I didn't know this out a priori but I found out later in Haggquist's second deposition -- or second declaration, rather, that these particles consisted both of activated carbon, as well as a zeolite.

So these materials are consistent with what you would find in zeolite, as well as in an activated carbon.

The other part of this is it is so sensitive. If there's any impurities, because these things are, particularly the zeolite, a natural material, you're going to pick up other things. They're all consistent with minerals of that type, plus the activated carbon.

Q There's oxygen in there as well?
A Right.

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Q What is that attributable to?
A Well, the zeolite has oxygen in it. It's also possible there may be some oxidized surfaces in the carbon particle. So they actually emanate from two potential sources.
Q Are there any other sources that oxygen would be attributable to?
A It's possible that there may be some other contaminants in there that contain some oxygens, but I think that's the primary source.
Just to be clear, this is done in a vacuum. So it's not oxygen from the air.
Q Okay. What about if some water got on the sample?
A It would be gone. This is under high vacuum. So the chances of any water remaining would be extremely slight.
Q Did you handle the material with gloves?
A The analysts did. We tried to stay away from handling anything that had to do with a particular area. Pick it up with the edges. And then when you make your sections, you try not to contaminate it, yes.
Q What would sulfur and calcium be attributable to?

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A Good questions. They're probably, as I say, trace contamination of the sample. The calcium peak is very low. So it's hardly there at all.
I'm not certain where the sulfur would come from, unless it was an acid treated activated carbon with some residues that was, you know, sulfur from sulfuric acid. But that's pure speculation. I don't want to go there.
Q What about phosphorus?
A That's so small. It's the computer playing tricks on you. It's almost not there as at.
Q What about silicon?
A Well, the silicon of course you would expect from any silicates. So if they were present, if there's any kind of silicate contamination, it would also be present.
Q What would cause silicate contamination?
A Well, your zeolite material, if I'm not mistaken, contains some silicon as well. So it's possible that that's bound in the zeolite material. Where else would it come from? Don't know.
Q What about the chlorine?
A The chlorine. Oh, my God. That is so small.

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Again it's the computer playing tricks on you.
Q Did you explain the sodium?
A That's also very small. Sodium is everywhere. It's almost hard to find a sample that doesn't have some in it.
Q Could it be salt if someone had handled this with their hands at some point in time?
A Well, if someone did, yes. But that didn't happen. It was always done with some extreme cares to not contaminate the surface.
Q Right. But were you able to verify whether other people before had handled it with their hands?
A Did not.
Q You did the same testing with respect to the sample called TNF jacket?
A Yes.
Q Do you know when that was made and who made it?
A I don't. I relied upon samples from Dr. Haggquist.
Q Same question. Were you able to verify the thicknesses of the layers or what the ratios were?
A Same issue. No, we couldn't. We would have liked to have, but we were unable to do so.

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Q Did you consider sending it out to another lab for testing?
A We did not.
Q You said you also reviewed TNF's DryVent products claim chart?
A Yes.
Q Did you actually review any TNF DryVent products that are actually accused of infringement?
A You mean this way?
Q Yeah, correct. With lab testing. You looked at the chart?
A Yeah.
Q Okay. Have you looked at Dr. Haggquist's inventor notebooks in this case?
A His actual notebooks?
Q Right.
A No.
MR. SONG: I'm getting a phone call.
- - - - -
(Telephone call.)
- - - - -
(Off the record.)
- - - - -

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BY MR. GERGELY:

Q Well, why don't we go back to that line of questioning.

MR. GERGELY: Are we back on?

Q So, sir, I would like to draw your attention back to the Haggquist '287 patent, which is marked as Daniels 10.

I understand you're stating that you believed -- I was asking you questions about how the bottom membrane would be 1 mil thick and then the membrane on the top would be cast 1 mil thick and I was asking you about the ratios, and then you suggested that there was going to be some shrinkage with respect to the second layer. I was asking you to try to characterize what that level of shrinkage would be.

Are you able to do that?

A Yes. I believe I said that it would shrink and the degree of shrinkage in my testimony was that it would likely fall in the range of two and a half to 10.

Q I think where we got sideways with objections, I asked you based on what?

A Yeah.

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Q What do you base that opinion on?

A The answer's quite simple. It's based on experience.

Q How can I test the veracity of what you're saying?

MR. SONG: I'll interpose an objection. It's outside the scope of the witness' direct testimony. It calls for improper testimony on section 112, issues that are outside the scope of these proceedings.

Q You can answer.

MR. SONG: You can answer.

A Okay. I mean, the most direct method obviously would be to create that mixture, condition it under the temperatures shown, do a 1 mil drawdown, and cure it under the conditions and measure it.

Q Now, wouldn't it have also been very simple for the inventor to have measured what you contend is a two layer structure with a set of calipers?

MR. SONG: Objection. Vague and argumentative as to the term "simple." Calls for speculation as to what the inventor could or could not have or would or would not have done.

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MR. GERGELY: You know, Counsel, there's been lot of speaking objections all day and I've been quiet about them, but what you're doing by these repeated objections is really going over the line and I'd ask you to stop and just -- there's a very limited set of objections you can make under the board's rules and practices. So I would ask you just to limit your objections.

I understand your objections.

Q Let me try to make it clear to you.

Do you understand what calipers are?

A I do.

Q Okay. Do you understand that calipers can be used to measure the thickness of a membrane?

A I would not do it with the calipers at this thickness, I would choose some other method because 1 mil is awfully thin.

Q What would you do?

A You would try to do it with a microscope. You would try to do it -- casting it on some sort of a substrate, like a glass slide, for example, put it on edge.

And assuming you could get contrast, and I don't know the answer to whether or not you can, but assuming you could, then with a calibrated set of automatic microscope equipment, which many labs have, that could be done.

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Q Okay. So there is an ability to measure what those purported two layers would be, correct?

A Yes. Particularly in the way that this experiment was described, there's no substrate nylon. So take that out of the mix so we don't have all of that frame going on. You would have to do it in a set of ideal conditions so that you know what you're dealing with and measure 1 mil at the start and then proceed through the process.

Q Regardless, the inventor didn't report here what those final dimensions were, did he?

A It's not shown in that paragraph, no.

- - - - -

(Petitioner's Exhibit Daniels 17 was marked.)

- - - - -

Q Why don't we go back to the infringement contentions, which was labeled Haggquist 14 and now we've also labeled it Daniels 17.

A Got it. Thank you.

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Q You've reviewed these, correct?
A Yes.
Q I seem to have lost my copy.
MR. GERGELY: Let's just go off the record for a second.
- - - - -
(Off the record.)
- - - - -
BY MR. GERGELY:
Q Now, sir, drawing your attention to Daniels 17, I'd like to draw your attention to the AA, the Analytical Answers report.
A Which is the one in the back?
Q Yeah, there's numbers at the bottom. It says 20 of 93.
A 20 of 93. 20 of 93.
Q It's this page.
A Got it. It's the back side of this one.
Q So you reviewed this report?
A Briefly I did, yes.
Q Do you see in the conclusions where it states "The North Face ink layer contained silicon based particles (presumably oxide), but these were very primarily very fine particles (tens of nanometers in diameter)"?

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A I see that.
Q Do you see where the author states "We did not find any abundance of observable carbon based filler particles in the ink layer. This could be interpreted as either the samples contained particles of a size which could not be resolved i.e., less than 5 nanometers in diameter using this technique, or that such particles were not present"?
Do you see that?
A I do.
Q So is less than 5 nanometers in diameter very small?
A Yes.
Q Is that on the order of carbon soot?
A I don't know, but it's very small.
Q Is that too small to be activated?
A Again I don't know.
Q You opine that carbon soot is too small to be activated, correct?
A Yes.
Q We know that Black Pearls 2000 is about 13 nanometers, correct?
A 13.
Q Do you believe that Black Pearls 2000 is too small to be activated?

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A No, I didn't say that. I just said that I have not studied the Black Pearls 2000 behavior to be able to tell you one way or the other, independently from what's been published, in terms of its ability to be activated.
Q And then above with respect to the "silicon based particles (presumably oxide)."
A Yes.
Q Were you able to verify whether those were silicon dioxide or not?
A In our analysis?
Q Yeah.
A No.
Q And then their author says, "these were primarily very fine particles (tens of nanometers in diameter)."
Do you see that?
A I do.
Q Given the fact that the silicon-based particles of an unknown origin and the carbon particles less than 5 nanometers, did that raise a question in your mind as to whether the North Face product was actually using activated particles?

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A In their analysis?
Q Correct.
A One of the questions I did not see answered in this was -- there are different ways of doing the so-called ultra shield emission scanning electron microscopy.
And the question I would have, and I didn't see this answered, is whether or not they have a detector that's capable of looking at particles as small as in atomic size as carbon. That's normally -- it's normally achieved with newer versions of the instrumentation.
So without seeing any of these being run with controls that contain a known carbon, is it possible they missed it because they couldn't see it, is it possible that it wasn't there as they stated, or is it possible that it was too small for the beam size they were using to be able to get a signal. They didn't answer that.
Q Does that raise a question in your mind as to whether or not the particles that are in the North Face product are actually activated?
MR. SONG: Objection,

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speculation.
A You can't tell whether or not they're activated by these techniques, you can just tell the elemental composition.
Q Okay. In terms of the thicknesses of the layers, do you know whether Cocona was averaging those thicknesses or whether they just picked certain of the measurements?
A I don't know.
Q What do you think would be a more fair representation, an average or picking a single measurement?
A Well, there's two ways to do it.
One is to measure one several times to determine how accurately you can make the measurement.
And the other method is to measure several of them several times and average the averages, if you will.
So in terms of representativeness, you like to look at more than one.
Q I appreciate that.
In terms of MVTR, did you see any analysis of this data with respect to a control?

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A In this report?
Q In the infringement claim chart or the report.
A I don't recall seeing that.
Q Would you need to compare a sample with the challenged material in it versus a control to make a determination whether or not there's an improved MVTR?
A You should do that.
MR. GERGELY: I don't have anything further for the witness.
I appreciate your time, Jacob.
Dr. Daniels, it was nice meeting you.
Do you have any redirect?
MR. SONG: Maybe just a few questions. Could I take a few minutes to organize?
MR. GERGELY: Of course.
- - - - - -
(Recess taken.)
- - - - - -
MR. SONG: I think I just have a handful of questions.
EXAMINATION OF CHARLES A. DANIELS
BY MR. SONG:
Q Dr. Daniels, let's go to exhibit Daniels 4.

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That was the application.
A Yes.
MR. GERGELY: Just give me a second, because I need to find it.
Got it.
A Okay.
Q If you turn to page 3, paragraph 30.
A Okay.
Q Review that for a moment.
So there are a number of compounds I guess I'll call them listed in paragraph 30. Do you see that, of the last sentence?
A Yes.
Q I believe you were talking about some of those articles with Mr. Gergely earlier. Zeolites and titanium dioxide, for example, right?
A Yes.
Q Do you recall that?
A Yes.
Q Zeolites in their naturally occurring state, are those active? Would you consider those active particles?
A Well, again, depending upon the surface, active -- I'm sorry. The surface topography, the pores on the surface area, they can be

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active in the sense that they will ad sorb materials just simply based on the fact that they're highly porous. But they can be further activated, as can others.
Q When you talk about that further activation, how is that accomplished?
A Well, you would do some surface treatments to create a much more chemically modified surface such that you could create increased porosity. You could change the chemical nature right at the surface.
Q So in terms of the active particles that are discussed here in paragraph 30 and by extension in the '287 patent, are those active particles that have been treated, as you understand it?
A My understanding is that when somebody says it's an active particle, it's been activated. So it's been treated.
Q So, for example, in paragraph 30 when we're talking titanium dioxide, we're referring to a treated and then activated titanium dioxide?
A Yes. Maybe I didn't make it clear. Titanium dioxide comes with a lot of surface treatments for various reasons; making them easier to disperse, protecting the surfaces so that they

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don't slough off, and other versions of them that are sold in converse. Some can be encapsulated. Some can be surface treated.

Q I'll have you look at page 15, paragraph 43 of Daniels 1, your declaration.

A Okay. What page again?

Q 15.

A 15.

Q Paragraph 43.

A Okay.

Q Have you had a chance to review that?

A Uh-huh.

Q So I think the third sentence, it says, "Materials such as activated carbon particles and porous aluminum oxide can be activated by heat and chemical treatment to alter the surface chemistry to act as adsorbing species."

A Yes.

Q So that heat and chemical treatment, are those some of the types of processes that would be applied to this list of compounds in paragraph 30?

A They're among the processes that can be used. These are the typically common ones, heat and chemical treatment.

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Q For each of the compounds listed in paragraph 30 of Daniels 4 --

A Daniels 4. Yes.

Q Those would be the activated versions on each of those compounds, is that correct, of what's being referenced?

A Yes. All along I believe that when Haggquist talks about particles, he's talking about activated active particles.

Q So, for example, if silica gel is referenced, it's understood by a person with ordinary skill in the art like yourself that it's talking about activated silica gel?

A Yes. And as I've mentioned, there are different forms of these materials, some of which can be made more active by activation than their pedestrian counterparts.

Q So for the purposes of the '287 patent, those compounds that we just discussed are all the activated or treated versions.

A It's my belief.

MR. GERGELY: I'm going to object to this line of questioning as leading.

Q Let's go to page 35 of Daniels 1.

A Okay.

Page 220

Q So the first sentence at the top of that page, "A POSITA understands that, in Dutta, the hydrophilic particles swell and thereby stretch the membrane, creating holes or channels that allow water vapor to move across the membrane."

Are those holes or channels, are those between hydrophilic particles, through the hydrophilic particles, or both?

A It could be both. It depends upon the forces that are created. Certainly there are going to be channels in a molecular level in the hydrophilic particles, but depending upon how much swelling takes place, you can create stresses that would create channels in the layer in which they're embedded.

Q Thank you.

I'm moving forward a little bit to page 38. So in paragraph 87, it's your conclusion that a person of ordinary skill in the art -- and I'm reading this verbatim.

"A person of ordinary skill in the art would not be motivated to combine Dutta and Haggquist and arrive at the claimed inventions, as discussed below, for at least the reasons that Dutta actively teaches away from using

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adsorbent particles to increase the water vapor transmission."

Do you see that?

A Yes.

MR. GERGELY: What page are you on?

MR. SONG: Sorry. I'm on 38, Daniels 1. The first paragraph on the page.

MR. GERGELY: Got it. I'm with you.

Q Paragraph 88, you say in the last sentence, "I have been further informed that a reference teaches away from a claimed invention when a person of ordinary skill in the art, on reading the reference, would be led away from the claimed invention."

Do you see that?

A I do.

Q And then the following paragraph, 89 at the bottom of the page, "Dutta actively discouraged the use of non-absorbent particles for the purpose of increasing WVTR."

A Yes.

Q Moving on to paragraph 90, "Dutta teaches that

Page 222

non-absorbent particles are 'inert' and play no role in water vapor transport."

Do you see that?

A I do.

Q That statement in Dutta that we just read in paragraph 90, does that comport with your conclusions and your analysis with respect to Dutta actively teaching away from using active particles?

A It does.

Q I'm sorry, I can't recall. The Halley reference -- my apologies. I can't recall the exhibit.

It was 13. Daniels 13.

A I'm sorry. You're looking at Halley.

Got it.

Q So if you turn to page 3.

A Okay.

Q That last sentence in the first paragraph, he lists several compounds. Some of those I think you might remember from paragraph 30 of the Haggquist application.

So in Haggquist, if I'm recalling correctly, your testimony was that those are the activated versions of those compounds.

Page 223

In Halley are these the nonactivated versions of those compounds?

A I have no reason to believe they're the activated version.

Q So these would not be the activated versions?

A I would not believe so.

Q Okay. That's all I've got.

REEXAMINATION OF CHARLES A. DANIELS

BY MR. GERGELY:

Q Sir, back to this activation issue that's discussed in the Haggquist patent publication.

Dr. Haggquist specifically states that certain materials are active in their natural state, correct?

A He did say that.

Q He actually called out specifically volcanic rock, correct?

A Right.

Q That's zeolite?

A Correct.

Q Then over on the next page he called out a list of items that he deemed to be active particles?

A Right.

Q He did not say one way or the other whether those had been treated with heat and/or chemicals to make them active, correct?

Page 224

A Specifically he did not.

Q In fact, on the facing page the only material he said that was treated, he gave the example of activated carbon as being treated with heat, correct?

A Correct.

Q He didn't cite any other material on his list as being treated with heat and/or chemicals?

A He did not specifically call heat and/or chemicals.

Q Do you recall that Dutta actually cautions the reader to not use too much of the hydrophilic particles because they may cause problems with the handling of the material, which could cause it to degrade and make holes, correct?

A Sure.

Q So is it fair to say that Dutta is actually telling the reader that he wishes to avoid making holes in the membrane?

MR. SONG: Objection, speculation.

A I did not interpret it that way. I think my interpretation was he cautioned you against using too much, not using any, which I think was the essence of your question.

Page 225

Q Right. The consequence of using too much is that perhaps the material could become damaged?

A Yes.

Q It would create cracks or holes in it, correct?

A Yes.

Q He wished to avoid that, correct?

A On the macroscopic sense you sure -- if you're going to have a usable product, you want to avoid having cracks in it of course.

Q Because if there are holes in the membrane, then that MVTR would spike way up, correct, because there would be nothing stopping the vapor from getting through?

A Right.

Q Okay. I don't have anything further.

MR. SONG: Okay. The last thing on the record, we reserve our right under Rule 30 to review and make corrections to Dr. Daniels' transcript 30 days from receipt of the final transcript.

MR. GERGELY: Okay. Great.

- - - - -

(Deposition was concluded at 4:25 p.m.)

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(Signature reserved.)

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THE STATE OF OHIO,) SS:
COUNTY OF CUYAHOGA.)

I, Sarah R. Drown, a Registered Professional Reporter and Notary Public within and for the State of Ohio, duly commissioned and qualified, do hereby certify that DR. CHARLES A. DANIELS, was first duly sworn to testify the truth, the whole truth and nothing but the truth in the cause aforesaid; that the testimony then given by him was by me reduced to stenotypy in the presence of said witness, afterwards transcribed on a computer/printer, and that the foregoing is a true and correct transcript of the testimony so given by him as aforesaid.

I do further certify that this deposition was taken at the time and place in the foregoing caption specified. I do further certify that I am not a relative, counsel or attorney of either party, or otherwise interested in the event of this action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office at Cleveland, Ohio, on this 10th day of December, 2018.

Sarah R. Drown, RPR, Notary Public
within and for the State of Ohio
My Commission expires April 22, 2022.

THE STATE OF)
) SS:
COUNTY OF)

Before me, a Notary Public in and for said state and county, personally appeared the above-named DR. CHARLES A. DANIELS, who acknowledged that he did sign the foregoing transcript and that the same is a true and correct transcript of the testimony so given.

IN TESTIMONY WHEREOF, I have hereunto affixed my name and official seal at
this day of
, 20 .

DR. CHARLES A. DANIELS

Notary Public
My Commission expires:

DEPOSITION ERRATA SHEET

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ERRATA SHEET

DEPONENT'S CHANGES OR CORECTIONS

Deposition of: CHARLES DANIELS

Case Title: VF Outdoor, LLC v. Cocona, Inc.

Date of Deposition: December 7, 2018

I, CHARLES DANIELS, have the following changes or corrections to make to my deposition:

Page:Line	Changes or Corrections	Reasons for Changes or Corrections
11:9	Correction. Pressurize should be changed to pressurized	Correction of typographical error
13:22	Correction. Dr. Albert should be changed to Dr. Oelker	Correction of typographical error of name
14:22	Correction. Absorb should be changed to adsorb	Corrected answer reflects what deponent said and intended answer
14:23	Correction. The phrase "being prior art" should be added (omitted in original).	Corrected answer reflects what deponent said and intended answer
15:25	Correction. "In a room" should be changed to "The room in"	Corrected answer reflects what deponent said and intended answer
16:14	Correction. "happens is" should be changed to "happens in"	Corrected answer reflects what deponent said and intended answer
17:5	Correction. "its" should be changed to "it's"	Correction of typographical error
17:23	Correction. "Absorbent particle" should be changed to "adsorbent particle"	Deponent said adsorbent, not absorbent; corrected answer

		reflects what deponent said and intended answer
18:2	Correction. "Absorbed" should be changed to "adsorbed"	Deponent said adsorbed, not absorbed; corrected answer reflects what deponent said and intended answer
18:5	Correction. "Cross length" should be changed to "crosslinked"	Corrected answer reflects what deponent said and intended answer
19:2	Correction. "This is a" should be changed to "there is a"	Corrected answer reflects what deponent said and intended answer
19:8	Correction. Absorbent should be changed to adsorbent	Deponent said adsorbent, not absorbent; corrected answer reflects what deponent said and intended answer
19:15	Correction. "Absorbent system" should be changed to "adsorbent system"	Deponent said "adsorbent system," not "absorbent system"; corrected answer reflects what deponent said and intended answer
20:21	Correction. "Absorbed case" should be changed to "adsorbed case"	Deponent said "adsorbed case," not "absorbed case"; corrected answer reflects what deponent said and intended answer
20:25	Correction. "Absorbed moisture" should be changed to "adsorbed moisture"	Deponent said "adsorbed moisture," not "absorbed moisture"; corrected answer reflects what deponent said and intended answer
21:7	Correction. Compete should be changed to complete	Corrected answer reflects what deponent said and intended answer
21:20	Correction. "Such point" should be changed to "such a point"	Corrected answer reflects what deponent said and intended answer

22:8	Correction. "Wall" should be added after the word "smooth"	Corrected answer reflects what deponent said and intended answer
35:13	Correction. "Centered at" should be changed to "centered on"	Corrected answer reflects what deponent said and intended answer
37:19	Correction. Absorption should be changed to adsorption	Corrected answer reflects what deponent said and intended answer
37:20	Correction. Polymer should be changed to polar	Corrected answer reflects what deponent said and intended answer
37:25	Correction. Subtract should be changed to attract	Corrected answer reflects what deponent said and intended answer
40:15	Correction. Stop should be changed to spot	Corrected answer reflects what deponent said and intended answer
44:3	Correction. Set should be changed to said	Question posed used term said, not said
44:24	Correction. Absorptive should be changed to adsorptive	Question posed used term adsorptive, not absorptive
45:15	Correction. Absorptive should be changed to adsorptive	Question posed used term adsorptive, not absorptive
47:13	Correction. Absorbing should be changed to adsorbing	Question posed used term adsorbing, not absorbing
49:21	Correction. Absorbent should be changed to adsorbent	Deponent said adsorbent, not absorbent; corrected answer reflects what deponent said and intended answer
56:24	Correction. "They've better" should be changed to "there're better"	Correction of typographical error
52:1	Correction. Is should be changed to as	Corrected answer reflects what deponent said and intended answer

62:19	Correction. Absorbed should be changed to adsorbed	Deponent said adsorbed, not absorbed; corrected answer reflects what deponent said and intended answer
71:18	Correction. "Ad sorption" should be one word and changed to "adsorption"	Question posed used term adsorption as a single word
73:3	Correction. "Absorbs onto" should be changed to "adsorbs onto"	Deponent said "adsorbs onto," not "absorbs onto"; corrected answer reflects what deponent said and intended answer
84:19	Correction. "He masses" should be changed to "the masses"	Correction of typographical error
86:8-9	Correction. Absorption should be changed to adsorption in both the question posed and the answer given	Question posed used term adsorption, and deponent said adsorption, not absorption; corrected answer reflects question posed and deponent's answer
86:23	Correction. Off should be changed to of	Correction of typographical error
88:1	Correction. Absorption should be changed to adsorption	Question posed used term adsorption, not absorption
88:8	Correction. Absorption should be changed to adsorption	Deponent said adsorption, not absorption; corrected answer reflects what deponent said and intended answer
111:7	Correction. "Obvious misrejection" should be changed to "obviousness rejection"	Question posed used phrase "obviousness rejection," not "obvious misrejection"
111:12-13	Correction. "Obvious misrejection" should be changed to "obviousness rejection"	Question posed used phrase "obviousness rejection," not "obvious misrejection"
125:11	Correction. Tope should be changed to top	Correction of typographical error
139:21	Correction. Square should be changed to squared	Correction of typographical error
144:3	Correction. Square should be changed to squared	Correction of typographical error

144:5	Correction. Square should be changed to squared	Correction of typographical error
146:8	Correction. Square should be changed to squared	Correction of typographical error
146:10	Correction. Square should be changed to squared	Correction of typographical error
155:21	Correction. Absorb should be changed to adsorb	Deponent said adsorb, not absorb; corrected answer reflects what deponent said and intended answer
155:23	Correction. Absorption should be changed to adsorption	Deponent said adsorption, not absorption; corrected answer reflects what deponent said and intended answer
155:25	Correction. Absorption should be changed to adsorption	Deponent said adsorption, not absorption; corrected answer reflects what deponent said and intended answer
164:14	Correction. Square should be changed to squared	Correction of typographical error
175:13	Correction. Polyethylene should be changed to polyurethane	Corrected answer reflects what deponent said and intended answer
179:15	Correction. Protective should be changed to protected	Question posed used term protected, not protective
193:21	Correction. Of should be changed to or	Corrected answer reflects what deponent said and intended answer
217:1	Correction. "Ad sorb" should be one word and changed to "adsorb"	Question posed used term adsorb as a single word
218:2	Correction. Converse should be changed to commerce	Correction of typographical error

DEPONENT'S SIGNATURE:

CHARLES DANIELS

DATE: 1/10/19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Case No. IPR2018-00190
Patent No: 8,945,287

DEPOSITION OF: CHARLES A. DANIELS
December 7, 2018

VF OUTDOOR, LLC,
Petitioner,

v.

COCONA, INC.,
Patent Owner.

AFFIDAVIT

I, Sarah Drown, hereby affirm under the penalties of perjury that the contents of the following Affidavit are true and correct and are based on personal knowledge and state as follows:

1. That I am a Court Reporter and Notary Public in and for the State of Ohio and the officer before whom the deposition of Charles A. Daniels was conducted on **December 7, 2018** in the above-entitled matter.

2. That pursuant to the request of counsel, I have reviewed my stenographic notes and back-up audio tapes of the above-referenced proceeding.

3. That after review of my stenographic notes and the back-up audio tapes, I wish the following corrections be noted to the record:

Page 14, line 22 "absorb," should read "adsorb."
Page 17, line 23 "absorbent," should read "adsorbent."
Page 19, line 8 "absorbent," should read "adsorbent."
Page 21, line 7 "compete," should read "complete."
Page 37, line 20 "polymer," should read "polar."
Page 38, line 2 "that," should read "out."
Page 44, line 3 "set should read "said."
Page 44, line 24 "absorptive," should read "adsorptive."
Page 45, line 15 "adsorptive," should read "adsorptive."
Page 49, line 21 "absorbent," should read "adsorbent."

Corrections Continued

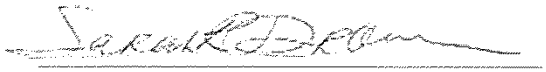
Page 62, line 19 "absorbed," should read "adsorbed."
Page 71, line 18 "ad" and "sorption" should read as one word "adsorption"
Page 73 line 3 "absorbs," should read "adsorbs."
Page 88, line 1 "absorption," should read "adsorption."
Page 88, line 8 "absorption," should read "adsorption."
Page 111, line 7 "obvious misrejection," should read "obviousness rejection."
Page 111, line 12-13 "obvious misrejection" should read "obviousness rejection."

* * * *

Affidavit

I DO SOLEMNLY AFFIRM THAT THE CONTENTS OF THE AFOREGOING AFFIDAVIT ARE TRUE AND CORRECT AND ARE BASED ON PERSONAL KNOWLEDGE.

01/02/2019
DATE



Sarah Drown

CERTIFICATE OF SERVICE

Notice is hereby given that on the 2nd day of January 2019, a copy of the Affidavit of Sarah Drown was sent via email to:

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