UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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AROMA360, LLC,

Petitioner,

v.

AIR ESSCENTIALS, INC.,

Patent Owner.

_____

IPR2025-00705
U.S. Patent No. 9,527,094

_____

LOCATION: Remote Audio-Video Communication
DATE: March 25, 2026
TIME: 10:00 a.m. - 6:07 p.m.

VIDEOCONFERENCE DEPOSITION
OF GERALD MICKLOW, Ph.D.

Taken before Julie Giordano, Florida Professional Reporter, Notary Public in and for the State of Florida at Large, pursuant to Notice of Taking Deposition filed in the above case.

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Thereupon,

GERALD MICKLOW, Ph.D,

was called as a witness and, having been first duly sworn, was examined and testified as follows:

THE WITNESS: Yes, I do.

DIRECT EXAMINATION

BY MR. RAYES:

Q. Good morning, Dr. Micklow.

A. Good morning.

Q. Am I saying that correctly?

A. What did you say, please?

Q. Am I saying your name correctly, Dr. Micklow?

A. Micklow. Yes. It's very close to the beer. So it's hard to blow my name. So...

Q. Perfect.

Well, Dr. Micklow, thanks for being here today. Have you been deposed before?

A. Yes, I have.

Q. About how many times?

A. I think this is number 68.

Q. And what was the nature of those cases?

A. Well, I've been doing them -- doing these -- I've been doing expert witness testimony

since the 1990s. So in the beginning, there were a lot of accident reconstruction, which kind of matured into machinery failing because of incorrect mechanical design for large companies. And then they moved on to things like combustion and propane grill, steel-product-liability-type work.

And then it must have been about, oh, right before the pandemic -- maybe a couple years before the pandemic. I had done one patent litigation case with aften- -- Alston & Bird back in the 1990s and it was for patent infringement. And it just so happens that one of the attorneys in that firm was looking for somebody with my expertise. And then I became involved in patent litigation, and it kind of exploded. It was right before the pandemic.

Q. And every time that you've been deposed, has it been as an expert witness?

A. There's been a few that are flavored in there still in the old type of work. For instance, last month, I was up in New Jersey. And it was a very intense accident reconstruction against a large manufacturer --

Q. So my question is, have you always -- every time you've been deposed, has it been as an

expert witness or have you testified as a fact witness?

A. In this type of work, every one has been as an expert witness.

Q. And, you answered most of my questions there.

And, I guess given that you've had so many depositions, I won't belabor the ground rules. But just to remind you of some basics. We don't want to -- try not to talk over each other and try to speak clearly. And wait for me to ask a question, and I'll try to wait for you to give an answer. If you don't understand the question, please ask me to clarify.

And, with that, avoid non-verbal responses. So is that a yes?

A. Yes.

Q. Okay. So if you give an answer, I'll assume you understood the question; is that fair?

A. That's fair. Yes, it is.

Q. Is there any reason you can't testify truthfully and accurately today?

A. Not to my knowledge at this point.

Q. All right. And we'll try to take a break about every hour. But if at any time you

need a break before then, just let me know. I'll just ask that you finish the question that is pending, and we'll accommodate that break.

Does that sound all right?

A. It sounds good. I may -- an hour is probably going to be pushing it for me. What happens when you get old -- I'm 72 now. And, I have -- I've been very active my entire life. And so I have severe arthritis in one of my hips, and I'm trying to make a decision whether or not to go with a hip replacement, which I haven't done. And so, the pain gets to be rather significant if I sit too long.

Q. Fair enough. I'm dealing with a hip issue myself. So I can --

A. You're too young for that.

Q. Yeah. I guess too active as well.

A. Yes.

Q. All right. Well, I think with that, we can get started.

So, you are serving today as an expert witness for Air Esscentials in these inter partes review proceedings; is that correct?

A. Yes, it is.

Q. And I may refer to those proceedings,

the inter partes review proceedings as an IPR.

Is that okay?

A. Okay.

Q. And when you first -- when were you first retained by Air Esscentials or its counsel in connection with these IPRs?

A. I'm thinking it was probably November of last year. Maybe October, November of last year.

Q. Of 2025?

A. 2025, correct.

Q. Who first contacted you about this -- these IPRs?

A. This one, it was through an intermediate firm, Teklicon. They had contacted me and said that they -- the law firm was involved in a patent litigation case, and they were looking for somebody that had expertise in fluid mechanics and fluid sprays.

Q. And what were you asked to do?

A. I was asked to review the data, which was the three patents which are at issue here, which I have done. And I was given the exhibits in some previous proceedings that I was not a part of.

So I reviewed that data and --

basically to interpret the accuracy or -- or the -- I guess the accuracy could be a term -- of the expert from the opposing side, Dr. White, and to investigate his statements in his IPR.

Q. And what materials were you provided other than the patents themselves? You mentioned some documents from -- exhibits from previous proceedings.

What were those documents or exhibits and anything else you were provided?

A. That's it. I wasn't provided anything additional. I did some -- some background case studies to investigate atomizers and sound dispersion in these types of systems.

And I also -- I had a large amount of textbooks, et cetera, here that I reviewed when I wrote the -- the responses that I provided several weeks ago.

Q. And so you mentioned some exhibits from previous proceedings. Is that -- are you referring to the district court litigation?

A. I think that's what it was. Yes. I'm not certain.

Q. And do you know what documents those were that -- that you reviewed from the --

A. I have a --
Q. What's that?
A. I said I have a list of them. Yes.
Q. You have a list with you?
A. Yes, I do.
Q. And was that provided in your declarations?
A. Yes.
Q. If you don't mind reading the list to me.
A. All right.
Q. Just to clarify. This was the list of documents you reviewed from the district court proceedings, correct?
A. Like I said, I don't know if it was district court proceedings or not.
But I'm picking up -- one of the first ones I opened was the Declaration of Christopher White, Ph.D., and then an IPR response for the '094 Patent, another declaration of Dr. White.
Q. So you said you have a list?
A. Yeah. Right now, I'm on my computer looking at them.
Q. So you're not looking at a list; is that correct?

A. Well, I have -- for instance, I have a folder entitled "Important Documents." And, I'm reading down through the documents in that folder. I may have a -- one also -- hang on.

Q. That's all right.

Coming back to your declaration, you said that these are listed in your declaration. Where would I find that in your declaration?

A. I did not include them.

Q. So you're relying on documents that are not listed in your declaration; is that correct?

A. At least in my form of the declarations, yes.

Q. Okay. And would you be able to provide through counsel the list of documents that you have relied on in your declaration?

A. Yes, I will.

Q. All right. Have you been retained by Air Esscentials or its counsel in the parallel district court litigation against Aroma360?

A. That's my understanding, that that is, yes.

Q. What is your role in the district court litigation? What's the scope of your

representation in that case?

A. Well, I was looking at the three patents which are at issue here, which are the Air Esscentials patents. And then I was looking at a standard inter partes review, IPR reviews and the referenced patents in those reviews. And therefore, I was critiquing the --

Q. So let me just clarify my question.

There -- do you understand that there is -- there was a lawsuit that Air Esscentials filed against Aroma360 for patent litigation?

A. Yes, I do.

Q. Have you been retained in that district court litigation?

A. I may work on that in the future. I haven't done anything directly on that as we speak.

Q. Okay. But you expect to be retained in that; is that correct?

A. I would expect to be, yes. I'm not certain, though.

Q. Before this matter, had you ever worked for or consulted with Air Esscentials?

A. No, I have not.

Q. Have you ever had any financial interest, direct or indirect, in Air Esscentials?

A. No, I have not.
Q. How are you being compensated in these IPRs?
A. On an hourly basis.
Q. What's your hourly rate?
A. I'm thinking that I'm charging 500 per hour for this case.
Q. Are you being compensated in any other way?
A. No. I'm not.
Q. So no portion of your compensation is contingent on the outcome; is that right?
A. That's correct.
Q. How much have you billed to date?
A. How much have I billed to date? I would have to check. Probably 20 hours or so.
Q. Is any portion of your compensation -- sorry. Strike that.
Up through today, what did you do to prepare for today's deposition?
A. Well, basically, I went through the documents I've recently written on my declarations, on the three patents which were involved in this matter. And then I reviewed the exhibits associated with the previous IPR publications of

Dr. White. And then I went into some textbooks that I have and reviewed the textbooks.

I've written reports on fuel injection systems before, both tactical and advanced injector type of work. So I reviewed a lot of that work. Basically everything I've done in spray and fuel injection systems over the last 20 or 25 years, I've gone through.

Q. You've gone through all that in about 20 hours?

A. Well, some of it, I don't charge for, you know. And some of it has already been done.

You know, for instance, I was -- for instance, I was funded at the beginning of my academic career by NASA on fuel injection systems for advanced gas-turbo engines. That was a six-year period. Master thesis came out of that. Publications came out of that work.

Q. So my question was about, what you did to prepare for today's deposition. And I guess your response is that you reviewed everything you've ever written since the '90s on fuel spray injection systems and et cetera.

MR. EAGAN: Objection.

Mischaracterization.

BY MR. RAYES:

Q. Did you -- did you meet with anyone to prepare for your deposition?

A. Yes. Yesterday, I met with the attorneys involved in this matter for about an hour.

Q. Who did you meet with?

A. Oh, it was -- who did I meet with? It was Mr. Eagan, Mr. Bruzos. Who were the other ones? I know there were four attorneys.

Q. So four attorneys were there. Was anyone else part of the meeting?

A. No. There was no one else in the meeting.

Q. And you said you just met one time?

A. Met one time to discuss this deposition, yes.

Q. Did you review any documents in that meeting?

MR. EAGAN: Josh, I think I need to interject an attorney-client privilege objection here and instruct the witness not to answer.

BY MR. RAYES:

Q. Did you review any documents preparing

for your deposition?

A. Yes.

Q. What documents?

A. Well, basically, I have them -- the main documents, I have sitting right next to me. Would you like me to go through those?

Q. So I understand you looked at your declarations. You looked at the patents. You looked at Dr. White's declarations.

What other documents did you look at?

A. All right. Well, so I have my three declarations, which are case IPR 2025 --

Q. Yeah. I understand you looked at your declarations. You looked at the patents. You looked at Dr. White's declarations. I'm assuming you looked at the prior art.

Is there anything else you looked at?

A. I looked at a thesis which one of my master students had done in spray modeling. And I have just a -- they -- one of the slides out of her PowerPoint presentation in her thesis defense. I overlooked -- I looked over her thesis.

I had another student who had also done spray modeling with me before for a thesis. I reviewed that thesis. And then I looked at the

'094 Patent. I looked at a patent one-double-O-nine by Sevy. I looked at a patent '449, one of the patents in this case here, by Levy. I looked at patent '918 by Levy.

Q. So in terms of the thesis you -- you reviewed, did any of those thesis or papers, publications that you reviewed refresh your recollection?

A. Well, I haven't read -- I reviewed Dr. Lefebvre's two textbooks, edition one and edition two, on atomization sprays. And that is right behind me as we speak. I also --

Q. And did those refresh your recollection on anything?

A. What did you say, please?

Q. Did those refresh your recollection about anything?

A. Yes. I remember the work that I was doing on gas turbine fuel sprays and actually discussions I had with Dr. Lefebvre before he passed away.

Q. What specifically did they remind you about besides the passing of your friend?

A. The basic things are the complexity of fuel spray modeling, you know. When I became

involved in the fuel spray modeling back in the late 1980s, I guess, is when I first did it. I was -- my expertise in air dynamic systems. I had the top security clearance. I was working on some of the most advanced compressors and jet engines in the world. In fact, they were the most advanced.

And, I got -- I was in the right place at the right time. NASA Lewis, which is now NASA Glenn, picked me up for five or six consecutive years of funding on that advanced turbine modeling.

So some of the things which were important were the difficulty to get a good liquid spray dispersion and to get particles of the correct diameter to ensure complete combustion in low pollutant emission formation.

And so I did work with Parker Hannifin also on that, Teklicon, Molykote on that, General Electric on that, Pratt & Whitney Aircraft on that. We were all involved in that work at that time. Oh, University of California, Irvine with Dr. Samuelsen and Dr. McDonell. We were probably the spray group in the world at that time.

My expertise was high-performance modeling. And so I was modeling the sprays. And that's why two of the theses are on spray modeling,

because we had to develop the models to predict the flow field. So we were running on supercomputers then, programming them for -- getting them the right answer in the shortest period of time. In the shortest period of time, then we would run 24 hours a day, seven days a week for about 30 days to get one simulation completed on a $20 million computer. And so those were the beginning of my -- my fuel injections work. After that --

Q. All right. And so you mentioned that it reminded you about the complexity of fuel spray modeling.

Can you explain what the complexity is with fuel spray modeling?

A. Well, if you start to think about this, all right -- to begin with, if we're talking combustion -- we'll start at the end of the day.

I want a clean plane which all the fuel has been burned and low pollute emissions. That's what I want. How do I get that?

Well, of course, you've got the aerodynamic flow field, which you have to be able to correctly model. And then after that, you have to model the fuel spray. And so you're injecting a liquid fuel into a gaseous meeting. And when you

inject a liquid fuel, it's exactly what it is. It's a liquid fuel. It's not a droplet.

And, there's a breakup procedure which has to take place from wherever you're exiting your, quote-unquote, nozzle and going into the fluid flow structure. So everything came into play. Fluid -- this was compressible, unsteady, three-dimensional, viscous fluid flows.

And just to do that part of it on a computer was tough. Now we're injecting a liquid spray. And when you inject a liquid spray, you have to change your whole thinking procedure.

And this is where the computational power requirements went through the roof. Because no longer could I just look at an air molecule and use what was called a "utilitarian viewpoint," where one air molecule is exactly the same as the other.

When I'm looking at fuel sprays, I have to track every fuel spray, every particle. And I didn't say "droplet." I said particle. And therefore --

Q. How do you distinguish between particle and droplet?

A. Well, a particle is a blob of fuel, a

ligament of fuel. It's being stretched out. And based on the internal forces on that fuel, it eventually starts to break up. And it breaks up into ligaments first, and then it breaks up into large particles. And then as you continue to --

Q. So a particle breaks into large particles?

A. Into large particles, yes.

Q. So a particle breaks up into large particles. And then how is that different from a drop -- how is a particle different from a droplet?

A. Well, normally, you're talking about droplets that are the final end point, which is -- in combustion, it doesn't have to be combustion. Or it could be a system just like we're looking at here. To get that perfect smell to your nose, you want to have a uniform particle size. And you want them to be small. Right? In combustion, you want them to be small so you get a rapid burn. And what we're doing here, you want them to be small so that the sensors in your nose can pick up the particles and moving into droplets.

So a particle and a droplet -- a particle is -- could be eventually a thousand droplets. It could be eventually a million

droplets, whereby you're getting to that final liquid state before the particle is destroyed either through combustion or through evaporation.

And, to model that, you have to track every particle in the domain and --

Q. Just so -- just to make sure I understand then. Would it be fair to say that every droplet is a particle but not every particle is a droplet?

A. Well, that -- it just depends on who you're talking to. Right? So normally --

Q. Well, I'm talking to you.

A. Okay. Then I would be talking radius. What's the diameter of the particles, is what I would talk about. And I would look at the particle-size distribution until we get evaporation, total evaporation of the droplet or particle.

So, there's no fine line where, okay here is a particle, here is a droplet. We start off and we say particles. What's a particle. Well, we have to come up with statistical averaging. We use what's called a "Monte Carlo distribution" to be able to calculate the sizes of the fuel entities. Actually it's the entities

inside of the domain of interest.

And, when you get down to a point where you want the final spray distribution, then you would be calling it a droplet. And, the --

Q. Typically, how long does it take to -- to break down a particle until it is a droplet?

A. Well, it depends on the -- the operating characteristics of the device at hand.

Q. What characteristics does it depend on?

A. Well, it depends on -- the three major characteristics upon which it depends are, number one, would be the surface tension. And the surface tension is what is referred to as a -- a damping of fluid.

And a surface tension, it's the spring effect. As I stretch out this glob of fuel, I get to a point where it's trying to come back together because of the surface tension effects. And finally, the aerodynamic drag on the particle, because of the velocity or maybe I hit a wall or maybe I hit another particle or maybe I'm heating or maybe a burn is taking place, it stretches until it breaks.

And now I have ligaments. And the

ligaments stretch until they break into smaller and smaller sizes. And so how long does that take? Inside of an internal combustion engine like a diesel engine, we're talking milliseconds. But then the injection pressure is extremely high. We're talking 10,000 atmospheres on a diesel engine operating going down the road.

Q. So you mentioned that it depends on characteristics -- how long depends on characteristics. And one is, that you mentioned, surface tension.

What were the other characteristics it depends on? You said velocity, I think?

A. Well, the velocity becomes important, yes. In fact, it's not just the velocity. It's the difference in the velocity between the -- if we're saying we're injecting into air, and we have a liquid oil, it's the difference in the -- between the velocity of the oil and the velocity of the air.

And so then we get down to two types of atomizers. And one is a pressure-based atomizer. One is an air-blast atomizer. And so density is coming into play too. What is the density of the air? What is the density of the

fuel or the oil being used to produce a scent? So --

Q. And does air pressure -- is that a characteristic as well that plays into this?

A. The air pressure is a characteristic as well. But it can be -- usually they're combined into the density. You know, because if I have -- for instance, air is my working fluid. And I assume it can be an ideal gas. Then I could say the pressure is equal to the density times the gas times the absolute temperature.

And so if the temperature is set maybe room temperature, then the pressure is inversionally proportional to the density.

So, normally, I'll say "density." But in my fuel spray modeling, pressure may be more handy to use inside of the software that I have developed with Los Alamos National Labs.

And, you can use pressure. And, therefore -- and then based on the pressure and temperature, back out to density. So, the end of the day is, the basic three major parameters of surface tension, viscosity and density, or you can say "pressure and velocity."

And then we have to talk about the

type of atomizer also. So we have -- have to come up with some very complex atomizers, particularly the work I did with Parker Hannifin back in the 1990s.

Q. All right. I'm going to go ahead -- let's move on from that and get into your declarations.

I'm going to introduce three declarations. I'll mark as Exhibit 1, Micklow declaration related to the '094 Patent.

(Petitioner's Exhibit No. 1 was marked for identification.)

BY MR. RAYES:

Q. We'll mark Exhibit 2 the Micklow declaration related to the '918 Patent.

(Petitioner's Exhibit No. 2 was marked for identification.)

BY MR. RAYES:

Q. And we'll mark as Exhibit 3 the Micklow declaration related to the '449 Patent.

(Petitioner's Exhibit No. 3 was marked for identification.)

BY MR. RAYES:

Q. And as those are loading, I just want to ask, do you have clean, unmarked copies of your

declarations with you?

A. On the computer, I do. The ones that I have -- I may have some. I think I printed them out last evening. And so let me see if they're marked.

That one is not marked. Okay. These are unmarked -- well, this one, I do have a -- this is the '094 Patent. It looks like I do have something highlighted in here.

Q. All right. And do you have access to Exhibit Share?

A. Yes, I do.

Q. Okay. Do you have that pulled up?

A. I had it pulled up. Back here.

Well, I have -- for instance, I have a folder which is entitled "2025-00705 for petition." And this was the work that was done prior to my becoming involved. And there is -- there are roughly -- it goes from Exhibit 1001 to Exhibit 1040.

Q. So you're on Veritext Exhibit Share?

A. What did you say, please?

Q. You're on the Veritext website for Exhibit Share?

A. No. I'm on my computer.

Q. Okay.

MR. RAYES: Let's go off the record, please.

(A brief recess was taken from 10:33 a.m. to 10:57 a.m.)

BY MR. RAYES:

Q. Dr. Micklow, as I mentioned, we marked three exhibits, the three declarations you submitted, Exhibit 1, the '094 Patent declaration; Exhibit 2, the declaration for the '918 Patent; Exhibit 3, the declaration for the '449 Patent.

Do you have those available in Exhibit Share?

A. Yes, I do.

Q. Other than your declarations, do you have any notes, paper or other documents with you today?

A. Yes, I do.

Q. What other documents do you have with you?

A. Well, as I stated, I have a list of -- of -- or a pile of documents here that I was using preparing for the deposition today. I was going through those -- that list before we diverged on to the declarations -- my declarations.

Q. And do you have anything else with you today?

A. Other than textbooks, no. Textbooks and I've got another pile of documents on the floor associated with fuel injection systems.

Q. And, are you referring to any of the documents or notes during your deposition?

A. In the declarations, no.

Q. Are you looking at any of the documents or notes that you have with you during this deposition?

A. Oh, no. I will not, unless you give me permission.

Q. And, you don't have anything on the screen except for -- well, what do you -- have anything on the screen besides this video?

A. I had some stuff on there from last night. Let me double check what I've got here.

No. There shouldn't be anything open at this point.

Q. There shouldn't be or there is not?

A. No. There is not. I don't see anything.

Q. So on your screen, there is only -- what is on your screen then?

A. Okay. What is on my screen is, obviously, the Zoom Workplace. I'm on the Exhibit Share. And then there's some windows open, which I'm closing, when we were attempting to get -- for me to find the -- I'm closing those as we speak. Register for your Veritext. Close that. Register. Close that. What's in Zoom? Looks like we can get rid of that. Request. Get rid of that.

Okay. So now I should be good.

Q. So what is on your screen?

A. What's on my screen is -- so on the web, I have the join meeting picture and also the Exhibit Share with Veritext.

Q. Okay. And when we were trying to get Exhibit Share, I guess you inadvertently showed some attorney-client information. And were you referring to that during your prior testimony?

A. That was in a prior testimony, yes. Because that's the one I was looking at late last evening. So these were on my computer from last night. And I had that one -- I had some things open still from last night, but they're all closed now.

Q. Okay. Your declarations contain the opinions that you intend to offer in these IPRs,

correct?

A. Yes. Unless I have additional information presented for me. I think they -- they summarize my opinions, yes.

Q. What do you mean additional information presented for you?

A. Well, if I'm asked to expand on any of these matters, I would be able to expand on those matters. And then I may bring in additional information if I'm asked to expand on any of the discussions in those declarations.

Q. Do you expect to expand on those opinions?

A. I don't know. I don't know the answer to that question. It just depends on if anyone asks. Or even today, if you're questioning me, I won't need to put those in my hand because I think they're already in my mind. Everything there. But, at this point in time, I don't have any plan to do that.

Q. Your declarations contain the basis and reasons for your opinions, correct?

A. The declarations, that's correct, yes.

Q. Your declarations identify the facts and data that you relied on, correct?

A. I don't have a list of exhibits there. No, I don't. I was writing those with different things that I have available directly to me. And so, if I look at that deposition -- I don't recall putting a list of exhibits on it.

Q. Okay. So your declarations do not identify the facts and data that you relied on, correct?

MR. EAGAN: Objection. Mischaracterizes the document.

THE WITNESS: No. The opinions I have in those declarations, I would say the majority of it is based on the work that I've done over the last 50 years.

And so, as I stated, I've been working in fuel sprays for a long time and spray analysis. I've worked with Dr. Lefebvre and Los Alamos National Labs and many other people.

I lecture on these matters. I have shared probably 20 advanced fuel injection sessions with the Society of the Automotive Engineers. I am the editor of the "Society of Automotive Engineers International Journal of Fuels and Lubricants."

And so these are things that I have on my knowledge base based on 50 years of experience.

BY MR. RAYES:

Q. In your 64 other cases or so that you have been a part of, has it been your experience that you have provided opposing counsel with the materials that you relied on in forming your opinions?

A. Normally it's requested in that deposition notice. Right? And so I found this rather unusual that that wasn't included.

First off, I didn't receive a deposition notice. The majority of those other 64 depositions that you're talking about, or 67 depositions, usually the opposing side attorney gives me a very explicit list of things to bring with me to the deposition.

Since that is not the case, normally I wouldn't have anything with me right now. But since we now do things via Zoom and -- and not face-to-face -- you know, I'm in my home office. And so I have them here, my textbooks and reports, et cetera, that I have acquired over the years.

Q. Do we have a complete record of all of

your publications that you've authored?

A. I think so.

Q. And do we have a list of all cases where you've testified as an expert at trial or by deposition?

A. You should. If not, I can supply you with that.

Q. Do your reports -- do your declarations provide a full explanation of everything you did in forming your opinions in these IPRs?

A. Well, you have to define full -- full description. Depending on your audience, a full description could be quite different.

And so, you know, I lecture at a lot of high schools and other places like that, and I talk about things that I've done in rocket science work and that type of -- I may show them pretty pictures of all the advanced systems I've analyzed over the -- over the years.

But, for instance, I'll say that conversations I used to have with Dr. Lefebvre, they are quite different than what I have when I go to a high school and lecture. Right? We would sit there and pontificate on how to model fuel space.

And he spent his entire career on it. I spent a good portion of my career on it. And --

Q. Okay. So do your declarations disclose all of the opinions that you intend to express?

A. At this point in time, yes.

Q. Is there anything you did to form your opinions in these IPRs that is not explained or expressed in your declarations?

A. Not that I can recall at this point in time.

Q. Beyond what's in your declarations, are there any calculations, notes, simulations, test results, demonstratives or summaries that support your opinions?

A. I am working on that as we speak. And, it is --

Q. Working on what?

A. Pardon me?

Q. Working on what exactly?

A. Well, for instance, my area of expertise is advanced fluid flow modeling of liquid fuel sprays. And, I am working on simulations as we speak, which are essentially no charge.

So at this stage of the game, you

know, money is out there, but it's not a big deal. I do things because I like to do them. And so I have supercomputers in my house here. And I have began to model the fuel spray systems in those patents.

Now, once again, I told you before how long it takes to do these studies. Typically, a study like that would be, okay, NASA tells me they want me to do this for a year. And there would be a one-year study with graduate students helping me, et cetera, just to do the legwork. And, the cost goes markedly higher. You know, a computational study in one year for NASA might cost $250,000.

I'm not going to charge the law firm I'm working for $250,000. But I may do it for free. And so -- in fact, I probably will eventually. Just I do it when I have the time to be able to do those calculations. And I have initiated them, however.

Q. Have you formed any opinions regarding infringements with the Aroma360 products?

A. Well, at this point in time, I haven't addressed patent infringement. I was requested to investigate, essentially, the technical discussions of Dr. White on this matter and the comparisons of

the -- the patents used to show obviousness of different claims in the different patents.

And so I have been looking at that. And based on my technical expertise, sometimes I don't need to refer to anything. In fact, the majority of that is, I don't need to refer to anything other than what I need to write a report. And then, of course, you always start any report with literature surveys, et cetera.

But everything I have there is based on my 50 years of experience.

Q. So have you viewed -- have you seen Aroma360's products?

A. Yes, I have. In fact, I think I even had one here, possibly. But that'll be in the future too to investigate that. I've been looking at the patents and the diagrams in the patents is what my main effort has been up to this point in time.

Q. And if the challenge -- challenge claims survive the IPRs, you said that you anticipate offering opinions regarding the infringement in the district court case; is that correct?

MR. EAGAN: Objection. Scope.

THE WITNESS: Once again, it's up to the -- it's the law firm involved, if they would like me to move forward on that matter.

BY MR. RAYES:

Q. All right. And you mentioned that you are looking into running tests on the devices, which would typically cost about $250,000, and you're going to do that for free for the law firm.

And when you say running tests on the devices, what are you referring to?

MR. EAGAN: Objection to scope.

BY MR. RAYES:

Q. What devices are you referring to?

MR. EAGAN: Objection. Scope.

THE WITNESS: Well, once again, if I ever get to that point in time, experimental work is every bit as expensive -- more expensive than computational work. So the computational program may cost $250,000 to NASA for two -- one or two years. And an experimental program may cost 1 million.

In fact, I've -- like I said, I was heavily involved with the University of

California at Irvine --

BY MR. RAYES:

Q. Okay. Yeah. Let me -- let me -- my apologies. Let me rephrase the question.

I guess you said simulations. You might run simulations on some of these -- some of these devices.

When you say you might run simulations for free, what are you -- what do you anticipate -- what devices do you anticipate running simulations on?

MR. EAGAN: Objection. Scope.

THE WITNESS: Well, I've already began modeling -- I think it was the Gao Patent. And when --

BY MR. RAYES:

Q. The Gao?

A. Yeah. G-A-O, Gao. I think I'm saying it correctly.

Q. Okay.

A. But, and this is just because I like to do it. And I've been doing this my whole life.

And so when I look at that patent -- I work with my students. And they have -- to be able to understand to model it correctly on the

computer, they have to be able to intimately understand the fluid flow phenomena which is involved.

And so when I look at that patent, I look at those pictures, I already can see what the simulation is going to look like. I can tell you where the fuel particles are going to be or the vaporous odor particles are going to be. I can tell you how the air is going to flow through that device, just by looking at it.

And once you have the boundary conditions involved -- you know, you have to set up the dimensions of the device. You have to set up the initial conditions. You have to set up the boundary conditions --

Q. On that point, how do you know the dimensions of the Gao device?

MR. EAGAN: Objection. Scope.

THE WITNESS: Well, if the patent is to scale, if the photographs are to scale, there's different ways to get those dimensions.

In the day when we were heavily involved with --

BY MR. RAYES:

Q. So if it's not to scale, then you would not know the dimensions?

MR. EAGAN: Objection. Scope.

THE WITNESS: Well, I would know the dimensions associated with a generic device.

And then, as I stated, if I was getting ready to move forward with this -- because first you set up the model. Then the model is easy to change after that because all you have to do is change the grid.

I would attempt to get the actual device. But right now, I can scale off of the patents. I can take my engineering ruler -- and I always have my engineering ruler right here.

And I actually put it up against a patent, and I sketch it again on my engineering paper if I'm just doing this for fun. And I draw it on my engineering paper. I start to put the boundary conditions on it.

And then I bring the software out that I developed with Los Alamos National Labs.

This is not commercial software. It's probably the most advanced software in the world and --

BY MR. RAYES:

Q. So you will basically create a CAD-like drawing of the device and then incorporate that into the software to run the simulation.

Is that a high level of review?

MR. EAGAN: Objection. Scope.

THE WITNESS: That's the beginning of it. Yes, uh-huh. And you can call it a computer-aided design. But we have our own regenerators that we have here. So we don't use any CAD programs.

BY MR. RAYES:

Q. Okay. Who drafted your declarations?

A. Pardon me?

Q. Who drafted your declarations?

A. I worked on them with the attorneys together. I wrote the first initial portion of them. They made it -- they helped me with the legal terms and make sure everything was good from that side of it. But technically, essentially they're 100 percent mine. And so --

Q. So you personally drafted the first

version of each declaration?

A. Correct. The attorneys asked me questions. I answered the questions from my area of expertise. And the -- my response was much longer than the final edited versions, as we cut down the length of the documents.

But, no. Definitely. I was given a task to investigate different devices in comparison. And I did that. And that --

Q. How -- approximately how many hours did you spend drafting and revising the declarations?

A. That's probably the 20 hours that I did back in the beginning of this system. I would have to pull my invoices out. I don't have them with me, and I don't have them on this computer. I would have to speak with my accountant.

Q. Are you aware of any errors in your declarations?

A. Well, of course you hope it to be no errors. And I didn't see any as we speak. There could be errors there. But I don't -- as we -- as I sit here today, I don't -- I didn't see any errors.

Q. Did you view -- or did you review the

patent owner's response to the IPR petitions?

A. No, I did not.

Q. Did you review the IPR petitions?

A. When you say the IPR petition, of?

Q. Of Aroma360.

A. Of Dr. White?

Q. Well, there was -- there's the petitions that start the proceedings. And in support of the petitions, there's Dr. White's declarations.

A. Okay. So all of those proceedings. Yes, I do. And I have them printed out here next to me. So I looked over these things.

And once again, the way I see the expert witness testimony --

Q. Sorry. Let me stop you.

What -- what is your understanding of your role in these IPRs?

A. My understanding is to critique the work which was done previously.

Q. And what is your understanding of the role that your declarations play in these IPRs?

A. Was to formalize those critiques in writing.

Q. Do you understand that they are --

they are used in support of patent owner's response to the IPR petitions?

A. Well, I was never told that directly. But I assumed that would be the case.

Q. So, you prepared declarations in support of the responses, but you never reviewed the responses to see how those declarations are incorporated; is that correct?

MR. EAGAN: Objection. Mischaracterization.

THE WITNESS: I didn't understand the question.

I've only been involved in this for several months, you know, and as we proceed forward, of course, with the limited number of hours that I put into this to keep costs reasonable, I think I satisfy -- I think I answered the tasks at hand presented before me.

BY MR. RAYES:

Q. Who is paying you for your time on these IPRs?

A. Well, the -- the middleman firm pays me, Teklicon pays me. So I invoice them, and they pay me.

Q. Who pays them?

A. Well, it'd have to be an assumption. I never asked anybody that question. So I would assume it to be the company eventually has to pay the bill.

Q. Okay. Coming back to your prior depositions in other cases, about how many patent cases have you been retained as an expert consultant for?

A. Now -- because I'm involved in other ones as we speak -- it's probably between 25 and 30.

Q. And percentage-wise, about what percentage of the cases were you retained by the accused -- by the patent owner?

A. That's interesting here. Because when I do product liability, you're always working for the plaintiff and you're going against the defendants.

Here, it's almost 50/50. Because I won't take a case unless it's correct. And I'm very strong on my ethics. If I don't think a case is right, I just say it's not my area that I would like to become involved in. So...

Q. Have you ever been retained in a case

involving atomization devices?

A. I'm trying to think if I've ever done that with atomization.

I can't -- it might come to me as we continue the deposition. But I can't recall at this point in time. However, I have received research funding in that arena for many, many years.

Q. Have you been involved in any cases involving technology similar to the technology involved in the patents at issue here?

MR. EAGAN: Objection. Vague.

THE WITNESS: Yes. Any cases, you said?

BY MR. RAYES:

Q. Yes. Any cases involving similar technology that's involved in the patents at issue here.

A. I'm trying to think. I'd have to think about that a little bit more. Because I have gotten involved in some cases with spray deposition of materials over the years. Those cases -- some of them, after I wrote the report, it -- it never went to deposition. We won the day and --

Q. Those are -- those were patent cases?

It's all right. We'll move on.

To your knowledge --

A. I don't recall if they were patent cases. They must have been because one company was worried about the other company taking its -- taking its data, its ideas. In fact, I even worked with Bosch, come to think of it, and --

Q. Okay. I appreciate that. Let's move on.

To your knowledge, has a court or any other tribunal ever excluded your testimony for any reason?

A. I just found out in the last two years, maybe three years, that one time, they did. Yes.

Q. What was -- what case was that?

A. It was on a product liability case back in my young expert witness days. And it was related to some reports I had written on biomechanics and on ergonomics.

And one of them somehow went under the door that I wasn't qualified to testify on biomechanics. Since that point in time, that's changed markedly. I've taken 20 short courses in biomechanics and published international journal

publications on biomechanics to rectify that situation. But --

Q. I appreciate that.

A. Pardon me?

Q. I appreciate that.

And how many times have you testified at trial?

A. Sometime -- someplace between 10 and 15.

Q. Is it -- do you know what cases those are?

A. One of them is a spray case, actually. That was -- as you see -- you told me -- so, yeah. There was one case that I got involved in. Boy, it was a long one too. It was with a system which washed huge turbofan engines when they come into the airport. They put nozzles on the front of it and shoot water through the engine while it's running.

And so that one was actually a -- okay. Now, that one was a patent infringement case. And it was also -- I did IPR -- I did both of them on that one. I did IPRs to invalidate patents. So I was working for the defendant, actually.

And, then we did joint testing with both sides involved, looking at water spray distributions, water particle size, et cetera, et cetera. And that one went to court. So that was a spray model -- was a spray case.

Q. What did you say the name of the case was?

A. I remember the company that I was working for was Merritt Brown (phonetic). And I don't even think that's on -- I think this is on my other computer.

Q. And what did you say the technology was?

A. Okay. The technology was an aircraft engine cleaner. And, the turbofan engine, they use currently. So at nighttime, when they bring in a gas-turbo engine -- there's large turbofans for commercial airliners. They have to clean the engine. And so they hook up -- on the front of it, they hook a water spray system. And then they fire up the engine, and they inject water into the engine.

And, so that was a spray case. And it went to court in Los Angeles. I remember now. Boy, that was about ten years ago, I guess. But it

was actually one of the first ones that I went to court on.

So that's the only spray case that I can remember, as I speak, that went to court. If others come up while we're having a discussion, I will enlighten you.

Q. I appreciate that.

We're going to mark as Exhibit 4 -- I think we already marked it. Exhibit 4, it's your CV that you submitted for these declarations.

Are you able to access that on Exhibit Share?

(Petitioner's Exhibit No. 4 was marked for identification.)

THE WITNESS: All right. I have it.

BY MR. RAYES:

Q. Is this the CV you provided to patent owner's counsel for use in these IPRs?

(Reporter clarification.)

(A discussion was held off the record.)

THE WITNESS: The answer is yes.

BY MR. RAYES:

Q. And, you are able to access that on

Exhibit Share, correct?

A. Yes, I am.

May I diverge for one second?

Q. Okay.

A. You had asked me if I had done any spray cases before. And the answer is yes. I was working for the defendant. Defendant was Ecoservices, LLC. And there was a water spray injection system for cleaning gas-turbine engines. And it was a patent infringement case. And I testified in court in Los Angeles a number of years ago.

Q. So thank you for that.

A. You're welcome.

Q. And, back to the CV. Everything in the CV is true and accurate to the best of your knowledge, correct?

A. It's the one I update all the time. So I'm thinking it should be correct.

Q. And, you understand that the PTAB will consider your background in deciding whether your opinions are reliable, correct?

A. What was your question? One more time, please.

Q. You understand that the PTAB, the

Patent Trial and Appeal Board, will consider your background in deciding the reliability of your opinions, correct?

A. I would assume so.

Q. Your CV is intended to communicate your qualifications relevant to the opinions you're offering here, right?

A. Yes.

MR. EAGAN: Objection. Mischaracterization.

BY MR. RAYES:

Q. What is the date the CV was last updated?

A. Maybe late last year.

Q. Since that date, what changes, if any, should have been made to your CV?

A. We -- down through.

(Reporter clarification.)

A. Just -- just a moment. I'm going down to the publications. And that's normally the place I make any changes, if I do.

Okay. Yeah. So I had three declarations there on Publications 124 through 126. That was '24. So that must have been from before. Conference publications, submitted 2024. I'd have

to look and see what the status are for those. That probably should have been updated because it's 2026. And books look good.

Since I moved into semi-retirement, I'm a professor emeritus right now. And I hate to say this, but the number of societies which I do free work for is decreasing because it's retirement time and --

Q. Well, congratulations.

A. Well, I still -- Florida Institute of Technology still has me teaching graduate classes. For that, I get a free parking pass for two rest of my life. Jeez, look out.

Q. Okay. So, is there anything relevant to qualifications in this case that are not included on your CV?

A. Not that I can think of at this point in time.

Q. You mentioned that you are a professor at the Florida Institute of Technology. And your CV says "Head of Automotive Engineering," correct?

A. Well, I was. But now I'm professor emeritus. And so -- it was interesting. As they brought me to Florida Tech to develop an automotive engineering program, which I did, we have jet dry

surge and everything now there --

Q. Yeah. I appreciate that.

So you were -- you were head of automotive engineering, correct?

A. I was head. Right.

Q. And based on the description of your professional -- well I guess, you said that your expertise is advanced fluid flow modeling of liquid spray.

Liquid fuel spray, correct?

A. Correct.

And I still -- so let's just back up one question here, one sec -- one moment.

And I see at 2021 as automotive engineering, director at Florida Center for Automotive Research.

So I'm no longer the director at Florida of automotive research. However, I guess hypothetically, I'm still the head of automotive engineering. I still take care of graduate students in mechanical engineering.

I'm seeing if I had updated that. So that looks good. Because I'm no longer the director of the Florida Center for Automotive Research. But there's no one that fills the head

of automotive engineering. And I think I'm still listed that way in the course catalog.

Q. Okay. So you -- none of the listed specialties in your professional experience mentioned consumer fragrance diffusers, essential oil diffusion or aroma delivery systems, correct?

MR. EAGAN: Objection. Mischaracterization.

THE WITNESS: So what were the three categories, please?

BY MR. RAYES:

Q. Consumer fragrance diffusers, essential oil diffusion or aroma delivery systems.

A. I have never worked directly in that area as an engineer, no.

Q. So, before being retained in this matter, you've never designed or developed a fragrance diffusion assembly that uses compressed air to atomize liquids, correct?

A. That's definitely --

Q. Pardon me?

A. No. That's definitely not the case.

Q. You have designed or developed a commercial fragrance diffusion assembly that uses compressed air to atomize liquids?

A. Well, your last one, you didn't say a fragrance. You said if I designed a compressed area liquid spray interface system, which I have done numerous times.

Q. So have you designed or developed a fragrance diffusion assembly that uses compressed air to atomize liquids?

A. I'd have to think about it. I've done a lot of things over the years. I know that --

Q. So sitting here today, you cannot recall one, correct?

A. I can -- I have 50 years of experience I have to run through in my mind right now. And, numerous times, numerous times -- in fact, now I'll take that back.

So you have to define design. So numerous times, because I have to run -- I have a full-scale shop at my house with the capability to do just about any type of car or motorcycle repair that you can think of. And, I have done that at most universities also, the Center for Advanced Vehicle Technologies in Alabama, the North Carolina Motorsports Research Center and University of North Carolina Charlotte, mechanical engineering systems at East Carolina University and here.

And we had design systems to cut down odor in the shops. And so yes, we have done that with my students. Because it's a pretty simple system. And so now if you start thinking about that -- for instance, if I took a can of air fragrance, put a piece of tape over the top of the nozzle assembly to hold it down, put it in front of a fan and diffuse that into a room to change the odor characteristics of the room, have I done that before? Yes. Have I done more complex systems than that? Probably because --

Q. Okay. So your CV includes numerous publications on internal combustion engines, fuel injections, fuel injections, spray breakup modeling and related areas, correct?

A. Correct.

Q. Which of your publications, if any, address consumer fragrance diffusion assemblies or indoor scent dispersion -- indoor air scent dispersion?

A. Well, I don't even know where you would publish something like that because it's so simple. In fact, I know -- like I said, I am the editor for many journals and have been over the years. And review for more that you can possibly

count, particularly in atomization systems.

Q. I can't count very high. So I believe you.

A. Well, we're talking hundreds, hundreds of paper I've reviewed over the year. So I can count and --

Q. And so what makes -- let me see here.

A. But you could publish fragrances -- in fact, when I just walked out -- Airwick is not involved in this in any manner, are they?

Q. What makes -- so you said that the device -- the consumer fragrance diffusion assemblies, or indoor air scent dispersion, are simple devices.

What makes them so simple?

A. Cost, effectiveness and reliability, disposability. All those things are. Because it's not rocket science. That's for sure. It's about as simple as you can get.

Q. And, which of your publications, if any, address Venturi-driven atomization in a consumer diffuser concept?

MR. EAGAN: Objection. Ambiguous.

THE WITNESS: When you say "consumer," is military Air Force a consumer? Is NASA

a consumer? Is -- the answer to that is yes, I've done that. Mercedes a consumer?

BY MR. RAYES:

Q. So which publications address Venturi-driven atomization?

A. Well, those things are too simple. There's no place I would even know to publish that. I mean, it's something that --

Q. What about Venturi-driven atomization in a fragrance diffusion assembly context?

MR. EAGAN: Objection. Vague.

THE WITNESS: As I stated right -- earlier, over the years, I've been an editor of many, many journals and reviewed more papers than I can count.

I never recall ever seeing one on fragrances that you -- you atomize oil into your house to make it smell better. That's just low-end engineering work. And that's work that the company hires their engineers to do.

It's a good, solid engineering problem, but it's not rocket science. And to publish in a journal, it needs to be rocket science.

BY MR. RAYES:

Q. So, the patents at issue here do not relate to diesel fuel injectors or combustion engines, obviously, right?

A. Well, they're exactly the same.

Q. They're the same?

A. Exactly.

Q. Can you explain what you mean?

A. You're injecting a liquid medium into a gaseous medium. And you're looking to get a good particle dist -- a good particle size, a good particle -- a good atomization of the oil and to have a good distribution of the oil with as small of a particle as possible so they can diffuse easily into the room, and your nose can pick up the smell.

Q. Would you agree that modeling or testing fuel sprays in engines involve different fluids, pressures, temperatures and objectives in atomizing fragrance liquids into a closed airspace?

A. Well, the internal combustion engine, you're injecting into a closed airspace always.

Q. So you would not agree with that then?

MR. EAGAN: Objection. Vague.

THE WITNESS: Repeat the question,

please, to be sure that I understood what you said.

BY MR. RAYES:

Q. Would you agree that modeling or testing fuel sprays in engines can involve different fluids, pressures, temperatures and objectives in atomizing fragrance liquids into an enclosed airspace?

A. Well, of course you've got an open-ended question there. There's not a direct answer to that because "can't" doesn't mean that they do. It means that they can.

I could go into my -- my air fragrance. And Air Esscentials has decided to hire Dr. Micklow to come and design the next generation of atomizer. And I'm saying watch this. If I kick the pressure up to this atmosphere and I use this type of nozzle, I bet you I could diffuse it into the room in one-tenth of the time, and it's going to smell a lot better.

If they gave me that job, could I do it? Yes, I could. How much would it cost? Well, I guess if you want to spend 5 or 6 or 7,000 for your atomizer in your house, then I'm going to get the job. Otherwise, they're going to say, Okay,

we've got an engineer right out of school, and he or she has done a great job, and they're going to design this system for us, and it's going to work effectively enough for a home application.

Q. So, just to make sure I understand, you -- are you saying that high pressure creates more uniformity in the --

MR. EAGAN: Objection. Mischaracterization.

(Reporter clarification.)

BY MR. RAYES:

Q. Are you saying that high pressure creates more uniformity in the droplets?

MR. EAGAN: Objection. Mischaracterization.

THE WITNESS: Well, you can't -- that question is -- can't be answered directly because you didn't give me enough data.

BY MR. RAYES:

Q. Does it increase in pressure, all else being held equal, result in more uniformity in the droplets?

MR. EAGAN: Objection. Speculation.

THE WITNESS: Which pressure?

BY MR. RAYES:

Q. The air pressure.

A. Which pressure? Where?

Q. You said that --

A. I'm just asking you to be definitive in your question, sir, because you're not giving me a definitive question. And I'm not going to tell you how to ask the question.

Q. Are you a named inventor on any patents or patent applications?

A. What was your question, please?

Q. Are you a named inventor on any patents or patent applications?

A. No. I never wanted to go that route. The way I -- my philosophy in life is that if they want to pay me a good job -- to do a good job as an engineer, they can pay me the money, and they can have the technology. And I've already given it away. Because that's not an important aspect of life. You know, the important aspect is that we improve the quality of life in the universe, in this world.

But patents. I'm sorry. I don't believe in taking years out to write a patent, and then have somebody steal it from another country. And the patent is then not worth very much to me as

an individual.

So, you want to hire me as an engineer, they want to hire me as a consultant -- and when I was younger, I would work 40 hours a week engineering. Here, they can hire me as a consultant. Then I'll do it. But --

Q. So you personally don't believe in the value of patents?

MR. EAGAN: Objection. Mischaracterization.

THE WITNESS: Well, no. No. I believe that if a patent -- patents were to operate as they were intended, they are exactly what we need in the engineering world and in a technical world.

But, Hey, the world is not a perfect place. And that's why we're -- we're sitting here today on this computer talking about this. Because, you know, it's too easy to look at somebody else's work and take it and use it. I mean, it's just too easy.

And sometimes it's not unethical. Right? If I publish a journal publication or if I go into details and I work for a

company and I develop a new compound for them -- and I have done that many times -- then it's their technology. And I'll even go out and try to help them sell it.

In fact, you might -- you're going to find something interesting. You can go online and see an infomercial I did one time maybe when I was 30, 40 years ago. And in that -- in that infomercial, which was playing nationally and in Auto Zones and --

BY MR. RAYES:

Q. All right. I appreciate that. Let's reorient here.

So, what is the field of technology? How would you describe the -- strike that.

So you're not offering any opinions here based on having invented or commercialized the kind of diffusers -- diffuser assemblies that are described in the challenged patents, correct?

MR. EAGAN: Objection.

THE WITNESS: No. I do that -- well, I don't -- I teach my engineering students how to do that. We have a course called "Capstone Senior Design." Students have to

design, fabricate and build a complex engineering system. It's not only design and building and have it functional, they have to be able to market it and they have to be able to have it be safe and they have to have it to be done in a certain period of time.

And so all of those things -- and I taught Capstone -- I've done more Capstone Senior Design projects than any professor that I know. And I think the last time I was at 182. Something like that. All for free.

BY MR. RAYES:

Q. And these Capstone projects involve the type of diffusion assemblies that are at issue here?

MR. EAGAN: Objection. Vague.

THE WITNESS: Some of them do, yes.

Yes. In fact, this is -- is -- like I said, over the years, over 50 years, I can remember -- oh, we were big in -- into water injection systems for a while on engines because we could inject water. We could increase power, eliminate knock, drop

low emissions, hydrogen injection into internal combustion engines, the dual fuels into internal combustion engines.

BY MR. RAYES:

Q. You mentioned that the Capstone Senior Design projects, they would design, fabricate complex engineering systems, and not only design and build them but have them functional to be able to market them.

So those complex engineering systems that you were referring to, are those different than the simple fragrance diffusers that we've been talking about?

A. Well, it's the beginning of them. Some of them are very complex. For instance, the most complex project, which I've done now over 40 times, is to design, fabricate and build a complex car from scratch. These aren't kit cars. We build everything, including --

Q. So you would -- you would consider building a car very similar to the technology at issue here, even though it would be more complex for a car, but it at least would be similar; is that correct?

MR. EAGAN: Objection.

Mischaracterization.

THE WITNESS: I wasn't finished talking, and you interrupted me.

So at the end of the day, I can say that was the most complex. And I've done 40 of those, including fuel injection systems, oil spray systems to cool down components, down to very simple types of -- in fact, I bet you if I go through and look at all of the Capstone Senior Design projects I've done, I'm thinking now -- there's one that's sitting back there in my mind -- or more than one, that we were doing air fresheners.

BY MR. RAYES:

Q. And so, as we speak --

A. So that was for an engineer at that level. They're not engineers. They don't have a four-year degree. They come in, and they design something like this, even though today, I'm calling it simple because I have 50 years' experience and a Ph.D. in mechanical engineering and everything else and I've been lucky enough to get over the years.

What's complex to me, is -- could be overly complex to them. And what is complex to

them is probably going to be very simple to me.

And so -- but at the end of the day, is that, do we publish journal publications on that work? Sometimes we do. Do we publish journal publications on what I consider to be good engineering projects -- which is what this is, a good engineering project -- and be what I would consider to be simple. But the person off the street couldn't do it.

Q. I appreciate that.

So you mentioned there was at least one project where a student -- you helped a student develop or design a fragrance atomization assembly.

Am I saying that correctly?

A. It feels like it's the back there and it's going -- it'll come out and tell me if I did or not. So right now, I'm doing a brain search and --

Q. I got you.

A. And, as I start to talk about the Capstone design, then I get in the Capstone design mode, and I start scanning over the years all the projects I've done. And like I said, the last time I counted, I was at 182. Normally professors might have five or ten of them in their whole career.

I've done 182.

Q. Yeah. I see. I appreciate that.

So sitting here today, though, you cannot point to any similar fragrance diffuser product that you designed that uses compressed air to atomize fragrance oils, correct?

A. No. I didn't say that. I already told you that I know I've done it in my shops before.

And so what I consider to be a design would be a way to distribute it in the shop. And, I have done that before.

Q. So do any of your opinions in your declarations rely primarily on general fluid dynamics and engineering principles rather than industry experience designing or commercializing fragrance diffusion assemblies?

A. Well, I have -- based on -- I'm not a marketing person. Like I said, I don't have a marketing degree. I don't want to have a marketing degree. I'm a scientist.

Q. Do you agree that your opinions are primarily based on general fluid dynamics and engineering principles?

A. No. Plus my expertise in spray

modeling, liquid spray modeling.

I hate to say this. But after you do something for 50 years, you better get good at it. And I think I'm one of the best.

Q. So, just to recap, you're -- your stated specialty or expertise is advanced fluid flow modeling of liquid fuel spray. And your CV includes specialties like fluid dynamics, CFD, sprays, injection, multiphase flow issues and the like. Correct?

A. Correct. Except when you said of. You tied my expertise to -- well, I don't know what you exactly said. Fluid mechanics of. That's one of the categories that I am -- considered to be my area of expertise is --

Q. And those topics involve pressure, velocity, turbulence, droplet formation, droplet transport, wall impaction and the like, correct?

A. Correct. And also turbulence modeling, also in computational modeling. Everything --

Q. And none of those physical principles change just because the application changes from fuel systems to fragrance diffusion, correct?

A. Well, once again, the complexity of

the device becomes important. But in general, how do I atomize a liquid spray is the same.

Q. And the physical principles don't change just because the application changes, correct?

A. Well, the basic laws of physics are the same throughout the universe.

Q. And Reynolds number and Weber number mean the same thing regardless of application, correct?

A. That's correct. That's why we use nondimensional groups.

Q. The same is true for droplet inertia, drag, breakup, coalescence and impaction, right?

A. To understand what you just said about breakup is ongoing research.

Q. What do you mean by that?

A. It's not solved. You show me a person that can do the -- the analysis from the complex three-dimensional study, compressible flow with liquid spray and -- pushing in the liquid spray and then have whatever happens after that, smells really good, it's distributed throughout the room well, or I'm burning in my Mach 10 aircraft -- which I have worked with Aerojet Rocketdyne.

And -- yeah. I forgot all about that too. Jeez. And the space shuttle.

Q. But --

A. Those things are the same. However, the -- even turbulence modeling. Everybody says turbulence, turbulence, turbulence, turbulence.

I've spent 50 years trying to model turbulence correctly. And no one can do it right. Even right now. Can we do it so we can produce a good engineering device? Yes. Do you do it right? We do it right enough. Could we do it better? 20 years from now, when the computers are a thousand times faster then they were.

When I started with NASA in 1988, you know, I was working on a $20 million Cray computer --

Q. Yeah. I appreciate -- I appreciate all your experience.

A. I'm answering your question.

And you need computational power to start with. And then you have to have the intelligence to be able to do the modeling.

But I need -- my telephone today is more powerful that a $20 million Cray computer from the '80s and the '90s. But I need better computers

right now, even as we speak today. You know, there aren't computers fast enough out there to do breakup correctly.

Q. Yeah. All right. That answers the question.

So, just to tie this together then. I guess, just -- even though your area of expertise is advanced fluid flow modeling and liquid fuel sprays and the like, your background is still relevant to the engineering issues here because the same governing fluid dynamic principles apply, correct?

A. That's correct. Yes.

MR. EAGAN: Objection.

BY MR. RAYES:

Q. And by the same logic, a technical reference is not automatically irrelevant merely because it comes from a different application area, correct?

MR. EAGAN: Objection.

THE WITNESS: That's correct.

(Reporter clarification.)

(A discussion was held off the record.)

MR. RAYES: I think he said legal

conclusion.

Let's go off the record, please.

(A discussion was held off the record.)

(A portion of the record was read by the reporter.)

MR. RAYES: Correct.

And the objection was legal conclusion. And the answer was yes.

I guess repeat the last question so we can get the answer.

(A portion of the record was read by the reporter.)

THE WITNESS: Yes.

MR. EAGAN: And my objection as a legal conclusion is noted on the record?

(Reporter clarification.)

MR. RAYES: It is noted.

BY MR. RAYES:

Q. Dr. Micklow, do you have any formal legal training?

A. No.

Q. You've been an expert witness, I guess, in so many cases now that you probably feel like a lawyer. But you couldn't lawfully practice

law in the United States, correct?

A. No, I do not practice law.

Q. Have you ever worked for the Patent and Trademark Office?

A. Yes.

Q. What was your role there?

A. When I was at East Carolina University, I went there to develop a new engineering program. And then we had a -- a very extensive program there to increase our technical expertise by finding money for the professors to do research.

And one of the things that we would have -- we would have to do to qualify for that research is have the patents approved. And then they would -- we'd find funding for the research. And so we were -- we would be communicating with the patent offices on those requests to get the patents approved.

And so we -- I did probably 10 or 15 of those. I'd have to -- and I just forgot about that too.

Q. What patents are you talking about?

A. They were patents within the university. So it wasn't this -- I can't remember

any on fragrances.

But there would be patents that research professors would like to get funding. And our university, since we started this new engineering program, would help them to get funding.

But one of the requirements for us to help them get that funding was that we would have to -- they would have to go through us, present it to the patent office, get the patent approved. And then East Carolina University took a cut out of it. I didn't, but they did. So, we did -- I did 10 or 15 of those with the patent office at that time, if I remember right.

Q. Okay. I appreciate that.

I'd like to look at your declaration for the '918 Patent, if you could pull that up, please. That is Exhibit 2.

A. All right. I have it up.

Q. And are you able to share your screen to show the exhibit?

A. Share it? Hang on. All right.

Q. And, if you could -- my apologies.

I actually wanted to look at the patent itself. We're going to introduce it as

Exhibit 5, the '918 Patent itself.

(Petitioner's Exhibit No. 5 was marked for identification.)

BY MR. RAYES:

Q. Just give me one minute. If you refresh, I think it should be in there for you. Perfect. Thank you.

And, you understand that the patents at issue generally relate to the field of dispersion of various fluids, including, but not limited to, fragrant oils, essential oils, odor neutralizers, disinfectants and the like into a generally enclosed airspace, correct?

A. Correct.

Q. And, do you agree that the field is not limited to consumer products for fragrance oils, correct?

A. I don't know the answer to the question.

Q. Well, if you look at Column 1 -- if you scroll down to page 8, Column 1.

A. All right.

Q. And, lines 7 through 11 is where it states what the invention generally relates to?

A. Yes.

Q. And that does not limit it to the field of consumer products for fragrant oils, correct?

MR. EAGAN: Objection. Speculation.

THE WITNESS: Yeah. I don't see consumer in there anywhere. I see -- I see type. I see fragrant oils, essential oils, et cetera. I don't see where it says "consumer" anywhere.

BY MR. RAYES:

Q. And, if you could scroll down to lines 35 to 43, it reads - it begins -- the paragraph begins with: As such, there's a need for a fluid dispersion assembly that is designed to significantly reduce the amount of noise generated during the -- during operation.

And it goes on to say that there's a further need that exists for a fluid dispersion assembly to operate quietly.

Do you see that?

A. Yes.

Q. And the patents disclose several embodiments aimed at achieving that goal, correct?

MR. EAGAN: Objection. Speculation. Calls for legal conclusion.

THE WITNESS: Well, I think the goal is in the claims. And so, you know, this is a description of related art. So when I say "related," that doesn't tell me that -- is this -- what was your question again? Maybe I missed what you said.

BY MR. RAYES:

Q. The patents disclose several embodiments aimed at achieving the goal of providing a forced air diffusion or dispersion assembly for fluids that operate quietly, correct?

MR. EAGAN: Same objections.

THE WITNESS: Once again, this is a description of related art. So, we would have to go to the claims to say -- for me to make a statement on your question.

BY MR. RAYES:

Q. If you look -- if you go down below to the summary of the invention, it says: The present invention addresses the need for a forced air diffusion and dispersion assembly for fluids, et cetera, that significantly reduces the amount of noise generated during operation.

Do you see that?

A. Yes, I do.

Q. And do you agree that the patents seek to address that need?

MR. EAGAN: Objection. Scope. Legal conclusion.

THE WITNESS: Once again, patents are -- are beautiful documents. However, I have ways that I investigate the initial part of any patent or any technical report.

You read the introductions and you read the conclusions and hear the conclusions or the claims.

And so when I -- the first time I looked at the '918 Patent, what did I do? I came into page 1, Column 1, and I went down through and looked at the summary of the invention. And, I read that in great detail.

Then I went in and just glanced at the figures because this is the first time I'm going through it. I'm going to look at it in much greater detail later. And I looked at the figures and the detailed description of the device.

And then I go down to the claim. And then I read the claims, even the first time

through, in great detail. I want to know which claims are independent, which claims are dependent. I want to know what this patent is claiming.

And so that's how I proceed when I start to investigate patents. And then --

BY MR. RAYES:

Q. So, I apologize to interrupt you.

But, did you understand my question? My question is, do you -- do you --

MR. RAYES: Could you repeat the question, please, Julie?

(A portion of the record was read by the reporter.)

THE WITNESS: Read that last part again. Because I was reading as you were saying. So I apologize.

BY MR. RAYES:

Q. Do you agree that the patents address the need for a forced air diffusion and dispersion assembly for fluids that significantly reduce the amount of noise generated during operation?

MR. EAGAN: Same objections.

THE WITNESS: Well, once again, I think for me to answer that question, I

would need to look at the claims.

BY MR. RAYES:

Q. Okay. Thank you.

Do you -- did -- did you review the detail specification of the patent?

A. Yes, I did.

Q. Do you agree that the patent discloses several embodiments that are aimed at achieving the goal of addressing the need for a forced air diffusion and dispersion assembly for fluids that significantly reduces the amount of noise generated during operation?

MR. EAGAN: Objection. Scope. Legal conclusion.

THE WITNESS: Well, it's presenting a system that will satisfy the claims at the back of the patent.

BY MR. RAYES:

Q. So, I don't think that answered my question.

Do you understand that the -- do you agree that the patent disclosed several embodiments?

MR. EAGAN: Objection. Scope. Legal conclusion.

MR. RAYES: John, I'm giving you some leeway here, but the proper objections are just for form. So if you don't mind just sticking to that.

THE WITNESS: Well, there's different embodiments, yes. Because I'm looking at the figures now. We've got a basic embodiment shown here. So then if I -- what you're asking me is, are there different embodiments of what I see in Figure 1, Figure 2 and Figure 3. Figure 3 is different than Figure 1 and Figure 2.

BY MR. RAYES:

Q. What is your understanding of what is disclosed in Figure 1 with respect to the goal of providing a device that reduces the amount of noise generated during operation?

A. Well, if I look at the brief description of the drawings, they say Figure 1 is a cross-sectional elevation illustrative of one embodiment of a fluid dispersion assembly as disclosed in the present specification.

Q. Do you agree that Figure 1 discloses an embodiment that uses a baffle to reduce noise?

MR. EAGAN: Objection. Scope. Legal

conclusion.

BY MR. RAYES:

Q. The question was, do you agree that Figure 1 disclosed an embodiment that uses a baffle to reduce noise.

So it's Figure 5 we're looking at here. I'm asking about Figure 1?

A. Oh, okay.

Yes. And Figure 2 also. Yes.

Q. Do you agree that Figure 3 disclosed an embodiment that reduced noise?

Do you understand the question?

A. Yes. I'm looking at the device.

Q. Have you seen these figures before today?

A. I've seen these figures before today, yes.

Q. And, you're not sure whether this discloses an embodiment that would reduce noise?

A. Well, I'm looking at it, sir. Be patient.

I would have to look at the description of Figure 3 in the patent, see if they give me any additional boundary conditions on that and take it from there.

Q. So, based on the figure itself, you cannot determine whether or not that would reduce noise; is that correct?

A. No. That's not correct. I said I would have to take time to look over that figure.

When I wrote the declaration, I looked at Figures 1 and Figures 2. And, there's definitely a baffle there. And, Figures 1 and Figures 2 are similar to the other patents. And, therefore, you know, I was making comments on Figure 1 and Figure 2. For me to make another comment on -- I wrote that declaration a number of weeks back. I would have to see exactly what I did in my notes. And, that would take time because I need to --

Q. So looking at Figure 1 -- just looking at Figure 1, now, here, today, you cannot tell from looking at it whether or not it would reduce noise, correct?

A. Well, it's a complex engineering system. You need to see the description of it and the detail description of the device.

Q. So you consider this to be a complex system; is that right?

A. I think it's a complex system, yes.

Q. So what would you need to look at -- what would you need -- what would you be looking for at Figure 3 to determine whether or not it reduces noise?

Could you tell from just the figure alone?

MR. EAGAN: Objection. Compound.

BY MR. RAYES:

Q. Sir, my question is, from the figure alone, can you tell whether the embodiment disclosed in Figure 3 would reduce noise?

A. Of course it's going to produce noise. None of them --

Q. Sorry. Reduce noise.

A. Reduce noise.

On this one, I'd have to do a more in-depth engineering analysis.

Q. What analysis would you need to perform?

A. I would do a fluid flow simulation of that system.

Q. So you cannot tell just by looking at it that it would -- whether or not it would reduce noise, correct?

A. Well, as I stated, I would have to do

a simulation and read in detail about this and spend some time thinking about that particular figure.

The only one I was preparing for this deposition and writing the declarations -- you know, I looked at probably over 1,000 figures. You know, as we stand here today, if you want me to opine on that particular figure in this complex engineering system, it'll take time.

Q. So previously, you testified that the infusion assemblies that produce fragrant oils are very simple systems.

Do you recall that testimony?

A. Simple systems from a technical standard of publishing in journals. So yes, this is a simple system when it comes to that. I don't see anything pushing back the bounds of science on this -- on this diagram.

If I go in and do a complex engineering analysis of this and come up with a definitive statement on this one, can I publish that in a journal? No. Will a company pay me to do that and design for them, yes. Will they help me to generate a U.S. patent for it and I'm an engineer working for that company, yes.

Q. So when you say "complex," you're talking about a complex engineering analysis. But it's your opinion that these are simple systems; is that right?

A. Well, some systems are simple. Some are more complex.

Q. We're talking about these systems in the patents.

MR. EAGAN: Objection. Vague.

MR. RAYES: You can answer.

THE WITNESS: Well, these systems in a patent? The technology is fairly simple. It's not computer controlled. There's no high-pressure systems. There's no combustion. There's no exhaust. All those things are simple in comparison to a lot of spray systems.

However, it's still complex fluid mechanics. And how the flow transfers from down to this point and comes back up through this other passage, I would need to see the overall dimensions of the device.

And so coming up here at 132, here's the injector at 132 --

BY MR. RAYES:

Q. Right. So the -- there's no dimensions shown in these figures, right?

A. Correct.

Q. And so just looking at these figures, you wouldn't know the dimensions of the assemblies, correct?

A. Well, I could get them, like I said, with my engineering ruler. Truly what I do is, I go in, and I would find out the radius of that system. And we'd have to know the scale of the drawings. Once I know the scale of the drawings, what we do or what my PC students do or my master students do is they go in with engineering rulers and they pull off coordinates so we can do simulations of these systems.

Q. And you mentioned that there's -- there's no high-pressure systems involved here; is that right?

A. Well, how do you define high pressure?

Q. How would you define a high-pressure system?

A. Well, it depends on the device. You know, a high pressure in a diffusion system to make my home smell well will not be the same high pressure that's in my advanced direct injection

diesel engine in my car.

Q. Okay. I'm just going to circle back on the -- the goal of achieving a device or assembly that operates quietly.

You wouldn't know how this embodiment shown in Figure 3 operates without a simulation, correct?

A. Well, like I said, I would have to sit down and go through it. When I looked at this patent, you know, I was concerned with Figures 1 and Figures 2. Those are representative of their device.

And once I'm talking about their representative of their device, which was used to get the patent, then, this is similar to the '094 Patent and the -- the other patent on this one. This is '918. What was the other one?

Q. So when you say "their device," which device are you talking about?

A. Well, associating with this company, Air Esscentials, Inc. And Levy is the inventor -- one of the main inventors. So therefore, he did the '449 Patent and the '918 Patent. And he presents this same cartoon picture. This is really just a cartoon. It's not an engineering blue point

-- blueprint.

And then I read that. I read about how everything takes place. You know, I make opinions based on what I have at that point in time.

If I'm asked to do additional studies, I will do it. And if I'm asked to opine in detail about what's happening in these fluid flow systems, then I can do that too.

You know, those things take time and, quite often, money. And, you could spend analyzing these systems a year alone if you want to do a detailed engineered analysis.

Q. And so your focus was only on Figure 1 and 2 in forming your opinions; is that correct?

MR. EAGAN: Objection.

Mischaracterization.

THE WITNESS: No.

BY MR. RAYES:

Q. Let me rephrase that.

In forming your opinions, you focused, with respect to the figures in the patents, on -- only on Figures 1 and 2, correct?

MR. EAGAN: Objection.

Mischaracterization.

THE WITNESS: No. I looked through the entire patent every time I do it. If I'm asked to complete a task in a certain amount of time --

BY MR. RAYES:

Q. Okay. Thank you.

So for Figure 1 and 2, you are able to visually determine that they would reduce noise, correct?

A. Yes. In fact, Figures 1 and 2 are the main figures in the patent. So if I go back to page 1 --

Q. Thank you. That's -- that answered my question.

And so then for Figure 3, you're not able to determine, based on a visual analysis, whether it would reduce noise, correct?

A. Not on a five-minute notice.

Q. And, is the same true for Figure 5?

A. Like I said, that one, not on a five-minute notice.

Q. Well, you've had -- you've had these patents for several weeks now, you said, right? And you reviewed everything already. So, you've had more than five minutes, correct?

A. Yes. And I looked at those. And I've obviously come to the conclusion that they're similar to the other ones.

But the key issue was, is what's happening with the clear baffle on Figures 1 and 2, which is the -- the key figure at the beginning of the patent. So --

Q. What is your understanding of why that is the key issue, what happened with Figures 1 and 2?

A. Why -- why else would it be on page 1?

Q. Okay. Thank you.

What are some ways to dampen sound waves?

A. Ways to dampen sound waves? You can cancel them out by reflective -- reflections off walls, off of surfaces. You can have sound-absorbant material.

One of the things that I did in my master study at Pennsylvania State University --

Q. I do appreciate all your experience. You have some great stories. But if you could just answer the questions, please, I would appreciate it.

A. So one more time. Ask the question.

Because I thought I was answering.

Q. What -- I mean, maybe you were getting to it. But instead of going into your prior experience, let's stick with the answer to the question.

The question is, what are some ways to dampen sound waves?

A. Well, that's what I was doing. In fact, I was talking about echoic chamber. And so you can almost dampen all of the sound waves. And I have designed those before. That's what I was doing exactly when you interrupted me.

So, you would look at that. You would look at reflections, what you're trying to cancel out waves. The anechoic chambers absorb sound. They absorb the energy. I could bounce off waves off these walls and cancel out pressure reflections.

And I know you're going to say I didn't ask this. But I go to a race car. I've done Formula 1 race cars. And how do you optimize the exhaust system on the car? You bounce pressure waves off the exhaust valve and at the end of the exhaust system. And that travels back up the exhaust system.

And guess what happens? You damp out the waves based on when the exhaust valve opens, which goes into piston motion, cam timing and everything else.

And so, I've already -- more times than I can count -- done those types of systems on automotive applications.

So you look at the waves being reflected. You come off the exhaust wave. You're traveling at the speed of sound. The square root kRT. K is ratio. T is the absolute temperature. You come down, you bounce it off a system in the exhaust system. That way, it bounces off and reflects, comes back up to the exhaust valve.

If I could time it so that I have a low pressure pulse when that exhaust valve opens, I can evacuate the engine and make more power. And not only can I evacuate the engine and make more power, I can quiet it down.

And so --

Q. Can you explain --

A. -- reflections within a device, eliminating turbulence, smooth flow fields, no massive flow separation. Jeez. Better nozzle atomizers so that I have smaller fluid flow

particles. The breakup phenomena can be very noisy. So I have to have an atomizer which can turn it into finely atomized particles quickly.

All those things come into play in damping sounds. I could go and pontificate on this for lecture after lecture after lecture, which I have done at the graduate level in every university I've ever taught. And so that's how you dampen sound.

Q. And, pardon my ignorance. But can you explain -- well, yeah. Can you explain what structure would cause the atomizer to quickly atomize?

MR. EAGAN: Objection. Speculation.

THE WITNESS: Well, it's the design of an effective nozzle and the flow field downstream of the nozzle.

And I know you don't want to go and hear another story because then another story just popped into my mind.

Well, we changed the whole status of the world with NASA in the late 19 -- in the early 1990s. We found how to do exactly what you're talking about.

BY MR. RAYES:

Q. I always want to hear your stories, Dr. Micklow, but I also want to get us through this before.

A. Well, you asked me about nozzle design. Do you want to have the whole course? I spent a whole course on fuel sprays.

I mean, nozzle design is extremely complex. It's the nature of the business. And -- oh, jeez. Like I said, you don't want to start me on that because lecture after lecture after lecture is developed based on how it affects the operation of fluid flow devices, whether it be sound, whether it be efficiency, whether it be power consumption, whether it be longevity and dependability, whether it be cost.

All those things come into play and have to work together.

Q. Okay. Let's move on.

Your declarations -- in your declarations, you offer an opinion regarding a person of ordinary skill in the art.

Do you recall that?

A. Yes, I do.

Q. And you offered a definition that includes someone with a bachelor's degree in

mechanical engineering, aerospace engineering, chemical engineering or a closely related field and at least two years of work experience designing or developing products involving fluid dynamics, correct?

A. Yes.

Q. And, so your definition of a POSITA, or person of ordinary skill in the art, does not require work experience that's specific to fragrance diffusion or scent devices, correct?

A. Well, normally, there's a training period. When you hire an engineer, they're going to understand all the concepts involved. You have to tell them what the important concepts are for that particular classification of device.

And so, yes. If they have two years' experience working in -- working in complex fluid flows. And then I'm their supervisor and they come to me, and there's -- and I tell them I want a fragrance device that fulfills all these criteria, can you do it for me.

And the answer is yes. And that's why they start to do things like patent searches. And they're going to say, well, Dr. Micklow, where am I going to look? I'll say, well, start with the

patent searches.

Now today, of course, we have internet, which is so powerful. It's unbelievable. I'd say start searching. And then they start searching. And then they find what they need. And that's how all of them start.

You know, in my engineering career, I've always been lucky that 90 percent of my work is pushing back the bounds of science, doing something no one has ever done before. And that's fun to do. Because then, you know, I have to go in there and really come up with these ideas that no one has ever had before.

But a thing like this, a good engineering degree, and if they had good professors to teach them good fluid mechanics and taught them how to see, then I go there and I tell them where to look, and they're ready to hit the ground running. And that's how it all starts.

Q. I appreciate that.

A. That's what it's all about.

Q. And so in preparing your -- when you were given the assignment for these declarations on these IPRs, were you asked to find the asserted patent claims valid?

MR. EAGAN: Objection.

THE WITNESS: Well --

MR. EAGAN: Ambiguous.

Sorry, guys.

THE WITNESS: Yeah. This is not a case that I started on, which was fresh, you know, that no one ever worked on before. Obviously, there was a significant amount of material already there. Right? And, we go down through and identify claims which are important.

And, I'll be honest with you. You know, there are times when I disagree with attorneys. And, there are times when I agree completely with them. So, they may think one thing is important, and I may think it's not.

But, in general, it starts out as a working -- a work in progress. And claims have already been identified. So I just have to agree or not agree on that piece of it.

BY MR. RAYES:

Q. Did you have any disagreement with the attorneys in this case?

MR. EAGAN: Objection. I believe that's going to a privileged discussion, Josh. And I think I'll instruct the witness not to answer.

BY MR. RAYES:

Q. Did you conclude that the patent claims -- sorry.

Are you going to follow your attorney's advice, instruction?

A. Yes, I am.

Q. Were you asked to conclude that the asserted claims were not invalid as obvious?

MR. EAGAN: Objection. Ambiguous.

THE WITNESS: I wasn't asked to come up with a particular conclusion, but I was asked to evaluate these devices. So my conclusion is always my conclusion. And that's --

BY MR. RAYES:

Q. Did you -- did you conclude that the patent claims were valid before your declarations were finished?

A. Which ones? There's a lot of claims in there.

Q. The claims on which you offer

opinions.

MR. EAGAN: Objection. Assumes facts not in evidence.

THE WITNESS: Well, I made opinions on which claims I thought would be important, yes. In fact, that's the first thing that I do without the attorneys. I'll be honest with you.

Because, like I said, I've done 30 of these cases now, if not more. You know, I got five more in the works right as we speak.

And, first thing I'll do is I'll go through the claims and I'll say which ones are independent, which ones are dependent, which ones do I think matter.

BY MR. RAYES:

Q. Okay. Thank you. That answers the question.

Which claims of the '918 Patent did you review?

MR. EAGAN: Objection. Scope.

THE WITNESS: I looked at all of them.

BY MR. RAYES:

Q. Which ones did you analyze for

validity?

A. I'd have to look back to my notes on that.

MR. EAGAN: Objection. Assumes facts not in evidence.

BY MR. RAYES:

Q. Sitting here today, you can't recall which ones you analyzed for validity, correct?

A. Well, no. Actually, I can open a folder in the next minute and tell you which ones, the claims I investigated, yes.

Do you want me to do that?

Q. We might come back to that.

Did you review your opinions either orally or in written form with anyone before you prepared your declarations?

A. No. The opinions in those declarations are my opinions.

Q. You didn't review them with anyone before preparing the declarations?

A. We were on a tight schedule. So, no, I don't recall reviewing them. We discussed them, of course. It wasn't like -- it wasn't as if I did this the day before that I submitted the declarations. We had been working several months

together. We have --

Q. Okay. That answers the question. Thank you.

What is Performance Engineering Solutions?

A. I have a nice website. And what it is right now, it's a corporation. But it started off with building race cars and race bikes. And so that was Performance Engineering. And I turned it into an LLC, which if you go to performanceengineeringsolutions.com, I think -- or just do -- scan Micklow and perform, you'll see my website. I put a website up there on things that I do. And one of them is --

Q. Are you -- are you paid for your expert services through Performance Engineering Solutions?

A. Not really. I think they write the checks out. My accountant has them written out directly out to me. And I get the necessary tax documents every year to be sure that I pay the taxman.

Q. So, you are not paid for your expert witness services through Performance Engineering Solutions?

A. No. But I think I've gotten paid to design race cars through there, if I remember. So it's -- it's more of a -- of a -- I like to -- like to enlighten people about my skills if they want to become involved with me.

So it's more of a gee whiz, look at this thing. And of course, I've got to brag about myself and everything else on there because I want people to utilize my services I describe there. But --

Q. So you -- you use Performance Engineering Solutions, LLC -- at least the website, is used to market your expert witness services, correct?

A. I have patent litigation on there, and I have expert witness services there too. I have other services there also.

Q. So you do provide expert witness services through Performance Engineering Solutions, correct?

A. I'm trying to remember the last time I got a case through there. I don't recall any in the -- in the close past. In fact, most of the time, like I said, it's -- I'm talking to people when they are developing new fuel additives,

different fuel injection systems, which I have analyzed --

Q. All right. So you are being compensated for your services in these IPRs? They are paying you as an individual; is that correct?

A. Through Telecon Services, yes -- Teclon- -- Teklicon, yeah. Because Teklicon takes a cut too, by the way.

Q. And occasionally, you have in the past received payment for your expert witness services through Performance Engineering Solutions; is that correct?

A. There hasn't been any time recently.

Q. How do you advertise your expert witness services?

A. Well, I have a website, just like most professors have websites. And so --

Q. Is that this Performance Engineering Solutions website?

A. I don't really advertise. It's word of mouth. And so the 25 or 30 IPRs I got, I didn't get one of them from advertisements. There was word of mouth. I started working for one attorney, and the next thing I know, I was working for the five big major German -- I worked for BMW and

Porsche and Mercedes and Audi. And I'm doing their advanced fuel injection system, variable cam timing. Then they tell Hyundai about me and then --

Q. That answered my question. Thank you.

MR. RAYES: Let's go off the record, please.

(A brief recess was taken from 12:56 p.m. to 1:32 p.m.)

BY MR. RAYES:

Q. All right. Welcome back, Dr. Micklow. I hope you had a nice lunch.

In your -- talking about the patents at issue here, in your opinion, what technology or field of art does the '094 Patent relate to?

A. The '494. It's a --

Q. The '094.

A. The '094? The '094 is the system that atomizes an oil to be able to enhance the smell of a room.

Q. Is -- and so what field of art would you categorize that as?

MR. EAGAN: Objection. Form.

THE WITNESS: I guess spray atomization.

BY MR. RAYES:

Q. And what about -- the same for the '918 Patent?

A. For the '918, spray atomization.

Q. And same for the '449 Patent?

A. I'm not holding on to the '449 Patent. But as to the discussion continued, you know, the spray atomization is one of them, but, you know, the fuel nozzle is what handles the majority of the spray atomization.

And we're talking about over system -- overall system design here. Therefore, the raw system, which is the -- what do they call it -- the fluid dispersion assembly. Because they call it an assembly. And that changes it. So the nozzle is part of that assembly. But everything else is also part of that assembly.

So therefore, I change my answer for -- for all three patents, that they're fluid dispersion assemblies.

Q. And you understood that claim construction was important to the opinions you offered in this case, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, claim construction

is important, yes.

BY MR. RAYES:

Q. And it was important to your opinions that you offered in this case, correct?

A. Well, there's a whole nother topic on flame -- on claim construction. The claims stated in this patent were that upon which -- the figures, that upon which I base my conclusions, yes.

Q. In forming your opinions, did you apply -- do you understand that the parties stipulated to certain -- to constructions of certain terms?

A. I understand that it's important to construe the terms, yes.

Q. And you understand that the parties agreed to the construction of certain terms in the patent claims, correct?

A. Yes. That's part of the -- of the process, yes.

Q. In forming your opinions, did you apply the parties agreed-to constructions of the term "fluid dispersion"?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, I don't recall seeing that, no.

BY MR. RAYES:

Q. Okay. So did you apply a claim construction for the term "fluid dispersion"?

A. Well, I wasn't involved in the claim constructions. That's -- like I said, based on all the other work I've done in patent litigation, that's something that takes place in the beginning.

And essentially, I'm coming here at the end of a process, I hope, and the claim constructions and how the terms are construed was already settled upon. And, I made my opinions based on what I read in the patents.

Q. Did you apply any claim constructions in forming your opinions?

A. Well, that's more of an -- of a -- the part of the attorney that I rely upon. And so I can help with term -- claim construction. However, when you asked me did I write these reports, and said the opinions in these reports are completely mine because I know the documents which I sent them as we put this together.

However, the issues with claim construction, et cetera, I saw what had taken place earlier and probably with the patent board, et cetera.

Q. So did you apply any claim constructions in forming your opinions?

MR. EAGAN: Objection. Form.

THE WITNESS: I think I already answered that. And the answer is I used patents. And the patents are there in terms of the claims. And that's what I used to make my opinions.

BY MR. RAYES:

Q. Okay. So I'm not hearing in your answer whether or not you used -- you applied any claim constructions in forming your opinions.

A. Well, that's an attorney term. So you would have to define that for me and educate me. That's not an engineering term.

Q. What is your understanding of claim construction?

A. Well, I'm not here to opine on this today because I wasn't involved in that part of the analysis.

Q. So if you look at the -- can you open up -- actually, I can, I believe.

A. If you have a document you would like me to refer to, I will do that.

Q. Yeah. If you can open up Exhibit 1

and share your screen for us, please. Exhibit 1 is your declaration for the '094 Patent.

A. I'm trying to see how I get back there. Back -- here we go.

So you want me to open 1? Okay. All right.

Q. And if you're able to share your screen again, please.

A. Refresh the screen?

Q. Share the screen.

A. Oh, share the screen. Okay.

Q. And if you could scroll to paragraph 14, it says, "I understand that certain issues in an IPR, such as claim construction and whether a claim is invalid as obvious, are assessed from the view of a hypothetical person of ordinary skill in the relevant art."

Do you see that?

A. I see that.

Q. So, did you -- so you understand, then, that claim construction is an issue in an IPR that -- that is required in order to determine the validity of claims, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: I was going to say based

on everything I've done before in this area of expertise, as an expert witness, is that there's always been issues on claim construction and whether or not I agree with that.

I have not seen those here today. And so I took the terms in the claims to be as ordinarily addressed by an engineer with that type of background.

BY MR. RAYES:

Q. So you did not apply any claim constructions to the terms in the claims beyond the plain and ordinary meaning; is that correct?

MR. EAGAN: Objection. Form.

THE WITNESS: I don't know if I would even apply claim construction. I applied engineering principles to a document that had been published with the patent office.

And so sometimes, the -- I recall in the claim construction discussions that were done prior to this case that, quite often, it was just on the ordinary meaning as accepted by a person of standard skills in the art. However, there are times when they wanted to change those constructions.

I did not see anything like that in this arena. So, I interpreted the claims as would be normally interpreted by an engineer.

BY MR. RAYES:

Q. Okay. So you are not aware, then, that the parties agreed to certain claim constructions for certain terms; is that correct?

A. Well, I haven't ever discussed that. So I would assume that it was done. And going through my analysis of this system, once again, I wanted to be able to provide a service that is cost effective, with all the engineering required, to make good engineering decisions.

And there -- I may have seen a document with claim construction in it. And when I was glancing through it -- just like I'm scanning through this document as we speak today, you know, I've seen the term "claim construction." And I do recall something that -- nothing was out of the ordinary there. That's what I recall.

Q. So sitting here today, your recollection is that there were no terms that were construed beyond their plain and ordinary meaning?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, that is what I assumed, yes.

BY MR. RAYES:

Q. So, for the term "mixing chamber," did you apply its plain and ordinary meaning?

MR. EAGAN: Objection. Form.

THE WITNESS: I applied the understanding I have of a mixing chamber, yes.

BY MR. RAYES:

Q. What is your understanding of a mixing chamber?

A. A mixing chamber has significant volume and dimensions so that you can have a finely dispersed fluid at the exit of the mixing chamber.

Q. Did you -- did you apply a construction for the term "diffusion chamber"?

A. For which chamber, please?

Q. Diffusion.

A. Diffusion chamber. Once again, a diffusion chamber is obviously where you're decelerating the flow. You're attempting to obtain a uniform spray distribution that is a fine spray with a uniform distribution across the exit.

Q. What is a uniform distribution?

A. Well, you're going to have a radius of the particle. And by the way, there are quite a few different radiuses. The one I use most often is the Sauter mean radius after Dr. Sauter. And that one will be a way to be able to talk about the implied performance of the spray using that Sauter mean radius.

Q. So what is a uniform distribution?

A. Well, it depends on the intention of the device. And this is what we started on just a minute -- perfect question.

A moment ago, you asked me about a nozzle and whether or not it would affect the -- the performance of this device. And, of course, I appeared to be rambling on, talking about nozzles I've designed before, et cetera, et cetera.

But that's not the case. And this is the difference between a nozzle that I put in a gas turbine engine for an advanced jet fighter versus one that I put in my house to make it smell nice.

So what is that distribution? It's going to be markedly different if I'm talking about the jet fighter than what it is in my house. And therefore, it's essentially an open framework within the industry.

And with the cost involved here, I think that there would be a significant variation in this distribution for the ones that I analyzed outside of the patent.

Q. What is a uniform particle size distribution?

A. Well, it depends on the type of flow. What type of flow do you want to tell me? Tell me your flow field.

Q. What's the meaning of the phrase "uniform particle size distribution"?

A. Well, there's going to be a range of size of particles which are associated with a particular flow configuration that satisfied the design constraints at hand.

Q. Do you agree that a uniform particle size distribution is a distribution of particle sizes that is uniform? So, for example, if the size distribution is 1-to-10 microns, and there are 100 particles, then there would be 10 particles at 1 micron, 10 at 2 microns, and 10 at 3 microns, et cetera?

Is that -- do you agree with that?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, it can be

definitive when you're talking about this.
You know, I --
BY MR. RAYES:
Q. Well, is uniform particle size distribution not a known engineering term?
A. It's an engineering term that would be understood for a particular flow configuration and based on many, many things.
One of them is, of course, performance related and the other one is cost related. The other one is dependability. And the other is practicality.
My -- the size distribution that I've seen for these --
Q. So how would you define a uniform particle size distribution?
A. For what configuration?
Q. As a general engineering principle.
A. It's -- you can't.
Q. You can't define general -- or a uniform particle size distribution?
MR. EAGAN: Objection. Form.
THE WITNESS: I can. You have to tell me -- you have to finish the question, sir.
You have to tell me in what type of

device and how much I've got to spend and how long I want it to live, and many, many other things that I'll think of when I'm starting to put pen to paper.

BY MR. RAYES:

Q. Do you agree that a uniform particle size distribution occurs when all particles in a sample are -- when there's the same number of particles in a sample that are -- strike that.

So you're unable to define a uniform particle size distribution on its own; is that correct?

MR. EAGAN: Objection. Form.

THE WITNESS: I didn't say that. I said you tell me the type of system. For instance -- I'll give you a for instance --

BY MR. RAYES:

Q. No. That's all right.

I just want to make sure that you're not able to define the uniform particle size distribution, the meaning of that term.

A. I didn't say that at all.

Q. So in my example, there's 100 particles, and the particles range in size from 1 micron to 10 microns, and there are 10 microns of

each size. So there's 10 particles that are each size. So there's 10 particles that are 1 micron, 10 particles that are 2 microns, 10 particles that are 3 microns, et cetera.

You follow me?

A. I follow you.

Q. Would that constitute a uniform particle size distribution?

MR. EAGAN: Objection. Form.

THE WITNESS: First off, you have to tell me what's going to give me a 1 micron particle. Because I've never seen one.

Number two is, what's this in?

BY MR. RAYES:

Q. Why does that matter for what is -- how you define a uniform particle size distribution?

A. Because it's device dependent. And that's what the problem is with a lot of people that aren't qualified to do certain engineering analysis. They don't understand that fact. But I understand it intimately well. And this is why you have to do such either complicated experiments --

Q. So if I were to look up, in an engineering treatise or some other publication, the

term "uniform particle size distribution," would I find a definition?

MR. EAGAN: Objection. Form.

THE WITNESS: In terms of a numerical dist -- numerical definition?

BY MR. RAYES:

Q. In terms of a definition of the phrase "uniform particle size distribution."

A. Well, you just gave me numbers. Or do you want me to just talk about uniform size distribution? I can give you the definition of that right now.

Q. Well, that's what I've been asking for the last five minutes.

A. And I've answered for the last five minutes. Based on the --

Q. Please do provide a definition.

A. Based on the type of the device I'm designing, based on the cost involved, based on the environment in which it is operating, based on the -- any size restrictions I may have, based on any volume restrictions I may have, based on any material restrictions I may have, then I can come in and say what I think a uniform size distribution would be for that system in terms of the

engineering design.

And there's different levels of design. If you think I want to sell this air atomizer down at Walmart and --

Q. So I guess you're not going to give me a definition, then, of uniform particle size distribution.

A. I just did. It was very definitive. In fact, I even have a book here behind me, which is what I call the Bible. It's atomization sprays. I wonder what it'll say in here. Lefebvre.

Do you know who Dr. Lefebvre is? I know him personally before he died.

Q. How do you define the term "fluid dispersion"?

MR. EAGAN: Objection. Form.

THE WITNESS: You're dispersing the fluid from a small volume to a large volume.

BY MR. RAYES:

Q. And did you apply that definition in forming your opinions?

A. Of course.

Q. You understand that the parties agree that the term "fluid dispersion" in the context of

the patents mean the mixture of an operative fluid, air, comprising a plurality of substantially uniform droplets of the operative fluid dispersed throughout the air?

A. Well, that sounds like the definition I just gave you. You hear what the first word was? Optimum. And that's what I was telling you. Based on how -- what the device is, based on how you want it to operate, based on how much you want to spend. You know, the first thing that you said was optimum.

Q. Operative. Operative.

A. Well, operative was later in the sentence.

Q. So the parties agreed that fluid dispersion means a mixture of an operative fluid in air comprising a plurality of substantially uniform droplets of the operative fluid dispersed throughout the air.

A. Okay. So as soon as you say uniform size distribution, then I agree with that. Okay. But it's going to change for every devise based on the characteristics I just stated a moment ago.

Q. How do you define a baffle?

A. What type of baffle?

Q. That's described in the patents.

MR. EAGAN: Objection. Form.

THE WITNESS: So a baffle. A baffle in a patent. First off, you have to think about where the word "baffle" came from.

Baffle came from the fact that you have -- I'm baffled by that. It's too complex for me. I don't understand where this part of the analysis is going or that part of the analysis is going. I'm baffled.

BY MR. RAYES:

Q. Let me --

A. I'll answer your question.

Q. Do you understand that the patents describe a baffle?

MR. EAGAN: Objection. Form.

THE WITNESS: You interrupted me. I wasn't done talking. I was just getting ready to get to that point.

And so I was giving you the history -- remember, I'm a professor. You have to be sure that you cover the bases.

BY MR. RAYES:

Q. I appreciate that. I'm not looking

for history here. I'm just looking for answers to my questions. If you could just please just answer the questions.

A. Well, you have to answer it the way that I answered it. That's my opinion.

Okay. Now back to it. So now we know what baffled means. It means it's random. It's disoriented. And so what do we do in a baffle, in fluid flow device? Now I'm getting to where the important part of the question is.

In a baffle, you want to make sure that you can send out random, unsteady pressure fluctuations to cancel out each one. The more that you send out, the more probable that you're going to be able to lower those pressure distributions.

What happens if all the pressure fluxes that are going up and down are on the high side and I have two coming in high? Guess what? It's loud. That's why you hear some car going down the road or a race car going on the track, and it sounds loud sometimes, and sometimes it's purring like a kitten.

Q. Okay. So what is your definition of baffle?

A. A baffle in a fluid flow device would

have to be a structure such that you could have cancellation of the unsteady pressure fluxes occurring within that domain of interest.

Q. What do you mean by -- what type of structure would it have to be?

A. It would have to be based on the type of the device. I mean --

Q. What do you mean?

A. There's no baffle out there which is a generic baffle that you put in everything. You know, one time, it may work. The next time, it could work completely differently.

Q. So it's a structure that -- it's a structure such that you would have a cancellation within the domain of interest, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Cancellation of the unsteady pressure fluxes -- fluctuations in the domain of interest.

BY MR. RAYES:

Q. So it causes a restriction; is that correct?

A. I didn't say anything about a restriction.

Q. So what is --

A. Restrictions, quite often, increase the noise.

Q. We're not talking about noise right now, sir.

A. All right. So, the restriction --

Q. So, is it your opinion that restrictions -- your opinion is that restrictions will increase noise?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, I asked you -- you have to be more definitive. You're not asking the right questions. You need to go back to engineering 101.

And so you're talking about a restriction. What type of restriction? Do I have a contoured restriction? Do I have a uncontoured restriction?

BY MR. RAYES:

Q. So there are restrictions that can increase noise, and there are restrictions that can decrease noise; is that fair?

A. Systems that can. Restrictions --

Q. Systems that include restrictions?

A. In -- in general, restrictions alone will not cancel noise, will not cancel unsteady

pressure fluctuations. Because in general, there will be flow separation in any restriction, even if I have a contoured restriction.

And I go in to define isotropic nozzle. And I've got my high-speed compressible flows. And, I'm hitting Mach 10. I can fly from New York to Los Angeles in ten minutes. And I'm worried about that nozzle on the back of that engine. And that's a restriction. And so I want it to be quiet because I have to fly over cities, and I don't want shock waves coming out of the back of that engine.

So what do I do? I contour the restriction. I do the best I possibly can to be able to eliminate the losses in the restriction. And I'll have a very contoured nozzle. I will spend many, many hours doing that, which I have done in my engineering career many times.

And if I come in and I have one large diameter over here and another large diameter here and the little plate inside of it, then that restriction is going to increase noise every time because you're going to increase turbulence. You're going to have flow separation as you come out the back end of that, quote-unquote,

restriction. You'll have marked flow separation. That flow separation will cause a decrease in the stagnation pressure. It'll cause a decrease in the available energy to do work and it'll increase turbulence every time. And I will say that's not some of the times. Every time. And it's called the "second law of thermodynamics." And when you learn that law, then you can learn to see.

And there is -- I will say that most definitive, there is no restriction. Now -- because engineers don't say every one. But I can say this time because there's something called the "second law of thermodynamics," increase of entropy. It's impossible to violate. And it's the only time an engineer will ever say "impossible."

And I can say this with conviction, that the restrictions that I saw in -- in this patent will increase turbulence, will cause flow separation, will increase noise, will hurt the fluid flow distribution, cause the fuel particles to coalesce, get larger. It'll be everything that you can think of that's terrible for this system other than it was cheap to make.

Q. So, just so I make sure I understand, that the patents -- the patents at issue -- the

restrictions that are used in the patents at issue will cause flow separation, increase noise and hurt the fluid flow distribution and cause the fuel particles to coalesce and get larger and everything you can think of that's terrible for the system; is that correct?

MR. EAGAN: Objection to form.

THE WITNESS: If you have an uncontoured restriction, yes.

BY MR. RAYES:

Q. And that's -- that's the restriction -- you're referring to the restrictions in the patents at issue, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, I saw that in one of the patents. And I brought it to my conclusions. In fact, I could even remember which -- it's -- is it Sevy? With part number 98.

BY MR. RAYES:

Q. Okay. So the patents at issue, they include restrictions, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: They include restrictions. Yes, they do.

BY MR. RAYES:

Q. And do those restrictions dampen sound waves?

A. Sometimes they do. Sometimes they don't. But in this '094, Figures 1 and 2, yes, in the baffle.

Q. So, you agree, then, that a restriction can dampen sound waves?

A. No. I didn't agree to that. That's too generic --

Q. I'm sorry.

So you agree that a restriction -- you don't agree that a restriction can dampen sound waves?

A. What was your question, please?

Q. Do you -- can a restriction dampen sound waves?

A. You can't make that statement in general. No. In fact --

Q. I'm not making a statement. I'm asking a question, sir.

A. In what I've seen in those patents, the answer is -- so hit me one more time with that. Because I want to make sure --

Q. Can a restriction dampen sound waves?

A. So it comes back to the -- the issue is that it has to be a particular type of restriction. It has to be something like a baffle or --

Q. So the answer is yes. Thank you.

A. No. The answer is not yes. Because I can say more -- more devices will increase sound than will decrease it. So you have to move into a particular category. You can't say that in general. Most definitely not, you cannot say that in general.

Q. So you cannot say that -- you cannot answer whether or not a restriction can dampen sound waves. Is that your testimony?

A. Well, it's -- it's a general term. You can't say that because it's too general. It's -- it's a term which is moot. I mean, is -- I go out there and I look at the water in my swimming pool, and I say the water is cold today. What does that mean? Is it cold or I think it's hot?

Those are things which, to define, well, you have to involve other -- other design criteria. So the water in the swimming pool. I can put a thermometer in, and I know if it's -- the temperature. And even then, I can't say whether

that's hot or cold, you know, because what's hot to me could be cold to you and vice versa.

Q. So whether or not a sound wave is dampened is relative?

Is that what you're saying?

A. Is relative to the design of the device.

Q. So if you take a noise measurement in whatever -- decibels, I guess, however noise is measured. If you measure noise, whether or not those decibels were decreased over a restriction would be a relative question?

A. It would be based on the design. And in fact, what you just said, I personally -- personally -- have measured that hundreds of times. Hundreds of times --

Q. All right. Let's go to --

A. -- with very accurate pressure measuring devices.

Q. I'm going to introduce Exhibit 6, will be the '094 Patent.

(Petitioner's Exhibit No. 6 was marked for identification.)

BY MR. RAYES:

Q. If you refresh it, it should be there

now.

A. I got it.

Q. If you can please turn to Claim 7 on the second-to-last page. If you want to -- I think you have the wrong exhibit here. If you could click back on the top left. Exhibit 6 on the bottom, the '094 Patent.

Have you seen this patent before?

A. Of course.

Q. Claim 7, right there at -- beginning at Column 9, line 37, it states -- or line 36, it says, "A silencer assembly having a silencer inlet, a silencer outlet and a baffle, wherein said baffle partially restricts movement of the fluid dispersion through said silencer chamber from said silencer inlet to said silencer outlet, thereby dampening sound waves generated during operation of said fluid dispersion assembly."

Do you see that?

A. I see that. And that's exactly what I just said.

Q. Do you agree that the baffle creates the restriction?

MR. EAGAN: Objection. Form.

THE WITNESS: Yes.

MR. EAGAN: Scope.

BY MR. RAYES:

Q. And do you agree that the baffle -- that the restriction created by the baffle thereby dampens sound waves?

MR. EAGAN: Objection. Scope.

THE WITNESS: It's not canceled by the restriction. It's canceled by what's happening on the molecular level and how the unsteady pressure waves are interacting.

And by the way, that's an inviscid phenomena. And therefore, you can model that with things like the wave equation, once I have the flow field. And the flow field is a very typical type of calculation that you would make for that.

So -- because you saw what it had to say there, silencer inlet, a silencer exit and a baffle. And that's what I'm saying. Is there a baffle there that's correctly designed wherein the baffle partially -- partially -- partially restricts movement of the fluid dispersion through the silencer from the said silencer to the said

silencer outlet.

And because of that, we can damp the sound waves, actually waves during the operation of said fluid dispersion assembly.

And in fact -- you know, I don't want to confuse you. But there's two types of pressures. And, one pressure is called the "stagnation pressure." Another pressure is called the "static pressure." And, in this case, one goes down and one goes up.

BY MR. RAYES:

Q. Which one increase -- which one increases?

A. The static pressure.

Q. And the other pressure decreases?

A. The other pressure decreases. And the -- why the other pressure decreases is, most engineers don't understand that. And that's why they spend a lot of time in my classes. Because I tell them all about why.

Q. So, the patents also teach a modified diffusion chamber, correct?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: I don't know what you

mean by "modified." Modified from what?

BY MR. RAYES:

Q. If you go to Column 7, lines 24 to 36.

A. 24 and 36. Okay. I am there.

Q. Can you please review those for me?

A. "More importantly, the fluid dispersion discharged from the atomizer assembly through the atomizer exhaust channel into the diffusion chamber is interrupted and redirected by virtue of the avial portion and transverse portion therein. The interruption and redirection of the flow in the modified diffusion chamber during the operation of the fluid dispersion assembly, in accordance with the present embodiment, serves to suppress or dampen sound waves generated therein in a similar manner as the suppression chamber of the previously disclosed embodiments."

Want me to --

Q. And it goes on to state: Further, the restricted discharge from the transverse portion 115 of the modified diffusion chamber 112 may serve to further suppress or dampen sound waves, thus reducing the noise generated during operation to an even greater extent.

Do you see that?

A. Yes, I do.

Q. Do you agree with that?

MR. EAGAN: Objection. Scope.

THE WITNESS: Yes, I do.

BY MR. RAYES:

Q. And it mentions the -- what you just read. It mentioned the previous embodiment which -- well, looking back, it says "interruption and redirection of flow in the modified diffusion chamber during operation of the fluid dispersion assembly, in accordance with the present embodiment, serves to suppress or dampen sound waves generated therein, in a similar manner as the suppression chamber of previously disclosed embodiments."

Do you recall the embodiments disclosing a suppression chamber?

A. I don't know. I would have to look through those numbers on the figures. That's in Figure 5. I would have to have time to go through that.

But I read this in great detail, and I didn't see anything that I had -- based on my analysis I've done up to this point in time, I didn't see anything in this patent that was

alarming me in terms of being technically incorrect.

Q. So you would agree, then, that the modified diffusion chamber embodiment that we just read about, that it would dampen sound waves, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: As I stated, I would need to go through that, see what's happening there exactly, and then I could answer that question.

BY MR. RAYES:

Q. You have no reason to -- no reason to doubt that what the patent teaches is untrue, correct?

A. No. I don't think it's untrue. And the reason I'm smiling is, is that you asked me before, do I have any patents. And I said no, I don't want to have any patents. I'll give my work away to, you know, whoever hires me as an engineer in a valid job.

These patents have problems associated with being able to correctly understand what they're saying. A moment ago, I asked you about static and stagnation pressure. If you don't

understand those concepts, then you're not going to be able to understand these patents.

And sometimes when things are put forth in a patent, the people that put them forth -- not the engineers, not the company -- but people associated with granting the patent may not catch that. Right? And that's when it comes into play of you understanding exactly what's happening from the fluid flow phenomena.

And even experiments, you can't really get it into great detail. Computationally, you can. You can see inside a device. And if you modeled it correctly, then you can see things that no one has ever seen before. You do it incorrectly -- and I would tell my graduate students, my Ph.D. students, you're just making pretty colored pictures. Go back and do it this way. And then we would have long discussions, and they became great engineers and great scientists.

Q. What problems are associated with these patents --

MR. EAGAN: Objection. Scope.

BY MR. RAYES:

Q. -- with making them --

A. I don't have any opinions on patents

and problems associated with them. That's not my job.

Q. So you just testified that these patents have problems associated with being able to correctly understand what they're saying.

What problems do they have that makes them difficult to correctly understand what they're saying?

A. And so you've already changed what I said, sir. You made it that I said that all the time. I said sometimes because of the complexity of the flow field associated with the device that we're investigating, that people don't have that technology.

Q. Just so you're aware, I have a realtime transcript here. And so I'm quoting your testimony.

A. Good. I'm glad you are. And I thought --

Q. If I do misquote you, it's not my intention.

A. That's fine.

Q. So what problems are associated with the patents that makes them difficult to understand?

A. You can't say that in general about every patent out there today.

Q. These patents.

A. I think that the inventors of this patent understood what I said about stagnation and static pressure. Other people may not. And therefore, they make incorrect conclusions. Because I know --

Q. So, talking about these patents, what problems do these patents have with being able to correctly understand what they're saying?

A. Well, everything they said here, I agreed with. Like I said, I didn't disagree with one thing in the paragraph that you just talked to me about.

However, you're trying to make a generic question about a restriction, is going to do a such-and-such an effect when it's not a restriction. It's a restriction with a baffle in a particular inlet in a particular exit. It's a system.

And so I know today, if I even go down to Lowe's and grab a tube and put a washer in that tube and blow it through the tube, guess what? When I put that washer in the tube, I'm going to

hear it. And that's a restriction. And I can do that example in Lowe's and talk to the person there who is working. I'll say what's this? What's --

Q. I appreciate that. Let's move on to another question.

So you gave us a definition of mixing chamber previously. And that's where fluid dispersion is formed. I'm paraphrasing what you said.

But, you also gave us a definition of diffusion chamber. Nothing -- so, do you agree that -- do you agree that fluid dispersion is formed in the mixing chamber, correct?

A. Otherwise, it wouldn't be a mixing chamber. So the answer is yes, it has to happen in the mixing chamber. That's one of the correct areas. Disbursing the fluid ending up with a uniform distribution, whether it be stagnant or moving.

Q. What do you mean stagnant or moving?

A. Well, for instance, if I want to have a mixing chamber -- and I know you don't like me to diverge or my stories.

But because the sprays are so difficult to model, Sandia National Labs took a lot

of government funding. And I'm talking tens of millions of dollars. And my students and I reported that study, where they came in and they said we have to definitively talk about how the sprays are dispersed with inside a chamber.

And so they had a number of different systems. And they were -- a number of different cases they were investigating. They were involving cases with combustion, without combustion. They were involving cases where they injected the -- the liquid into a big box. And so that flow was stagnant. It wasn't moving out of the box. And then they had ones where they were moving into and out of the box.

And then they had very, very accurate ways to measure the -- the particle distribution within the chambers and also the particle size within the chambers. And, they came up with test data to be able to use to correlate and create spray modeling. It was all done, tens of millions of dollars, just so that we can model the sprays. And we --

Q. And so the mixing chamber forms fluid dispersion. And, you said that it -- that's one correct area of disbursing the fluid -- you said it

creates fluid dispersion, and you mentioned uniform distribution.

What did you mean by "uniform distribution" in your previous answer?

A. Well, as I stated before, it depends on the device at hand. If I --

Q. Sir, we're talking about the patents at issue here.

A. The passion -- patents at issue here?

MR. EAGAN: Objection. Form.

THE WITNESS: I'm not willing to talk about a uniform dist -- uniform range right now, other than it should be -- and I'm not even going --

BY MR. RAYES:

Q. You're not willing to talk about a uniform distribution with respect to the patents?

A. I am, because it's an engineering term which is understood from one engineer to another. And you might say, well, why don't you give me some numbers?

Okay. Month one, I'm a new engineer. They hired me to design a system. I came up with a distribution, and I thought that was pretty good. This distribution of the -- of the fragrance

molecules within my device or outside of my device was plus or minus 10 percent in terms of sound and mean and radius.

And once again, you change the diameter -- by the way, nobody uses particle diameter. You have to have another way to do it because you can't identify a separate particle, you know. And, you're shooting it through lasers and coming up with the distribution and the size for a particular operational configuration.

Now, I know you don't want to hear about the gas turbine engine washing system. But that's the last one where we did detailed analysis with laser --

Q. So you don't know -- you won't tell me what you meant by "uniform distribution" in your previous answer with respect to mixing chamber of the patents at issue?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, I was getting -- like I said, you have to talk about a particular type of system. So it --

BY MR. RAYES:

Q. We're talking about the patent of systems that are disclosed in the patents at issue.

MR. EAGAN: Objection to form.

BY MR. RAYES:

Q. You mentioned a uniform distribution with respect to the mixing chamber.

What did you mean by that?

A. It's going to be -- there's going to be -- between the high and low particle distribution, it'll be bell-type in nature. So if I look at particle size versus axial distance from the center of the spray, it'll be a bell-type distribution where the peak of the bell is, and then you can look at different types of statistical correlations because you have to talk statistics. You're not going to talk about anything that this is the size of the particle or this is the size of it.

You do a bell-type distribution of the hundreds of thousands of particles in the spray. And even a simple spray like this, hundreds of thousands. And then you -- you plot up the data. And now we just have a million to take that data. And now we're sitting up there and we're looking at the peaks.

Then you take two standard deviations off from either side based on the operation of that

particular device. And I will tell you that's a uniform spray distribution. And now I just gave you an exact engineering definition.

And that's how I would do it. You know, that's the only way to do it. And I guarantee you, for this system, it'll be different than a gas turbine engine. It'll be different from that diesel truck running down the road. And you will not get one millimeter particle size coming out of these -- these systems. You won't get it.

Q. Okay. And you mentioned that nobody uses particle diameter.

What did you mean by that?

A. Physical particle diameter. You have to have a diameter which is more relevant on the type of system that you're looking to investigate.

You know, I've got right here -- in my typical things that I use as my database, I have a -- a report sitting here on the different types of radii which are associated with liquid sprays. What do I mean by different types of radii? Radius. There's probably at least ten that are defined there. And it depends on this flow situation I'm trying to model. When I --

Q. Do you understand that the patents at

issue describe droplets -- they describe droplet sizes with respect to the diameter of the droplet, correct?

A. They -- one more time, please.

Q. You understand that the -- give me one second. If you can go to Column 3. Column 3 on page 8 of this Exhibit 6.

A. Okay. Column 3.

Q. And starting at line about 15, it says: In at least one embodiment, the plurality of "substantially uniform droplets," each have a diameter that range about one micron in another embodiment, the diameter of the droplets in the range of about three microns.

Do you see that?

A. I see that.

Q. And, so, is the patent incorrect to be describing droplet sizes with respect to the diameter?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, it depends on the operation conditions. You know, what is the temperature.

You know, okay, so we've got 1, 3 and 5. Which one is it? We'll flip a coin and

say that's the one. The reason is, is that -- this is the point I was trying to make.

It depends on the operational conditions. And the effectiveness of this device is going to depend on many, many things other than just the size of the particle.

You have to talk about the type of oil, what is the -- what is the rate of evaporation of the oil in the external air. You know, what happens if they collide? Do they coalesce? What happens if they hit a wall? Do they split apart or coalesce and splash against the wall?

All of these things -- you know, these are important engineering facts.

BY MR. RAYES:

Q. Okay. So the fluid dispersion is formed in the mixing chamber. Do you -- and then, as -- as it progresses through the assembly, do you agree that the dispersion becomes more uniform?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: What makes it more uniform, please? I heard the last part of it, makes it more uniform. But what was

the first?

BY MR. RAYES:

Q. So, in the mixing chamber, the fluid dispersion is -- is formed. And then the fluid continues to flow through the assembly.

Do you agree that as it flows through the -- that as it flows from the mixing chamber, the fluid dispersion becomes more uniform as it flows through the assembly?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: It could.

BY MR. RAYES:

Q. In the patents at issue.

A. Depends on the design of the chamber. And --

Q. You've seen the figures in the patents, correct?

A. In this patent, yes, uh-huh.

Q. And so, in this patent, would the fluid dispersion become more uniform as it flows through the assembly?

A. Well, if we're talking about this, we're flowing through the assembly, and it's exiting the device after that.

So, I come up here and -- you know, it

gives another baffle, by the way. Interesting. That's coming out here.

But as I see it come across this baffle right here, then, it'll move up into this passageway. And as it does so, there could be coalescence of the oil. But it could still be within the acceptable design range.

Q. In this figure here, can you identify for me the mixing chamber?

MR. EAGAN: Okay. Scope. Form.

THE WITNESS: Well, the mixing chamber is over here.

BY MR. RAYES:

Q. I'm --

A. We blow air past it. We put it into this mixing chamber. This is where the mixing is coming -- place. As we suck the oil in, it come down through this thin tube. We then move on through this hole on the bottom of it and then --

Q. So you're pointing to the area that is with the numeric -- the number 232; is that correct?

A. That's correct.

Q. And that's the mixing chamber?

A. This is part of the mixing chamber.

Then over in 112, we're mixing also. And then --

Q. So 112 is also part of the mixing chamber?

A. Because the fluid is still mixing there. And it's --

Q. And any -- any other parts that are part of the mixing chamber, in your opinion?

A. Well, that's where the mixing should take place before it goes into the outlet. So, the key issue is that you have to have adequate fluid dispersion, adequate fluid mixing, adequate particle size, to achieve with a particular device before it moves out of the system.

So this is a system design. So you can't pull off pieces of it. I mean, in this -- so let's come in here and see what they call 232. You know, I'm looking at it as a fluid flow device. Let's just see what they call 232. 232. 232. Where are you 232? Right here we go. 235, 234 -- where's my 23 -- 222. Where are you 232?

Q. If you look at column 6.

A. Column 6?

Q. Line 12.

A. Line 12. Okay.

Q. "The suppressor assembly may also

include a suppressor discharge port to facilitate transfer of the fluid dispersion from the suppressor chamber."

A. Out of the mixing chamber 236.

Q. So, which component in this figure --

A. Well, I'm looking for 236 right now. Because that's what you just -- on that line, you told me it was here. So what do we got? This is 10.

Q. I don't know why you're looking -- you don't need to look for 236, sir.

A. Well, I thought that's what was in that paragraph line, page 6 -- oh, it's 2 -- yeah. Mixing chamber, 236.

By the flow of the fluid dispersion out of the mixing chamber 236 through atomizer exhaust channel 238.

Where is 238?

Q. So in Figure -- if you can turn back to Figure 1 or Figure 2, either one, which component of this assembly, in your opinion, is the diffusion chamber?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: Well, as you move out of 232 into 112, the diffusion of fluid, right

there.

BY MR. RAYES:

Q. 112 is the diffusion chamber?

MR. EAGAN: Objection. Form.

THE WITNESS: No. It's the area in which you're diffusing the fluid.

BY MR. RAYES:

Q. Okay. So going back to your original testimony, that the -- fluid dispersion is formed in the mixing chamber. Then -- so the mixing chamber, as you said, is 232. If you can go back to Figure 2.

A. That's what I would call the mixing chamber. That's where it's coming out of there and mixing together. Well, the mixing is happening here too. So we're sucking in the fuel right here. It's starting to mix with the fuel and move through that passage. However, it's a very thin passenger. So it moves on into here. And that's what I would call the mixing chamber.

Because then, after that, it exits the chamber. And this is the chamber. It exits the chamber through a hole at the bottom and moves into a larger chamber where it is, indeed, defusing the fluid. And then it moves into the baffle to quiet

it down. And then after that, hypothetically, it moves out of constant pressure to the atmosphere to be able to --

Q. And so, when -- so after it exits the mixing chamber, which, just to clarify -- just to clarify, the mixing chamber, in your view, is 226 and 232?

A. Well, that's where the fluid is mixing.

Q. And then -- okay. And then it goes out of that --

A. 236 into 228 into 232.

Q. And then after 232, it goes through that hole in the bottom, and it enters 112, which you have said is the diffusion assembly, correct?

A. Into where the fluid is diffusing. Yes.

MR. EAGAN: Objection. Scope.

BY MR. RAYES:

Q. So as it exits the mixing chamber, as it exits 232, it continues to diffuse, which means that the droplets are becoming more uniform in size; is that correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: That's what you attempt

to do in the diffusion chamber. Yes, uh-huh.

BY MR. RAYES:

Q. And, as it goes up into the hole at 135, and then it's restricted around the baffle, does diffusion continue to occur?

MR. EAGAN: Objection. Scope.

THE WITNESS: Not necessarily. It depends on the exact shape of that -- that piece of the overall system.

BY MR. RAYES:

Q. So sitting here today, looking at this figure, you can't -- you can't determine whether or not diffusion would have continued to occur in that -- in that area of 136 where the baffle is and in that chamber area, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, as the fluid moves into -- and this is interesting, by the way, how those lines are. Do you see that white area right there?

BY MR. RAYES:

Q. Yes.

A. That's essentially where the flow is separated off. And these could almost be

streamlines coming into here. This area right here is where you have a significant drop in the stagnation pressure of the fluid.

Q. You're pointing to the area just inside the hole of 134 just before it hits the baffle?

A. Uh-huh. Then here too. And here.

Q. And when you say "here," you're saying after it passes through the restrictions of the baffle on both sides?

A. That's great. That's correct. So the stagnation pressure dropped. The static pressure of the moving fluid increased as you moved into that area. And, then, as you move into this area, there's going to be another place where this is happening over here where the flow separates off, separates off, turbulence intensity is increased, noise generation goes up, turbulence intensity increased here, turbulence intensity increased here.

Every place the stagnation pressure drops is where you have flow separation into where turbulence intensity increases. If turbulence intensity increases, unsteady energy on the turbulence level increases. Unsteady pressure

fluctuations increase. Noise is generated.

However, this is helping the system because it's essentially blocking that off. And you can make this better. But you increase the cost by a factor of ten.

So, then, as you move into here, the pressure -- the fluid accelerates. The pressure drops to atmospheric pressure because here, it has to be atmospheric pressure. Here, it's above atmospheric pressure. And all the time you move through here -- all the time that you move through here, once you exit here, the stagnation pressure is dropping.

But the stag pressure, which is responsible for the noise generation, the aeroacoustics is not. And particularly the turbulence levels, where they're high.

When I look at this system, I can see how it's going to operate. I can look at it, and I can see it because I -- once again, you know, I'm 50 years old, and I've had so many students over the years. We're talking about thousands of times I've analyzed systems like this. Thousands.

Q. But you're unable to look at Figure 3 and determine how that system operates, correct?

A. No. I just told you in great detail, sir, how it operates exactly from the time it comes in to the time it goes out. I've showed you all the points of losses. I've shown you the points where the pressure -- stagnation pressure drops. I showed you the points where the static pressure increases. I showed you the pressure where the noise is being generated in this system.

But it's a good system because it's -- you know, no matter what happens, you're going to generate noise.

Q. So --

A. No matter what.

Q. Let's move on. Let's move on, please.

So in terms of the work you performed in forming your opinions in these IPRs, you did not conduct any tests on any technology at issue, correct?

A. I didn't -- so your question, I didn't see any technology at issue here?

Q. You did not perform any tests?

A. No, I did not perform any tests.

Q. You did not perform any Reynolds number calculations or any of the prior art in geometries, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Not at this point in time, I have not.

BY MR. RAYES:

Q. You did not perform any Weber number calculations for droplet impact on any surface, correct?

A. Weber-type calculations are inadequate. When you start to do momentum integral calculations --

Q. Is that -- so did you perform any of those calculations, sir?

A. No. Because they're inadequate to describe --

Q. Thank you.

You did not perform any Stokes number analysis for droplet inertia in turning passages, correct?

A. Those type of analyses are inadequate to calculate a system like this.

Q. Did you perform any?

A. Why would I do something that's inadequate?

Q. So you did not perform any, correct?

A. I think I answered it. Why would I

perform any calu- -- questions that aren't going to give me the right answer?

Q. This would go a lot easier if you would just answer yes or no.

A. Okay. And by the way, I thought this deposition was limited to three hours.

Q. It's limited to seven hours, sir.

A. Pardon me?

Q. Seven hours.

A. I didn't hear seven. I heard three.

Q. Well, I'm not sure who you heard that from.

A. Hm.

Q. So did you perform any Stokes number analysis for droplet inertia in turning passages?

A. Not at this point in time, I have not.

Q. Did you build any -- any devices and test whether they would operate, as you've opined in your declarations?

A. Things where I'm looking at how restrictions affect noise?

Q. For example, are you familiar with the Sevy device, the prior art known as Sevy?

A. This is not the 1950s anymore. This is 2026. I don't do calculations from the 1960s.

Q. So you're -- you are aware of the prior art known as Sevy, correct?

A. I understand the prior art. Yes.

Q. Did you build a Sevy device and test whether the separator plate 98 increases or decreases sound?

MR. EAGAN: Objection. Form.

THE WITNESS: Many times. Up to a million now. We're getting in big time. The answer is yes.

BY MR. RAYES:

Q. You did build one?

A. Well, for other -- for other type of systems, yes. To do the same job, yes. To dampen unsteady pressure distributions which cause noise, yes. With common -- with sophisticated engineering equipment, yes.

Q. I don't think you answered my question, sir.

A. I did. Yes.

Q. You did what?

A. Complicated calculation are done too. Yes.

Q. Sir, you're not answering my questions.

MR. EAGAN: Josh, if I could just interject. It might be helpful to bring up Sevy.

MR. RAYES: Is he not -- I guess he's not familiar with Sevy.

THE WITNESS: Oh, I'm exactly familiar with Sevy. I have it sitting here right behind me.

BY MR. RAYES:

Q. So you built a device that's disclosed in Sevy and tested whether the separator plate increases or decreases sound; is that correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Something which is markedly similar from an engineering standpoint, yes. But it wasn't in relation to this -- to this matter.

BY MR. RAYES:

Q. When did you do that?

A. Jeez, over the last 50 years? Now I'm not even exaggerating. A couple of hundred times.

Q. Do you have the test results?

A. Pardon me?

Q. Do you have the test results?

A. I could probably come up with them if

you're willing to pay my hourly rate for me to find them.

Q. So you don't have any test results for a Sevy device, correct?

A. What do you mean? Test results here today as we speak?

Q. Yes.

A. I don't have them here today. But as I stated, I'm not even exaggerating. And they're not locked, by the way. I just have to go on different computers and go through boxes of work that's going back 20, 30, 40 years.

So yes, I have the data. And, it's really simple. Like I said, after this deposition is done today, I can go over to Lowe's, spend $5, and I could show you how it works.

Q. If you could stop sharing your screen, please.

A. Pardon me?

Q. Can you please stop sharing your screen?

A. All right.

Q. We're going to pull up the '918 declaration, which is Exhibit 2.

And just to confirm, your declaration

contains all your opinions you're offering in this IPR, correct?

A. At this point in time, yes.

Q. And your declaration identifies points of disagreement with Dr. White. Those are the only disagreements you intend to raise at this point, correct?

A. No. I could -- if you want me to have a critique of his entire -- every sentence he's written, I could do that. But out of professional courtesy, I was just addressing the issues that were most important to the matters that I brought up. And there were issues in the work done by Dr. White which were technically incorrect.

Q. Other than what's written, you did not supply any supplemental calculations, test results or simulations to support your criticisms, correct?

A. Well, I've already done those calculations many, many, many, many times before.

Q. Please listen to my question.

You did not provide any supplemental calculations, test results, or simulations to support your criticisms, correct?

A. Okay. I heard the word "provide" now. Sorry. I missed that.

No, I have not.

Q. Your declaration says you relied on the White declaration and certain exhibits.

Did you rely on any other materials or documents other than those discussed in your declaration?

A. Probably. I mean, my basic education.

Q. So in paragraph 19 of your declaration, you -- if you want to review that for a second.

A. All right.

Q. So your criticisms there -- for your criticisms, did you perform any quantitative droplet size, resonance time or Stokes number calculation?

A. I didn't need to. I know what the flow looks like.

Q. And you did not, correct?

A. Well, many times before, I have. And there's many other technical papers that I could give that will show this --

Q. But for purposes of this declaration, you did not perform any of those calculations, correct?

A. Well, I didn't need to perform the

calculations because I've done experiments before.

Q. So you did not?

A. Well, I didn't need to do them. I've already done them.

Q. Did you conduct or commission any lab testing of droplet coalescence in a circular or spiral passage with respect to your declarations?

A. Yes.

Q. So, for the purposes of these declarations, you conducted or commissioned a lab test of droplet coalescence.

Is that your testimony?

A. Not in preparation for this deposition or this matter. But I've done that before many times. In fact, I can see it in my mind right as we speak.

Q. When you say --

A. I know where they got that curve shape.

Q. When you say "coalesce," you mean droplets collide and merge into larger droplets, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Yes. Well, yes. They collide and form into larger droplets.

Yes.

BY MR. RAYES:

Q. So, in paragraph 19, you mention non-uniform spray.

Do you see that?

A. Yes, I do.

Q. Are you referring to a wider droplet size distribution, such as more polydisperse?

A. One of the things, yes. Different velocities, different -- different densities, different sizes. Yes.

A non-uniform spray distribution, of course, is -- most people immediately think size. But it depends on the type of device you're analyzing. But then after that, you talk about sizes, velocity, and --

Q. So also in paragraph 19, you're expressing an opinion that the circular baffled path moves droplet sizes away from substantially uniform droplets; is that right?

A. That's correct.

Q. In terms of -- so if we could turn to the '918 Patent. This is Exhibit 5. And if you look at column -- Claim 1, Column 12, lines 1 through 3, Claim 1. Scroll down a little bit.

Sorry. You were in the right spot.

One through 3 calls for a diffusion unit at least partially defining an enclosed diffusion chamber wherein said diffusion chamber comprises an upper chamber and a lower chamber.

Do you see that?

A. Okay.

Q. How did you construe the term "upper chamber"?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, first off, I need to go up and look at the -- you know, you just jumped down to some words here. I need to go up and look at the diagram. I need to see what's happening. So I need to see what the picture looks like.

BY MR. RAYES:

Q. Do you recall forming -- do you recall construing the term "upper chamber" in forming your opinions?

A. If that's in what I wrote, then that's good. I don't remember every word I wrote. In fact, normally I have these things in front of me when I have a deposition so that I can review what I wrote.

I do many, many technical things every week. You have to refresh your mind as to what you did at this particular point in time. Then it all becomes clear.

And so when I look at this --

Q. Yeah. If you don't have the declarations with you, I -- you're certainly welcome to have unmarked copies with you. I thought that we had discussed that. So if you want to review --

A. I didn't get a notice for deposition, nor did I get the items to bring.

Q. Okay. Well, you mentioned that you have the declarations and the patents with you. So --

A. Okay. Because I need to see the '918 picture.

Q. Which figure would you like to see?

A. Well, let's go to the top of the -- okay. Now let's go -- I want to see the title of this patent. Okay, let's go down.

All right. And so, now what's your question?

Q. How did you construe the term "upper chamber" in forming your opinions?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: So may I look at my declaration and see the words "upper chamber"?

BY MR. RAYES:

Q. Yeah. You have those with you, right?

A. I probably wrote on it.

(Reporter clarification.)

MR. RAYES: We can go off the record.

(A brief recess was taken from 2:57 p.m. to 3:07 p.m.)

BY MR. RAYES:

Q. We're back on the record.

Dr. Micklow.

A. Yes.

(Petitioner's Exhibit No. 7 was marked for identification.)

BY MR. RAYES:

Q. I want to come back to some of your testimony from earlier regarding Sevy. I'm introducing as Exhibit 7 the Sevy prior art reference, which is US 2010/0084484 A1. And we have that up on the screen right now.

Do you see that?

A. Yes, I do.

Q. We have a Figure 8 on now.

And I believe you testified earlier that Sevy's baffle would increase sound; is that correct?

A. Yes.

Q. Yeah. And so, is it your opinion, then, that the patents at issue are different than Sevy with respect to the baffle because they include a plurality of holes on the perimeter of the plate --

MR. EAGAN: Objection. Form.

BY MR. RAYES:

Q. -- that we were looking at?

A. Well, first off, 98 is incorrectly labeled as a "baffle," if it's labeled as a "baffle." I don't know. I'd have to look at what it says in the patent. All that is, is a restriction. It's not a baffle.

And that was what we were having a discussion with earlier. You were telling me, does every restriction do this. And this is not a baffle. This is a restriction. A baffle will decrease the unsteady pressure fluctuations and decrease noise.

Q. How do you define a baffle?

A. Pardon me?

Q. How do you define a baffle?

A. I had talked to you earlier. It has to be -- and that's when I started talking about anechoic chambers.

You have to have a system such that there's a way to separate out the pressure pulses. And, when you have a pressure pulse, which is essentially unsteady pressure fluctuation, which is essentially a wave equation. It's like a sound wave. It's not a sound wave, but it's like a sound wave. And there's peaks and troughs in that sound wave. So I have to tune it so that if I want to decrease the sound intensity, that I have a high point of the wave, which is coordinating with a low point of the wave coming from a different source.

And that's when I was talking to you earlier about exhaust systems on race cars and how I --

Q. Okay. So how would you define baffle? Can you give me a definition?

A. Pardon me?

Q. Can you define baffle?

MR. EAGAN: Objection. Form.

THE WITNESS: A baffle is an

engineering structure such that the surfaces cause the reflections of the unsteady pressure pulses to cancel or the magnitude of the unsteady pressure responses to decrease. They won't be eliminated --

BY MR. RAYES:

Q. Is that the definition you applied to your opinion?

A. Pardon me?

Q. Is that the definition that you applied in forming your opinions?

MR. EAGAN: Objection. Form.

THE WITNESS: I guess we're talking off the top of my head now. You know, but that's pretty much what I would assume -- not pretty much. That is what I know how a baffle works. That's how -- you walk into an --

BY MR. RAYES:

Q. Okay.

A. -- echoic chamber, and it's quiet in there. You can't hear anything, because it has sound-absorbing materials, and the rest of them are reflecting surfaces and all these cones that point

out in different random areas which cause the pressure waves to reflect from the cones and those waves to cancel in the peaks and troughs.

This system here, 98, does not have that capability from any format. It's going to --

Q. So, going back to the patents at issue and the baffle we were looking at in those patents -- in Air Esscentials' patent.

If you used -- so to remind you, that's -- the baffle is 136 where the arrow is pointing right now.

So if that baffle was used here in Sevy to replace 98, would that -- would you still consider it a baffle?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: Consider what to be a baffle? The other one?

BY MR. RAYES:

Q. If you took that baffle from the Air Esscentials patent, the structure from the Air Esscentials patent, and replaced it with -- and used it in place of 98 in Sevy.

A. The answer is that you're moving in the right direction. Can it -- can it be a baffle? Yes. Can it not be a baffle? Yes. It has to be

designed.

And so those dimensions on those holes in the other patent have to be such that we cancel the pressure fluctuations, the unsteady pressure fluctuations. And of course, that can be -- quote-unquote, that's when they used to call exhaust tuning or intake tuning.

And same type of difference here. You tune it to get away from those unsteady pressure fluctuations. If you don't do it right, and you can make it louder. You know, that's -- this -- did you ever see how a whistle works, by the way?

Q. So the difference, then, is that -- the difference between 98 in Sevy and 136 of the patents at issue -- which, again, is the baffle we just looked at. The difference is that -- their sizes and locations of the holes?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, first off, there's only one hole here. So you can't -- there's not holes. You only have one hole here. That means all the air is passing -- the air, liquid vapor is passing through that hole. And they're all essentially traveling on the same part of the wave.

You can't cancel onto pressure pulses, the unsteady pressure pulses. There's no way to do it. There's no mechanism there to do it, with what I see here.

There's always an engineering way to do something. Right?

BY MR. RAYES:

Q. So if the 98 in Sevy had multiple holes, would that act as a baffle?

A. Most baffles I've seen have multiple holes. The more, the better.

Q. So if Sevy's 98 included multiple holes, would it dampen sound?

MR. EAGAN: Objection. Form.

THE WITNESS: It could. But it could not also.

You know, there's systems where they have holes to increase noise too, you know. That's what musical instruments are all about.

And like I said, this is a -- the key thing of a whistle. When you have a child who has a whistle. How many holes are on that whistle? One. What are you doing? You're blowing in one side, going out the

other side. And what happens? It gets really loud if it's designed correctly.

So when I look at that, I see that's a whistle. You're --

BY MR. RAYES:

Q. So --

A. -- asking --

Q. -- again, having multiple holes, then, would help alleviate noise?

MR. EAGAN: Objection. Form.

THE WITNESS: It could. Depends on how they're designed. Are all the holes are going to be the same diameter or are the holes --

BY MR. RAYES:

Q. They're designed the same way as the holes in the structure we were looking at from the Air Esscentials patents.

A. Then everything else has to be the same too. You can't keep the same dimensions unless everything else is the same. Unless the temperature is the same. Unless the scented fluid is the same. Unless the pressure is the same. All those things have to be the same.

Q. Do you know how many holes are in the

baffle of the Air Esscentials patents?

MR. EAGAN: Objection. Scope.

THE WITNESS: From the picture that we just looked at a moment ago, I only saw two. But I thought I saw other ones that there were more than two.

But it's not the number of holes. See, you can't make it that simple. It's how the holes interact. And in fact, one key way to -- to -- to decrease sound -- oh, I say, Okay, I want the holes to be nice and smooth. So I'll drill them nice and smooth. Right? But guess what? You just hurt yourself because the flow separation is going to occur when the fluid comes across here. The fluid is going to want to separate off in this direction. Some of it is going to go up here in that separated region. Right here is where the stagnation pressure dropped. It's where turbulence increased. It's where noise increased.

And therefore, one way that you might want to do it, is that you could punch the holes. You don't just drill them. You

punch them, and you stretch them out. And so some of the holes are higher than the other holes. And then maybe one hole is this high, and another hole is this high, and how they're no longer exactly circular because they're conical. And the additional friction is what will dissipate the unsteady pressure force. You know, because that's energy in the fluid. Energy -- you know, it's energy in the fluid.

And I don't want to ramble on. But you know, I made my life teaching, and I love being a professor. But --

BY MR. RAYES:

Q. So you would -- just to circle back regarding the person of ordinary skill in that art.

You would consider yourself at least a person of ordinary skill in the art, correct?

A. I hope so. I'm teaching people of ordinary skill in the art.

Q. Would a person of ordinary skill in the art be able to modify the size and locations of the holes to make Sevy less noisy?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: Of course, it depends on

a unique individual's talent. And then the second part is, depends what universities you go to. It's not just because it costs more or costs less. And then what type of class work is there, who were their professors, how good were their professors at what they did. And --

BY MR. RAYES:

Q. Would you be able to?

A. Well, obviously, you know the answer to that already. The answer is yes. I definitely could. And my students definitely know this when they come out. But then I have the reputation of being one of the hardest professor at every university I've ever been. But they come out, and they're happy.

Q. Thank you.

Let's see here. So, if we could turn to the petition for the '918 Patent. Give me one sec. Sorry. Not the petition. The response, patent owner's response.

I'm going to introduce that as -- is it 8? So Exhibit 8 has been introduced, and it is patent owner's response to the IPR related to the '918 Patent.

(Petitioner's Exhibit No. 8 was marked for identification.)

BY MR. RAYES:

Q. Have you seen this document before?

A. I don't recall seeing this before. It may be in my file. Because when I do these cases, I always get more files than I can ever look at in a multiple-year period. And so you have to pick the ones that you're going to utilize. Normally I like to go through and at least scan through them quickly.

Q. Yeah. If you can just give yourself a chance to scan this. You will need to zoom in probably.

A. Yeah. This, I had not seen before.

Q. Okay. Let's -- let's back out of this. And I'm introducing Exhibit 9.

(Petitioner's Exhibit No. 9 was marked for identification.)

BY MR. RAYES:

Q. Which is patent owner's motion to amend related to the '918 Patent.

If you can go to the top. Have you seen this before?

A. It may be in my file, but I -- if --

if anything, I just opened it, scanned on through it, and probably one or two or three minutes or less and moved forward with the other work that I was doing on this particular matter.

But if you want to show me something, I could look at it.

Q. Sure. At page -- page 7, we have this chart.

Let me ask you this. Are you aware that petitioner has argued that the first -- are you -- do you -- let me back up.

Do you understand -- what's your understanding of priority dates with respect to patents?

A. Well, I understand what's happening here. You know, I'm not up to speed on this particular document, but I've reviewed these types of documents before.

Q. So you're aware that with these -- with these patents at issue, there was a provisional patent application that was filed, correct?

A. Well, I'll interrupt you. And I'm not aware of how many of the procedures that took place before I became involved. But I know that occurs.

And I've been involved with cases where that has occurred.

I have not seen these documents that you're showing to me right now.

Q. Are you aware that the petitioner has argued that the first written description support the upper chamber and lower chamber -- well, actually, let's -- let's pull up the '918 Patent.

If we look at the claim, Claim 1 -- we were looking at this earlier. If you could zoom in. If you could zoom in.

So, the "between" language. Do you see where it says: Said diffusion assembly is disposed between said upper chamber and said lower chamber?

Do you see that?

A. Yes, I do.

Q. And, do you recall construing the term "upper chamber"?

A. Sometimes people use words which they may use between themselves or people within their company.

But when I look back -- so let's see what this is. We've got -- can we go back to the picture and see what the upper chamber is, 115, of

the modified diffusion chamber? May I see that, please.

I don't remember seeing that, and I don't remember it being shown on the photo -- on the figures. Am I missing 115 there somewhere? Doesn't look like I'm missing it. Because I looked at this diagram in great detail. Mine is printed up with writing close to every number on here and -- because I looked at this in great detail. And I don't remember seeing anything that denoted an upper or lower mixing chamber. Maybe -- maybe it's here.

What else do we have? Let's go down a little bit. Look at another picture. I don't see it here. Is it there? 112. It's not there. 112. No, it's not there.

Q. Let's go to the petition. Now that we have this claim language, let's go to the petition for the '918 Patent. It's Exhibit 8 at page 7.

Page 7 towards the top, it reads, "It is clear from Figures 1 and 3 of Goubet that the 'atomizer assembly' identified by petitioner is at no point disposed between the identified 'upper chamber' and the 'identified lower chamber.' In fact, the 'diffusion assembly' identified by

petitioner rises vertically above the identified 'upper chamber.' This structure directly contrasts the meaning of the word 'between' taught by the '918 Patent where the upper chamber is shown to be above and the lower chamber below the diffusion assembly."

Do you see that?

A. Okay. I'm reading this. So we've got Goubet.

So, "In fact, the diffusion assembly identified by the petitioner rises vertically above the identified upper chamber. See paper 2, page 63."

Q. So you see what I just read, correct?

A. Pardon me?

Q. You see what I just read, correct?

A. I see what I just read. But first off, I don't know what that paper 2 is.

Q. And so when it says -- the last sentence I read, "This structure directly contrasts the meaning of the word 'between' taught by the '918 Patent where the upper chamber is shown to be above and the lower chamber below the diffusion assembly."

And in support of that, it cites

Figures 1 through 3 and 5 through 6.

Do you see that?

A. I see that. Yes.

Q. Would you agree that that is stating that the '918 Patent discloses, in Figures 1, through 3 and 5 through 6, an upper chamber that's above and a lower chamber that's below the diffusion assembly?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: Yeah. I'd have to see those in general. And so, yeah. When they call things upper and lower and -- it's all relative. What's the coordinate system? You're talking about the Z axis progressing out from the center of the earth. Is that what defines the upper and lower part of the system?

And then it says "it's between." So, it may be poor English. In fact, Goubet -- so they're taking that out of the French paper?

BY MR. RAYES:

Q. They are discussing the '918 Patent.

A. Yeah. But see, those numbers aren't on the '918 Patent.

Q. The numbers are referring to the figure numbers from the -- from the '918 Patent.

A. Okay. But I don't see where the upper and lower diffusion chamber and diffusion assembly are defined, at least right now.

Q. So, if we look at Figure 1 from the '918 Patent --

A. Okay. So Figure 1.

Q. You don't see an upper chamber or a lower chamber in this figure.

Is that your testimony?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Well, it depends on what they want to call it.

And I could tell you another story -- you don't want to hear, I'm sure -- about how people make -- the nomenclature of particular complex engineering devices.

So I have to see where they're pointing to me, to an engineering diagram, to understand what they're saying. You know, I have hundreds of patents, here associated with this patent alone today. Although a lot of them. There may be a hundred. There's probably 30 files. Well,

jeez, there's probably hundreds of files there.

And, if I'm going to opine on a particular photograph or figure, then I need to see how it's presented in the --

BY MR. RAYES:

Q. Let's look at Figure 3.

A. Okay. Figure 3.

Q. Do you -- can you identify an upper chamber and lower chamber in this figure?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: I wouldn't identify an upper and lower chamber. I see one chamber. You know, that's what I see.

BY MR. RAYES:

Q. What one chamber do you see?

A. Well, I see one chamber that -- so we've got air coming in here. You've got air coming in here, air coming down through here. It moves back up --

Q. We can't see your mouse, Dr. Micklow. So if you can describe what you're referring to.

A. Oh, you can't see. All right.

So there's an inverted triangular shape, which is 222.

Q. That's the one chamber?

A. Yeah. That looks like that's where the air is coming in. Below it -- the liquid. And liquid is coming in there too. Or the air coming around the liquid. Okay. Yeah. So the air comes in around the nozzle. The liquid is right there, and it moves down into a chamber below it.

Q. So there's one chamber in this figure, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Well, like I said, I would have just said -- wouldn't even call them chambers. You know, I would address this from a three-dimensional fluid flow calculation, and I would just have all the pictures and I'd have one device analyzed.

I wouldn't break it up into trying to make it more simple and look at different components. So, I mean, it would take time for me to define what they're meaning by upper and lower mixing chambers, particularly since it's not showing up on their numbers that they have here.

BY MR. RAYES:

Q. So you testified that -- you stated

that you see one chamber?

A. Well, the flow passage is what I would call them. I wouldn't even call it a chamber. I would say there's an internal flow passage, which I'm utilizing to accomplish my task at hand, to give me a uniform oil and spray distribution coming out so I can enhance the capabilities of this device to deodorize a room.

Q. So if there's one chamber, is -- do you have an upper chamber and a lower chamber?

A. To me, it's a chamber.

Q. Okay. Let's look at Figure 5.

A. And nowhere in here do they define an upper and lower chamber, did they? Am I missing something? Because I looked at this in great detail, this particular patent.

Q. Did you -- do you see -- can you identify an upper and lower chamber in this figure, Figure 5?

MR. EAGAN: Objection. Scope.

THE WITNESS: Once again -- miss out.

I see a fluid flow passage.

BY MR. RAYES:

Q. So no lower chamber and upper chamber, correct?

MR. EAGAN: Objection. Scope.

THE WITNESS: If you start to break it up into components, there's a reason you're doing that from an engineering standpoint.

And you would probably say, Okay, I have, on this particular patent and this particular device, and the lower chamber shown on X as 1007, does this? And then the fluid flow, the fluid oil mixture goes into the upper chamber, which I would number 1008 or something like that. I'm just talking hypothetically now. And it does this here. And then after that, it goes out.

BY MR. RAYES:

Q. So, did you just identify a lower chamber and upper chamber?

A. No, I did not. I'm sorry. But one thing I can see, which is important here, is the length of this tube also because --

Q. So there is no upper chamber -- in your opinion, there's no upper chamber and lower chamber in this figure, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: It's not an opinion.

It's a moot point to me.

And so, if there's a reason -- there always has to be a reason in engineering. Engineers like things to be as simple as possible. And things are black and things are white. That's the simplest thing I can think of. If I can say that, I'm happy.

Do I have a reason to find an upper and lower chamber? If I do, then I would discuss it in my text and I would give it a number. If I don't, then I wouldn't do that.

BY MR. RAYES:

Q. So there's no reason for an upper and lower chamber in this figure, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: No. I didn't say that either. I mean, if he wants to call it an upper and lower chamber, that's fine.

Calling it an upper and lower chamber, to me, the next question from an engineering standpoint is, if I call it an upper and lower chamber or just a chamber, does it affect the performance of the device.

And the answer to that question is no. It doesn't matter what I call it. As long as I'm consistent when I call it that, and all my colleagues understand that that's why I call it that.

And I don't know why there's not a number on the upper and lower chamber here.

BY MR. RAYES:

Q. Where would you put a number? Where would you -- what part would you identify as the upper chamber and lower chamber?

MR. EAGAN: Objection. Scope.

THE WITNESS: You've already asked that five times in a row, sir. I mean, I wouldn't do it. I just wouldn't do it. It's a straightforward internal flow study.

BY MR. RAYES:

Q. Okay. If we go back to the petition quickly and look at that sentence that we were looking at.

So the sentence that says: Structured directly -- this structure directly contrasts the meaning of the word "between" taught by the '918 Patent where, in the '918 Patent, the upper chamber is shown to be above and the lower chamber below

the diffusion assembly.

That's what we just looked at. So do you agree -- and then it cites Figure 1 through 3 and 5 through 6.

So, do you agree that patent owner's position is that Figures 1 through 3 and 5 through 6 include an upper chamber and lower chamber?

MR. EAGAN: Objection. Scope.

THE WITNESS: I don't have an opinion on it. If the patent owner wanted you to know that, and if there's a distinct reasoning for saying that, then it would have been numbered and discussed in the text.

That's another thing that --

BY MR. RAYES:

Q. We looked at patent owner's response and their citation.

Do you agree that that statement, that sentence that we just read, is stating that Figures 1 through 3 and 5 through 6 include an upper chamber and lower chamber?

MR. EAGAN: Objection. Scope.

THE WITNESS: That's number six now that you asked me that. And the answer is

the same as the other five times.

I don't see where it's anything other than an internal flow passage.

I won't even -- well, I can call it a chamber, I guess. But, I would just say internal flow passage. And if there's a reason for trying to -- so, let's go to the text then, because I haven't read that passage. Let's go --

BY MR. RAYES:

Q. So, let's look at Figure 6 quickly.

So, in terms of -- I'll represent to you that the way that this patent came to be is that there was an initial filing called a "provisional patent application."

A. Yes.

Q. And then there were subsequent filings that are called "continuation in part." And so there was largely the same disclosure from the previous applications, but the patent owner -- in filing for this '918 Patent, the patent owner added this Figure 6 along with additional disclosure.

So this Figure 6 and certain disclosure -- written text was added for the first time in this patent family with this patent filing.

A. Okay. There needs to be additional diagrams. Is there a Figure 7?

Q. Not in this filing. Figure 7 was added in the '449 patent.

A. Okay. Because, on this one, I would have to look at it in greater detail.

I've looked mostly at Figures 1 through 3 on the particular patent. And those are the ones that I based my opinions upon.

But this one here, it's -- I would need to investigate what's happening exactly and look at how they're talking about this in their text.

Q. So you didn't base your opinions on Figure 6, correct?

A. No, I did not.

MR. EAGAN: Objection. Form. Scope.

BY MR. RAYES:

Q. Just in looking at this figure alone, do you believe that it discloses an upper chamber and lower chamber?

MR. EAGAN: Objection. Scope.

THE WITNESS: I don't even know how they're developing -- defining upper chamber and lower chamber.

And so I would need to have a text, a good engineering report has to inform the reader of exactly what's happening. Therefore, I would have to have a text saying that the upper chamber seen in Figure 6 as number da, da, da. And I'm not going to give you a number because then you'll say I said that.

But that it said 2011. The upper chamber is 2011, and the purpose of this upper chamber is to do this. Then chamber 2012 is the lower chamber, and it's sandwiched between the upper chamber, and its purpose is to do this.

So I need to see text like that.

BY MR. RAYES:

Q. Sure. That's fair.

So, is it fair, then, to say that a person of skill in the art would not understand what an upper chamber and lower chamber are without -- with respect, in the context of these patents, without further written description?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Well, normally everything has to be, you know,

engineering -- particularly this type of engineering. This type of engineering is unique.

Even though it's just air fresheners, it's advanced technology. And you might find some of it in some classrooms in this country. But it wouldn't be at every classroom. That's for sure.

So you go to the company you're working for, and that first year or two is when they educate you to do your work.

BY MR. RAYES:

Q. Sir, my question is yes or no.

Without text, would a person of ordinary skill of the art understand what an upper chamber and lower chamber are in the context of these patents?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Okay. So the answer is yes. And the reason being yes is because he worked there for two years. It's not just a master's degree. He's worked at this company for two years.

BY MR. RAYES:

Q. Sir, do you understand -- you have

opined that you are a person of ordinary skill in the art, correct?

A. Yes.

MR. EAGAN: Objection. Form.

BY MR. RAYES:

Q. So my question is, would a person of ordinary skill in the art understand what an upper chamber and lower chamber are based on the figures in this patent without any further text?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: The answer is yes. Because I worked at the -- you have -- you can't leave off pieces in -- when you say -- ask questions. And the piece you left off is two years' experience. So, if I'm at this company for two years --

BY MR. RAYES:

Q. Sir, sir. Your -- let's look at your declaration.

A. All right. So, if they have -- and they call something upper and lower chamber, and I worked at that company for two years, I'll know --

Q. Is it your testimony that a person of ordinary skill in the art is a person who worked at -- that person must have worked at the company

at issue for two years?

MR. EAGAN: Objection. Form.

THE WITNESS: If you look at my definition of person of skill in the art, yes. You'll see it. Go to my definition.

BY MR. RAYES:

Q. If we could go to that.

A. Whoops.

Q. Zoom in.

A. Looks like you were down -- go down a little bit.

Q. So if we look at paragraph 15.

A. There we go.

Q. You say that: In view of the above, I believe a hypothetical person of ordinary skill in the art with regard to the '918 Patent would either have -- either have a bachelor's degree in mechanical engineering, aerospace engineering, chemical engineering or a closely related field and at least two years of work experience designing or developing products involving fluid dynamics.

Do you see that?

A. Yes. I see it.

Q. So, that does not say designing or developing products involving Air Esscentials

products, correct?

A. Yeah. But it wouldn't. You can't name companies in there.

Q. Well, it also doesn't say products involving fragrant dispersion assemblies, correct?

A. No. It's implied. If you're an engineer and you're at your first job because you just got your four-year degree, then you go to your first company and you work there. After two years of work and -- for instance --

Q. So is it your testimony then that -- that the person of ordinary skill in the art, it's implied in your definition that their work experience designing or developing products involving fluid dynamics, that actually means designing or developing products like those disclosed in the patents?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, if -- now that you're making a point about this here. I might say, yes, well, you can get an extra word or two in here. But I think it's implied.

BY MR. RAYES:

Q. What's implied?

A. I don't know of any engineering students that I've taught in my -- so I started teaching in '82. So that's how many years? 43, 44 years. That I ever stayed at a company for at least two years, after they took their first job. And, that's when -- and that's the key thing, is that's when they develop their work. That's when you look for another job. You get about four years in --

Q. Did you ever work at Air Esscentials?

A. No.

Q. But you're somehow a person of ordinary skill in the art?

MR. EAGAN: Objection. Form.

THE WITNESS: At the time that this patent was written, yes, I was a person of ordinary skill in the arts. I don't have --

BY MR. RAYES:

Q. But you are no longer a person of ordinary skill in the art?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, no, I'm not a person of ordinary skill in the art. I'm well above that. If you tell me I'm an

ordinary skills in the art, I'm in trouble. I can't make my living as a professor.

BY MR. RAYES:

Q. So I just want to clarify then.

Do you want to change your definition of a person of ordinary skill in the art?

MR. EAGAN: Objection. Form.

THE WITNESS: No. I like it the way it is because it's implied that -- even -- even if they did work at Air Esscentials. They go there in the first week, and they look at this device, the first discussion they'll have with the designer will make it clear. And it'll take five minutes.

And so that's the end of the day, is that that's why I put the two years on there, so that you come out, and you've got to learn how to become an engineer. You got all these great tools that were given to you as you got your education. Now you're trying to use them, and you've got to learn how to use them.

BY MR. RAYES:

Q. So it's implied -- in your opinion, it's implied that a person of ordinary skill in the

art would have at least a week of experience working at Air Esscentials or a company like them?

MR. EAGAN: Objection. Form.

THE WITNESS: No. I retract that also.

So, why do they need to know lower chamber or upper chamber? There's not a reason. All they have to do is look at the flow path. And if they've done fluid and dynamics, they can do it.

So no. I will go back to that they never worked at Air Esscentials before. But, if they look at that patent -- when I looked at that patent, this is the first time in my recent history that I remember seeing anything to do with things that made the house smell good and the atomizers.

But, when I looked at it, I could watch -- I could watch everything going through those devices like I was watching TV.

BY MR. RAYES:

Q. So going back to my question then. Would a person of ordinary skill in the art understand what an upper chamber and lower chamber

are based on the figures in the patents without any further text?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: See, you're asking a question about something which won't happen.

Every engineer out there knows that you can't put a figure into a report without discussing it in the text and taking away any type of questions that the -- the reader may have.

I mean, that's when I do my review -- the thousands of -- probably up to a thousand now, I bet you -- of -- of engineering reports for the journals and everything else.

I look here, and I say, all right. And they adequately told their audience what they're doing.

BY MR. RAYES:

Q. Okay. Let me make sure I understand then.

A figure must be described for a person of ordinary skill in the art to understand what's disclosed in that figure?

MR. EAGAN: Objection. Form.

THE WITNESS: No. If you get into a more complex structure -- you would never send an engineer out there and say, Okay, go do this. You're going to spend time discussing it with them and coming up with how to proceed. And once you have that type of analysis, you're fine.

BY MR. RAYES:

Q. But with respect to these patents, the figures in the patents, sitting here today, looking at just -- looking at the figures, you are unable to identify an upper chamber and lower chamber, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: I didn't even think about it because I don't think it's important.

BY MR. RAYES:

Q. Okay. So you're not -- you're not interested in answering my question because you don't think it's important?

A. All right. So what's the coordinate system?

Q. So, the question is, looking at the

figures, can you identify an upper chamber and lower chamber in any of the figures?

MR. EAGAN: Objection. Scope.

THE WITNESS: Once again, I see -- I see an engineering device with an internal flow passage, is what I see.

I don't see any reason to define an upper or lower chamber unless you tell me that there's something that those upper chambers and lower chambers do differently so that they need to be discussed.

And if somebody presents that to me, it's not going to improve my understanding of how that device is working. And that's pretty much it.

And then if we go back to the patent, I've asked you several times --

BY MR. RAYES:

Q. So you understand that the upper chamber and lower chamber are claim limitations in the '918 Patent, correct?

A. So may I see it? I'm going to ask you one more time. And if you want to keep the information from me, that's fine. I mean --

Q. Sir, I'm not keeping any information

from you. You've had the patents in your possession for weeks and months now. And --

A. I told you I haven't looked at these things that were associated with the initial filing of the patent because I wasn't involved in the case at that particular point in time.

So you're showing me something I've never seen before. And now you're telling me that I should know something about an upper and lower chamber without allowing me to read where it was referenced in the petition for the patent.

So how can I do that? Am I a fortune teller? Show where it says it, and then I'll go back to the figure and I'll show you where this hypothetical upper and lower chamber is. Show me where they talk about it, and I will come back to that and do my best to relay to you where the upper and lower chamber are.

Q. So we looked at the claim -- we looked at Claim 7, which recited an upper chamber and lower chamber.

Do you recall that?

A. I want to go to the petition. You showed me a petition a moment ago. And now you took that off the screen. Where did that go?

Q. Well, we weren't looking at the petition. We were looking at patent owner's response and patent owner's motion to amend.

But we're looking at the '918 Patent, now Claim 7 -- Claim 1. Sorry. And, it says, "The diffusion assembly is disposed between said upper chamber and said lower chamber."

Do you see that?

A. I see that. But I need to read everything. You can't just go into a complex engineering document and grab some words out. You know, the only reason --

Q. Do you agree that's a claim limitation in this claim? Correct?

A. Yes. But I wasn't told to bring anything to my -- to this deposition today. Therefore, you're showing me something -- what am I supposed to have crammed for a test? I've got 30 or 40 patents sitting over here. I'm supposed to understand and remember? I will understand. I'm supposed to remember every word in every patent? No. You have to show it to me. I have to read it. I have to reevaluate to answer your question.

And that's all I'm asking. What does it say before it gets to that point? Because I see

a chamber. I don't see an upper and lower chamber. So there must be something that they're saying there. And, that's what I want to see.

Q. Do you agree that understanding a claim limitation is important in providing -- in evaluating the validity of a -- of that claim?

MR. EAGAN: Objection. Scope.

THE WITNESS: You should understand the claim limitations, yes.

BY MR. RAYES:

Q. Thank you.

Let's look back at your declaration for the '918 Patent.

A. Are we going to get to see this other paragraph or maybe -- oh, we can't. I was looking at it there. It was interesting. I thought it said something which was important.

Q. In Exhibit 2, paragraph 19, you state --

A. So you're not going to bring it back and let me see what it said in that '918 Patent, I take it?

Q. I'll save that for some bedtime reading for you.

It states in paragraph 19 -- or you

state in paragraph 19 that the baffle path will call the droplets to remain in close contact with one another and result in the coalescence of fluid droplets into larger sizes.

What is the dominant mechanism you contend causes coalescence? Is it droplet collision in flight, droplet impaction on walls followed by film formation and entrapment or something else?

A. It's a combination of both of those, along with centrifugal force. And that's what's happening. This is that old bucket in the water trick.

When I was a child, I used to take a bucket, fill it with water, put it up over my head, and be amazed how the water didn't fall on me. Gee, I wonder what's happening here. They've got to go against circles.

The density of the oil is probably a hundred or more times the density of the air. Therefore, you have a flow separator here. You've got it going around in circles. And you're going to throw the oil to the outer walls --

Q. Thank you.

A. It's going to stick to the walls --

Q. Thanks.

So you agree that in a tortuous path, droplets often impact surfaces and either stick, drain or reatomize, correct?

MR. EAGAN: Objection. Form.

BY MR. RAYES:

Q. Yes or no?

A. I need to hear what you said again.

Q. You agree that in a tortuous passage, droplets often impact surfaces and either stick, drain or reatomize?

MR. EAGAN: Objection. Form.

THE WITNESS: What was that word, torsion package? What was that word, please.

BY MR. RAYES:

Q. Tortuous.

A. My speakers aren't working well. One more time, please.

Q. Baffle path.

A. Well, baffle is -- okay. So we're in the baffle path. And then continue, please.

Q. So, a tortuous or baffle path or circular shape, the droplets often impact surfaces and either stick, drain or reatomize.

Do you agree?

MR. EAGAN: Objection. Form.

THE WITNESS: Drain was the second word? Drain?

BY MR. RAYES:

Q. Stick, drain or reatomize.

A. What do you mean by "drain"? There has to be a drain if they're going to drain. So where are the drains?

Q. By drain, I mean drip down the wall.

A. Oh, okay. Well, drain normally means your leaving -- the --

Q. Okay. So they either stick, drip down the wall or reatomize.

A. Those are the three categories that can occur, yes. But they can splash off of the wall too.

But -- oh, in circular path. The centrifugal force will have them hit the wall. And they may rebound off depending on the momentum of fluid and radius of curvature of the device. Because once again, this is very complex. You've got a radius there.

Q. So your declaration does not analyze which of those occurs, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: They all three occur at the same time. That's what makes spray modeling so difficult.

BY MR. RAYES:

Q. Thank you. Okay. Let's see.

A. They're not events which can be done alone.

Q. You did not calculate whether droplet inertia will cause impaction at the turns for micron scale droplet, correct?

MR. EAGAN: Objection to form.

BY MR. RAYES:

Q. With respect to these patents.

A. I don't have to. I have experience in those type of flow fields.

Q. So are you aware that baffles are used in atomization systems to reduce droplet size by inertial impaction and splashing?

A. Who did that?

Q. Are you aware that baffles are used in atomization systems to reduce droplet size in inertial impaction, splashing?

A. I don't know. I would have to see how the device looked and what the operating conditions

were on the device.

Q. So, you're not aware of any use of baffles to -- in atomization systems to reduce droplet size by inertial impaction and splashing?

MR. EAGAN: Objection. Form.

THE WITNESS: By inertial impact? You're trying to make it too simple. And that's why I'm smiling, in that this is an extremely complex phenomena. That's something that will never occur in nature. That's statistically impossible.

BY MR. RAYES:

Q. You state that the amount of time that the droplets spend in the baffle will be relatively short, resulting in a non-uniform spray.

Do you see that?

A. Yes, I do.

Q. How do you know how many times the droplets will be spent in the circular shape of the baffle path?

MR. EAGAN: Objection. Form.

THE WITNESS: Because I made the calculations like that before. And I've done so many spray systems. It's unbelievable. And, in fact I just -- while

I'm sitting here, I just remembered another one --

BY MR. RAYES:

Q. Are you aware -- do you know which -- in paragraph 19, are you -- what circular path -- what circular shape or baffle path are you referring to?

Do you know?

A. In paragraph 19? It'll spend time in the baffle. It's a baffle. The amount of time will be relatively short. So it's relatively short lived. How long is it going to stay in the baffle --

Q. What baffle are you referring to in paragraph 19?

A. I would have to -- I guess I'm comparing it against the -- one of the other -- so was that Levy or Sevy? Which one was this one?

Q. So sitting here today, you're not sure which -- what you're referring to when you refer to the circular shape of the baffle path, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Not at all. I'm sitting here. You're trying to make me cram for a test. I have thousands of pages of

material here, which all I have to do is look at it, and I will immediately have an answer once I take -- once I have the time to find what you're asking me.

But, in general, in general, a good engineer is going to know basic characteristics of the flow field. And, therefore, okay, this is an air atomizer. What is it atomizing to scent? Is it for your house or is it for industrial applications?

In fact -- and now I have to hit you on this one because I just remembered another project that I had.

BY MR. RAYES:

Q. Well, I'm going to introduce --

A. And this is directly related to this, this other project. Directly related.

Q. I'm going to introduce another exhibit. This will be Goubet.

A. It is directly related to this where I have experimental data. I have photographs. I have moves. I have everything of a --

Q. I'm introducing Exhibit 10, which is the English translation of the Goubet reference.

(Petitioner's Exhibit No. 10 was marked for identification.)

BY MR. RAYES:

Q. And if we can go to Figure 3.

A. All right.

Q. Is this the baffle path that you're referring to in paragraph 19?

A. It's acceptable.

Q. I don't understand your answer.

A. It's a similar situation, yes.

Q. Well, are you referring to a different baffle path in paragraph 19 of your declaration?

A. Not that I recall.

Q. So, how did you -- so if you recall, your declaration stated that the -- I will read it for you.

It stated that the amount of time the droplets spend in the baffle will be relatively short, resulting in a non-uniform spray.

How do you know the amount of time the droplets will spend in the baffle?

A. Well, you have typical velocities. You know, you think about how long it takes to evaporate a spray. You know, spray developments usually are on the order of distance. And,

distance is related to time based on the fluid flow of velocity.

But, if you're injecting out of a nozzle, by the time you hit a fully developed spray, you're probably 200 or 300 or 400 nozzle diameters downstream of the nozzle.

Q. Where did you get -- where did you determine -- how did you determine the velocity in this Goubet reference of the droplets?

A. Well, I just have to know ballpark.

Q. How did you get a ballpark?

A. Based on 40 years of experience.

And in fact, I forgot about a project I just finished two years ago. And this is an exact system that I have analyzed and did experiments on and did high-level computational fluid dynamics. And so based on that experience, based on making videos --

Q. So your -- your --

A. Based --

Q. Your paragraph 19 -- paragraph 19 of your declaration also states that twisting and turning of the droplets will cause them to coalesce into larger sizes.

And just to confirm, that's not based

on an analysis of whether a competing mechanism may be at play, such as splashing, correct?

MR. EAGAN: Objection to form.

THE WITNESS: Such as what?

BY MR. RAYES:

Q. Splashing.

A. Splashing? No. That accounts for splash also. The one that you would normally have take place. And the fluid is almost going to be tangent to the wall, by the way, too, in this case, because of the centrifugal force. It's going to go through the oil to the outside. The air is going to be on the inside. And the oil doesn't want to come into lower radius. It wants to go to a larger radius. And therefore it's going to eliminate reentry into the flow field, if you think about it.

You have to look at the situation. You have to learn how to see. And oil is a thousand times more dense than air. It's going to be hitting the wall. It's not going to want to come to a lower radius. It's going to want to stay on the wall.

Because that's the old bucket in the water trick. I never got wet one time when I was a child when I did my bucket in the water trick for

my buddies. And that's what's happening here. It's not going to reemerge. It's going to stay at the wall.

And then I had just, in fact -- I thought I didn't do scent deodorizers --

Q. Thank you.

Do you agree, Dr. Micklow, that uniform droplet size distribution is critical to uniform evaporation?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: Not necessarily.

BY MR. RAYES:

Q. So looking back at the Goubet reference, at the bottom of page -- bottom of this page. So at the top of page 4, which is labeled page "2," this -- this is disclosed throughout this reference.

But here, it says at the top -- the very bottom page. It says: Droplets thus pass through the passage 14 -- at the top of page 5 now -- and strike the walls, separating the inner enclosure 13 from the walls 17 of the compressed air inlet channel 9. Along this path, and as the result of the many shocks they receive, the droplets are broken up into tiny [sic]

microdroplets.

Do you see?

A. Yes, I see that.

Q. Do you agree with that?

A. I don't even know what I'm looking at. Show me inner enclosure 13. Show me wall 17. Show me compressed air at 9. And I will tell you whether or not I agree with that. Disagree.

Q. What's your disagreement based on?

A. Pardon me?

Q. What do you disagree with?

A. That statement. You're asking me if I agree with that statement. I said I disagree.

Q. Which part of the statement do you disagree with?

A. I disagree with the statement.

Q. So, the whole statement, you disagree with.

And what is your -- what is the basis for your disagreement?

A. What is my basis? We just finished an experimental program one year into it with a three-dimensional unsteady compressible calculation, liquid spray injection on a company that makes aftermarket vapor-controlled systems.

And we designed a circular chamber. We injected the water vapor in at an angle along the wall, allowed it to progress through the wall. We were worried about resonance time. We wanted to know how long we can make it stay in the device.

And then on top of that, we went in and started to look at how the liquid water particles were behaving. They were going down to the bottom. And we measured that in the experiment, took videos of that in the experiment. We then went in and did computational fluid dynamic analysis.

And this is one of those ones, like I said, I can't do it for here. This was a big contract. And I just finished it two --

Q. Okay. So you're not going to answer my question then. We'll move on.

A. No. You're asking me how I did it. I said I not only see it. I have movies of it.

Q. So a year ago, you created this device. Is that what I'm hearing you say?

MR. EAGAN: Objection. Form.

THE WITNESS: No. A year ago, I worked for a company that went out and got a patent. And, I smiled because they paid

for two of my graduate students and myself. And we did state-of-the-art work like it's never been done before.

BY MR. RAYES:

Q. So you were named on that patent?

A. No. I'm not a name on that patent. I gave up any results non-disclosure. The first thing I sign when I go into a research contract is, it's all yours.

Q. Well, you were an inventor then?

A. I was -- ran the research program. I came up with the configurations. They were my graduate students. And that's all I wanted. University pays me a salary. That's good enough for me.

Q. So you were an inventor, though?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, when you do things that no one has ever done before, like I've done so many times in my life I can't count, then I guess they call you an inventor. I don't like that word. I'm an engineer. I solve problems.

BY MR. RAYES:

Q. Is that patent issued?

A. Pardon me?

Q. Is that patent issued?

A. I have no idea. I have no idea. I haven't spoken to that company since I went into semi-retirement from Florida Tech. But they call me every time they want to hire an engineer. I know that even now. Probably last time I talked to him was about a year ago. I guess right around that time. And he said --

Q. So you testified earlier that you've never been an inventor on a patent, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: I don't even like the word "inventor." And I have never written a patent, no. And every time I did work in a research format paying my graduate students, I signed non-disclosure forms that I wouldn't ask them for patents.

The university pays me well. I get to come in here and talk to gentlemen like you and get paid a lot more money to do this stuff. So, I'm just joking about that but --

BY MR. RAYES:

Q. You understand that -- you understand

that when you file for a patent, you are required to list the inventors even if you are not going to be paid for it, correct?

MR. EAGAN: Objection. Scope.

THE WITNESS: No, I don't understand that because I've never attempted to do a patent. All I know is --

BY MR. RAYES:

Q. In your work, do you ever look at the work of others that -- such as looking at other patents or patent applications or things of that nature?

A. To me, the work that I do here in patent litigation is interesting.

Q. Sorry. Let me rephrase.

In your engineering work, when you are, you know, solving problems that have never been solved, do you look to other sources to help in your innovation?

A. Of course. There's always teams.

If -- the one thing that's not in my resume is I have top secret security clearance --

Q. So in your engineering work, have you reviewed patents or patent applications to understand -- to help in your engineering work?

A. I'm trying to -- I've used patents for many different things. Normally it's utilized in discussions like we're having today. I'm trying to think if I ever did anything on patents before.

Like I said, if I'm -- my whole career -- early part of my career was top secret. I can't even tell you about it. Even though I'm telling you a lot of stories, I could tell you real stories.

Q. But you can't recall, then, if you've used patents in your engineering work?

A. There wasn't any patents. When you do work like that, there's no patents because the work has not been done yet. Truly, it's the first time it's ever been done in the world. And that's been most of my adult career. And you don't even look at patents normally as a source because if you did, you're getting 20-year-old technology.

They want to tell me Micklow, what can you do -- I just finished a big contract with a rocket engine manufacturer doing things that no one has ever done before and --

Q. Okay. So Dr. Micklow, just to circle back, you disagree that uniform droplet size distribution is a key part to your uniform

evaporation; is that correct?

MR. EAGAN: Objection. Form.

THE WITNESS: It's interesting how you always change my word, sir. I never said that at all. Why don't we look back on what I've really said.

BY MR. RAYES:

Q. Can uniform droplet size distribution affect uniform evaporation?

A. If I have uniform size distribution. That's the most logical choice to move forward with changing uniform evaporation, yes. Is that what --

Q. Sir, if you could just answer the question and then stop talking, that would be appreciated.

The proposition -- so, uniform droplet size distribution. That's been -- that's been an issue that has been known since the '90s, I believe you testified earlier.

Is that correct?

A. Every system we have is probably -- atomization, you would like to have uniform properties. There's none that I can -- well, I take that back too.

But anyway, in general. The general

the type of systems I can talk about, that's the case.

Q. So, I don't understand your testimony. You -- you took it back?

A. Well, no, I didn't take anything back. I said what I said to begin with. That's why I'm saying, look back at what I said. Don't misquote me the next time.

Q. So every system -- in every atomization system, the goal is to seek uniform properties.

Is that fair?

A. In general, that's the case, yes. Particularly for these types of systems. You know, if I'm looking at systems to make my house smell nice, yes, yes, yes, yes. I'll say yes three times.

MR. EAGAN: Objection. Scope.

BY MR. RAYES:

Q. And droplet size distribution affects evaporation behavior, correct?

A. Yes, it does.

Q. And that's well known, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Other people don't know

that.

BY MR. RAYES:

Q. It's well known to a person of ordinary skill in the art, correct?

A. Of ordinary skill in the arts with a -- two years of experience in fluid mechanics, after they are given the -- the task of designing a new system. Because when we talk about this --

Q. Thank you.

So, you did not -- let me see here.

So you understand that Dr. White is relying on a reference known as "Kaiser" to address droplet uniformity, correct?

A. Yes, I do.

Q. And Dr. White is not relying on Kaiser to teach the entire diffuser assembly structure of the '918 Patent, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: What was your question, please?

BY MR. RAYES:

Q. Dr. White is not relying on Kaiser to teach the entire assembly of the '918 Patent, correct?

A. So you said Dr. White is not --

Q. Relying on Kaiser to teach the entire diffuser assembly structure of the '918 Patent.

A. No. He's using with an obvious defense. So he has to combine with another patent.

Q. And pardon my ignorance to the civil engineer. But could you please explain how Kaiser works at a very high level?

A. Well, first off, the electrostatical discharges is the old Coulomb effect. We did that in undergraduate physics in every college in this country, probably.

You can charge the particles, and they'll float. And I can remember that back in physics 101 at Penn State 50 years ago, and watching this in the physics laboratory when they put a particle charge on particles and watched them float upwards and then recombine and repulse each other, et cetera. It was well known. It is.

However, in this type of system, it would be difficult to use. How are you going to power the device? How much is it going to cost?

Q. By float, you mean form droplets, correct?

A. Pardon me?

Q. You mentioned -- you said float. You

said you --

A. Floating, floating particle.

Q. Particles, droplets?

A. I'm just talking about something you put an electrostatic charge on. It could be a piece of dust. I don't care.

Q. Okay. And, the electrospray is an atomization of liquid, correct?

A. Never seen it used ever in aerospace fields and fields in the spray atomization that I have right now because it's not practical. So I've never ever seen it used in my 50 years as an engineer.

Maybe it is. I'm not saying it's not. It might be out there in some part of engineering where they use it every day.

Q. So in Kaiser, the floating that you're referring to is a fluid, correct?

A. Well, it's something that has charge on it. And like I said, the only thing I remember from that -- because that's all work I've ever done -- is physic class 101 at Penn State University in 19-whatever. Sometime in the 1970s.

Q. So in Kaiser -- Kaiser is atomizing a liquid fuel, correct?

A. He's atomizing something. It doesn't have to be a liquid fuel. Or he is causing particles to separate. And if you do it correctly, I am assuming you can get atomization out of it. But, you know, that is by no means my area of expertise.

However, I know that I've seen people do it in experiments. It's that gee whiz experiments on electrostatical forces and like charges repulsing one other. And so if you can break the spray up and charge up the particles and they all have the same charge, then they're going to repel each other. And if they repel each other, they're going to hit into one another. And if they hit into one other, they're going to break up.

So, then, the end of day, is it probably would work. However --

Q. So where -- in Kaiser, where does the fluid dispersion go after it floats?

MR. EAGAN: Objection. Form.

THE WITNESS: I don't recall. As I stated, when I read the Kaiser patents, my immediate thought process was that this is not the type of system we're modeling here. This cannot be something that could be

designed, developed and produced and sold.

Because like I said, cost. How are you going to do it? Jeez, what type of electrical discharge do you need? Is this going to be in my house? Not going to be in my house? And so on.

So, I'll tell you that's the least amount of time I spent on any of the patents I have in front of me because mechanical engineer or somebody that did fluid flow wouldn't think about that. It's just -- it's just not there.

BY MR. RAYES:

Q. Okay. You just testified that Kaiser disclosed a phenomena that's taught in every college physics class. Now you're stating that it's too expensive?

MR. EAGAN: Objection to form.

THE WITNESS: From what I've seen. And so, you can't say every college class. But the majority of -- I'm dating myself too because that was in the 1970s when I saw it in the physics lab.

BY MR. RAYES:

Q. So, the -- the proposition that

uniform droplet size distribution affects uniform evaporation, that's not unique to electrospray, correct?

A. But we didn't -- I didn't say that gives you uniform size distribution either. And so you put words into my mouth again. I just said that it would work. That's all. I didn't say it was going to give you a uniform size distribution. Because I'd have to go in and make calculations. And I could --

Q. I don't think you're listening to my question.

My question is, the proposition that uniform droplet size distribution affects uniform evaporation is not unique to electrospray, correct?

A. Yeah, but see, when you're telling me to answer that question and say "correct," then I'm agreeing with you that there's a uniform size distribution in a Kaiser type of patent.

And I'm not agreeing to that because there's other issues there. And so you can't add these extra words on and then say "is that correct" to me. Because you added too many words on.

Q. So your position -- your opinion is that Kaiser does not teach the uniform droplet size

distribution?

A. Well, once again, I'm going to answer that the way I answered it a moment ago.

And that is that it would not be a choice of -- of a mechanical engineer designing a system like this. And I read over that paper that you have up there right in front of me as we speak. And it was an interesting paper.

But how are you going to make this work? You know, an engineer is different than a scientist. An engineer makes things work. They -- particularly mechanical engineers. They put it out there, and it's going to work, and it's going to fulfill all the design criteria, hopefully, that was given.

So I read the paper. It's a nice paper. And over the years, I've talked to people to talk about that, using laser injection systems and gas turbine and internal combustion engine configurations. How -- electrostatic charger. The key issue is that the only --

(Witness connection interruption.)

(A brief recess was taken from 4:37 p.m. to 4:45 p.m.)

THE WITNESS: What happened to

everyone? I didn't even know we went somewhere.

BY MR. RAYES:

Q. Glad you're back.

We were looking at Kaiser before you left. And I would like to direct you to Figure 1 of Kaiser.

Could you describe for me what's being shown in Figure 1 of Kaiser?

MR. EAGAN: Objection. Scope.

BY MR. RAYES:

Q. If I could zoom in on that.

A. Well, it says: Schematic of the catalytic mesoscale burner operating with electrosprayed JP8 fuel.

Q. Would it be fair to characterize this as fluid droplets entering a chamber?

MR. EAGAN: Objection. Form.

THE WITNESS: Yes. It appears that fluid droplets are entering a chamber, yes.

BY MR. RAYES:

Q. And that's an enclosed chamber?

A. Yeah. It appears to be one of the stagnant or enclosed chambers I was talking about earlier.

Q. Let's move on from this.

Have you reviewed the patent owner's motions to amend?

A. No. No, I have not.

Q. Are you aware that the patent owner filed motions to amend the claims?

A. I didn't make that known to me. But, so no, I don't know whether or not they have or not.

Q. We were talking earlier about restrictions and sound dampening. I'd like to ask you more about that.

So, if we looked at Claim 7, it states: The baffle partially restricts movement of the fluid dispersion through said silencer chamber that it might dampen sound waves generated during operation of said fluid dispersion assembly.

Do you recall that, that discussion?

A. It doesn't sound like anything I wouldn't say. I need to see where -- what the -- where the document is.

Q. So we were looking at the baffle in the patents at issue.

Do you recall that?

MR. EAGAN: Objection. Form.

THE WITNESS: We looked at the baffle earlier, yes.

BY MR. RAYES:

Q. And you testified that that baffle will dampen sound waves. Again, this is the baffle from the Air Esscentials patents.

A. If it's designed properly, yes.

Q. And it's your opinion that it is designed properly in the patents of Air Esscentials, right?

MR. EAGAN: Objection. Scope.

THE WITNESS: I would assume that if it's in the patent, then it's assumed to be designed correctly.

BY MR. RAYES:

Q. And do you agree that the baffle creates a restriction that dampens sound waves?

MR. EAGAN: Objection. Scope.

THE WITNESS: No.

BY MR. RAYES:

Q. What do you not agree with?

A. I don't agree with the fact that the restriction causes the dampening of the sound waves.

Q. So, if we look at the '094 Patent.

That is Exhibit 1, Claim 7. I'm sorry. Not Exhibit 1 -- you got it. You're ahead of me.

Exhibit 6, Claim 7, baffle partially restricts movement. So we are at line 37. Said baffle -- highlight. Yeah.

"Wherein said baffle partially restricts movement of the fluid dispersion through said silencer chamber from said silencer inlet to said silencer outlet thereby dampening sound waves."

Do you see that?

A. I see that, yes.

Q. So, it states that the baffle partially restricts movement of the fluid dispersion, thereby dampening sound waves, correct?

A. If you read that, that's what it says. Yes.

Q. So, the patent claim itself is stating that the baffle is creating the restriction, and it's the restriction that is dampening sound waves?

MR. EAGAN: Objection to the form.

THE WITNESS: Yeah, if you interpret it in that fashion. I don't interpret it that way.

BY MR. RAYES:

Q. How do you interpret it?

A. It says baffle created the dampening of the sound waves.

Q. And it's -- it says it does that by restricting movement of the fluid dispersion, correct?

MR. EAGAN: Objection. Scope.

BY MR. RAYES:

Q. Let's look at Column 7, lines 24 to 36. And it states that fluid dispersion discharged from the atomizer assembly through atomizer exhaust channel into the fusion chamber. It's interrupted and redirected by virtue of axial portion and transverse portion therein. The interruption and redirection of flow in the modified diffusion chamber during operation of the fluid distribution assembly serves to suppress or damage sound waves generated therein in a similar manner as a suppresser chamber.

And then this is the key part. It states at --

A. So where are you reading?

Q. Line 34.

A. Okay.

Q. "Further, the restricted discharge

from the transverse portion 115 of the modified diffusion chamber 112 may serve to further suppress or dampen sound waves, thus reducing the noise generated during operation to an even greater extent."

Do you see that?

A. Yes.

Q. So this is teaching the restriction of the discharge will further suppress or dampen sound waves?

MR. EAGAN: Objection. Form. Scope.

BY MR. RAYES:

Q. Correct?

A. Okay. I see what's happening. You know, you're misinterpreting this.

And so what's going to happen. First off, the restriction suppresses or dampens the sound waves because of the reflections moving from one hole to another. So the --

Q. So, thank you. So, if we could --

A. And then -- I'm ready to continue that -- okay. Well, go ahead and ask the question.

Q. Go ahead.

A. I was going to say then -- so you have a -- you have a delta P -- the delta is change

in pressure. The pressure just services (phonetic) divided by an average pressure. All right? And that average pressure is the stagnation pressure, which I talked to you about previously.

So, the restriction this time gives me a percentage of the unsteady pressure pulse with respect to an average pressure at that point in the flow field. So maybe that's 10 percent, 5 percent. Okay?

Now, what is the stagnation pressure? That P on the bottom of that delta P over P -- and delta is the Greek letter delta. And it's a difference in the pressure difference created by the unsteady pressure fluctuations.

So, the delta P comes into account from the reflections on -- on the baffle. Okay? We've got to get this right. On the baffle. But now, what happened to the stagnation pressure? Due to the loss, it dropped. And therefore, even though the restriction alone cannot cause the further reduction of the pressure -- unsteady pressure fluctuations, because a stagnation pressure has dropped due to the losses, then you can reach a smaller unsteady pressure fluctuation.

So if I'm -- once again, these are

wave-type equations. If -- on the pressure disturbance traveling through the median, if it's fluctuating like a sound wave --

Q. Okay. So, thank you.

So this is -- this description here is in relation to Figure 6, as you can tell, if we could zoom in. If we could zoom in, this is -- my apologies.

This is in relation to Figure 5. So, if we -- so, if you looked at -- let's go back to that.

So go up to where it shows Figure 5, where it describes that it's part of Figure 5. So, up here, it says that this is describing Figure 5.

Do you see that?

A. Yes, I do.

Q. So, what we just read is in connection with Figure 5. So, if we look at Figure 5, I believe you testified that this is due to the pressure around -- pressure -- change in pressure will cause the sound dampening, correct?

MR. EAGAN: Objection. Form.

THE WITNESS: Well, the -- the reflections of the unsteady pressure pulses is what's -- and canceling out is what

reduces sound.

BY MR. RAYES:

Q. So in this -- in this embodiment, there is no baffle that's used, correct?

MR. EAGAN: Objection. Scope.

THE WITNESS: What are they calling 117? Because there's some unusual things happening there.

And, if you look at 117 -- first off, look at 1 -- look at the structure right above 170, in the area which is 117. I see an unusual lip on that structure there. And then a -- a -- a negative slope section. Then a positive slope section. Then trans -- then coming up along the wall.

BY MR. RAYES:

Q. So just to make sure we're clear, you -- if we could zoom in.

So the flow comes up into that narrow passage, yes. And then -- 17. And the lip is at the bottom of 117; is that right?

A. It's at the bottom of 117. Correct. So the baffle then essentially is that white area. And, you'll see --

Q. Which white area?

A. And so, well, come up from the edge of that lip. If you allow that to come up -- okay. Now bring that at an angle and hit that far corner. Bring your mouse up and go to the far corner. No. Over to your left a little bit. There.

So, that's the inlet hole. And so something is going to happen on that lip right here, which is going to cause a flow to come over and have the dead region in there, which can help to damp out the flow passages.

And then if I look at the diameter of the inlet tube in comparison to the diameter of the exit tube, I see that it's different. And --

Q. So just to make sure the record is clear, you are referring to 117, the inlet tube being the more narrow portion of 117. And then, the lip is on the left towards the top of that inlet portion?

A. It's there, and it's also on the right towards the bottom of that inlet portion.

Q. Below the top lip?

A. Correct. Yes.

Q. And they're both sort of at 45-degree angles or so?

A. Essentially, yes.

And then the inlet tube is a different diameter than the outlet tube. And so those things are going to cause some type of reflections happening inside of that baffle 117.

So you asked me where the baffle was. When I look at that, that has to be what they're talking about.

Q. So your -- can we go back to that.

You would consider that structure from -- which part would you consider to be the baffle?

A. The whole way up into the upper tube.

Q. So from the bottom of the inlet tube of 117?

A. Essentially. What are they calling 117? They call that a baffle?

Q. Discharge chamber is what they call it.

A. Discharge chamber. All right.

Q. So the bottom of -- the bottom of the narrow portion of 117 to the top of the narrow portion of 117 is the baffle, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Essentially that's what

I'm interpreting right as we speak today. And I could see reflections happening in there because it'll go up and hit the upper surface, and it would reflect down into the -- it could be.

BY MR. RAYES:

Q. And so, that -- go back to this one. So in the description we were just looking at, at Column 7, lines 24, 36 or --

A. So you can have restrictions in baffles. And that's one way to try to get the pressure pulses to cancel out.

And now that I look at this in great detail -- much greater detail than I have at that figure before. Because the other figures, I looked at in great detail. This one, that diffusion chamber 112, 117, a discharge chamber.

Q. So this restriction that we were describing occurs upstream of what you're referring to as the baffle, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: And what did they say about the fluid return lip. 116, 115, 112. Okay.

BY MR. RAYES:

Q. So the restriction occurs upstream of the baffle, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: May I look at 115 once again, please?

BY MR. RAYES:

Q. 115, meaning figure?

A. The same figure. Yes. It's there. And what was that 115 referred to again? 112. Okay. Okay. I got it.

Let's go back down and look at those words you were telling me to look at, please.

Q. Okay. Column 7.

A. So this one is... That discharge chamber, I'm thinking, based on what I'm seeing in the last ten minutes, is going to act like a baffle.

Q. Right. I guess just to summarize, the patent teaches several ways to dampen sound waves, including through partial restriction, fluid dispersion through a redirection/interruption of the fluid flow and through the use of a suppresser assembly to disrupt the path of the flow, correct?

MR. EAGAN: Objection. Form. Scope.

THE WITNESS: Well, it's disrupting

the path of the flow, yes. And may serve to further suppress or dampen sound waves thus reducing the noise generated during operation to an even greater extent.

To suppress or dampen sound waves generated within and to suppress...

Okay. So they're comparing this to the chamber in 232 and the previously disclosed embodiment.

BY MR. RAYES:

Q. Which is Figure 3, I believe, is that previously disclosed embodiment?

A. The key issue is if a restriction is going to be used to dampen sound waves, it has to be essentially the same as a baffle. And, this is labeling a number of different components, which is fine. It can be much more definitive.

But in today's engineer-type calculations, they're going to view that as an internal passage. And they're going calculate and design it based on essentially one internal passages -- one internal passage. And the restrictions and baffles, if they're done correctly, can dampen the pressure waves.

Q. So let's look at Column 7, lines 1

through about 10.

It says: As noted above, it may be seen with reference to the Figure 5. The diffusion chamber 112 of the present embodiment comprises a modified configuration, Specifically the modified diffusion chamber 112 comprises an upside down L-shaped configuration wherein the first axial portion of the diffusion chamber is disposed in a substantially axial portion -- orientation adjacent and relative to the discharge of the atomizer exhaust channel.

Do you see that?

A. 7 through 10.

Q. Column 7 at the very top, the first paragraph.

A. Column 7. Okay. All right.

Q. So, how is the L-shaped chamber -- how is the L-shaped chamber a baffle?

MR. EAGAN: Objection. Scope.

THE WITNESS: Well, anything that reflects sound waves can be a baffle. People think baffles are supposed to have a lot of holes in them and they're supposed to be in a certain way, and et cetera, et cetera.

But you turn to fluids. Then you've got a pipe going through the bottom part of the fluid. So you're having a fluid flow interaction there, which is going to -- which is going to have a marked effect on the flow field.

At this point in time, I don't have an opinion on what that would be I would have to think about it a little bit.

BY MR. RAYES:

Q. Do you -- so, I guess what portion of the L-shaped configuration is the baffle?

MR. EAGAN: Objection. Scope. Form.

THE WITNESS: It could be the entire L-shaped configuration. Then it would be part of the mixing chamber too. And, this is the terms we were getting involved in before when you were saying well, is it the upper or lower or mixing chamber.

And I don't see reasons to make those statements, add those additional descriptive terms when they're not required.

BY MR. RAYES:

Q. Okay. Thank you.

So do you agree that the patent discloses several embodiments to dampen sound waves, correct?

A. Yes, I do.

Q. So, looking at Figure 5 still, with -- I believe your testimony is that fluid would be restricted as it moves from the larger portion 114 to the more narrow portion 115, correct?

A. Yes. And in fact, it's -- there's not a copy you're looking down on this, is there?

Q. No.

A. Because what's going to happen is that -- that air oil mist is going to be coming out there into that chamber. And about where 112 is pointing, it bends down and has to go around the tube for the oil. And that's going to be like a co-centric ring. It's going to have to go around the back. And it's going to be hitting walls and come back around and -- you have like a swirling motion there moving down in that passage, which will definitely affect the pressure in that passage.

And the -- I was going to say the turbo intensity. The tube -- the flow will briefly separate off at points right below the arrowhead

for 112, and reattach on the bottom part of that and move into the other structures.

Q. Okay. Thank you.

How do you define a disruption?

MR. EAGAN: Objection. Scope.

THE WITNESS: A disruption of the flow field is any physical structure that will affect the flow field, whether it be lost pressure, temperature, density, et cetera.

BY MR. RAYES:

Q. How do you distinguish a disruption from a restriction?

MR. EAGAN: Objection. Scope.

THE WITNESS: From a restriction?

BY MR. RAYES:

Q. Yes.

A. Well, as we sit here today -- well, you can disrupt a flow in a rapid expansion too. So you can do a -- putting things in there. Putting things inside of the flow field that don't necessarily restrict the flow.

So, and once again, this is -- I didn't look at this in great detail, this one. I looked at the other figures here in detail. I didn't look at this in great detail.

But a disruption doesn't have to be a restriction. A restriction could be a class of a disruption. But every disruption doesn't have to be a restriction.

Q. So all restrictions are disruptions but not all disruptions are restrictions?

A. I think I said the other way around. All -- all restrictions -- all disruptions -- how do I say it? As not -- all restrictions are -- all destructions -- disruptions -- not destructions. All disruptions are not necessarily restrictions. So that's -- that's the statement I made. All destructions -- disruptions are not necessarily restrictions.

Q. But all restrictions are disruptions?

MR. EAGAN: Objection. Form.

THE WITNESS: You got me there almost because I can't say no and I can't say yes because -- engineering language has been changed markedly over the last 30 years.

And the way engineers used to talk in the -- in the '60s and the '70s and the '80s -- which is where I grew up, in the '70s and the '80s and the '90s.

We talk differently now. Why? Not

because we got any more intelligent or any more educated. Simply because advanced things, such as computational fluid dynamics, where we can eliminate testing. And we can just make changes like this and look at how it affects the overall flow path and flow rates and sound acoustics of the system.

In the old days, you couldn't do that. You mostly had to test. And when you test, you always talk about, okay, how am I going to disrupt the flow. What am I going to do to restrict the flow.

And you would still talk like that here. Like I said, I'm not blowing that out.

But, I could see me having a discussion with my students or if I was an engineering manager, with the engineers that work for me, and --

BY MR. RAYES:

Q. All right. Thank you.

So just to confirm, what is your answer to whether all restrictions are disruptions?

A. That's a hard one. Because then you

have to think about how you're going to define disruptions. For instance --

Q. Well, in an engineering sense. I understand you're saying that the terminology has changed over time.

But as you sit here today, the current definition of disruption and the current definition of restriction, are all restrictions disruptions?

MR. EAGAN: Objection. Scope.

THE WITNESS: That's not an easy question to answer. And not just because we're sitting here. This is one week. I hypothesized for a long time in the classroom or in my office.

BY MR. RAYES:

Q. Can you give me an example of a restriction that is not a disruption?

A. An isotropic nozzle. All right? That's not a disruption.

Q. But it is a restriction?

A. It's a contoured restriction, but a very special type of a contoured restriction.

And, it's not impossible. But, no one has ever done it yet. Let's put it that way.

Q. So that's -- that's a not-yet-existing

restriction?

A. See, I know things I'm not allowed to talk to you about right now.

Q. Are there any other examples, real world examples of a restriction that's not a disruption?

A. If I was a fluid flow guy -- and I was a fluid flow guy before I became a combustion guy.

Q. So --

A. I have --

Q. I'll take that as a no. There's no examples --

A. What's that? I'm trying to come up with it.

Q. Sitting here right now, you're not able to come up with it. So if you're able to, we look forward to learning about that.

A. Okay. Good.

Q. Do you agree that whether flow disruption increases or decreases sound depends on more than just the presence of turbulence?

A. It's turbulence in this whole issue about stagnation pressure. All right?

Q. It depends on the geometry and operating conditions, including things like the

characteristic of the turbulence structures while interaction and downstream flow conditions, right?

A. Yes. But I could even make another statement right now.

Q. So flow disruption can, in some circumstances, reduce noise and in other circumstances increase noise, correct?

A. Correct.

Q. And you didn't perform any specific geometry acoustic analysis calculations, testing or measurement for the prior art references that you discuss in your declarations, correct?

A. So what was the beginning part of that question, please?

Q. I'm going to move on from that.

A. I hate to say this, but do you have any idea how much longer we're going to be? You're beating this old guy up too bad here. It's been a long time since I had a deposition.

Q. It's probably a good time for a break. And I'll just be able to hopefully give you a better answer to that after a break.

If we can go off the record, please.

A. All right. Let's take a break. I need a cup of coffee.

(A brief recess was taken from 5:22 p.m. to 5:31 p.m.)

BY MR. RAYES:

Q. All right. The home stretch.

Dr. Micklow, to ask you quickly about prior art reference that I've introduced as Exhibit 12, which is the Zeng reference.

A. Zeng. Zeng. I have that?

Q. It's in the Exhibit Share.

(Reporter clarification.)

(Petitioner's Exhibit No. 11 was marked for identification.)

(Petitioner's Exhibit No. 12 was marked for identification.)

BY MR. RAYES:

Q. And it is coming up on the screen. It's on the screen now. If you can go to figures --

MR. RIVIELLO: Yeah, Josh, I think there's an issue with the labeling. It's -- because it says -- here it says Exhibit 11 Kaiser. But Exhibit 12 Zeng.

MR. RAYES: It's fine.

BY MR. RAYES:

Q. So, let's go to -- actually, before we

get into the Zeng, let's look at your declaration for the '094 Patent, which is Exhibit 1.

So it's at paragraph 24, you state that you address Ground 2. And, you state that the droplets expelled from referenced numeral 14a of Zeng would adhere to the outer surface of a noise-reduction head 20 which, in turn, would lead to the merging of similar droplets adhering to the same surface, ultimately resulting in an appreciable gain in size.

Do you see that?

A. Yes.

Q. So your opinion for Ground 2 is that adding -- well, then you go on to explain that the person skilled in the art would not have been motivated to incorporate Zeng's reference and that the incorporation in paragraph 26, incorporation of at least Zeng's reference numeral 20 and reference numeral 30 downstream of Sevy's reference to numeral 98 would not appreciably dampen the sound waves generated during operation of a fluid dispersion assembly.

Do you see that?

A. I see that 26. Yes. Uh-huh.

Q. So your opinion appears to be that

adding Zeng's noise-reduction head downstream of Sevy would destroy Zeng's fluid membrane mechanism; is that correct?

MR. EAGAN: Objection. Form.

THE WITNESS: So I have the incorporation -- and this is off of my IPR, right? Yes. Or is it? Yes.

Reference -- would not appreciable -- okay. So, what's your question, please?

BY MR. RAYES:

Q. Just to make sure I understand your opinion with respect to Zeng.

I believe your opinion is that adding Zeng's noise-reduction head downstream of Sevy would destroy Zeng's fluid membrane mechanism.

MR. EAGAN: Objection. Form.

THE WITNESS: Well, I'm just saying that it's not going to appreciate dampen sound waves.

And don't see where it says any destruction.

BY MR. RAYES:

Q. In paragraph 24, you state that the droplets expelled from the reference numeral 14a -- what was that? Sorry. In paragraph 26.

A. Yeah.

Q. Can you explain in your own words your -- your opinion with respect to Zeng?

MR. EAGAN: Objection. Form.

THE WITNESS: If I remember correctly, it was a curved surface of flexible membrane they were putting over it. I need to see that again. So --

BY MR. RAYES:

Q. We'll go back to -- we'll go back to Exhibit 12, the Zeng reference.

A. Okay. Now I see it. Good. Now I remember intimately. Yeah, I do.

And so 14a. We have 14 and -- what's 20? 20 is that over the top. All right. Okay. All right.

So let me read what I wrote back there again. Okay. So the noise-reduction head, it's a screen mesh. And if you've ever seen a liquid passing across a screen, due to friction, it'll adhere to the screen. And, further, it's hitting it -- we have a rather sharp rise in the vertical direction coming down in a parabolic shape, which is similar on the left-hand side. So left and right-hand side, more symmetric. I got 20. Coming

up along 20. It peaks at 21. Comes down the other side, 23. Interesting.

Anyway, it doesn't matter. It doesn't change my conclusion. I'm just wondering why they have 20, 21 and 23 on a piece that could have been just given one number.

But, as the fluid flow droplets come across that -- it's not a para -- I guess it's part of a ellipsoid. I guess it's part of an ellipsoid, would be a better definition.

Part of an ellipsoid, as they proceed through the holes due to the friction, it'll stretch out, and then it'll adhere to the holes because of issues associated with surface tension of the -- of the droplets coming through.

So if I had a vapor in here, all right -- I'm trying to get to the point where I can describe this adequately.

If I had a vapor in there with droplets and they were going across the wire mesh, the wire mesh is going to truly break them apart. But they're going to be coming off -- depending upon the fluid flow, coming across 20, 21 and 23 velocity. There is a high probability particularly along the edge in 20 and 23, where we're close to

the edge of 30, where the water will essentially hit both walls. It'll form larger droplets and condense down into the bottom of 30.

I think I said everything I wanted to say. And there will be remaining one that goes out, of course, to the outside part of the analyzer.

Did I answer your question?

Q. I don't think so. But, what is -- you didn't build -- what is your reason -- in your opinion, why can Zeng not be combined with Sevy?

MR. EAGAN: Objection. Form.

THE WITNESS: Why that can't be combined with --

BY MR. RAYES:

Q. With the Sevy reference.

A. Sevy reference... May I see Sevy again?

Q. Yeah. We'll pull up Exhibit 7.

A. The first thing I would say is how are you going to put it in there? I don't see a way to install it on that. No way we can put up both pictures and the words at the same time, can we?

Q. We can try.

(Reporter clarification.)

BY MR. RAYES:

Q. So while he's doing this, I guess, you sort of answered my next question.

You didn't build a combination of Sevy and Zeng, I guess, given since you're not sure you didn't build one?

A. No, I didn't build one. But I may be a lot better at the end of the day. Like I said, I still have a pretty good amount of energy during the day, but it takes -- my deposition started at 10:00. It's 5:43. That's seven hours and 43 minutes for me. I'm about at the end of my energy level here. The brain is shutting down.

Q. You didn't calculate whether any membrane could still form under altered geometry or flow rates, correct?

A. I did not make calculations on that.

So where are we? Let me see if I can remember what I was telling myself when I was writing this.

Q. It's Ground 2.

A. So Kaiser is down there. So Zeng. Okay. 14a. Okay, good. 14a. Wait. Here to the noise reduction 20.

Okay. So I'm not -- right now, I'm

just looking at a problem with this device alone. It's not with merging with the -- at least number 24. Number 24, I'm saying that, 14a, which is essentially allowing the oil to come in, will have a problem going through a wire mesh due to friction, along the whole surface. It should be -- now I'm looking at it, it should be 20, 21, 23.

And, so I would say that, which, in turn, would lead to the merging of similar droplets adhering to the same surface, ultimately resolving in appreciable grain size.

So to come through the mesh, they break apart. However, friction at the surface causes the droplets to adhere. And also due to the surface tension.

And, similar drops -- depending on what the velocity of the mixture is coming out of 14a, those drops could -- and depending upon the temperature of 20, 21, 22, 23, those drops could come out and adhere to the sides. Once they turn into a liquid, gravity would pull it down along the sides into the narrow gap between 20, 23, and 30.

Q. So -- so, is it your testimony that Zeng does not operate as it described itself?

A. I am stating that, yes.

Q. Okay. You testified earlier about materials that you considered -- sorry. Let me back up.

I guess, in paragraphs 25 and 26, you opine about the combination. Can you explain those opinions in your own words?

MR. EAGAN: Objection. Form.

THE WITNESS: Let's go down some. Well, I don't see any mechanism to dampen sound waves there. And that's what I'm saying here 30.

So -- so I'm assuming I'm putting this -- when it said I said -- downstream... Sevy reference numeral 98...

I'm saying if you put that on -- if you go over to the -- the Sevy diagram, and up at 17, the spray head, downstream their restriction 98, is where I was assuming they would put Zeng in some fashion.

And, if they did that -- because I said downstream. So that's downstream. That's outside. Okay. At least part of such a substitution would be expected to inhibit atomization due to fuel coalescence.

So first I'm saying I think the fuel is going to coalesce if I just look at Zeng alone. Then if I bring it over here and put it in at least 17 on the diagram, it would amplify the problem even more. And it'll -- it will not dampen the sound waves during the operation of the fluid flow dispersion assembly.

BY MR. RAYES:

Q. You referred to a fuel coalescence. What is that?

A. Hopefully I spelled it correctly. And I think I did.

That would be the one droplet touching another droplet and creating a third larger droplet.

Q. What's the fuel part of it?

A. What's the fuel or fluid?

Q. It says "fuel coalescence."

What fuel are you referring to?

A. Oh. See, these are my words. I was -- I was looking at other of my fuel reports, you know. So, that's my typo right there.

I said: Due to vapor oil coalescence. So, when I had other reports that day, which are in

my personal library, and I must have came up with fuel when it should have been vapor oil.

And then I end up with 27, saying if that's a thin metal structure, like a brass screen or something like that -- I would say use a lot of fuel lines, by the way. And this is the one I was smiling on the other day -- or earlier. It feels like I've been here for days.

When I was looking at number 20 and -- numbers 20 and 21 and 23. And I was being egotistical and stating that, oh, yeah, I have tested that many times.

Well, if you look at the fuel injection assembly on a 1957 corvette, that's how exactly upstream to the fuel injectors. That -- that case right there. This is a 1957. So this is old technology. It looks almost just like that. It's got a wire screen like that. It has a curved surface on it just like that. And they inject the fuel across that.

Q. Okay. So coming back to some prior testimony. You mentioned that you relied on -- for the materials you considered, there's materials -- you have a list of materials you considered, correct?

A. I can produce one.

Q. Sitting here today, can you identify the materials that you considered?

A. I could identify them, but not -- they're not in writing right now.

Q. Okay. Well, if you can please identify them.

A. I could identify them, yes.

Q. Please do.

A. You would like to have those?

Q. Yes. Yeah. If you tell us on the record which materials you considered in forming your opinions.

A. Right now?

Q. Yeah.

A. There's quite a few of them. So I would need to go through them. Because I'm looking at things that I was using when I was writing this report. So I've got quite a few reports on the -- sitting here on the floor. I've got things on my bookshelf case. I've got different arenas whereby I would have to put them together, along with files on the computer. So...

Q. Well, what can you -- what materials can you recall considering off the top of your

head?

A. Well, fuel injection systems. As I stated, that's why I had fuel coalescence in there. And that is typical, even in modern fuel injection systems. Not quite so prevalent anymore. They don't put the screens in the fuel injectors on the cars. They just have a different type of cover for the injectors. But, like I said, this was -- reminded me of the old 1957 Corvettes.

Q. So can you recall any materials that you considered in forming your opinions?

A. Can I recall what, please?

Q. Any materials that you considered in forming your opinions.

A. Well, I have some copies of some old GM reports on Rochester fuel injector units. It's R-O-C-H-E-S-T-E-R fuel injection. And, they started those in 1957, produced them until 196 --

Q. So other than those, anything else?

A. Well, those are ones I have practical experience with because I owned quite a few of those and worked on many of those cars.

Q. Those are the only materials that you recall considering?

A. Well, I had that -- that screen over

top of the injector, yes.

MR. RAYES: I have no further questions.

MR. EAGAN: Josh, Dr. Micklow, I appreciate that we've all been here for a while. I need to ask just a few redirect questions. But I promise they're very easy, and we will all be out of here shortly.

THE WITNESS: That's fine.

CROSS-EXAMINATION

BY MR. EAGAN:

Q. Dr. Micklow, do you still have access to the Exhibit Share?

A. To the Exhibit Share?

Q. That website where you could pull up each of those exhibits.

A. I don't see it. Share. Hang on. Yeah, I do. I got it. Okay. I have it in front of me.

Q. Okay. Thank you.

Could you please pull up Exhibit 1?

A. Yes.

Q. And, scroll to Paragraph 13.

A. I'm there.

Q. Could you read that, please?

A. "In reaching the conclusions described in this declaration, I have relied on the documents and materials cited herein, as well as those identified in the list of exhibits set forth in the patent owner's response. These materials comprise patents, related documents, printed publications, and documents filed in the instant IPR, including the Declaration of Christopher White, Ph.D. Exhibit 1002. I have also relied on the sources cited in Exhibits 2005 to 2014. And my opinions are also based upon my education, training, research, knowledge and personal and professional experience."

Q. Is that a complete list of the documents that you relied on in drafting the opinions in this declaration?

A. I would say I think those cover them all. I have other documents that I will use in the future if I am requested to do so. But that's all I can think of other than the Rochester fuel injection unit. And I didn't even have documents on those. Like I said, I had cars like that.

Q. Okay. Thank you.

Could you please scroll to paragraph

17.

A. Okay. 17. "After reviewing the Declaration of Christopher White, the following are points of disagreement."

Q. So, then, the next sections of this declaration raise your disagreements with Dr. Christopher White; is that correct?

A. That's correct.

Q. Do you express any other opinions in this document other than your disagreements with Dr. Christopher White?

A. I'm giving statements about fuel spray flows in general.

Q. But those are in conjunction with identifying a disagreement; is that correct?

A. That is correct, yes.

Q. Could you please open Exhibit 2.

A. All right. All right. It's open.

Q. And please scroll to Paragraph 13.

A. Okay. I have it.

Q. And you'll see that this paragraph is the same as the one you just read in Exhibit 1.

Same question as previously. Is this a complete list of the documents that you relied on in forming the opinions in this declaration?

A. Yes. This is that same paragraph I cut and paste from the other document. And yes, this one covers what I used in these documents.

Q. Okay. Please scroll to paragraph 17.

A. All right.

Q. It's the same as paragraph 17 in Exhibit 1.

So, same question. Your scope of work here in this declaration was to identify points of disagreement with Dr. Christopher White; is that correct?

A. That's correct.

Q. Did you express any other opinions in this document?

A. Well, other than what -- how I think the -- the performance of these devices should be, no.

Q. Okay. Thank you.

Last set of questions. If you can open Exhibit 3.

A. All right.

Q. And scroll to Paragraph 13.

A. All right. Looks like it's there again, same paragraph.

Q. Right. So once again, it's the same

paragraph as in the previous two exhibits. So I have the same question.

Is that a complete list of the documents that you relied on in preparing the opinions that are in this declaration?

A. Yes.

Q. And final question here. Please scroll to paragraph 17.

A. Yes.

Q. Once again, it's the same as the previous two exhibits. So, is it correct to say that your scope of work here was to identify points of disagreement with Dr. White?

A. Correct.

Q. And does this declaration contain any other opinion other than identifying points of disagreement with Dr. White?

A. No.

Q. That's all my questions.

MR. RAYES: I have two follow-ups.

REDIRECT EXAMINATION

BY MR. RAYES:

Q. Dr. White -- sorry.

Dr. Micklow, just to -- just to remind you that you are under oath here today. I just

want to ask whether you wrote your declarations.

A. Ask me what, please?

Q. Did you write your declarations?

A. Yes. As I stated, 1 through 12 are essentially -- I pulled out of my IPRs that I do. So I went in and made that modification. I put that into play.

This is a generic -- 13 is a generic statement that I have in not only my declarations but most of my expert reports. And, normally, I actually go down and list everything. But, here, I did not. And, I have all those things on my computer.

And in 17, 14 and -- I probably got some help with the attorneys on 14. Talking about claim construction. I'm, by no means, an attorney and by no means will I ever be an attorney. Not because -- I don't think it's a bad profession. Just can't change your profession at 72.

Those things, I'm pretty good on, the obvious and anticipation of the things.

Q. So what about -- you're looking at Exhibit 3, correct, the '449 patent?

A. Yes, I am.

Q. And, so what about paragraphs 19

through 32 of Exhibit 3?

Did you write those paragraphs?

A. Okay. So, I wrote those paragraphs in separate documents. And, at the end of the day, we incorporated them in. And I took in comments on these documents.

However -- and this is very clear, that I made this with -- I'm telling you today because you're deposing me, and I can't lie on the stand. But also with the attorneys I'm working with, is that my opinions on technical -- on technical issues are truly my opinions.

Is every word here my word? Every important word here is my word. So, that's where we stand on the grounds as we move down through here.

In fact, we even caught my -- caught me in one of my cut and pastes where -- what did I say? Something about fuel coalescence when we don't have fuel. So...

These things, moving down through the rest of the documents, are, indeed, my opinions and they were in writing when we were putting these declarations together. And -- okay.

Q. Okay. Thank you. And thank you for

your time today.

A. You're quite welcome.

MR. EAGAN: For purposes of the record, we'll read.

MR. RAYES: Expedite copy. How quickly does that get us the transcript?

(Reporter clarification.)

MR. RIVIELLO: Monday is fine.

MR. RAYES: Monday.

MR. EAGAN: Yes. What's your standard turnaround?

(Reporter clarification.)

MR. EAGAN: That will be fine.

(The proceedings were concluded at 6:07 p.m.)

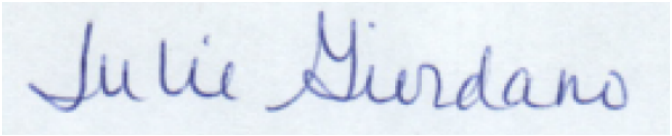
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) SS.
COUNTY OF BREVARD)

I, Julie Giordano, Florida Professional Reporter, do hereby certify that I was authorized to and did stenographically report the deposition of GERALD MICKLOW, Ph.D, that a review of the transcript was requested; and that the foregoing transcript, pages 1 through 284 is a true record of my stenographic notes.

I FURTHER CERTIFY that I am not a relative, employee, or attorney, or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

Dated this 30th day of March, 2026.



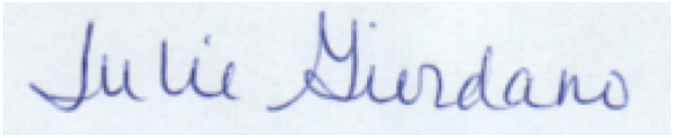
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CERTIFICATE OF OATH

STATE OF FLORIDA)
) SS.
COUNTY OF BREVARD)

I, the undersigned authority, certify that GERALD MICKLOW, Ph.D remotely appeared before me and was duly sworn.

WITNESS my hand and official seal this 30th day of March, 2026.



_ _ _ _ _ _ _ _ _ _ _ _ _ _

JULIE GIORDANO, FPR-C
Notary Public State of Florida
My Commission Expires: 11-27-27

John Eagan

johneagan@malloylaw.com

March 30, 2026

RE: AROMA360, LLC v. AIR ESSCENTIALS, INC.

3/25/2026, Gerald Micklow , Ph.D (#7954146)

The above-referenced transcript is available for review.

Within the applicable timeframe, the witness should read the testimony to verify its accuracy. If there are any changes, the witness should note those with the reason, on the attached Errata Sheet.

The witness should sign the Acknowledgment of Deponent and Errata and return to the deposing attorney. Copies should be sent to all counsel, and to Veritext at errata-tx@veritext.com.

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If the witness fails to do so within the time allotted, the transcript may be used as if signed.

Yours,

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AROMA360, LLC v. AIR ESSCENTIALS, INC.

Gerald Micklow , Ph.D (#7954146)

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Gerald Micklow , Ph.D Date

AROMA360, LLC v. AIR ESSCENTIALS, INC.
Gerald Micklow , Ph.D (#7954146)

ACKNOWLEDGEMENT OF DEPONENT

I, Gerald Micklow , Ph.D, do hereby declare that I have read the foregoing transcript, I have made any corrections, additions, or changes I deemed necessary as noted above to be appended hereto, and that the same is a true, correct and complete transcript of the testimony given by me.

_____ _____

Gerald Micklow , Ph.D Date

*If notary is required

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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