UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LUMINEX INTERNATIONAL
COMPANY LTD.,

Petitioner,

v.

CASE IPR2024-00101
U.S. Patent No. 10,299,336

SIGNIFY HOLDINGS B.V.,

Patent Owner.

VIDEOTAPED REMOTE DEPOSITION OF

JAMES GARY EDEN

Friday, April 25, 2025

9:00 a.m. Central Standard Time

Reported By:

GRETA H. DUCKETT, CCR, RPR, CRR, CVR-S, RVR-M-S

JOB NO.: 10501

Signify Ex. 2052
Luminex v. Signify
IPR2024-00101

April 25, 2025

9:00 a.m. Central Standard Time

Videotaped remote deposition of JAMES GARY EDEN, taken stenographically by Greta H. Duckett, CCR, RPR, CRR, CVR-S, RVR-M-S.

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THE VIDEOGRAPHER: We are now on the record. The time is 9:00 a.m. Central, April 25, 2025. This begins the video-recorded deposition of Dr. Gary Eden taken in the matter of Luminex versus Signify Holdings. I'm your videographer Joe Lopez. The court reporter is Greta Duckett.

Counsel will state their appearances, after which, the court reporter will swear in the witness.

(Counsel stated appearances for the record.)

JAMES GARY EDEN,

the witness, having first been duly sworn to speak the truth, the whole truth and nothing but the truth, testified as follows:

EXAMINATION

BY MR. DORSKY:

Q. Good morning, Dr. Eden.

A. Good morning, Mr. Dorsky.

Q. I know you've testified once already in this proceeding, so some of this may be a bit repetitive. But you understand that

you have been sworn in and are under oath, the same way as if you were in a courtroom?

A. Yes, I do.

Q. Is there any reason you cannot provide complete and accurate and truthful testimony today?

A. No.

Q. Are you on any medication that would prevent you from understanding my questions or providing truthful testimony?

A. No.

Q. I will be asking you questions today. If you do not understand my question, please let me know. Otherwise, I will assume that you understood the question.

Is that okay?

A. That will be fine.

Q. And I will try to make sure we take a break every hour or so, like the last deposition. If you need a break before then, please let me know. But I'll ask that you respond to any pending question before we break.

Is that okay?

A. Yes, that will be fine.

Q. And I believe you said you are in Dallas today?

A. Yes, that's correct.

Q. Is there anyone in the room with you today?

A. No, there is not.

Q. Now, what did you do to prepare for today's deposition? And as I ask that question, please don't reveal the contents of any specific communications you've had with your counsel. I'm just trying to get an idea generally of what you did to prepare.

A. Well, I've been doing what I normally do. Over the past week or so, I've been reading documents just to refresh my memory, so all of the patents that are at issue in this matter. Yesterday, I had a meeting with Pranita Dhungana, Jeffrey Messing, and Joshua Nightingale.

Q. Okay. Did you meet with anyone other than your counsel or Luminex's counsel in this IPR proceeding?

A. No, I have not.

Q. Did you review any documents in preparation for this deposition that are not

listed in your reply declaration?

A. No, not that I recall. No.

Q. Did you bring anything with you to the deposition today?

A. Not to the deposition. I brought into the building my small briefcase. But it's not accessible to me now.

Q. Okay. And so today, you don't have any, for example, paper copies of any declarations or exhibits in this proceeding; is that correct?

A. Oh, no. I forgot to mention. There is, to my left side, Mr. Dorsky, a notebook that has in it clean copies of my reports and the patents.

Q. And just to be clear, your reports are the first declaration and reply declaration you submitted in this proceeding?

A. To be honest, I haven't opened the notebook yet to see what they were other than it was a past report. I haven't checked to see if both declarations are there or not.

Q. Is there a table of contents in the front of the binder or notebook you have?

A. That's a great question. No, but

there are tabs. So I can read them to you, if you want.

The first tab says, Eden Declaration; the second says, Supplemental Eden Declaration; the third is the Provisional, which I assume is the '424, and Chaimberg, Roberge, Halliwell, and Reiff. I haven't checked to see if they're complete. But that's what the tabs say.

Q. Okay. And to your knowledge, is there any notations, markings, or highlighting in any of those documents?

A. No. It was represented to me that they are clean copies. I haven't checked them, but I haven't seen any notations of any kind.

MR. MESSING: I will represent for the record -- sorry, Dr. Eden -- these were printed at our Dallas Jones Day office yesterday, and these are clean copies of his two IPR declarations and the references that Dr. Eden just mentioned.

MR. DORSKY: Okay. Thank you.

BY MR. DORSKY:

Q. And just to be clear, other than the documents you read off that are contained in that notebook, there are no other documents, paper documents, with you today; is that correct?

A. That is correct.

Q. So, like last time in our last deposition, I will be providing certain electronic exhibits through the Zoom window here. If you have a paper copy that is more comfortable or convenient for you to reference, you can do so. But if you notice any differences between the paper copy and the electronic version I submit through Zoom, please let me know. Okay?

A. Yes, I will.

Q. Okay. So I am going to mark a few documents up front so you have the electronic versions and we have them in the record for you to refer to. The first document which I'm going to be putting in the Zoom window here is a document that was previously marked Exhibit 1027.

///

(Exhibit 1027 was marked for identification.)

BY MR. DORSKY:

Q. This document is titled, Declaration of Dr. J. Gary Eden in Support of Petitioner's Reply. Please let me know when you see that.

(Technical discussion.)

THE VIDEOGRAPHER: The time is now 9:08. We are now off the record.

(Off-the-record discussion from 9:08 a.m. to 9:13 a.m.)

THE VIDEOGRAPHER: The time is now 9:13 a.m. We are now back on the record.

BY MR. DORSKY:

Q. Thank you. So, Dr. Eden, I put into the chat window a document that was previously marked Exhibit 1027, titled, Declaration of Dr. J. Gary Eden in Support of Petitioner's Reply.

Did you receive that document?

A. Yes, I did. And I'm very happy to say it's now displayed on the computer to my

right.

Q. Okay. And this is the reply declaration you submitted in this proceeding; is that correct?

A. Yes.

Q. Is it okay if I refer to it as the reply declaration during this deposition?

A. Please do.

Q. And are you aware of any mistakes in this reply declaration at this time?

A. No, I am not.

Q. The next document I will be putting in the chat window is a document previously marked Exhibit 1004. This document is titled, Declaration of J. Gary Eden under 37 CFR Section 1.68.

Please let me know when you have access to that document.

(Exhibit 1004 was marked for identification.)

THE VIDEOGRAPHER: The time is now 9:18. We are now off the record.

(Off-the-record discussion from 9:18 a.m. to 9:22 a.m.)

THE VIDEOGRAPHER: The time is now 9:22. We are now back on the record.

BY MR. DORSKY:

Q. All right. So, Dr. Eden, were you able to access Exhibit 1004?

A. Yes.

Q. And this is the first declaration of yours that was submitted with the petition in this proceeding; is that correct?

A. Yes, that's correct.

Q. And is it okay if I refer to this as your first or original declaration?

A. Yes, that would be fine.

Q. Okay. I am next going to put in the chat window a document that was previously marked Exhibit 1001.

A. Okay.

(Exhibit 1001 was marked for identification.)

BY MR. DORSKY:

Q. This is a copy of U.S. Patent number 10,299,336. Please let me know when you have access to that.

A. Yes, I have it.

Q. Now, is it okay if I refer to this document today as the '336 patent?
A. Yes.
Q. Great. The next document I am going to put in the chat window is a document that was previously marked Exhibit 1008.
(Exhibit 1008 was marked for identification.)
A. Yes. It's already arrived. Thank you.
Q. And this is a copy of provisional application number 62/297,424.
Is that correct?
A. Yes, that is correct.
Q. And is it okay if I refer to this document today as the provisional or provisional application?
A. Yes, that would be fine.
Q. Great. The next document I'm going to put into chat is a document previously marked Exhibit 1003.
(Exhibit 1003 was marked for identification.)
BY MR. DORSKY:
Q. Please let me know when you can

access that.

A. It's already here, Mr. Dorsky.

Q. And this is a copy of U.S. Patent number 10,234,091. Is that correct?

A. Yes.

Q. And is it okay if I refer to this document today as Chaimberg?

A. Yes, that would be fine.

Q. The next document I am going to put into chat is a document previously marked Exhibit 1011.

(Exhibit 1011 was marked for identification.)

BY MR. DORSKY:

Q. Do you have access to that document?

A. Yes, I do. It's the '941 patent.

Q. Right. And is it okay if I refer to this document today as Roberge?

A. Yes, that's fine. Choose whatever pronunciation you prefer.

Q. What pronunciation do you use when you refer to this?

A. I'm not sure it's correct, Mr. Dorsky, but I refer to it as Roberge.

Q. We'll go with that today. Great.
The next document I am going to put into chat is a document previously marked Exhibit 1012.
(Exhibit 1012 was marked for identification.)
BY MR. DORSKY:
Q. Please let me know when you can access that.
A. Yes. It just appeared on the screen. It's the '250 patent.
Q. And is it okay if I refer to this document today as Halliwell?
A. That would be fine.
Q. And then the last document I am going to put in the chat for now is a document previously marked Exhibit 1013.
(Exhibit 1013 was marked for identification.)
BY MR. DORSKY:
Q. Please let me know when you have access to that.
A. Yes. That too has appeared. It is the '160 patent.
Q. And is it okay if I refer to this

patent today as Reiff?

A. Yes, please do.

Q. Okay. Now, you can set those aside or minimize them for now. But please feel free to reference them as needed during the deposition.

A. Okay.

Q. One of the documents I just put before you is your reply declaration, Exhibit 1027. You can reference that if you'd like.

Now, did you prepare the reply declaration yourself?

A. Yes, I did.

Q. Did anyone help you prepare the declaration?

A. Yes. As I mentioned at my first deposition with you, Mr. Dorsky, the deposition -- the declaration was prepared with the assistance of individuals from counsel from Jones Day. But all of the words in the end are mine but they were gracious to assist me with legal language.

Q. And just to be clear, all of the opinions in this declaration are your own; is

that correct?

A. Yes. Yes, indeed, they are.

Q. Does this reply declaration, together with your first declaration, represent a complete statement of your opinions in this proceeding?

A. Yes, it does.

Q. Did you perform any analysis relating to this proceeding that is not set forth in one of your declarations?

A. No.

Q. In setting forth your opinions in your reply declaration, did you rely on any documents or information that is not expressly identified in the declarations?

A. No.

Q. Okay. Let's stay with your reply declaration. And I'd like you to turn -- and you can refer to the paper copy if more convenient. Please turn to pages -- starting on page 5 of your reply declaration. Please let me know when you get there.

A. In the tab that I have it's referred to as the Supplemental Eden Declaration.

Q. Okay. Do you have a preferred nomenclature?

A. No. That's just fine. I just wanted to make that note. But we're referring to Exhibit 1027; is that correct?

Q. That is correct.

A. Okay. Thank you, Mr. Dorsky. I'm on page 5 now.

Q. Now, on pages 5 through 8 of your reply declaration, you cite to and include images of certain Globe products; is that correct?

A. Yes, that is correct.

Q. And one of these Globe products is identified as product number 92291, and the other Globe product is identified as number 91458. Is that correct?

A. Yes.

Q. And in your declaration, you state that these Globe products are sold by Home Depot, right?

A. Yes, that is correct.

Q. Are the images of the Globe products on page 6 of your reply declaration from photographs you took of the two products?

A. No, I did not take them, but I do have the products at my home and have inspected them thoroughly. And the photographs are precisely what you would have before you if I had taken the photographs.

Q. Who did take the photographs on page 6?

A. I don't know. It might have been -- I don't know.

Q. How did you receive the photographs on page 6?

A. They were inserted into the draft of my report, at my request.

Q. Who inserted them into your report?

A. I'm not sure. It might be Mr. Messing, but I'm speculating.

Q. So am I correct that you requested counsel to insert the images into the --

A. Yes.

MR. MESSING: Advise Dr. Eden to not disclose any discussions that he had with counsel, the substance of them.

BY MR. DORSKY:

Q. Now, did you separately purchase

and disassemble these products?

A. I did not purchase them separately. The units that I have were sent to me. But I have disassembled them, yes.

Q. Were you aware of these products prior to receiving them from counsel?

A. Not from this particular manufacturer. I have an interest in illumination products, so I'm often at Home Depot and other stores. So I'm constantly looking for new products. But I had not seen this particular product.

Q. Did you analyze these Globe products on page 6 of your reply declaration solely for purposes of this proceeding?

A. Yes.

Q. Were there any other products you analyzed for purposes of this proceeding other than the Globe products?

A. No.

Q. And it is your opinion that these Globe products that appear on page 6 of your reply declaration embody Chaimberg's claims, correct?

A. Well, it depends on what you mean

by the word "embody." My opinion is that my inspection and analysis of the Globe products confirm that they have all of the features of the Chaimberg product -- excuse me -- the Chaimberg patent.

Q. I'd like you to refer to page 5 of your reply declaration now, paragraph 12. And about eight lines down, do you see the sentence beginning with the word "finally"?

A. Yes, I do see it. Thank you.

Q. And that sentence states, Finally, Globe Electric Company, Inc., (the assignee of Chaimberg), manufactures a number of LED recessed luminaires (sold through Home Depot) that embody Chaimberg's claims.

Did I read that correctly?

A. Yes.

Q. So my question is: It is your opinion that these Globe products embody Chaimberg's claims; is that correct?

A. Yes. I was using in my text a legal term that I was -- I decided to use. But yes, that sentence is correct.

Q. What did you mean by "embody Chaimberg's claims" in paragraph 12?

A. To me, as a nonlawyer, it means simply that the products reflect, have every aspect of the Chaimberg patent, whatever phraseology you prefer to use.

Q. So am I correct that you did not mean embody Chaimberg's claims in the legal sense?

A. Well, you might want to instruct me on the nuances of the legal meaning of "embody." But I did intend it to mean "embody" in a legal sense.

Q. And specifically, embody Chaimberg's claims, correct?

A. Yes. Correct.

Q. Now, you did not identify any Globe products relating to Chaimberg in your first declaration, Exhibit 1004, correct?

A. Yes, that is correct.

Q. Okay. And there were no Globe products identified or discussed in the petition, correct?

A. That, I do not recall.

Q. So you are relying on these particular Globe products for the first time in your reply declaration; is that fair?

A. Yes.

Q. Now, why do you believe that these Globe products on page 6 of your reply declaration embody Chaimberg's claims?

A. Well, you have my report in front of you. And you can read the report and if there's any questions that you might have about the conclusions I reach, please point them out.

I'm sorry. I was just going to say that my report has already dealt with that in considerable detail.

Do you have any questions about the conclusions I reached?

Q. Yes. My question is: What analysis did you perform to determine that the two Globe products on page 6 of your reply declaration embody Chaimberg's claims?

A. Well, I just looked at every limitation of the claims that are at issue in this matter. And as one would normally do, to make sure that the Globe product -- let's say, for example, the 92291, has every limitation of the claims.

Q. And the claims at issue in this matter, you're referring to the '336 patent

claims?

A. Yes. That's the centerpiece of this matter, as you know.

Q. And the '336 patent claims are not Chaimberg's claims, correct?

A. No. That's true. But what is the expression that lawyers use that Chaimberg reads on the '336 patent?

Q. My question is: What analysis did you perform to determine that the Globe products embody Chaimberg's claims as stated in paragraph 12 of your reply declaration?

A. I did the same thing with Chaimberg that I just mentioned a moment ago for the '336 patent.

Q. You don't identify any claims from Chaimberg in your reply declaration, correct?

A. No. But I read them all.

Q. Which specific claims of Chaimberg do you believe that these products on page 6 of your reply declaration embody?

A. I don't recall off the top of my head. But certainly, I remember claims 1 through -- I'm trying to remember. Claims 1 through 3. But the most important aspect of

the Globe product analysis is that the Globe products are precisely what is described by the '336 patent. And that's what's most important in this matter.

Q. And just to be clear, in your reply declaration, you don't provide a element-by-element analysis of any Chaimberg claim to any Globe product, correct?

A. That is correct. I didn't believe it to be necessary.

Q. But you did compare the Globe products to the '336 patent challenge claims; is that right?

A. Yes. Yes, indeed. Because that's the centerpiece of this matter.

Q. And you're relying on these Globe products to demonstrate the unpatentability of the '336 challenge claims; is that right?

MR. MESSING: Objection. Scope.

A. Yes. That was not what I said in the -- in my report.

Q. In your reply declaration, you refer to the Globe products being marked with a patent number on page 7 of your reply

declaration.

Do you see that?

A. Yes. Yes, of course, I remember it, Mr. Dorsky. That's a major -- a major factor in my reaching the conclusions that I did, that the Globe products not only fulfill all of the patent claims of the '336, but they confirm my analysis in my earlier report.

Q. So just to confirm, is it your understanding that because the Globe products are marked with a patent number, that they necessarily are the same design as an embodiment disclosed in that patent?

A. No. That's a much too stringent question. Necessarily, no, not at all. I'm just simply saying, as I said a moment ago, that every -- the construction, the features of the Globe products match not only Chaimberg, but the '336 patent claims.

Q. When you say "they match Chaimberg," you're saying that these Globe products match the limitations of claims in Chaimberg or the Figure 1 embodiment of Chaimberg?

A. I think I said just a moment ago

that they not only confirm my analysis of Chaimberg in terms of the claims of the '336 patent, but every aspect of these physical products -- I don't know what the legal language is, but these are features that are required by the claims of the '336 patent.

Q. And that includes features of the Globe products that are not necessarily disclosed or visible in Chaimberg itself; is that right?

MR. MESSING: Objection to form.

A. What do you mean by "features that are not visible"? Can you explain your question?

Q. Sure. You are relying on the, for example, features of the Globe product switches as disclosing claim features of the '336 patent claims that may not be expressly set forth in Chaimberg itself; is that fair?

A. No, I don't think that's fair at all. As I said a moment ago, these products are ones that I took the switch apart to verify that it is a slide switch and that it offers multiple -- the selection of multiple CCT

values. There are features other than the ones that I believe your question just alluded to.

Q. Now, this image on page 7 of your reply declaration -- or I should say images -- in the top image on page 7 shows the patent marking; is that correct?

A. Yes.

Q. And this is the patent marking shown on Globe products number 92291; is that right?

A. Yes.

Q. And the patents listed here in this image on page 7 is 10,234,091. And that is Chaimberg; is that right?

A. I'm sorry. Where are you?

Q. Page 7 of your reply declaration.

A. Yes.

Q. There are two images on this page. I'm referring to the top image.

A. Okay.

Q. And the top image includes a patent 10,234,091, correct?

A. Yes. And that's the one you downloaded to my computer just a little while ago.

Q. And that is Chaimberg, correct?
A. That is correct.
Q. And there's another patent marked here 11,206,720, correct?
A. Yes, that is correct.
Q. Did you analyze the '720 patent shown on the image in page 7 of your reply declaration to see how it might relate to the design of this Globe product?
A. No. But it wasn't necessary.
Q. How did you know that it wasn't necessary if you didn't analyze the patent?
A. Well, because all of the features that are obvious -- the prominent features, and even small features, of the Globe products confirm that Chaimberg has everything that is mentioned in the '336 patent. So it wasn't necessary to go beyond the Chaimberg patent.
Q. How did you know the features you are looking at in the Globe products were cited features or claimed features in the other '720 patent?
A. Are you talking about the 11,206,720?
Q. Yes.

A. Well, that's a later patent, right?
Q. Right.
A. So the Chaimberg patent precedes the '720 patent. So I don't understand your point.
Q. My question is: You show images of the Globe products that refer to features of the Globe products. How do you know whether or not the features and descriptions of the Globe products in your declaration aren't the subject of the '720 patent, the other marked patent, of these products?
A. Well, because, Mr. Dorsky, all of the features that I see that are relevant to the '336 patent and are -- they're in the 10 -- excuse me -- the '091, Chaimberg. I need not resort to a later patent.
Q. But to be clear, you did not perform any analysis comparing the '720 patent identified on the image on page 7 to any Globe products; is that correct?
A. No, it wasn't necessary at all. Everything that I needed was in Chaimberg and on the Globe products. It was -- the Globe products reproduce the Chaimberg patent.

That's the bottom line.

Q. Just to be clear, in your reply declaration, you did not present an analysis comparing every element of a '336 patent claim to either of these Globe products, correct?

A. That is correct. As I said early in our conversation a few moments ago, my analysis of the Globe products simply confirms everything that I've said about Chaimberg and its anticipation of the '336 patent claims.

Q. In your reply declaration, at the top of page 8, paragraph 14, the first sentence, you state that because the Globe products feature a CCT switch with five positions that it further confirms that Chaimberg anticipates and/or renders obvious claim 1.

Do you see that?

A. Yes, I do.

Q. Why does -- let me strike that.

Why does the Globe products having a CCT switch with five positions confirm that Chaimberg anticipates or renders obvious claim 1?

A. Well, the operative term in the

sentence that you just read is "further confirms." So it is not the only factor in -- to consider. But the Globe products are, I believe, an important confirmation that Chaimberg does, in fact, anticipate every aspect of the '336 patent.

Q. What relevance does a CCT switch having five positions have to claim 1 of the '336 patent?

A. Well, as you know very well, the CCT switch is a central feature of the '336 patent, and one of the claims also mentions the necessity for five positions. So these are two of the features that are expressly called out in the '336 patent, and that's why I mentioned them here.

Q. Chaimberg does not mention five switch positions, correct?

A. I don't recall whether -- how many positions Chaimberg calls out.

You're referring to the patent itself?

Q. Yes. You're not sure how many switch positions are disclosed in Chaimberg?

A. Well, we can take a look at

Chaimberg. I don't recall -- I don't recall precisely what he says. By the way, this will be a theme today. If this evolves into a memory contest, I'm in trouble.

Q. If you would like to refer to Exhibit 1003, which is Chaimberg. And once you're there, I can give you some --

A. I'm there.

Q. Okay. Column 4, line 34 to 37 may help.

A. This is a long document. All right. It's just three positions. That's true.

Q. So Chaimberg's switch only has three positions, correct?

MR. MESSING: Objection. Form.

A. Sure. That's all that he -- that's all that he mentions. But I think anybody who is skilled in the art would recognize that if Chaimberg mentions three, then five, seven, an arbitrary number is obvious to me.

MR. MESSING: Dr. Eden, please allow me time to object in between questions.

BY MR. DORSKY:

Q. Just to be clear, Chaimberg does not state or mention five switch positions, correct?

A. I can't say absolutely yes, but in this section that we just read, it only mentions three.

Q. Okay. In the Globe products you identified, both Globe products have five positions related to CCT; is that correct?

A. Yes. Which, of course, includes three positions.

Q. When you say "includes three positions," you mean that having five positions includes three positions plus two additional positions; is that right?

A. Yes. It goes beyond the patent.

Q. Okay. Both Globe products go beyond the patent, correct?

A. Yes.

Q. And the patent, just to be clear, is Chaimberg?

A. That's what you mentioned a little while ago. It's the label on the back of the Globe products.

Q. Now, earlier, we discussed that the Globe products shown on page 6 are marked with Chaimberg and one additional patent, correct?

A. Yes.

Q. Do you believe that because these products are marked with Chaimberg and show certain features, that those features must also be present in Chaimberg?

MR. MESSING: Objection. Scope.

A. I think you're asking for a legal conclusion, Mr. Dorsky, and I don't know how to answer your question.

Q. I'm not asking for a legal conclusion. I'm just asking for your understanding.

So my question is: Do you believe that because the Globe products are marked with Chaimberg and show certain features, that those features must also be present in the Chaimberg reference?

A. No, I don't know that to be true. Let me reiterate the importance of the Globe products, Mr. Dorsky. The Globe products, to me, are a powerful confirmation that the

Chaimberg patent anticipates the claim limitations that are important in this matter.

Q. So I'd just like to understand here. Is it your understanding that if an element -- claim element, for example -- appears in a marked product, that it is necessarily taught by the patent it is marked with?

MR. MESSING: Objection. Form.

A. No. I'm not sure I can agree with that statement at all. The claim elements that I'm referring to are those that I know to be present in Chaimberg.

Q. If you know claim elements are present in Chaimberg, then what is the relevance of the Globe products?

A. Let me say it again. I believe I've said this several times. The Globe products simply show that the claim elements of the '336 patent are exemplified or taught -- whatever term you wish to use -- by the Chaimberg patent. Because I see them in the product. They're right in front of my eyes.

The electrical cable, the switch,

everything that is important to the '336 that Chaimberg also has. And I see them in a physical product that has been commercialized.

Hopefully, that answers your question.

Q. Do you believe that any modification to a marked commercial product beyond what is disclosed in the corresponding patents is obvious?

MR. MESSING: Objection.

Scope.

A. There's a lot of subjective terms in your question. Could you rephrase your question?

Q. Do you believe if there's a modification to a commercial product that is marked with the patent and that modification is not disclosed in the corresponding patent, that that modification would be obvious?

A. Your question is a compound question, Mr. Dorsky. Would a modification to what?

Q. The commercial product?

A. To what are you referring?

Q. Well, for example, the Globe

products include a switch with five positions, Chaimberg discloses a switch with three positions. I believe you confirmed that earlier. Do you believe that because the Globe product has a modification beyond Chaimberg's disclosure, that modification is necessarily obvious?

MR. MESSING: Objection. Form.

A. No, I don't agree to your inferred conclusion at all. Because I won't agree to the idea that Chaimberg mentioning only three necessarily limits Chaimberg to three positions.

Q. My question wasn't about what Chaimberg limits. My question was about modifications to a commercial product and whether those modifications to a product mean that those modifications are obvious based on the patent.

Is it your opinion that if a product is marked with a patent that modifications to that product beyond what the patent discloses are obvious because it's marked with that patent?

MR. MESSING: Objection.
Form.
A. Yeah. I'd have to think about that. I don't know the answer to your question. I have -- I would have to think about it. You're using the word "obvious" that has a legal meaning, and I need to think about what you're saying. I think your questions are missing the point of what I've done.
Again, the reason for the Globe products is that it is a vivid illustration that Chaimberg was commercialized and that not only does Chaimberg describe all of the claim elements -- at least of the contested claims in the '336 patent. And that these are -- they've come alive in the products, which are on store shelves. So I know that your -- well, I won't say anything further.
MR. MESSING: We've been going about an hour. If there's a good time for a break soon, that would be appreciated.
MR. DORSKY: Sure. Just a moment here.
///

BY MR. DORSKY:

Q. Is it your opinion that because the Globe products include a switch with five positions that it would be obvious to modify Chaimberg -- Chaimberg's three-position switch to include five positions?

A. Oh, yes. I thought I said that a minute ago; that three positions that are described in the specification of Chaimberg would not limit Chaimberg to three. I think any reasonable -- anyone skilled in the art would recognize that you could increase the number.

MR. DORSKY: All right. We can take a break here.

THE VIDEOGRAPHER: The time is now 10:02. We're now off the record.

(Recess from 10:02 a.m. to 10:10 a.m.)

THE VIDEOGRAPHER: The time is now 10:10 a.m. We are now back on the record.

BY MR. DORSKY:

Q. Now, Dr. Eden, you did look at the

claims of Chaimberg, correct?

A. Yes.

Q. And I believe you mentioned claims 1 to 3 is what you looked at for the Globe products?

A. I don't recall precisely what claims. At one point or another, I read them all.

Q. Now, the claims of Chaimberg do not include a limitation requiring that the switch be disposed remotely from the luminaire housing, correct?

A. I don't recall. I'm happy to take your word for it, but I don't recall.

Q. But you would agree that if that limitation is not present, a product can practice Chaimberg's claims even if the CCT switch is not disposed remotely from the luminaire housing, correct?

A. Can you break that up into two parts? I would appreciate that. That was a multiple-part question, or at least it sounded that way to me.

Q. Well, let me just ask: Do you agree that a product can practice Chaimberg's

claims, the claims in Chaimberg, even if the product's CCT switch is not disposed remotely from the luminaire housing?

MR. MESSING: Objection.

Scope.

A. I don't recall. You're asking me to recall the specific language of all the claims. I don't recall.

Q. So sitting here today, you're not sure; is that correct?

A. I'm not sure. That is correct.

Q. The claims of Chaimberg do not include a limitation requiring that the switch must include a coupling feature that is electrically coupled to a cable of the luminaire, correct?

A. Right. Why would they?

Q. So you would agree that a product can practice Chaimberg's claims even if the product switch does not include a coupling feature that is electrically coupled to a cable of the luminaire, correct?

A. Again, that was a compound statement. Can you break it into two parts, please?

Q. I'm not sure where you're seeing the compound issue here, but I'll restate the question.

Do you agree that a product can practice Chaimberg's claims even if that product switch does not include a coupling feature that is electrically coupled to a cable of the luminaire?

MR. MESSING: Objection. Scope.

A. I'd have to think about that. Clearly, Chaimberg has a switch that is coupled to an electrical cable of the luminaire. I'm using the language of the '336 patent, as are you.

Q. Yes, I'm asking about Chaimberg's claims, not the embodiment. So my question is: Could a product practice Chaimberg's claims even if that product switch did not include a coupling feature that is electrically coupled to a cable of the luminaire?

A. Right. But what I'm saying is that you're talking about Chaimberg but you're using language of the '336 patent.

Q. Correct.

A. I don't understand what your point is.

Q. My question is: Can a product practice Chaimberg's claims even if that product switch does not include a coupling feature that is electrically coupled to a cable of the luminaire?

MR. MESSING: The same objection.

A. I'd have to think about it, Mr. Dorsky.

Q. Let me ask a different way.

A. Please do.

Q. Do Chaimberg's claims require that a product practicing those claims must include a switch having a coupling feature that is electrically coupled to a cable of the luminaire?

MR. MESSING: Objection. Scope.

A. I'm not sure what the answer to the question is. I'll just simply say that Chaimberg has the CCT switch that is central to the '336 patent. It has the electrical cable -- what the '336 patent calls the

electrical cable of the luminaire. It has everything that is -- that is central to the '336 patent.

Q. Going back to page 6 of your reply declaration, I want to focus on products -- Globe product number 92291, the top image here.

A. Okay. Thank you. I'll be there in just a minute. I had turned to someplace else.

So what product are you interested in?

Q. Globe product number 92291 at the top of page 6.

A. Okay. I'm there.

Q. And product 92291 looks to have two switches; is that right?

A. Yes. There are two switches.

Q. Do you know what the bottom switch is as we look at this image?

A. Yes. And I took it apart. It's a slide switch that is similar to that for the CCT control, but I -- oh, boy. I don't recall the function of it. I don't have the product with me here in the room, but -- what did it control? It's a good question. I don't recall.

Q. Do you recall if the bottom switch of the image on page 6 controlled CCT settings?

A. Oh, yes. You mean for the other product, the 91458?

Q. No. I'm staying with product number 92291. And I'm referring to the lower switch in the image at the top of page 6. So staying with 92291, we discussed two switches appearing in that image.

And my question is: Does the functionality of the lower or bottom switch relate to CCT selection?

A. I think I said just a moment ago I don't recall what the function is. But it's a logical function. It doesn't seem to -- as I recall, it doesn't involve changing the CCT's value, because that's accomplished by the top slide switch.

Q. Now, Chaimberg, in Figures 1 and 2 in its description, does not depict or disclose two switches along the cable, correct?

A. That's correct.

Q. Now, do you know when Globe product number 92291 on page 6 was first released or sold?

A. The research that we've done suggests that the product was introduced commercially in 2018.

Q. Do you know when in 2018?

A. I don't know exactly when.

Q. And what research are you referring to?

A. Just basically online research.

Q. Did you disclose this research in your reply declaration?

A. No, I did not. But I didn't believe that it was necessary.

Q. And do you know when Globe product number 91458 was first released or sold?

A. My recollection is that it was in the same time frame, but I can't -- I cannot say definitively when.

Q. And is that based on the same research you referenced in your prior answer?

A. Yes.

Q. And you didn't provide any research relating to product number 91458 with your declaration, correct?

A. No. It wasn't the point of the research. It was just to show that the

products had been on store shelves for some time.

Q. Okay. And just to be clear, you did not provide any evidence with your declaration about when Globe product number 92291 or product number 91458 were commercially available or sold, correct?

A. No, because it wasn't necessary. It wasn't the point of my report. That's why it's not mentioned, because it's not -- it's not a -- it's not relevant to what I was dealing with in the report -- or discussing in the report, I should say.

Q. Now, if you turn to page 8 of your declaration, paragraph 14.

A. Yes, sir. I'm there.

Q. Okay. If you go seven lines up from the bottom of page 8, do you see the sentence that starts, "I also note"?

A. Ah. Yes, I did mention it. I didn't think I had.

Q. And here you state that Globe began selling products embodying Chaimberg at least as early as October 2018, correct?

A. Yes. That's correct. It could

have been earlier, but it's not clear.

Q. Now, the '336 patent was filed on June 21, 2018, correct?

A. Yes, that's correct.

Q. So October 2018 would be after the filing date of the '336 patent, right?

A. Yes, of course.

Q. And Chaimberg was filed on April 27, 2018, right?

A. Yes, that's correct.

Q. So October 2018 is also after the filing date of Chaimberg, right?

A. Yes, that's correct. But before we leave that point, even though I didn't discuss it in my report, if a product appears on the shelves of a retailer in October of 2018, what does that say about when the product -- work on the product started? Because that doesn't happen overnight, as you know. So it certainly is suggestive that work began very quickly. Very early.

Q. But you don't have any evidence in your declaration, or otherwise, that the Globe products referenced in your reply declaration predated the '336 patent or Chaimberg itself,

correct?

A. That's true. I would have to talk to the corporate folks at the manufacturer, and they're unlikely to give me that information. So I can only use my experience from having commercialized products, illumination products, and I know how long it takes to develop a product that is ready for market.

Q. Now, in the sentence we're looking at on page 8, paragraph 14, of your reply declaration, the sentence further states, Indeed, one Globe SKU received a Home Depot innovation award in 2019.

Do you see that?

A. Yes. That's interesting, isn't it?

Q. And here you refer to Exhibit 1044 and Exhibit 1045 as support for this, correct?

A. That is correct.

Q. Now, I'd like you to go to the table of contents of your reply declaration. It's page iv.

A. It will take me just a moment. Of the supplemental declaration?

Q. Of your supplemental reply declaration, yes.

A. Okay. The updated table of exhibits?

Q. Yes. And I'd like you to go to the very end of that updated table of exhibits.

A. Yes.

Q. And here you list Exhibit 1044 and 1055, which are the two exhibits you cite to, to show that the Globe products received a Home Depot award in 2019, correct?

A. Yes, that's correct. I think you meant -- you said 1055 and I think you meant, for the record, 1045.

Q. Yes. 1044 and 1045. Now, neither of these products listed here on Exhibit 1044 and 1045 are Globe product number 92291 shown on page 6 of your reply declaration, correct?

A. Yes, that is true.

Q. And neither of these products is Globe product number 91458 shown on page 6 of your reply declaration, correct?

A. Yes, that is correct.

Q. And in your reply declaration, you don't provide any images or analysis of Globe product number 91479 referenced in Exhibit 1044, correct?

A. That's correct. We could not find those products.

Q. And in your reply declaration you do not provide any images or analysis of Globe product number 91477; is that correct?

A. That's correct. I would have been delighted to do so, Mr. Dorsky, if I could have found one of the products.

Q. So do you know when Globe began selling product number 92291, the specific product on page 6 of your declaration?

A. I don't know specifically when it entered the market, no.

Q. And do you know when Globe began selling product number 91458 that appears on page 6 of your reply declaration?

A. No. Again, I don't know exactly when it entered the market.

Q. Let's turn back to page 8 of your reply declaration. That's that paragraph 14 we were looking at.

A. Okay. Please proceed.

Q. About nine lines down in paragraph 14, halfway through the line, do you see the sentence that starts, "However, even if"?

A. Yes, I see it.
Q. Okay. And this sentence states, However, even if Chaimberg did not anticipate claim 1, it would have been obvious for a POSA to slightly lengthen the piece of cable between the light fixture housing and the switch to ensure that the switch lays just outside of the housing upon installation -- which Dr. Krames agrees would practice claim 1.
Did I read that correctly?
A. Yes, you did.
Q. In your original declaration, Exhibit 1004, you did not mention modifying or lengthening Chaimberg's cable, correct?
A. Right. But why should I?
Q. So this is a new idea that's in your reply declaration, right?
MR. MESSING: Objection.
A. No, I don't agree with that statement at all. It's not a new idea. It's always been my position that a POSA is the person to whom we must look for making different modifications that would be a part of his or her training. In fact, that was a major theme in both of my declarations.

In the second declaration, I think it's around paragraph 21. I said that this is a recurring theme in everything that I'm going to say. And it's probably going to be a recurring theme in everything that I say today, that, as it turns out, the Globe product -- in fact, the part of paragraph 14 you have not mentioned actually measured the length of the cord, the electrical cable. And it takes -- in both products, it takes the switch well outside the housing.

And the statement that you're now pointing to just simply says that if Chaimberg had not anticipated claim 1 -- but it does, but I said if it does not, I'm saying that a POSA would have quickly done that. Why? Because if it's within the housing, it's more difficult to access. So. . .

(Simultaneous speakers.)

Q. I'm sorry. Were you still testifying?

A. I was just going to say, does that answer your question?

Q. No, it doesn't. So let me try to re-ask.

A. Okay. Please do.

Q. Where in your original declaration, Exhibit 1004, did you mention modifying or lengthening Chaimberg's cable?

A. Mr. Dorsky, no report that I write is exhaustive in the sense that no report says everything that I can think of to do with regard to a patent or that a POSA would think of. It's not necessary for me, from the very beginning to equal zero, as we say in the field, to say to you or anyone everything that I can possibly think of.

The reason it's mentioned here is that it's relevant, because I actually have a product, and it has an electrical cable of a certain length, and I simply want to show that it anticipates all of the claims of the '336 patent. That's my goal.

Q. I still don't think you're answering my question here. So let me ask again.

You agree that, in your original declaration, Exhibit 1004, you did not mention modifying or lengthening Chaimberg's cable, right?

A. I did not mention many things.

(Simultaneous speakers.)

Q. I'm talking about this specific thing.

A. I understand. And by the way, if I have not answered your question, it's not due to lack of trying, I assure you. So I did not mention it specifically, but I -- there are many things I did not mention specifically.

Q. Okay. So you did not mention in your original declaration modifying or lengthening Chaimberg's cable, correct?

A. There are many things that I did not mention.

Q. Okay. I'm just talking about lengthening Chaimberg's cable.

A. I understand that. And I'm giving a complete answer.

Q. I would like you to answer my question.

A. I think I have. I just don't believe that it can be answered by yes or no.

Q. Why don't you think it can be answered that way?

A. Because I think it's misleading to

answer yes or no.

Q. So sitting here today, you can't tell me whether or not you mentioned lengthening Chaimberg's cable in your original declaration?

A. I cannot recall, but it's not relevant.

Q. I'm not asking if it's relevant. I'm asking if it's in your declaration. So let me ask very clearly one more time.

In your original declaration, Exhibit 1004, you did not offer an opinion in your original declaration concerning modifying or lengthening Chaimberg's cable, correct?

MR. MESSING: Objection to form.

A. I do not recall whether I addressed the issue that you're raising, but in the interest of a complete answer, I'm saying that there are a number of things that are unlikely that I didn't mention, because they were not relevant at the time.

Q. So what prompted you to offer this new opinion in your reply declaration?

A. I thought I just said that,

Mr. Dorsky. I thought I just addressed that. I said that I had a product before me -- in fact, I had a couple of products, both of which are mentioned in here. And I had before me a living realization, if I can call it that, of Chaimberg, which addresses all of the claim elements of the '336 patent that are at issue in this matter. I had it in front of me. With my own hands, I took it apart. That's why I made measurements, because I knew that this was an issue, that Dr. Krames had addressed the length of the cable. And he said that if it lies -- if the switch lies outside the housing, in his opinion, that rendered the switch remote.

So the answer to your question, why would I address it here? Because I had these products in front of me and I was analyzing them. So I made every measurement that I had the opportunity to make.

Q. And is it your opinion that the cables in these Globe products are necessarily the same cable disclosed in Chaimberg?

MR. MESSING: Objection.

Scope.

A. What do you mean, it's the same cable? What do you mean, the same cable?

Q. Do you think the -- let me strike that.

Is it your opinion that the length and composition of the cables used in the Globe products identified on page 6 of your reply declaration are necessarily the same as the cable disclosed in Chaimberg?

A. The length and composition of the cable. Boy, that's a vague question if I ever heard one, Mr. Dorsky.

The length -- as you know, the length of the cables is not specified in Chaimberg, nor in the '336 patent, and no one would specify the exact length. There are just guidelines as to making it. So the Chaimberg -- it's clear to me that Chaimberg thought of the idea of having a switch in an electrical cable of the luminaire well before the '336 patent. So it's not necessary to specify a length, because that will change with time. It depends on the product, it depends on the nature of the switch.

So in the composition of the cable,

I'm not at all sure what you mean by that.

Q. Why would a person of ordinary skill, without the '336 patent in hand, choose to modify Chaimberg by lengthening cable 15, as you propose?

A. Well, they didn't lengthen it. That was just the way that it was originally. A POSA -- it's really critical, Mr. Dorsky, that we give a POSITA, a POSA, whatever term you use -- someone skilled in the art, the credit they deserve. So the engineers that designed this will design the length of the cable so as to maximize convenience to the user.

And in most applications where the light is installed in a drop ceiling, for example, you're going to want to have the length of the cable from the junction box to the switch of sufficient length so that it's easiest for someone to access, because that's the whole purpose of the CCT switch, right, to make it convenient for somebody to change the CCT value.

So a good engineer will know all of these things. And the length of the cable will

change depending on the application.

Q. So I'm not referring to the Globe products. I'm referring to your statement in your declaration in paragraph 14 of your reply declaration, that it would have been obvious for a POSA to slightly lengthen the piece of cable between the light fixture housing and the switch to ensure that the switch lays just outside of the housing upon installation.

A. Right.

Q. That's in your reply declaration, right?

A. Right.

Q. And my question is: Why would a person of ordinary skill, without having the '336 patent, choose to modify Chaimberg by lengthening the piece of cable in Chaimberg, as you state in paragraph 14?

A. Yeah. Mr. Dorsky, we're going over the same ground repeatedly. I just said why a little bit ago, that a POSA -- somebody skilled in the art -- an engineer would know that if the cable is so short that the switch is inside the housing, imagine what the implications are -- for the convenience of the customer,

imagine what the implications are for electrical hazard if the switch is actually inside the housing.

Now, if it's mounted to the outside of the housing, that's one thing. But if you have a cable and it's so short that it doesn't even extend beyond the housing, imagine -- I don't know if you have ever installed one of these. But you would make the repairman's life difficult.

Q. You don't mention in your reply declaration any of these concerns about hazards and convenience in paragraph 14, correct?

A. Well, Mr. Dorsky, you see in that same sentence that you were talking about a little bit ago, there is a phrase. It says, It would have been obvious for a POSA.

See, this is why I'm here today, because I've made these products, or similar ones. Not identical. And we have to design them. We made lamps for the cinematography industry, white lamps, one foot square. And believe me, safety and convenience and accessibility is critical in all industries.

Q. So based on your knowledge, you

didn't feel you had to put that rationale in your reply declaration?

A. No. It's my understanding -- I'm not a lawyer like you, Mr. Dorsky. But my understanding is the phrase "it would have been obvious for a POSA," means just that. It would have been obvious for a POSA. So we have to give people who are trained -- I mean, that's the reason why, in defining a POSA, I said that the person has to have -- I can't remember my exact definition -- but they had to have two years of post-baccalaureate work in lighting design. And then, yes, it becomes obvious.

Q. I understand. . .

MR. MESSING: Please allow me time to object. Thank you.

BY MR. DORSKY:

Q. My question is: Paragraph 14, where you propose modifying the cable in Chaimberg to slightly lengthen it does not provide a reason for doing so. You agree, right?

A. Is that necessary?

Q. My question is: Whether or not it's necessary, it's not here, correct?

MR. MESSING: Objection to form.

A. I'll just simply say, the question has been -- to use your language -- has been asked and answered. But I'll say it again, that I have the statement, it would have been obvious for a POSA. That's one of the reasons -- the reason I just gave you is one of those reasons that it's obvious.

Q. So the statement "it would have been obvious to a POSA," you believe, implies the rationale that you just discussed about hazards?

A. In this context, the phrase "it would have been obvious for a POSA" will mean different things, depending on our subject. So we can talk about the length of the cable, we can talk about the number of CCT switch selections that are made available. All of those things are the domain of the POSA.

Q. And just to confirm, you're saying here that in the case that Chaimberg does not anticipate, it would have been obvious to lengthen the cable 15 in Chaimberg to ensure that the switch is disposed remotely from the

housing?

A. I'm sorry. Where are you now?

Q. The same paragraph. I'm just trying to understand this statement. So I'll ask that again so it's clear.

From the sentence in paragraph 14 of your reply declaration we've been discussing with the word "obvious" in it, what you're saying is that in the case that Chaimberg does not anticipate claim 1, it would have been obvious to lengthen cable 15 in Chaimberg to ensure that the switch is disposed remotely from the housing; is that right?

MR. MESSING: Objection to form.

A. What is your question? I mean, you just read the sentence that I wrote.

Q. Okay. If what I just said conforms with the sentence you wrote, if you understand that to be the same, that's my question.

MR. MESSING: The same objection.

A. That's what is written on the page. I don't understand what you're asking.

Q. Okay. Let's turn to Chaimberg for

a moment, Exhibit 1003. Please let me know when you have that accessible.

A. Yes. I'm there.

Q. Okay. Let's look at Figures 1 and 2, which is on the second page of the reference.

A. Okay.

Q. Are you there?

A. Yes, sir, I am.

Q. Okay. So these figures are drawings of the luminaire in the process of being installed or deinstalled in Figure 1 and then as installed in Figure 2.

Do you agree with that?

A. Yes, I do.

Q. And do the proportions generally look what you'd expect to be for a luminaire of this nature?

A. Well, as you know, Mr. Dorsky -- by the way, I hope you'll accept my apologies if I ever mispronounce your last name.

Q. That's fine.

A. It's very important to me to pronounce somebody's name properly. But in any case, as you know very well, drawings in

patents are not required to be to scale. So one must be careful to not read into the drawings' scale issues. And that's, again -- we're back to the POSA. The POSA knows where these things should be.

So I cannot -- we cannot at all assume that the placement of components is drawn to scale.

Q. Now, the element labeled 15 in Figures 1 and 2 is a cable, correct?

A. Yes, sir. To use the language of the '336, it's the electrical cable of the luminaire.

Q. I'd like to stick with the language of Chaimberg for now. We can get to your other opinions. But in Chaimberg -- and if you'd like, you can refer to column 3, lines 17 to 23, element 15 is referred to as a cable, correct?

A. Yes. And that's a fine -- that's a fine name, or you can modify it to be electrical cable to make it more precise. But yes, it's -- he refers to it as a cable.

Q. And in these figures, you can see a label 15 prime, correct?

A. Correct.
Q. And Chaimberg says that 15 prime refers to one end of cable 15, the end that's secured to the light housing, correct?
A. I believe that's the language. I'll take your word for it.
Q. And, again, please feel free to reference -- I mentioned column 3, lines 17 to 23, where these elements are discussed.
A. Yes.
Q. And the Figures 1 and 2 also include a label 15 double prime, correct?
A. Yes. That's the one in column 3, line 22.
Q. And Chaimberg says, 15 double prime refers to the other end of cable 15 that is secured to the driver -- or connected to the driver circuit in the driver housing, correct?
A. In column 3, it's referred to as, quote, far end 15 double prime, end of quote.
Q. So Chaimberg says that element 15 is the entire cable that runs from the luminaire housing to the driver housing, and that 15 prime and 15 double prime refer to opposing ends of that cable 15, correct?

A. Yes. That's one way of phrasing it.

Q. Staying with Figure 1, you can see switch 18 in the middle of the figure, right?

A. Correct.

Q. Now, in Figure 1, switch 18 is wider than cable 15, correct?

A. It's wider? Are you referring to the symbol?

Q. I'm referring to the feature in Figure 1 that is labeled 18, that Chaimberg says is the switch, is wider than the feature 15 in Figure 1, that Chaimberg says is the cable. Is that correct?

A. I wouldn't draw any conclusion at all about its physical dimensions, the physical dimensions of 18 from the drawing. So I -- I don't agree with the idea of trying to -- assigning a width or any physical dimension to a symbol that is chosen.

Q. I'm not asking about a symbol. I'm asking about what is actually depicted in Figure 1. I'm asking about the drawing itself, not what it could be.

So in the drawing itself, what we

see in Figure 1, switch 18 is drawn to be wider than cable 15, correct?

A. I understand. But what I'm saying is, is that -- that has no meaning, any more than you see up in that same drawing, 16, the junction box has two holes. The one on the left has a smaller diameter than the one on the right. That has no meaning.

Q. I'm not asking about the driver housing.

A. I know you're not.

Q. I'm not asking if you think what I'm asking has meaning. I'm just trying to see if we're on the same understanding of what is drawn here.

So the way Figure 1 is drawn, switch 18 is wider than cable 15, correct?

A. The only thing I'm willing to agree to, Mr. Dorsky, is that there is a switch labeled 18. That switch is represented by a rectangular box. And that's all that one can conclude.

Q. I'm not asking you to conclude anything. I'm asking if the drawing depicts images in a certain way. Can you, sitting here

today, tell me if the switch depicted in Figure 1 is depicted as wider than the cable 15 in Figure 1?

A. I will agree that the symbol for component 18, which is a switch, is a rectangle whose width is wider than the diameter of the cable.

Q. And if we look at the Globe products you include in your reply declaration, the switch casing shown in the Globe products is wider than the cable, correct?

A. Yes, it is, in the products.

Q. And you believe that these products are similar to what Chaimberg discloses, correct?

A. I believe that they're -- in terms of components and function exactly what Chaimberg describes.

Q. Now, staying with Figure 1 of Chaimberg and given the proportions and dimensions that are depicted in Figure 1, whether or not you agree with them, if cable 15 was laid in front of switch 18, you would expect to see the outline of the switch 18 symbol even if cable 15 was laid in front of

it, correct?

MR. MESSING: Objection.

A. Could you repeat that question, please?

Q. Sure. If cable 15 was laid in front of switch 18, as depicted in Figure 1, you would expect to still see the outline of switch 18 behind the cable, correct?

A. No. Again, I think you're trying to read something into the physical sizes of the components of the luminaire. And I don't know Mr. Chaimberg at all, but I know he would be mortified if somebody were trying to assess the individual sizes of the components.

I know that when I draw diagrams in patents -- in fact, I'm working on a utility application right now -- I don't -- in fact, I say explicitly, do not make any conclusions about the dimensions.

And I object, for the record, to your -- I forget how you put it just a moment ago -- trying to make inferences about the sizes of components.

Q. I'm not making any inferences, Dr. Eden. I'm asking a very simple question.

If you can't answer it, that's fine, and we can move on. But I don't want to know about how you interpret patents or any of these other things you do in your job.

My simple question is: Based on the figure itself -- we're limiting it just to Figure 1 -- seeing how things are drawn in Figure 1, if cable 15 was laid in front of switch 18, you would expect to still see the outline of switch 18 behind the cable based on how it's drawn in Figure 1, correct?

MR. MESSING: Objection.

Form.

A. If that's just another way of saying that the symbol for 18 is wider than the width shown for 15, yes.

Q. Okay. Now, in Figure 1, you can also see an element labeled 23, correct?

A. Yes. I do.

Q. And according to Chaimberg, element 23 is a clamping arm that secures the housing to the ceiling, correct?

A. Yes. It's a very conventional means of attaching a luminaire to a -- let's say, a drop ceiling.

Q. And, again, switch 18, as drawn, is wider than clamping arm 23, correct?

A. I'm sorry. Could you please repeat the question? I was looking at the diagram.

Q. As drawn in Figure 1, switch 18 is wider than clamping arm at 23, correct?

A. Yeah. I'm just not willing to go any further with this, Mr. Dorsky. This is -- I can't tell anything about the width of 23 and 18. This is a symbolic representation of an idea.

Q. So sitting here today, you can't tell me in Figure 1 if switch 18 is depicted as wider than clamping arm 23?

A. No, I can't. That's why I keep saying, the symbol for 18 is a rectangle that is wider. But I know of switches that could either be much bigger than the -- much wider than the cable or much smaller. I know of switches, slide switches, that will integrate directly into the cable. In fact, both -- I believe the '336 and Chaimberg talk about that.

And you're -- what I'm concerned about is what you appear to be doing is stripping the value of the patent. The reason

this patent speaks to a POSA is it presents an idea: Putting a switch in an electrical cable and changing the CCT.

But the specifics of the -- number 23, the clamping mechanism, and 27, those change with time. In fact, they're very different today than shown in this diagram.

Q. I'm only talking about the diagram. I'm not talking about anything beyond today or anything before or anything else.

A. I understand you are. But that's what I'm saying, that you cannot --

Q. I understand you --

(Simultaneous speakers.)

A. That's what a POSA does, is make decisions about how big everything will be or how small it will be based on what the technology is. And switch technology, luminaire technology, is changing rapidly.

Q. I've tried a few times here. It's clear that you won't make these comparisons in the drawing. Let me ask you this: Cable 15 in Figure 1 is depicted with the same dimensions as cable 15 in Figure 2, correct?

A. I don't know. I'd have to make a

measurement.

Q. Do you have any reason to believe it's not depicted with the same diameter in both Figure 1 --

(Simultaneous speakers.)

MR. MESSING: Objection to form.

A. Thank you. Thank you for the objection. Figure 1 and Figure 2 --

Q. So my question is: Do you have any reason to believe that the diameter of cable 15 in Figure 1 is different than the diameter of cable 15 in Figure 2?

A. No. It's probably the same. Because it has the same numerical identification.

Q. Do you have any reason to believe the measurements or diameter or size of clamping arm 23 in Figure 1 is different than clamping arm 23 in Figure 2?

A. No. But, again, those change with time.

Q. Do have any reason to believe the size, width, or diameter of switch 18 in Figure 1 would be different in Figure 2?

A. Well, you notice that 18 is not shown.

Q. Whether or not it's shown in Figure 2, do you believe the size or width of the switch changed in Figure 2?

A. I don't know. I don't know what's -- because both of the -- both of these apply to a wide variety of switches. So who knows.

Q. So you think it's possible that between Figure 1 and Figure 2, switch 18 changed in dimensions?

MR. MESSING: Objection to form.

A. I think it's significant that switch 18 is not even shown in Figure 2. But I just don't think you can make any statements about the relative size of anything.

Q. Did you -- now -- let me strike that.

If Chaimberg stated that switch 18 resides within the luminaire housing in Figure 2, do you think that would necessarily render the lighting device inoperable?

MR. MESSING: Objection to

form.

A. I never said anything about inoperable. The only thing that you and I have addressed in our conversation is safety hazards and convenience.

Q. Yes. My question is: If Chaimberg stated that switch 18 did reside within the housing shown in Figure 2, do you think that would mean that Chaimberg's luminaire would be inoperable?

MR. MESSING: Objection to form.

A. It might be operable, but it would be a safety hazard.

Q. Please turn to -- let's go back to your reply declaration. And please turn to, I guess, the bottom of page 9, which is paragraph 16.

A. I'm there. Thank you.

Q. And then here at the bottom of page 9 onto page 10, you refer to Dr. Krames' analysis of a Menard product, SKU 348-2107, correct?

A. Yes.

Q. And this Menard product is one of

the accused products in the related litigation involving Menard, right?

A. That's my understanding, yes.

Q. And you are a expert witness in that related litigation involving Menard, correct?

A. Are you referring to the district court litigation?

Q. Yes, the one pending in Wisconsin.

A. The answer is yes.

Q. And in this image at the top of page 10 of your reply declaration, some colors have been added to the product image provided by Dr. Krames, correct?

A. Yes, that is correct.

Q. The CCT switch has been colored yellow, it looks like, right?

A. Yes.

Q. And what Dr. Krames identified as the luminaire housing has been colored blue; is that right?

A. Yes.

Q. Now, SKU 348-2107 is a flat panel troffer light, correct?

A. Yes, I believe that's correct.

Q. And this particular flat panel light is about four feet by two feet in size; is that right?

MR. MESSING: Objection to form.

A. That sounds approximately correct.

Q. Just so you can reference it, I'm going to introduce a document.

One second. So I am introducing a document that was previously marked Exhibit 2049, which you should receive momentarily.

(Exhibit 2049 was marked for identification.)

A. Okay. I've just received it.

Q. Do you recall seeing this document before?

A. Well, I haven't opened it yet. So let me try to do so.

Okay. I have it up on the screen.

Q. Okay. And this product in Exhibit 2049 corresponds to SKU 348-2107, correct?

A. Yes, that's correct.

Q. So this is an approximately

four-foot-by-two-foot flat panel light; is that right?

A. Yes. Just a little under two-by-four. Right. Exactly.

Q. And this SKU 348-2107 would be mounted into a grid ceiling, like a drop-down suspended ceiling; is that right?

A. Right. A so-called drop ceiling. That's correct.

Q. And so this is a different type of luminaire from the one depicted in Figures 1 and 2 of Chaimberg, right?

A. Yes. Yes, they serve the same purpose, but the geometries are different.

Q. Just to confirm, in your reply declaration, you did not provide any analysis comparing any claim of Chaimberg to SKU 348-2107, correct?

A. That's correct.

Q. And you did not present, in your reply declaration, any analysis comparing any '336 patent claim to SKU 348-2107, correct?

A. No, I haven't analyzed that SKU, as I have, say, the Globe products.

Q. Now, on page 10 of your reply

declaration, the image you show of SKU 348-2107 is from the back of the luminaire housing, correct?

A. Yes. Simply, as I say on page 9, Mr. Dorsky, I have annotated Dr. Krames's tear-down picture. So this is from Dr. Krames.

Q. So when this light is installed, the portion of SKU 348-2107 we see on page 10 of your report would be facing up into the ceiling, correct?

A. No, I'm not sure that's correct. Say that again.

Q. When SKU 348-2107 is installed in the drop ceiling, the portion of that product we see on page 10 of your report, the view is that of the side facing up into the ceiling, right?

A. It's the back side is what you're saying?

Q. Yes.

A. Yes. It would not be very wise to put that in the front where light is supposed to be emerging into the room.

Q. So the other side of this product is where the light would be emitted into the

room, right?

A. Yes. It's the same with the circular -- the recessed lighting fixture that's shown in Chaimberg.

Q. Now, in Chaimberg, there is no figure showing a corresponding view of the back of its luminaire, correct?

A. No, there is not. But there need not be.

Q. And in Chaimberg, there's no description of the back of the luminaire housing, correct?

A. It's not necessary.

Q. Well, I'm not asking if it's necessary. I just want to confirm.

In Chaimberg, there's no description of the back of the luminaire housing, correct?

A. I'm not sure I'll agree to there's no description, because it does talk about components that are located within the housing.

Q. I'm not talking within the housing. I'm talking about the back of the luminaire housing. There's no description in Chaimberg of the back of the luminaire housing; is that

correct?

A. Not as far as I know.

Q. In SKU 348-2107, there is what appears to be a metallic junction box attached to the back of the luminaire housing, correct?

A. What are you looking at to reach that conclusion, Mr. Dorsky?

Q. I'm looking at the image on page 10 of your reply declaration.

A. Oh, you're looking at that. I thought you were looking at the exhibit. You were drawing some conclusions based on the exhibit. Okay.

Q. No. No. I'm referring to your image of SKU 348-2107 on page 10 of your reply declaration. And my question is: There is what appears to be a metallic junction box attached to the back of the luminaire housing, correct?

A. It appears to be, but I am not willing to confirm that it is unless I inspected the product, which I have not done.

Q. In this image in your reply declaration, the switch colored yellow is located within that metallic feature, correct?

A. It appears to be.
Q. Now, in Chaimberg, the junction box or driver housing is not attached to the back of the luminaire, correct?
MR. MESSING: Objection to form.
A. No. Are you talking about -- okay. The driver box and the junction are intentionally separated from the -- from the lamp itself. That's the entire -- or at least a major benefit of the invention. So. . .
Q. So the driver housing in Chaimberg is located away from the luminaire housing, correct?
A. Yes. And separated by the electrical cable of the luminaire, to use the language of the '336 patent.
Q. So you would agree that SKU 348-2107 is at least different from Chaimberg's design with respect to where the driver housing or junction box is located, right?
A. It's hard to say. This figure, Exhibit 1038, is from Dr. Krames's own testimony, as I'm sure you're well aware. So it was Dr. Krames who made the statements that

led to paragraph 16. But I have not -- as I've said now twice -- looked at this particular product with my own eyes. So if you're willing to represent that such-and-such is true, I'm happy to agree.

Q. Now, in the Wisconsin litigation, Dr. Krames submitted a infringement report that included this product, correct?

A. I believe that's correct.

Q. And you submitted a rebuttal report on noninfringement that included opinions that related to this product, SKU 348-2107, correct?

A. I did have some opinions.

Q. And you offered those opinions without personally inspecting this product, correct?

A. That's correct. I haven't been able to, by a long shot, examine every product at issue. That is correct.

Q. The CCT switch of SKU 348-2107 colored yellow here is not located inside of the blue-colored housing, correct?

A. I'll say that it appears that it is not located. I cannot agree to your statement as you've phrased it, because I haven't taken

it apart.

Q. Do you have any reason to believe, sitting here today, that the CCT switch in SKU 348-2107 is located inside the blue-colored housing?

A. Mr. Dorsky, what I'm having great difficulty communicating to you is that every product is engineered differently, using the wisdom of people skilled in the art, engineers, illuminating engineers, and so forth. So it's impossible for me to imagine the creativity of engineers, so I have no idea what decisions were made until I actually inspect the product.

Q. So you don't know, sitting here today, whether or not the switch colored yellow on page 10 of your reply declaration is or is not located within the luminaire housing; is that right?

MR. MESSING: Objection to form.

A. What I can tell you is that what is colored yellow -- it is my understanding that the object colored yellow on page 10 of my report is the CCT switch. But I can only see it from one perspective, and I have no idea

what the rest of the switch looks like.

Q. Dr. Krames provided additional images of the switch in his declaration in this proceeding, correct?

A. This is correct. And I thought this was the one that most dealt with the issue that I'm discussing in paragraph 16 on page 9.

Q. But just to be clear, you are not sure whether or not the CCT switch colored yellow on page 10 of your reply declaration is located within the housing colored blue; is that right?

A. I'm only seeing a small section of the -- of the housing colored blue. So it's possible that the switch extends into the -- into the housing.

Q. But you're not sure sitting here today?

A. No, I am not.

Q. Are you aware whether or not the CCT switch of SKU 348-2107 colored yellow in this image is physically attached to the blue-colored housing?

A. No. I'll say this again: That I have not inspected this particular product.

Q. So you don't know whether or not the CCT switch of SKU 348-2107 is or is not physically attached to the luminaire housing; is that right?

A. I do not know.

Q. Okay. Do you agree -- well, let me strike that.

Is it your opinion that SKU 348-2107 as depicted in your reply declaration has a CCT switch that is disposed remotely from the housing?

MR. MESSING: Objection to scope.

A. Well, the whole point of paragraph 16 is that it is remote.

Q. Okay. So just to be clear, the CCT switch of SKU 348-2107 is remote from the housing; is that right?

MR. MESSING: Objection to form.

A. Are you asking me a question?

Q. Yes.

A. Well, can I read paragraph 16 for you?

Q. I'd rather you not read it. I just

would like an answer to my question.

A. Well, let me just quote from the report. I won't make it lengthy. But I think since you're asking me about things that I've already opined on, given an opinion --

Q. Well, let me stop you there, Dr. Eden, because the question I'm asking you is not in your report. So I don't think that's going to answer my question. So let me try to ask that again.

You agree that the CCT switch of SKU 348-2107 as shown on page 10 of your reply declaration is remote from the housing of that product colored blue in your reply declaration, correct?

MR. MESSING: Objection to form.

A. I'm just going to read into the record the first sentence of paragraph 16.

Finally, I note that even if Chaimberg's CCT switch 18 touched or laid upon the housing after installation, it would still be remote based on Dr. Krames' infringement analysis.

So I believe that answers your

question.

Q. It does not. So I will ask it again. Do you agree that the CCT switch of SKU 348-2107 as shown on page 10 of your reply declaration is remote from the housing of that product colored blue in your reply declaration?

A. It appears to be.

MR. DORSKY: I think we can take a break here. I think we've been going about an hour.

THE VIDEOGRAPHER: Okay. The time is now 11:19. We are now off the record.

(Off-the-record discussion from 11:19 a.m. to 11:29 a.m.)

THE VIDEOGRAPHER: And the time is now 11:29. We're now back on the record.

BY MR. DORSKY:

Q. Dr. Eden, please turn to page 13 of your reply declaration.

A. Okay. I'm there.

Q. All right. And here on page 13, running through page 15, you again refer to

Globe product number 92291, correct?

A. Yes. That's correct.

Q. And this is one of the same Globe products we previously discussed shown on page 6 of your declaration, right?

A. Yes, that's correct. Same product.

Q. And here on page 13, you are relying on this Globe product to show that claim 7 is obvious in view of Chaimberg, right?

MR. MESSING: Objection.

Form.

A. Give me just a moment to review this section before I agree to that. Could you repeat your question before I do that, please?

Q. Yes. My question is: Here on page 13, you are relying on this Globe product to show that claim 7 is obvious in view of Chaimberg, right?

A. You're referring to paragraph 23?

Q. 23 -- yes. 23 and 24, I guess is the conclusion.

A. Yes. It says, Further, my analysis of Globe product number 92291, which embodies the Chaimberg patent, confirms my opinion that Chaimberg renders obvious claim 7.

Q. Okay. So you are -- am I correct that you're relying on this Globe product to show that claim 7 is obvious in view of Chaimberg?

A. Yes, that's what it says.

Q. Okay. Now, is it your opinion that the construction and contents of the junction box or driver housing for Globe product 92991 is necessarily the same as that of Chaimberg's Figure 1 and Figure 2 embodiment?

A. Thank you. It is -- I don't know what you mean by "the same." It has the same characteristics, properties. The design is very similar. The dimensions may not be identical, but they are the same in every meaningful sense.

Q. And how did you determine that they are the same?

A. Well, it was just a process of examining the Globe products, as I've described earlier this morning, and part of the answer to your question can be gained just by simply looking at the photographs on page 15.

And I described in my report very much of the detail. And I'd be happy to -- I'm

sure you've read it. But it talks about the cable, for example, that's shown in the lower photograph, and the general design of the box at top.

If you have any specific questions about what I concluded on pages 12 through 14, I'd be very happy to address them.

Q. Chaimberg doesn't include any figures showing views of its driver housing that correspond to the views you show on page 15 of the Globe products, correct?

A. That's precisely the point I was trying to make earlier in our discussion, Mr. Dorsky, that Chaimberg shows us all that he needs to show. The photographs that you see on page 15 are the result of engineers taking Chaimberg's description and putting electronics in it.

Q. So is it your opinion that if Chaimberg did include a top-down view of its driver housing, it wouldn't necessarily look like the images on page 15 of your reply declaration?

MR. MESSING: Objection to form.

A. It -- it almost certainly would not be identical. And I don't know if Chaimberg actually built one of his units. The way it reads, I suspect that he did. But it's not important, the design of the electronics.

So, for example, in the lower photo on page 15, we see a PC board and there's a capacitor at the right and a transformer and so forth. The circuitry would undoubtedly be different. But that's not the point. The point is that Chaimberg told us how to make a luminaire.

And that's what the Globe products -- the Globe -- is that their name, Globe?

Q. Yes.

A. The Globe product folks have done.

Q. Is it your opinion that Chaimberg's claims recite limitations on how its driver housing is constructed?

MR. MESSING: Objection to scope.

A. Again, you're using legal language, recites limitations. You mean describes features of the driver. Is that what you mean

in English?

Q. No. I'm referring to Chaimberg's claims.

A. Right.

Q. So the same limitations, I'm talking about claim limitations. Do you understand the claim limitation, generally speaking?

A. Yes, I do.

Q. Okay. So my question is: Is it your opinion that Chaimberg's claims recite limitations regarding how its driver housing is constructed?

A. No. Certainly not. And that's my -- but my point, which I know I'm probably beginning to annoy you. But I'm saying it because it's so important to understanding what's going on here, that we rely on Chaimberg or Reiff to give us ideas as to how to build luminaires. The electronics, I have smart undergraduates who can design the electronics.

So in a patent, I don't put descriptions of how the electronics is built. So I'm not sure how to answer your question, other than to say, no, he does not. Chaimberg

does not tell us how to build the driver housing, because he assumes that skilled people know how to build driver -- drivers.

Q. And Chaimberg does not state what dimensions its driver housing is, right?

A. No. And I would think he would not.

Q. If this product's -- this Globe product's driver housing were so small that it could not fit a CCT switch, do you believe that would mean it cannot practice Chaimberg?

MR. MESSING: Objection to form.

A. What does the driver housing and Chaimberg have to do with the CCT switch?

Q. I'm just asking if the driver housing of the Globe product were so small and compact that you couldn't put a CCT switch in there, would that have any relevance to Chaimberg?

MR. MESSING: Objection to form.

A. You're asking me to speculate, Mr. Dorsky, and I'm not willing to do that.

Q. So you're not willing to answer

that question?

A. I'm not willing to speculate, which is what you're asking me to do.

Q. I'm trying to understand how you believe this product is relevant to Chaimberg. So my question is simply: If this driver housing were designed such that it would not be possible to fit a CCT switch inside of it, could that product still practice Chaimberg?

A. Mr. Dorsky, if I have failed in showing how the Globe products emulate, reproduce -- whatever verb you like -- Chaimberg, I have failed miserably in the last couple of hours. Because my personal inspection shows that it reproduces the Chaimberg patent very well.

Q. I'm not asking if it reproduces the Chaimberg patent. I'm asking if the Globe product's driver housing that you show on page 15 were designed such that you could not physically fit a CCT switch inside of it, it could still practice Chaimberg, right?

MR. MESSING: Objection to form.

A. You're asking me to speculate, and

I'd need to think about it, the answer to --

Q. You're not sure so you can --

A. The box would have to get very, very small for me not to accommodate a switch.

Q. But it could get that small, right? There's nothing preventing it?

A. I do things at the micro scale. Believe me, there are switches at the micro scale. Again, this is all speculation and it seems to me, not terribly valuable.

Q. Would you agree that it's possible to design a driver housing so compact that you wouldn't be able to fit a CCT switch inside of it?

A. There are many things that are possible, but I'm not willing to speculate. I've spent my whole life in research and developing things. So I'm surprised at what is possible. But I'm not willing to speculate.

Q. Please turn to page 24 of your reply declaration.

A. Okay. I'm there.

Q. And do you see paragraph 47 at the bottom of the page?

A. I do, indeed.

Q. And here, you are talking about modifying Chaimberg's disclosed switch to include additional switch positions corresponding to additional CCT values, right?

A. Yes. This is a subject we talked about earlier.

Q. And you state here in paragraph 47, that this would be merely a matter of design choice, correct?

A. Yes, that's correct. It's basically echoing what I said in paragraph, I think it's 21, about giving POSAs or POSITAs, a person skilled in the art, their due.

Q. Now, as we saw earlier, Chaimberg's disclosed switch only has three switch positions, according to Chaimberg's description, but leaving out whatever modification you think may be obvious, correct?

MR. MESSING: Objection to form.

A. I thought I've answered this question several times. Chaimberg mentions three -- a switch having three positions, but I'm sure that was arbitrary. He could have mentioned --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. Now, Chaimberg itself does not expressly state that a switch can have more switches or switch positions, right?

A. I don't recall.

Q. If Chaimberg did state that its disclosed switch could have more switches or switch positions than the three in Figure 1, would that, in your opinion, disclose a switch having five positions as claimed in claims 4 and 16 of the '336 patent?

A. No. I think the fact that he mentioned a switch with three positions already discloses. It could have N positions where N is an integer greater than three, five, seven, 12.

In 1963, I was working and have been ever since, with switches -- rotary switches that have up to 20 positions.

Q. So it's your opinion that by disclosing a switch with three positions, Chaimberg was in possession of a switch having five positions corresponding to five CCT settings; is that right?

MR. MESSING: Objection to form.

A. I wouldn't say that Chaimberg has -- he did, I think, in the sense you intended. But I would say speaking much more largely, the community has the switch. And it was well known, not only by Chaimberg but everybody.

Q. Let's turn to page 35 of your declaration. And please let me know when you get there.

A. Oh, by the way, I'm sorry to interrupt your train of thought, Mr. Dorsky. But two things: One, I'm just passing by page 28, and earlier in the day you had asked me about the function of the other slide switch on Globe product number 92291, and I couldn't remember what its function is, and, duh, it should have been obvious. It's an on/off switch.

So just for the record, that's the answer to your question.

Okay. I'm sorry. It was page 38, did you say?

Q. Page 35.

A. Okay. Please continue.
Q. Okay. About -- I'd like to focus on paragraph 69. And about halfway down this paragraph, about seven lines down, do you see the sentence that starts, However, even if?
A. Yes.
Q. I'm sorry. Let me reference the prior sentence, starting five lines down, that starts with, I testified.
Do you see that?
A. Yes. I do.
Q. And that sentence states, I testified that all switches, including the '424 provisional's DIP switches 210, include a body and at least one coupling feature.
Did I read that right?
A. Yes, you did. And it's a true statement.
Q. So just so I'm clear, you agree that the provisional's DIP switch includes the body and coupling feature, but you disagree that the provisional shows that the DIP switch is actually electrically coupled to an electrical cable; is that right?
MR. MESSING: Objection to

form.

A. Yes. And that's because there's no evidence in the '424 -- well, there's no description, there's no hint, there's no suggestion of an electrical cable. And so -- of the luminaire. So the claim 13 requires coupling to an electrical cable of the luminaire. There's no description, there's no figure, there is no notation, there is no nothing. So there is no inconsistency here whatsoever.

Q. Now, you agree that the provisional does disclose electrical wiring that extends through a wiring aperture 103 and the luminaire housing 105, correct?

MR. MESSING: Objection to form.

A. There is one statement that refers to electrical wiring, and there are -- there are diagrams of the -- there are schematic diagrams. So they, by definition, have electrical wiring.

Q. Now, if the provisional used the words "electrical cable" instead of electrical wiring, would you agree that the provisional

does disclose this limitation?

MR. MESSING: Objection.

Scope.

A. No. Electrical cable -- they're referring to the schematic. And the conventional term of art is it's just called wiring. That's what a schematic diagram is. But there's no hint of a cable anywhere in the '424.

Q. My question is: The electrical wiring described in the provisional that extends through an aperture 103 in the housing of the luminaire -- and if you'd like, you can turn to page 29 of your declaration to reference that language.

A. Sure. I'll tell you what. Let's just go to the provisional itself. You entered that as an exhibit, so why don't we just look at the provisional itself?

Q. That's Exhibit 1008.

A. I have it.

Q. And if you go to page 4, lines 24 to 25.

A. So the sentence I was referring to -- and perhaps it's the same one. I think

you did mention page 4, line 24. Electrical wiring not illustrated extends through a wiring aperture 103 and the housing 105.

Q. And if you scroll down or flip pages to Figure, for example, 1A or 1B, you can see that wiring aperture 103 in the housing, correct?

MR. MESSING: Objection to form.

A. I'm looking at Figures 1B --

Q. 1A, as well. If we start with Figure 1A, you can see the housing is labeled 105, right?

A. Right. But the 103 is not labeled.

Q. Well, 103 is that circular aperture in the housing, right?

A. That looks like a 2. That's just a standard -- a standard connection for -- if there's some electrical connection that you want to enter the housing.

Q. And, in fact, the provisional states that electrical wiring extends through this wiring aperture 103 into the housing, correct?

A. There is a part of -- I take the

statement to be that there is electrical wiring and some portion of that goes through the aperture 103.

Q. And if you scroll down to, say, Figure 1E, for example, you can see the aperture opening is right by the substrate 125 on which the LEDs are mounted?

MR. MESSING: Objection to form.

A. Yes. I think we talked about this last time.

Q. So the electrical wiring would extend through that aperture, connect to the circuit board, correct?

MR. MESSING: Objection. Foundation.

A. It might.

Q. Would there be anything else inside the image shown in Figure 1E that you would expect the electrical wiring to connect to, if not the circuit board?

MR. MESSING: Objection. Scope.

A. We've talked about this in some length, Mr. Dorsky. And the problem is that

the phrase used in claim 13, the electrical cable of the luminaire is the most -- I think everyone would agree -- is the most critical aspect of the '336 patent. It's the basis of claim 1, claim 6. I was looking at it just a few days ago. It's several claims. It's by far the most important aspect of it.

So where we're going here, of course, is with respect to priority. And it seems to me that if something that is the centerpiece of the '336 patent, if the inventors -- the authors of the patent had access to the electrical cable idea in the '424, would they not describe it in incredible detail? But there's nothing.

You're trying to take a statement that refers to electrical wiring -- and there's plenty of electrical wiring that has nothing to do with a cable. In fact, I submit it has no -- there's no mention of a cable of any kind.

Q. So you think the exact word "cable" needs to appear in order for the inventors to have possession of the concept of a cable?

A. Or they have to describe what the

idea is somewhere. I mean, I'm not a lawyer, but I'm told that for priority, that the provisional must describe -- what's the phrase you use? Within the four corners? I'm using my hands.

And I take that to mean that there has to be a description somewhere of this cable. You can call it whatever you want. But it has to be something that separates the luminaire from a junction box or a driver housing or whatever you want to call it. You can use a wide variety of terms, but there has to be some separation. There has to be a cable and there has to be a switch in it.

There is no hint, no suggestion, no inference, no nothing in the provisional. So you know, the electrical wiring can be interpreted just to refer to delivering power to the unit from the wall or the schematics that are shown in figure -- well, there's one in Figure 4, a very detailed one. That shows electrical wiring. It shows quite a bit.

Q. And the provisional refers to electrical wiring entering the housing through aperture 103, correct?

A. That one -- I just read the sentence, yes. There's some aspect of the electrical wiring. That could be delivering power to the unit. It has to have electrical power.

Q. And that could be interpreted as electrical wiring of the cable of the luminaire, right?

A. No. Why would you do that?

Q. Why wouldn't you do that?

A. Well, because where does the other end of the electrical wiring go? There's no mention of a cable.

Q. Provisional doesn't say anything about house wiring, does it?

A. But you have to supply power to it. And it's showing us a diagram that would -- of a housing and there's components inside it. You have to supply power to it from somewhere.

Q. Is it your opinion that the electrical wiring expressly stated in the provisional could never be an electrical cable of the luminaire?

MR. MESSING: Objection to form.

A. Oh, my gosh. Mr. Dorsky, what you're suggesting is mind-boggling. You're telling me you can just open up a door and insert anything into it that you wish.

Q. No. I asked you a question. I'm waiting for your response.

A. And I'm saying --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. My question is: Is it your opinion that the electrical wiring expressly stated in the provisional could never be an electrical cable of the luminaire?

A. That is exactly my opinion. That, to me, is doing an injustice to patents. If the inventors have in their possession an idea and it turns out that, down the road, it turns out to be a really important one, then they have, my understanding, under the law, to describe it at least in some detail. And for us to have this silly discussion where you're inferring, oh, it could be this, it could be anything. And it's very troubling to me to hear that kind of language.

I know, as an inventor, I have an

obligation to describe to the PTO and an examiner what I have in mind. And I can't come back five years from now and say, oh, I've got a new idea and I want this priority date.

If it's not described in the four corners of the provisional, then -- I'm not a lawyer, but my understanding is you're not entitled to the priority date.

Q. Did electrical cables of luminaires exist prior to 2016?

A. Not in the way that is talked about in Chaimberg.

Q. I'm not talking about Chaimberg. My question is: Did electrical cables of luminaires exist prior to 2016?

MR. MESSING: Objection to form.

A. Electrical cable existed, but I'm not going to agree to your statement.

Q. So prior to 2016, your opinion is an electrical cable of a luminaire did not exist?

MR. MESSING: Objection to form.

A. The only form of cable was the

power cord that delivers power from the wall to the driver. That was it.

Q. So --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. Prior to 2016, luminaires did not have an electrical cable of the luminaire?

MR. MESSING: Objection to form.

A. Not the way the term is used in the '336 patent.

Q. So you believe --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. What is the restriction on what an electrical cable of a luminaire can be as stated in the '336 patent?

A. Oh, that's an easy question to answer. Because the novelty of Chaimberg was to physically separate -- I don't know if you can see my hands now -- to physically separate the housing for the luminaire from the driver and put it --

(Simultaneous speakers.)

///

BY MR. DORSKY:

Q. Chaimberg -- I'm sorry. Chaimberg?

A. Chaimberg is the first one to introduce it. '336 was not the first. That's why we're having this discussion.

Q. So I'm not talking about Chaimberg, to be clear. And I'm talking about 2016, which is prior to Chaimberg, which is the date of the provisional.

So my question is: Your opinions regarding priority are based on your understanding that prior to 2016, an electrical cable of a luminaire did not exist, correct?

MR. MESSING: Objection to form.

A. I am saying that electrical cable obviously has existed for 150 years. Okay? But no one had ever done what Chaimberg was the first to do well prior to the '337. The whole point, the novelty, if you call it that, that the '336 claims is we're going to put some distance between the electrical driver and the actual LEDs and we're going to have a piece of cable between them. And as -- as others -- anyway, there's going to be a distance, length

of cable, and in the middle of that or somewhere along the line, we're going to put a switch and it changes the CCT. That did not exist before Chaimberg.

Q. Well, my question has nothing to do with that arrangement. My question is very simple. Your opinions regarding priority are based on your understanding that prior to 2016, before Chaimberg, an electrical cable of a luminaire did not exist, correct?

MR. MESSING: Objection to form.

A. You're using a phrase from the '336 patent.

Q. Correct.

A. And because of that, I'm saying that what was -- what is meant by that term did not exist before 2016. There was not a product that I'm aware of -- nobody's been able to find anything before Chaimberg. There's a length of cable between the electrical driver and the LEDs over here and my right hand, left hand is the electrical driver, connected by a cable. And in that cable somewhere is a switch. That's what the '336 patent means by the

electrical cable of the luminaire.

Q. So according to --

A. That did not -- excuse me. Please allow me to finish. Prior to that, and prior to Chaimberg, there was no such thing that I know of in the patent literature or in industry. That was the beginning. But it was not the '336 patent.

Q. Okay. And your opinion, then, because electrical cable of a luminaire appears in claim 13, is that claim 13 requires the switch to be located on a cable?

MR. MESSING: Objection to form.

A. Well, it has -- it has to exist. The switch might be in a different location, but the principle is that there's a separation between the driver and the driver housing and the LEDs and there's a cable between them. In most embodiments, there is a switch. That's a '336 language.

Q. So in your opinion, for there to be an electrical cable of a luminaire, there has to be a driver housing separated from the luminaire housing with a cable running between

the two. Is that correct?

A. That's the principle that is described by the '336 patent and by Chaimberg.

Q. And that's how you're interpreting electrical cable of a luminaire in your declarations, correct?

A. Yes, because that's what they say.

Q. Now, does claim 13 require a driver housing to be present?

A. No. Claim 13 doesn't have anything to do with the driver housing at all. We just know about the -- as you know, you know the answer to this, of course, that the driver housing is only described in the discussion of embodiments in the specification, right? And everybody is going to make different driver housings. And that, again, is the importance of the POSA.

See, that's the whole point is that POSAs come to the patent literature looking for new ideas. And the new idea for that was first presented by Chaimberg is we don't have to have the luminaire at the same place where the driving electronics is located. Let's separate them, put a cable, and we're going to put a

switch in the line. And it controls the CCT. What a novel idea.

The POSA can take it from there.

Q. You did not provide any proposed construction for electrical cable of the luminaire in either of your declarations, correct?

A. No. But I take my job, my responsibility, before you and primarily the PTAB is to present to the PTAB my honest opinion of what's going on here. And I just told you my honest opinion.

Q. Let me ask -- going back to the provisional here, and that statement on page 4 of the provisional. If the provisional used the words "electrical cable of the luminaire" instead of "electrical wiring," would you agree that disclosed limitation 1B?

MR. MESSING: Objection to form.

A. No, not at all. Not at all. That phrase is a phrase that's peculiar to the '336 patent. No. What I want to see is some evidence of the idea, Mr. Dorsky. It's the idea that matters. There is no evidence

anywhere in the '424. My suspicion is that it's because they didn't have the idea, but that's -- ignore that.

But there is no -- there is no indication, no -- nothing from the -- the authors to say, look, I've got this idea and there's no need to co-locate them. I'm going to put a length of cable. It's going to be very different from power cable. So the power cable going into a housing is not divulging the idea that's -- that's in Chaimberg.

There's no indication anywhere in the patent that says, hey, this is our idea. We're going to separate these two so that it will be easy to access, for example.

Q. The DIP switch disclosed in the provisional is the same DIP switch described in the '336 patent, correct?

MR. MESSING: Objection to form.

BY MR. DORSKY:

Q. Do you want me to repeat the question, Dr. Eden?

A. Yes.

Q. The DIP switch disclosed in the

provisional is the same DIP switch described in the '336 patent, correct?

MR. MESSING: Objection to form.

A. So I'm going to have my own objection to the form. The DIP switch is not the same. The -- the DIP switch in the '337 -- excuse me -- '336 comes from the same family of switches. But it's not going to be an identical switch, probably.

Q. You think the DIP switch in the '336 patent has a different part number?

A. It probably has a different structure. The last time you and I met, we went through the switch graph catalog at some length. And there's -- you know, a DIP switch is a basic DIP switch, as I said at my last deposition, is the simplest of all switches. And it's only a on/off switch.

So in order to get any functionality at all, you have to have at least two of them, which is what the '337 talks about.

Q. If you look at Figure 4 of the provisional, and hold that and maybe keep that

in one hand and then look at Figure 4 of the '336 patent, let me know if you can identify switches 210 there.

A. I don't need to look through the '424 provisional. I know the figures by heart. So I'm happy to agree to the fact that there is switches 210.

Q. And I'm particularly interested in having you look at element 131 in Figure 4 of the '336 patent.

A. What figure in the '336, please?

Q. Figure 4.

A. Sure. I'm there.

Q. Okay. Now, in the bottom left corner, do you see element 131?

A. I do.

Q. And the arrow is pointing to a part number, 157-1999-4, correct?

A. Yes.

Q. Okay. Now, I'd like you to turn to Figure 4 in the provisional.

A. I'm just looking at it. It appears to be the same diagram.

Q. I know it's a bit harder to read, but does that appear to be the same part number

of switch 157-1999-4?

MR. MESSING: Objection to form.

A. Yes. I mean, it appears that no changes were made to Figure 4 between the provisional and the utility application.

Q. So the DIP switch in the '336 patent is the same as the DIP switch in the provisional, right?

A. It appears to be.

Q. Okay. Now, would you agree that the coupling feature of the provisional's DIP switch is capable of electrically coupling to an electrical cable of a luminaire, if it was present?

MR. MESSING: Objection.

A. As I testified in my last deposition, Mr. Dorsky, a coupling is not a term of -- electrical coupling is not a term of art. Coupling is a term that is conventional in the field of mechanical engineering. In fact, I believe the '336 also talks about mechanical coupling. So it's common in mechanical, but in electrical, it's not.

But there are electrical

connections on every electrical component or it won't function. The circuit won't function.

So there are different types of connections on DIP switches. As you know, last time we talked about this at some length.

Q. Right. So I guess my question is: You would agree that the coupling feature of the provisional's DIP switch is capable of electrically coupling to an electrical cable of a luminaire if the cable was present, right?

MR. MESSING: Objection to form.

A. It's capable of connecting to any electrical component.

Q. Which would include an electrical cable of a luminaire?

A. It includes an electrical cable, but the operative term is, if it is present. In fact -- excuse me for -- I'd like to comment on something I meant to say earlier.

Your pointing out the serial number of the DIP switch reminded me of something I wanted to say. Figure 4 in the provisional and the corresponding figure in the '336 have incredible detail. The MOSFETs have product

numbers. The logic components -- we're told exactly what the logic component is. We're told for the MOSFETs where the drain and the source and gate connections are.

The reason I'm bringing this up is if I'm going to provide that kind of detail and yet I say nothing about an electrical cable that separates the main feature of it, it's nowhere to be found. Doesn't that strike you as odd?

Q. You believe the exemplary embodiments in the provisional limit the invention?

A. No. But it tells me something about the importance they attach to it, that they're willing to give you product numbers, Mr. Dorsky, and yet they say nothing about this -- what is the central feature of the '336? Nada.

In fact, the silence in the provisional is deafening.

Q. So in your opinion, the central feature of the invention of the '336 patent is an electrical cable of the luminaire?

MR. MESSING: Objection to

form.

A. I will say -- I'm not sure I would characterize it that way, but I would say that the key feature or a key feature of the '336, and certainly of Chaimberg, as well, is the idea that the technical community is looking for from the patent literature is a new design for a luminaire, where the actual emitter, light emitter is physically separated.

And guess what? I'm also going to put a switch in the line that allows me to conveniently access the CCT. Yes. I would say how can you not talk about that? If you're willing to talk about the part number for an LED or a MOSFET, but you're silent on this major issue?

Q. And you agree that the word "driver" does not appear in any claim of the '336 patent, correct?

MR. MESSING: Objection to form.

A. This is true.

Q. And the claims of the '336 patent don't limit where the driver circuitry is located within the luminaire, correct?

A. It doesn't mention them, because that's the job of a POSA or POSITA.

Q. Well, I'm not asking about a POSA or a POSITA. I'm asking the claims of a '336 patent do not limit where driver circuitry is located within or near a luminaire, correct?

MR. MESSING: Objection. Scope.

A. Well, I'm saying the reason I'm bringing up one skilled in the art is that the driver housing is basic electronics. You know, my undergraduates in electrical and computer engineering know how to do this. And by the way, they would do something far superior to what we have in the provisional '424 and in the '336 patent. So, of course they don't mention the driver housing.

Q. This driver housing isn't mentioned at all in claim 13, correct?

A. No, it's not mentioned anywhere. Well, no, that's not true. But it's not mentioned in claim 13. Again, we're looking to the patent literature for a new idea. I know how to build driver housings.

Q. And so claim 13 could be practiced

without including a driver housing, correct?
A. You're asking me to speculate again.
Q. I'm asking for your opinion. Could a luminaire practice claim 13 if it did not include a driver housing?
MR. MESSING: Objection. Scope.
A. I'd have to think about that.
Q. You're not sure sitting here today?
A. I'm saying you're asking me to speculate, and I've already gone on record as saying I'm not willing to do that.
Q. So sitting here today, you're not sure if a luminaire could practice claim 13 if it did not include a driver housing or junction --
A. I don't know. And to be honest, my opinion is --
Q. My question is: So sitting here today, you're not sure if a luminaire could practice claim 13 if it did not include a driver housing or a junction box?
MR. MESSING: The same objection.

A. I'm saying I don't know the answer to your question. I haven't thought about it, and it's not an important one.

Q. Sitting here today, you're not sure if a luminaire could practice claim 1 of the '336 patent if it did not include a driver housing or a junction box, right?

A. Did you say claim 1?

Q. Yes.

A. Well, the way that claim 1 reads and all the claims assume that you have LEDs. So there must be a driver somewhere.

Q. And do you believe that claim 1 requires a remotely located driver housing or junction box?

MR. MESSING: Objection.

A. Well, could you read the language of claim 1? And we can think about it.

Q. Well, you have Exhibit 1001 in front of you, right?

A. I do somewhere.

Q. It may not be in your binders. It may be one of the ones I put into chat.

MR. MESSING: I know we're not quite at an hour yet, but if

there's a good spot for a break soon, I would appreciate it.

MR. DORSKY: Okay. I will keep that in mind.

A. Claim 1, of course, I mentioned this earlier, it requires the electrical cable. And so what was your question again about the driver housing? I'm sorry.

Q. Could a luminaire practice claim 1 of the '336 patent if it did not include a driver housing or junction box?

MR. MESSING: Objection. Scope.

A. It certainly requires a driver to practice claim 1 because you have light sources that are capable of producing different values of the correlated color temperature, CCT. That requires a driver. It's customary to put a housing on it.

Q. A driver could be located within the luminaire housing, correct?

A. It says -- okay. The switch must be disposed remotely from the housing. I don't know. It just requires speculation, and I'd like to think about it.

Q. What, in your opinion, would the provisional need to say in order for an electrical cable of a luminaire to be disclosed?

MR. MESSING: Objection to form.

A. About the same things that the '336 says. '336 reproduces the provisional except for the most important concept of the -- of Chaimberg and the '336.

Q. Can you tell me specifically in the '336 patent where the electrical cable of the luminaire is described in a manner that you think is sufficient?

A. Sure. The abstract -- at the outset, '336 goes right after the electrical cable. It's in the third sentence of the abstract.

Q. So the luminaire can further include an electrical cable having a first end and a second end, where the first end is coupled to at least one electrical component. That's the sentence in the abstract you're referring to?

A. Yeah. Keep going.

Q. Now, let me just stick with the sentence I just read. Is that sufficient, in your opinion, to disclose an electrical cable of the luminaire?

MR. MESSING: Object to form.

A. I don't know, Mr. Dorsky. But your questions missed the point. The point is, if this is just a critical aspect of the invention, why do we not have any hint -- we have to play silly games with thinking about electrical wiring and maybe there's some going into the housing and so forth. You and I both know very well that if this is so important, I'm going to tell you if I'm the writer of the patent. They have not done so. The description of the electrical cable of a luminaire using the '336 language is nowhere discussed in the provisional.

Q. And, again, if the provisional, instead of using the words "electrical wiring" instead used the words "electrical cable of the luminaire," it's your opinion that still would not sufficiently disclose limitation 13B, correct?

MR. MESSING: Objection to

form.

A. If I had the idea that Chaimberg published in his patent application, I would not talk about it in obscure language that maybe hints at something. And unfortunately, we don't even have a hint in the '424 of this. But I would be forthright and say what it said in the -- by Chaimberg and by the '337 patent specification and the abstract we just read.

Q. You keep bringing in Chaimberg. I'm not talking about Chaimberg at all at this moment. I'm asking about the provisional. And my question is: Column 4, lines 24 to 25 of the provisional, if instead of using the words "electrical wiring" the provisional used the words "electrical cable of the luminaire," do you believe that would sufficiently disclose the concept of an electrical cable of a luminaire being electrically coupled to the switch?

MR. MESSING: Objection.

Form.

A. The answer is no. Because the phrase you just used is from the '336 patent, which came years later. And it's a peculiar

phrase. I've never heard of a phrase of that type. But I use the specification and the earlier claims to inform what is meant.

But what I -- the reason I keep bringing Chaimberg is -- because you're asking me what would the provisional have to have, so that I -- so that I would understand that they had possession of this invention or whatever the right legal language is. And my answer is, Chaimberg does that. That's why I keep mentioning Chaimberg, because they do that.

Q. So the provisional would have to have the disclosure of Chaimberg in order to disclose a electrical cable of the luminaire electrically coupled to a switch?

A. No. Would you like for me to go to Chaimberg and just tell you what the language is that says in unambiguous language or you just get the hint? My standards are low here.

Q. I'm not asking you about Chaimberg. You're the one who keeps bringing up Chaimberg. I'm trying to understand why it's your opinion that the provisional could not disclose an electrical cable of the luminaire, if I understand you correctly.

Is that your opinion?

MR. MESSING: Objection.

Form.

A. My opinion is that if the provisional had any indication of the basic idea -- any indication, a hint, anything -- if the circuit diagrams, for example, showed that the LEDs were physically separated, it was the intention of the inventors that the LEDs in -- what is it? Figure 4 -- are physically separated from the driver.

And there are a number of ways that an electrical engineer can do that on that diagram. In fact, if it's so seminal an idea, so critical an idea, a foundational idea, that's exactly what an electrical engineer would do. But there's --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. So you believe that claim 13 requires that the LEDs be physically separated from a driver?

MR. MESSING: Objection.

Form.

A. I didn't say that. It says that

the switch has to be configured to couple to the electrical cable of the luminaire. And so, like all of us are supposed to do, I go back, okay, what do you mean by electrical cable of the luminaire? And I know very well, because it's described in the specification. It's described in claim 1.

Q. Okay. But it's also described in claim 13, correct?

A. It's just the phrase is used.

Q. Yes. But claim 13 does not require a driver, a driver housing, or a switch located on a cable, correct?

A. Well, no. But if the phrase "electrical cable" of the luminaire is to have any meaning, there have to be all of these other things that are described in the specification.

Q. And what are these other things you're referencing?

A. The driver. You keep bringing up the driver.

Q. And the driver has to be located separately from the LEDs in order for it to be an electrical cable of the luminaire?

MR. MESSING: Objection. Form.

A. That's the description in the patent, the '336.

MR. MESSING: We've been going for over an hour. Dr. Eden would like a break.

MR. DORSKY: We can take a lunch break now.

THE VIDEOGRAPHER: The time is now 12:29. We are now off the record.

(Lunch recess from 12:29 p.m. to 1:31 p.m.)

THE VIDEOGRAPHER: The time is now 1:31 p.m. We are now on the record.

BY MR. DORSKY:

Q. All right. Now, Dr. Eden, I'd like to go back to your reply declaration, Exhibit 1027. And please turn to page 30 when you have a moment.

A. Okay. I'll be there in a moment. I'm there.

Q. Okay. And I'd like to discuss

paragraph 59 right in the middle of this page.

Now, in paragraph 59 of your reply declaration, you state that the electrical wiring described in the provisional could be existing house wiring, correct?

A. I believe you're referring to the second sentence of the paragraph?

Q. Yeah. Or the paragraph, generally.

A. Okay. I'm sorry. What was your question again, Mr. Dorsky?

Q. In paragraph 59 of your reply declaration, you state that the electrical wiring described in the provisional could be existing house wiring, correct?

A. Well, it says that it is possible to hard wire a luminaire inside one's house wiring without a cable of the luminaire. So this was just intended to say that you don't need a wall receptacle to access the power of the house wiring. So I'm not sure if that answers your question or not but that is what it's addressed to.

Q. Is it your opinion that the electrical wiring referenced in the '424 provisional could be house wiring?

A. No, I don't think there's any reason to believe that. The electrical wiring -- the only electrical wiring that's discussed in the '424 provisional is the sentence that you and I were looking at earlier. And then the obvious wiring -- the connecting of components in Figure 4 of the provisional.

Q. Just to be clear on this, the words "house wiring" do not appear in the provisional, right?

A. No. No, it does not.

Q. And the words "line voltage" do not appear in the provisional, right?

A. I'd have to search it carefully. I don't recall it being in there. I'll take your representation that it's not in there.

Q. The words "hard wire" do not appear in the provisional either, right?

A. Correct. I'm using terms of art in the field, and I do that because that's my training and experience. But I've noticed that the patents don't tend to use terms of art.

Q. I'd like to turn to the next paragraph here, paragraph 60, still on page 30

of your reply declaration.

A. Yes, I'm there.

Q. And here you state that the luminaire in the provisional could receive power from a battery. Is that correct?

A. Yes, that's correct.

Q. Now, the word "battery" does not appear anywhere in the provisional, correct?

A. No. But why would that be necessary?

Q. The provisional includes several views of the exemplary luminaire labeled 1A through 1H, correct?

A. I'll have to check and make sure that those numbers are right. Yes, it's 1A through something.

Q. And feel free to refer to the provisional, Exhibit 1008.

A. Okay. Thank you. To answer your question, yes, there are several figures in the beginning of the provisional that do show a diagram of the luminaire.

Q. And in the Figures 1A through 1H showing the disclosed luminaire, that includes images of the inside of the luminaire housing,

correct?

A. Well, I wouldn't call them images, because they're drawn by an artist. And so they're not -- that's not an image. And that's why we can't -- we can't surmise dimensions from them. But there are drawings -- I found the drawings.

Q. Figures 1A through 1H include drawings depicting the interior of the luminaire housing, correct?

A. Yes, that's correct.

Q. In these figures of the provisional application, there is no depiction of a battery in any of Figures 1A through 1H, correct?

A. That's true. But there are other things that are undoubtedly missing, as well. The authors show us what they believe is most important.

Q. Now, there is a description in the provisional of electrical wiring extending through wiring aperture 103 in the luminaire housing that we discussed earlier, correct?

MR. MESSING: Objection. Form.

A. Well, there is a sentence that we

talked about. I forget where it was. But it does talk about electrical wiring, yes.

Q. What would be the purpose of the electrical wiring extending into the housing of the provisional luminaire if not to deliver power to the luminaire?

MR. MESSING: Objection. Form.

A. That's a speculative statement. You're asking me to make a speculative conclusion, Mr. Dorsky. I'll just say that the reason that I have the battery as a possibility is based on the statement that -- and I -- oh, well, here's the best place for it.

Figure 3, if I could draw your attention to it, you'll notice that the upper left-hand corner of Figure 3, there is a voltage source. The symbol that's used tells us that it's a constant voltage, and it says DC.

(Simultaneous speakers.)

A. We're both prone to do this. And I apologize for my contribution to it, to Greta.

But anyway, a battery is a perfectly good DC source. And the voltage

that's required would be known by any -- anyone skilled in the art, that for LEDs, the forward voltage is a few volts.

So batteries are a perfectly good source. In fact, I may have mentioned this the last time we talked. But I have holiday lights that have arrays of LEDs, and they're battery-powered. So like other topics we were discussing earlier this morning, the patent isn't going to be exhaustive. So the long and the short is, this could be a battery.

Q. So the DC power supply you're referring to in Figure 2 is the one labeled 205 in that figure of the provisional?

A. Correct. That's a symbol for a DC voltage source.

Q. And it's not your opinion that that symbol necessarily means the DC voltage source is a battery, correct?

A. No. It doesn't matter. We're back to the role of one skilled in the art. It takes general directions from the inventor.

And I know I'm not telling you anything you don't already know, but it's so critical to keep this in mind, that the job of

the provisional is to tell us what's most important, and then a POSA or a POSITA takes it and runs with it.

Q. If the provisional luminaire used a battery as its DC voltage source, what would a person of ordinary skill understand the purpose of the electrical wiring to be?

MR. MESSING: Objection. Scope.

A. Oh, the electrical wiring that's talked about in the -- I forget what -- the sentence we were talking about earlier?

Q. Yes.

A. Oh, well, we have Figure 4, Mr. Dorsky. That has a -- that's filled with electrical wiring.

Q. I'm referring to on column 4, lines 24 to 25, the description of electrical wiring entering aperture 103 in housing 105, which we looked at earlier in Figures 1A through H. The electrical wiring that extends through the wiring aperture in the housing, what would the purpose of that be if the luminaire is battery powered?

MR. MESSING: Objection to

form.

A. Well, one possibility is that if the battery is located inside the housing, wiring can go through there to the LED sets.

Q. If the battery is located inside the housing, why would the electrical wiring extend through an aperture in the housing?

A. Well, remember that the diagrams -- at least most of the patents that I've seen, they're -- the inventors are trying to show us some of the possibilities. So it may be that there are some aspects of the housing that don't need to be used, depending on different solutions for powering it. You mustn't assume that everything that you see is going to be necessary in a commercialized device.

Q. I'm not talking about commercialized device, Dr. Eden. I'm asking you if the provisional luminaire was battery powered, what would be the purpose of electrical wiring extending through an aperture in the luminaire housing as described in the provisional?

MR. MESSING: Objection.

Form.

A. The answer is that I don't know. And it may not be necessary. The commercialization is everything. That's why we're having this conversation.

Q. Let's turn to page 31 of your reply declaration and particularly at the bottom of page 31, paragraph 62.

A. Okay. Page 32 and paragraph -- I'm sorry? Which paragraph?

Q. Page 31, paragraph 62.

A. Okay.

Q. And here in paragraph 62, you include an image of Figure 1E of the provisional with the feature that Dr. Krames identified as a receptacle for receiving the electrical wiring circled in red, correct?

A. Correct.

Q. Okay. And you state here in paragraph 62 that the provisional does not explicitly state that that circled feature is a wiring receptacle, right?

MR. MESSING: Objection. Form.

A. That's correct. And it does not state.

Q. Okay. And staying with this Figure 1E -- and again, feel free to reference the provisional -- we can see in Figure 1E a large square in the center labeled 125.

Do you see that?

A. Where are you now? I've lost you.

Q. I'm referencing the Figure 1E in your declaration on page 31, but you can also reference the provisional, if preferred, in the Figure 1E in the provisional.

A. No need. This is fine on page 31.

Q. Okay. So on -- in Figure 1E, in the center of the figure, there's a large square or a rectangle labeled 125, correct?

A. Yes, that's correct.

Q. And 125 is the substrate, according to the provisional, right?

A. That is correct.

Q. And on substrate 125, there's lots of small rectangular shapes labeled 150/155, right?

A. Yes. It's so noted at the bottom of the figure. That's correct.

Q. And 150/155 in the provisional are the individual LEDs, right?

A. Yes.
Q. Now, we noted the features circled in red on page 31 in your declaration. But to the right of that feature, there's another square box, and that is the DIP switch in the provisional, right?
MR. MESSING: Objection. Foundation.
A. I don't -- I don't recall that. It's not labeled on the diagram that we're looking at. So why do you -- why do you make that statement?
Q. Do you understand this Figure 1E to include a DIP switch?
A. I'm saying there probably is a switch, but it's not labeled on the figure. Unless you can point me to a label.
Q. Now, above the feature circled in red in Figure 1E at the bottom of page 31, if you look directly up towards the housing, you can see that aperture 103 in the housing, right?
MR. MESSING: Objection. Foundation.
A. I see in Figure 1E is a poorly

labeled figure. So I'm not sure that you and I would agree on what you just said.

Q. Okay. Well, maybe let's turn to the provisional, and that will help. Do you have the provisional handy?

A. Yes. Yes, I do. The beauty of this notebook, Mr. Dorsky.

Q. Wonderful. Now, if you go to, let's say, Figure 1B of the provisional.

A. Okay.

Q. Do you see aperture 103 in housing 105?

A. Yes, I see 103.

Q. And that's a circular aperture right where this sort of bent metal feature is, correct?

A. Well, it could be, but I'd have to compare every part of 1B or another figure to be able to agree with you.

Q. Well, let me ask: Does Figures 1A through -- Figures 1A and 1B show any opening or aperture in the housing other than aperture 103?

MR. MESSING: Objection.

A. I'm not aware of one. But, again,

I'd want to think about this. It depends on what conclusions you want me to reach on the basis of this.

Q. Now, if you scrolled -- or scroll down or page over to Figure 1F.

A. Okay. Okay. I'm looking at --

Q. And 1F also shows aperture 103 in housing 105, correct?

A. That's correct.

Q. Now, if we go back to Figure 1E, there is only one aperture or opening shown in the housing by that bent metal piece, correct?

MR. MESSING: Objection. Form.

A. Okay. We've gone back to 1E; is that correct?

Q. Correct.

A. Okay. Well, see, the problem that I'm having, Mr. Dorsky, and that I had in analyzing the '336 is I presume that you want me to say that in 1E we're looking at what's called a projection drawing or a cutaway by some. And I assume that you want to say that 103 is an unlabeled rectangular disc in one of the rings.

Q. An unlabeled rectangular disc.
A. Is that what you're --
Q. No. My question is: Based on all of the figures, taken collectively, as a person of ordinary skill would view them, do you agree that the circular aperture in Figure 1E, and which can maybe better be seen on page 31 of your reply report at the top of Figure 1E, is the same circular aperture 103 labeled in Figures 1A, 1B, and 1F?
MR. MESSING: Objection.
Foundation.
A. You know, and that's what I was -- thought that might be where you were going. So I can't agree that in Figure 1E there is a circular aperture shown.
Q. What do you understand the circle to be toward the top of Figure 1E?
MR. MESSING: Objection.
Form.
A. Are you talking about the crosshatch region?
Q. Yes.
A. Okay. The problem is, if there is a -- if that is an aperture, then what is the

white ring outside it? And there's no -- engineers will show a dashed line -- two parallel dashed lines going through the white region. So --

Q. Oh, perhaps I can help here with that. If you look at 1F, Figure 1F of the provisional, you can see that the housing, about halfway up the housing or down the housing, there's a change in diameter to the housing, correct?

A. And by change in diameter, you mean that the housing diameter is smaller than that of the ring, the outer ring?

Q. Yes.

A. The plate that mates to the drywall or ceiling, whatever?

Q. Right. So if you were looking at 1F and you were looking -- if you removed 120 and you were looking directly at the inside of Figure 1F, you would see the white ring that you see in Figure 1E, which is where the diameter of the luminaire housing changes, correct?

A. Yes. Well, I'm not sure it's correct. I do understand what you're saying.

And I would just say that I would want to think about it more before I would agree with you.

If it were labeled, then we would not need to have this discussion, we would just know. And -- but apparently the -- the authors did not feel that that was necessary. So I'm reluctant on the basis of 1E to make that call. I understand what you're saying, and it's possible that you're correct. But I just don't know sitting here right now.

Q. So sitting here today, can you identify an aperture in the luminaire housing in Figure 1E?

MR. MESSING: Objection.

Scope.

A. I'm not willing to go on record saying that 1E shows an aperture. That is correct.

Q. If there was an aperture, could it be the circular feature in the crosshatching at the top of Figure 1E?

A. Well, there are many things that could be true. And we've had this discussion already this morning. The problem is, is that 1E was clearly not intended to show that. If,

in fact, there is the aperture at all embodiments. But the emphasis on Figure 1E is 125, 115, and 110, and so forth, that are labeled.

Q. What is your understanding of the circular shape in the crosshatching at the top of Figure 1E?

MR. MESSING: Objection. Form.

A. To be honest, I haven't thought about it. It could be -- it could be a variety of things. So -- but the point is -- and, again, I will always object to what I perceive as any effort to extract more information than is actually given. If the -- if the inventors were -- the authors were really intent on, boy, I have to show you this, they would have labeled it as they did in other drawings that you pointed out.

Q. Let's reference Figure 1F of the provisional. And you agree aperture 103 is certainly identified and called out in Figure 1F, right?

A. Yes, it is.

Q. And you agree that the provisional

describes electrical wiring extending through this aperture 103 shown in Figure 1F and into housing 105, correct?

A. Yes. Yes, I do agree.

Q. Now, a person of ordinary skill would reasonably expect wiring that enters a luminaire housing to terminate somewhere within the housing. Is that fair?

MR. MESSING: Objection. Form.

A. I think it would normally be the case that, you know, a cable, wires entering something. Not always. But, again, it takes -- it depends on how far you take that thought.

Q. And a person of ordinary skill would have understood as a general matter that when you connect wiring to a substrate, you can do so by using a receptacle on the substrate, right?

MR. MESSING: Objection. Form.

A. You could use the receptacle as discussed in the drawings. Normally, I would not go into a PC board with an AC fitting

because of the currents that are -- if, in fact, one is using this power to power LEDs, the current -- the electrical current that they require will heat the receptacle, and that's why they're generally made of aluminum. The power will be dissipated in a board. So I would -- I'm not sure what the authors intended. But if we're building something like this, I would not do it that way.

Q. Electrical wiring can carry a DC current, right?

A. It can carry an AC and DC current. It can carry radiofrequency. It can carry a lot of things.

Q. Now, a receptacle for wiring would provide a more robust or secure connection as compared to just soldering wiring onto a substrate, right?

MR. MESSING: Objection.

A. Well, you cannot just solder wires. You would violate code.

Q. You would need a receptacle of some kind?

A. You would need an approved receptacle. And, by the way, the one that's

shown, I hope it's inaccurate, because it doesn't appear to be a code drawing.

Q. And you're referring to the receptacle shown in Figure 1E of the provisional?

A. Right. But again, that doesn't matter to a POSITA because they will probably ignore the design that is shown. The most important thing the patent does for us, as we've discussed already, is to present the idea of a new luminaire. But unfortunately, it wasn't new. There's nothing new described.

So but as far as wiring goes, a POSITA doesn't need an electrical -- you know, a schematic diagram provided by the authors or inventors.

(Simultaneous speakers.)

BY MR. DORSKY:

Q. So would it be reasonable for a POSITA or POSA to understand the provisional describing electrical wiring entering aperture 103 of housing 105 and terminating at the receptacle on the substrate of Figure 1E?

MR. MESSING: Objection.

Foundation.

A. Could you restate your question, please?

Q. Would it be reasonable for a person of ordinary skill to understand the provisional as describing the electrical wiring entering aperture 103 of housing 105 and terminating at the receptacle on the substrate shown in Figure 1E?

MR. MESSING: Objection. Foundation.

A. Well, I think to answer your question, we'd just have to look at the provisional. I believe that you have used some of the wording from the provisional. I just don't know if it's accurate.

Q. Yes. I'm asking how a person of ordinary skill would understand the provisional.

A. Oh. Understand it? Okay. Then you're not looking for a "yes/no" answer.

Q. Well, no. I'm asking you, would it be reasonable for a person of ordinary skill to understand the provisional as describing the electrical wiring entering aperture 103 of housing 105 to terminate at the receptacle on

the substrate shown in Figure 1E?

MR. MESSING: Objection.

Foundation.

A. Well, I think it's reasonable for a -- I think anyone skilled in the art to recognize that the authors have provided what is a conventional aperture. It should have a rubber bushing around it -- it doesn't -- to allow for passage of something -- electrical wiring for anything.

But as I said, that's about all one could assume. Because in going forward, a POSITA will have their own configuration and their own electrical wiring.

Q. Well, I'm just asking based on the drawings of the provisional, it would be reasonable for a POSITA to understand that wiring entering the housing would terminate at the wiring receptacle on substrate 125, correct?

MR. MESSING: Objection.

Foundation.

A. No, maybe not. The receptacle that I would put on -- they may look at it and say, it says it's a receptacle, maybe that's what

the authors intended. But as I explained a moment ago, as somebody skilled in the art who actually does this for a living would say no, I want the receptacle to be very different.

In fact, the normal way to do it -- this is not a safe way to do it -- is to have the receptacle right there where the aperture is. If you want power to come into the housing, don't put a hole in the housing.

Q. Okay.

(Simultaneous speakers.)

A. So I'm just saying that, you know, what would a normal POSITA think? To be honest, I would ignore most of the wiring, because that's not what I'm coming to the patent looking for. Looking for a new luminaire.

Q. I'm not asking about modifying anything in the provisional. I'm just asking about the provisional itself. And while a person of ordinary skill might place the receptacle elsewhere, it's reasonable for a person of ordinary skill to understand these drawings as showing the wiring would connect to the receptacle on the substrate 125, correct?

MR. MESSING: Objection.
Foundation.
A. Yeah. I just can't say that because I can think of other purposes for the aperture or hole 103.
Q. Okay. But it would not be impossible for the wiring entering the housing to connect to the receptacle on substrate 125 in Figure 1E, correct?
MR. MESSING: Objection.
Foundation.
A. As we've talked about before, there are many things that are possible. But that's irrelevant -- in my opinion, that's irrelevant. What matters is what the inventors have told us that's new.
Q. And I'm not talking about what's new. I'm just talking about what's shown. And the inventors show that you can connect that wiring to the receptacle on substrate 125 in Figure 1E, correct?
MR. MESSING: Objection.
Foundation.
A. I'm sure it's possible. But as I -- like many other things are possible.

Q. If you turn to page 36 of your reply declaration, please.
A. I'm sorry. What page did you say?
Q. Page 36.
A. Thank you. And you're talking about the most recent declaration?
Q. The reply declaration, Exhibit 1027.
A. Thank you. Okay. I am there.
Q. Okay. And in paragraph 70, you refer to one of Dr. Krames' patents, the '644 patent; is that right?
A. I do.
Q. Okay. And in this paragraph, you state your opinion that if claims 13, 15, and 16 are entitled to an earlier priority date, you believe those claims would be obvious in view of this '644 patent; is that right?
MR. MESSING: Objection. Form.
A. Let me just take a minute to read the document.
Q. Please let me know when you are --
(Simultaneous speakers.)
A. You're condensing it in a way that

I may not agree with.

Q. Please also read on to paragraph 71.

A. I remember this well. Please, proceed with your question.

Q. My question is in paragraph 70 and 71. You state your opinion that if claims 13, 15, and 16 are given an earlier priority date, you believe that those claims would be obvious in view of the '644 patent from Dr. Krames; is that right?

A. Yes, I do.

Q. Now, just to be clear, you did not discuss the '644 patent in your original declaration; is that right?

A. No, I did not.

Q. And the petition does not mention the '644 patent, right?

A. No, that's correct. To my knowledge, that's correct.

Q. And to your knowledge, the '644 patent is not part of any of the proposed grounds for unpatentability in the petition, right?

A. No. I'm just saying that

Dr. Krames' own work supports the conclusions that I've reached with respect to the '424.

Q. Now in your reply declaration, you did not set forth an element-by-element analysis of the '644 patent applied against any claims, right?

A. No, I didn't realize that that was expected.

Q. Please turn to page 38 of your reply declaration. And please let me know when you get there.

A. I'm there. I'm sorry.

Q. And in the section towards the bottom of page 38, you have a section about Roberge and Ducharme disclosing DIP switches; is that right?

A. Yes. They both mention DIP switches.

Q. In your original declaration, Exhibit 1004, you relied on Figure 34I of Roberge as rendering certain limitations obvious in your opinion, right?

A. Yes. 34I of Roberge, as you know, shows a rotary switch which makes possible a multiple number of CCT value selections, not

just three or five or two.

Q. And Figure 34I in Roberge is not a DIP switch, correct?

A. No. It's a rotary switch.

Q. And the petition and its applied grounds against the '336 patent, does not mention any DIP switch embodiment of Roberge as part of the proposed combination, right?

A. I'm sorry. Could you repeat that question again? I was reading parts of the text on page 39.

Q. Sure. The petition, in its applied grounds against the '336 patent, does not mention any DIP switch embodiment of Roberge as part of its proposed combination of Chaimberg and Roberge, correct?

A. Well, as you know, I can't answer that question, Mr. Dorsky, because I didn't write the petition.

Q. Did you review the petition?

A. Oh, yes. I reviewed it. But I have my entire life tried to cultivate a photographic memory, but I simply don't have one.

Q. Well, let me ask a different

question, then. In your original declaration, in the sections describing the grounds against the '336 patent, you did not mention any DIP switch embodiment of Roberge as part of the proposed combination with Chaimberg, correct?

A. Well, that's true. But I was aware of Roberge's Figure 34G that is discussed on page 39 of my report that does include a DIP switch. I was aware of that early on but failed to introduce it earlier. But it seemed to be essential that I do so now.

Q. Now, you did discuss Ducharme in your original declaration, right?

A. Yes, I did.

Q. But you didn't mention any DIP switch embodiment in Ducharme in your original declaration, correct?

MR. MESSING: Objection. Form.

A. I don't recall discussing Ducharme's use of DIP switches. But, again, it is something that was noted very early on, that the DIP switches of the '424 provisional and the '336 patent is far from unique.

Q. Now Ducharme is not part of any

proposed ground for unpatentability in this proceeding, right?

A. That, I cannot attest to. You would know better than me.

Q. Well, let me ask: In your declarations when you discuss the grounds at issue in this proceeding, Ducharme was not part of any of those grounds, correct?

A. That's correct. I did use Ducharme for support. As you correctly stated, I mentioned Ducharme in the first declaration. But, again, it was primarily for support. I don't have the time and the energy to, again, be exhaustive about references. There are other references I could have used from the beginning, Mr. Dorsky. But just time and energy limited what we went forward with.

But I would be remiss if I didn't mention to the PTAB that there is nothing unique about the '424 provisional, there's nothing unique about the '336 patent, and this is just another example of that.

Q. You turn to page 40 of your declaration -- reply declaration, to be clear, Exhibit 1027. Please let me know when you are

there.

A. I'm there. Thank you.

Q. Okay. In the section, starting on page 40, you discuss certain CCT adjustable luminaires and lamps that you say were on the market before the provisional, correct?

A. Yes. If you remember back to my first report, I put considerable amount of effort into talking about what's known as tunable white technology. And I quoted a number of sources. And I'm incorporating my initial report into the second. I'm assuming that the first, for all intents and purposes, becomes a part of the second. So that's what I'm alluding to is that quite lengthy discussion in my first report.

Q. Now, the specific products you discuss in this section, going from page 40 to page 43 of your reply declaration, were not discussed in your original declaration, correct?

A. No. I think I did. I think I cited, actually -- if you have the opportunity to go back and look at the first report and look at the discussion which I think was a page

or more, and it had references to, oh, the well-known professional publication known as LED -- oh, I forget the title. Forgive me. I'm doing it off the top of my head. But it's a well-known professional publication, and they had a large article about tunable white technology. And this technology was -- the date of the publication was before the earliest priority date. So I'm incorporating that by reference basically.

Q. I'm not talking about publications. I'm specifically talking about the products you discuss at page 40 to 43 of your reply declaration. So you did not discuss in your original declaration the OSRAM smart LED lighting device that you discuss and show images of from page 40 to 41 of your reply declaration.

A. Well, it might be, actually, Mr. Dorsky, because, again, that article was talking about -- it's written by illumination engineers for illumination engineers, and they talked about a number of products. So you mustn't, you know, jump to that assumption that they were not discussed there. They might have

been --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. To be clear, I'm not asking if they were discussed in some article you may have cited in your original declaration. I'm asking you, were the products themselves discussed in your original declaration?

MR. MESSING: Objection to form.

A. No. I was speaking generally about the fact that this technology was commercialized quite broadly before the earliest priority date. That was my point.

Q. Okay. So just to confirm, your original discussion -- I'm sorry. Let me restate that.

Just to confirm, your original declaration, Exhibit 1004, did not specifically discuss the products referenced in pages 40 to 43 of your reply declaration, including the Philips smart LED light bulbs and OSRAM smart LED lighting devices, correct?

A. No. It's not necessarily correct, Mr. Dorsky. Perhaps you didn't hear what I

said a moment ago. That article that I reference and quote from talks about a number of -- and so I don't know that they -- because it was discussing the most prominent products at the time. And that's what I am discussing here in my second declaration.

Q. I'm not asking about an article and what that article discussed. I'm asking about your original declaration and what you wrote down in that declaration. So if you could -- and maybe this will make it simpler. Please identify the page and paragraph in your declaration where the word "OSRAM" appears.

A. Well, I can't do that sitting here.

Q. Does the word "OSRAM" appear anywhere in your original declaration?

A. That, I do not know. But is it important?

Q. Does the word "Philips smart LED" appear in your original declaration?

MR. MESSING: Objection. Form.

A. That, I don't know, without a computer search.

Q. And Exhibits 1035 and 1031 and 1036

and 1037 were not cited in your original declaration, correct?

A. Perhaps by way of the reference. The reason for referencing something is that it incorporates into the body of the report a broader background that would be onerous to just simply reproduce in a declaration that you read. So I don't know if the word "OSRAM" or "Philips" appears in the original report. It certainly was my intent to provide a background --

Q. And --

A. -- on tunable white technology.

Q. The products you identify on pages 40 to 43 of your reply declaration, you did not set forth any analysis comparing those products to each element of any challenged claim, correct?

A. That wasn't the point of the discussion. But simply to show that much more sophisticated technology than that described in the '336 -- and I underline the word "much" -- was available before the priority date, the earliest possible priority date for the -- for the '424 or '336.

Q. But it's not your contention in your reply declaration that these products anticipate or render obvious any claim of the '336 patent, correct?

A. No. That wasn't necessary, because we had so much other literature to employ.

Q. If you could turn to page 46 of your reply declaration.

A. 46. Yes, sir.

Q. Let me know when you get there.

A. I am there.

Q. Here on page 46 of your reply declaration, you have two images of what appear to be mechanical switches; is that right?

A. I know what you're referring to. Yes. I do. Yes, I'm there.

Q. And these two images on page 46 are mechanical switches?

A. Well, no, they're not -- well, they're called electrical switches because their job is to switch circuits from one circuit to another. There is a mechanical component to it that -- the shaft in the case of the upper switch, and, of course, the lower one is a slide switch which we've seen before

in this matter.

Q. Now, the top image on page 46 of your reply declaration is from Exhibit 1028; is that correct?

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

Q. And Exhibit 1028 is an EH series DPDT toggle switch?

A. Yes.

Q. And the image below that is from Exhibit 1029, correct?

A. Correct. It looks very much -- very similar to what we've seen earlier in '336.

Q. And Exhibit 1029 is a Switchcraft slide switch?

A. Yes.

Q. Now, these particular switches shown in Exhibit 1028 and 1029, they are not identified or referenced in the Chaimberg reference, correct?

MR. MESSING: Objection. Form.

A. It depends on what you mean, they're not reference -- what do you mean by

that, by that --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. Chaimberg itself does not reference or identify the particular switches that are shown in Exhibit 1028 and 1029, correct?

A. Well, I'm not sure whether you're correct or not. It depends on what you mean. Do you mean that he doesn't mention the specific part from the specific manufacturer or he doesn't mention the type of switch? What do you mean?

Q. The switch itself. Not the type of switch. I'm saying this switch -- well, let me take a step back. The word "Switchcraft" does not appear in Chaimberg, correct?

MR. MESSING: Objection.

Form.

A. No. Any more than a specific manufacturer for the LEDs is mentioned. Why would he do that?

Q. So Exhibit -- the switch -- the specific switch from Exhibit 1028 is not identified or referenced in Chaimberg, correct?

A. But why would he do that?

Q. I'm asking you a simple question, Dr. Eden. I'm not asking you why.

A. Okay. Well, my answer is he does not reference that specific part from a specific manufacturer because no inventor would ever do such a thing.

Q. And Chaimberg does not identify or reference the switch in Exhibit 1029 as well, correct?

A. The same answer.

Q. And that answer is?

A. That Chaimberg does not reference that particular switch from Switchcraft , or whoever the manufacturer might be, because no inventor would do that.

Q. And the particular switches in Exhibits 1028 and 1029 are not identified or referenced in the Halliwell reference, correct?

A. And again, you mean the specific manufacturer and part number?

Q. Yeah. The switches that you're showing images of on page 46, those switches in Exhibits 1028 and 1029 are not identified or referenced in the Halliwell reference, correct?

A. I should put this into the record

that the reason that these switches are shown is to illustrate different types of switches that are possibilities for inserting into the electrical cable that Chaimberg and later '336 show.

Q. But I'm not asking for the reason, I'm trying to make clear that these switches are not in the references themselves. So I'll ask my question again. The switches that you're showing on page 46 of your reply declaration from Exhibits 1028 and 1029 are not identified or referenced in the Halliwell reference, correct?

MR. MESSING: Objection. Form.

A. This is a question I've already answered. The answer is specific part numbers from specific manufacturers are not mentioned because it's not relevant. Because a POSA will choose the most current technology in implementing an idea. The electronics in -- that's shown, for example, in the '424 provisional is not a good choice and it's outdated already. So why -- what is the value of presenting this to the -- to a POSA or

POSITA?

Q. And the word "Switchcraft" does not appear in Halliwell, correct?

A. No, it doesn't.

Q. Okay. And the particular switches shown in Exhibits 1028 and 1029 on page 46 of your reply declaration are not identified or referenced in the Reiff reference, correct?

A. Well, I would have to check before I can answer your question one way or the other. But I'll put it this way: I would consider it doubtful that they would have the name of Switchcraft or any other manufacturer any more than they would the name of Amazon or Google.

Q. And these particular switches shown in Exhibit 1028 and 1029 referenced in your reply declaration were not presented or referenced in your original declaration relating to any ground for patentability, correct?

A. These specific switches were not mentioned in my original declaration. I felt that it was just helpful to present them here.

Q. Is it your opinion in your reply

declaration that these switches in Exhibits 1028 and 1029 could be used as the switching chamber?

A. Yes, absolutely.

Q. Do you believe that Chaimberg is limited to only these two switches?

A. No, of course not. They're examples.

Q. So Chaimberg could use some other switch?

A. Of course.

Q. So you are not saying that Chaimberg necessarily implements one of the switches in Exhibits 1028 or 1029, right?

A. No, no. Of course not. I'll reiterate, they are examples of what could be done.

Q. So you were saying that it would be obvious to use one of the switches in Exhibits 1028 or 1029 to implement Chaimberg; is that right?

A. I think it would be obvious to implement a wide range of switches. That's the novelty of it. It's not our prerogative to tell a POSITA. That's the point that I made a

couple of times earlier today. Otherwise, the word "POSITA" has no meaning. If we don't entrust to a POSITA to use his or her knowledge of the latest switches, for example, or the latest MOSFETs or diodes, such as the '424 provisional uses in Figure 3 -- or sorry -- Chaimberg uses in Figure 3 -- then we strip the word POSITA of all meaning.

Q. So just sticking with these particular switches on page 46 of your reply declaration, you're saying it would be obvious to use one of these switches from Exhibit 1028 or 1029 to implement the Chaimberg switch; is that right?

MR. MESSING: Objection. Form.

A. I'm simply saying that it's obvious to make a number of improvements to Chaimberg that don't affect the underlying principle that we were discussing earlier; that is, the separation between the driver and the actual light emitting diode arrays. Separate them with an electrical cable of the luminaire, if you like that expression, and put a switch in the line.

Q. One of those obvious improvements to Chaimberg would be using one of these two switches on page 46?

A. I am simply using them as an example --

MR. MESSING: Objection.

Allow a moment.

(Clarification.)

BY MR. DORSKY:

Q. I can help you here, Dr. Eden. You responded earlier that -- I'm simply saying that it's obvious to make a number of improvements to Chaimberg that don't affect the underlying principle that we were discussing earlier, and you went on from there.

My question is: Is one of those obvious improvements to Chaimberg using one of these two switches that you show on page 46?

A. Essentially, yes. I'm saying that a POSITA would consider, in the application, what type of switch would be best suited for the application. Sometimes a slide switch is the best choice. Sometimes the toggle switch we see in -- from Exhibit 1028 at the top of page 46, maybe that's most appropriate. It

depends on the way in which it's mounted. Or it's just suspended freely in the cable as Chaimberg shows.

Q. If you turn to page 52 of your reply declaration.

A. I'm there.

Q. Okay. And here on page 52, paragraph 98, you again refer to the switch in Exhibit 1029 in this section, correct?

A. Correct.

Q. And this section relates to Halliwell, correct?

A. That is correct.

Q. And just to confirm, you are not saying here that Halliwell is necessarily limited to only the switch in Exhibit 1029, correct?

A. That is correct. You'll notice on the second line of paragraph 98, it says, for example, comma. So that's what I meant. It's an example.

Q. So are you saying it would be obvious to use the switch in Exhibit 1029 to implement Halliwell switch 30?

A. Yes. I'm certainly implying that,

because I said that this particular switch is a -- my words -- typical, and it is typical. I can't tell you how many hundreds or thousands I've seen. It's a typical three-position slide switch from Switchcraft that was readily available for purchase off the shelf at the time of the '336 patent. And that is a correct statement.

Q. Please turn to page 55 of your reply declaration and let me know when you get there, please.

A. I'm there.

Q. Okay. And in paragraph 105, you again refer to the switch in Exhibit 1029, right?

A. Yes. That's correct.

Q. And this paragraph is discussing Reiff, correct?

A. Yes. That's the context, is Reiff.

Q. And just to confirm, you are not saying here that Reiff is necessarily limited to only the switch in Exhibit 1029, correct?

A. Yes. That's correct.

Q. And you're saying here in paragraph 105, that it would be obvious to use the switch

in Exhibit 1029 to implement Reiff's switch, correct?

A. Yes. I wouldn't use the -- a POSITA would not use the word "obvious," that you just employed. But as I said at the end of the paragraph, Indeed, such switches were readily available for purchase off the shelf. And people who build circuits know these things. They know what the latest products are in switches, electrical components of all kinds, resistors, capacitors, op-amps, you name it.

Q. So in your opinion, this switch in 1029 could be combined with Reiff in its disclosure?

A. Yes, it can be used in Reiff. It can be used in Chaimberg. Yes.

Q. Let's go back to page 46 for a moment. Please let me know when you get there.

MR. DORSKY: You know, I think we've been going for about an hour. If you want to take a break here, we can.

THE WITNESS: That would be fine. Thank you.

THE VIDEOGRAPHER: The time is 2:35. We are now off the record.

(Recess from 2:35 p.m. to 2:47 p.m.)

THE VIDEOGRAPHER: The time is 2:47. We are now back on the record.

BY MR. DORSKY:

Q. Dr. Eden, let's turn back to page 46 of your reply declaration, Exhibit 1027.

A. Okay. I'm there.

Q. Okay. Great. Now, in each of these images of Exhibit 1028 and 1029, there are arrows and language referencing certain claim elements of the '336 patent, correct?

A. That's correct.

Q. And just to be clear, those arrows and language are not in the exhibits themselves, right?

A. No. That's why both exhibits are said to be annotated.

Q. Now, did you add those arrows and that language in the images on page 46?

A. I did not do it specifically

myself, but I wanted it done.

Q. So you directed for that -- those arrows and language to be added to those images; is that right?

A. It was suggested and I wanted it done. That's correct.

Q. Just to be clear, when you say it was suggested, who suggested it?

MR. MESSING: I instruct Dr. Eden not to disclose attorney confidential information.

BY MR. DORSKY:

Q. Just to be clear, when I ask the question, I'm just looking for an individual or person that was asked, not any further content of the discussion.

A. Yes. And I don't recall. It's something that I wanted as an illustration of the fact that all switches have the features that the '336 patent calls for.

Q. And just to be clear, your opinion is that all switches predating the provisional have all features that claim 13 calls for?

MR. MESSING: Objection.

A. Yes. They're very conventional.

And the limitations of claim 13 regarding to the body and the coupling features are like insisting that all resistors have two leads. They all must, in order to be a switch or a resistor or capacitor or op-amp or anything.

Q. And through these annotations you made to the Exhibit 1028 and 1029 switches, are you showing where you believe these claim elements would be if these switches were combined with Chaimberg, Halliwell, or Reiff?

A. I'm sorry. I don't understand the question. What do you mean, where they would be?

Q. Let me ask it a different way. Through these annotations you made to the Exhibit 1028 and 1029 switches in your reply declaration, are you showing or identifying where the claim 13 elements would be if these switches were used in Chaimberg, Halliwell, or Reiff?

MR. MESSING: Objection. Form.

A. Well, again, I don't understand what you mean with "where it would be." That's a vague statement.

I'm just saying that the arrows point to the portions, components, parts, whatever you want to call it, of the switch. The switch has a body and it has what the '336 patent calls an actuator, which, again, is not a term of art. In fact, it's well known that switches don't have actuators. They -- but for the sake of the '336 patent, we'll go with that. So they all have some mechanism that allows the switching process to occur. So I'm just simply pointing to those and saying, if one wants to know where they are, here they are.

Q. So are you relying on Exhibits 1028 and 1029 to confirm what you believe to be inside the outer casings or boxes in Chaimberg, Halliwell, and Reiff?

MR. MESSING: Objection. Form.

A. No. As I said a couple of times in the last hour, these are examples of switches that have long been known. And a POSITA could choose any of them to implement the ideas in Chaimberg or Reiff. Does that make sense?

Q. I'm trying to understand why you

label claim features in these images. So I guess my question is: Did you label claim features in the images of Exhibits 1028 and 1029 in your reply declaration to show that if these switches were combined with Chaimberg, Halliwell, or Reiff, the components you point to in your annotations would be the claim elements of claim 13?

MR. MESSING: Objection to form.

A. I think you may be taking this a bit far. I'm just simply showing that it's something that I mentioned in my first deposition, my first report, and I've been saying it consistently ever since, that there are many switches that could be used. Chaimberg talks about a specific type, and that works really well. But there are others, as well. And that the language of claim 13 of the '336 patent is so broad as to include everything. And so I'm just pointing out that every switch that I've ever seen and that has been manufactured has the elements that are mentioned in claim 13. That's it. That's my sole purpose. It's no more profound than that.

Q. Let's go to page 50 of your reply declaration. Please let me know when you arrive.

A. I have arrived.

Q. All right. Now, here at the top of page 50, you show an image of Globe product number 92291 on the left, correct?

A. Yes. That's correct.

Q. And it looks like an outer casing has been disassembled and there are two switches shown inside that are mounted on a circuit board; is that right?

A. Sure. We already agreed earlier that the Globe product SKU number 92291 has the two switches. Even when it's fully assembled, you see at the left, in the left-hand photograph, that there are two slide switches, and removing the cover and you can see where the four screws were at the corners, and it reveals the actual switch itself.

Q. And is it your opinion that this image of the Globe product, with the switch mounted on a circuit board, to which a cable is also connected, discloses a switch having a coupling feature that is electrically coupled

to an electrical cable of the luminaire?

MR. MESSING: Objection.

Form.

A. Yes, I believe it fulfills all of the elements of the claims. But it was simply to show that the main reason for showing it, as shown at right, is that the switch has a body and that it is electrically connected to the wires within the cable.

Q. Now is it your opinion that Chaimberg switch 18 is necessarily the same design as this Globe product switch you show on page 50?

A. No. You've used the word "necessarily" a number of times today. And as I've tried to emphasize throughout our time together, that there are many ways that the switch labeled 18 in Chaimberg could be implemented. Chaimberg uses, as I recall, a slide switch -- or specifically mentions a slide switch, but -- and these are slide switches. But that's -- I would like to avoid the word "necessarily."

Q. Okay. So it's possible that the Chaimberg switch could have a different design

from this specific Globe product switch, right?

A. And may well. Different products were probably implemented in different ways.

Remember, that's the domain of the POSITA. Someone skilled in the art, that's their domain.

Q. On page 50, staying on the same page, in this box at the top, you also show, next to the Globe products, an image of a disassembled switch from Dr. Krames' declaration, correct?

A. Yes.

Q. And that disassembled switch on the top right of page 50 corresponds to the Menards product SKU number 348-2107, correct?

MR. MESSING: Objection. Foundation.

A. Let me look at the --

Q. And actually, if you want to look at paragraph 93 right before this image, that may help you.

A. That is exactly what I would like to do, Mr. Dorsky. Thank you.

Q. Yes.

A. Yes, that's exactly right.

Paragraph 93 makes clear that the SKU number is precisely as you said, it's 348-2107. And the reason for showing it is that Dr. Krames, as I said in my text, referenced this particular switch in his declaration.

Q. Now, the Menard SKU 348-2107, to your knowledge, is not marked with the Chaimberg patent number, correct?

A. I do not know the answer to that question.

Q. In his declaration submitted in this proceeding, Dr. Krames did not state that Menards SKU 348-2107 practices or embodies Chaimberg, correct?

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

Q. Is it your opinion that the switch connection shown in SKU 348-2107 at the top right of page 50 would also practice the limitations of claim 13 of the '336 patent?

A. I do not know. I don't -- I did not opine on that subject. I would be happy to consider it if everyone wanted me to. Simply showing that the switch from Exhibit 2031 has a switch body, and that is the point of my

discussion in paragraph 93.

Q. Now, it is your opinion that the switch connection shown on the left of the Globe product would practice claim 13 of the '336 patent, correct?

A. Well, again, you're using legal language. I would say it -- the way I would express it is that the Globe product is a commercial product that practices -- I guess -- I don't know if that's a legal term or not -- the Chaimberg patent. It has every aspect of it, every element of it, however you would like to phrase that.

Q. And just to be clear, I'm not referring to Chaimberg. I'm referring to claim 13 of the '336 patent.

A. Oh, I thought --

(Simultaneous speakers.)

BY MR. DORSKY:

Q. Is it your opinion that the switch arrangement shown at the top left of page 50 for the Globe product practices claim 13 of the '336 patent?

A. Oh, my goodness, yes.

(Simultaneous speakers.)

BY MR. DORSKY:

Q. Same question for the Menard product at the top right of page 50. Is it your opinion the switch arrangement shown at the top right of page 50 for the Menard product practices claim 13 of the '336 patent?

A. Well, that's not what my report said, Mr. Dorsky. I assume that you read my report. And you can see that what it said -- I won't read it all for the sake of time. But I simply say that, as discussed above, both products -- okay. I need to move further down.

As shown below, the CCT switch in Globe product 92291 is structurally similar to the switch of Menard SKU 348-2107 that Dr. Krames referenced in his declaration. And then I talk about that the slide switch is mounted onto a PC board and so forth. That's a standard slide switch which Dr. Krames -- the '336 patent specification, and I agree, includes a body, an actuator disposed on the body, and one or more electrical, in brackets, coupling features disposed on the body. So that's the limit of my opinion.

Q. Right. And I'm asking you if you

believe the Globe product at the top left of page 50 practices claim 13 based on the switch configuration shown, do you also believe that what you call structurally similar arrangement at the top right of page 50 also practices claim 13 of the Menard product?

A. Well, to the first question I've already answered.

Okay. The second question, I didn't do the analysis of it -- of that particular product. I'm limiting my opinion to saying that the switch shown on the right panel on page -- the upper half of page 50 is a switch in every sense of the -- of claim 13. But whether it's connected to -- well, that's it. That's just my opinion, that it's structurally similar.

Q. So how did you determine they were structurally similar?

A. Well, because I can see it just from the cover removed. That's why we took the cover off of the switch console or -- that you see at left for the Globe product. So the reason that this figure was done is to give you a side-by-side comparison of the general

features of the switch.

Q. So if you can determine from the covers off that the Globe switch and the Menard switch are structurally similar and you can also determine from the top left image that the Globe switch practices claim 13, in your opinion, why can't you make that same determination for the Menard switch?

A. Because with the Globe product, I've had the opportunity to see that there is the electrical cable of the luminaire, which is a crucial aspect of claim 13. It's right before your eyes on the left.

Q. Are there not cables shown on the right image for the Menard product?

A. I don't know where they go. I don't know what the geometry is of the overall luminaire.

Q. You have analyzed this product in connection with your opinions in the Wisconsin litigation, correct?

A. I have, yes, to an extent. But I'm reluctant on the basis of just the structure of the switch to say any more at this point.

Q. Let's turn for a moment to

Exhibit 1013, which is the Reiff reference.

A. Okay.

Q. Please let me know when you have that open.

A. I have it.

Q. All right. And I'd like you to go to column 5, line 62. Please let me know when you get there.

A. I am there.

Q. And this paragraph is discussing the Figure 2 and Figure 4 embodiments or what Reiff calls the second embodiment that it discloses, correct?

A. Yes. That's what it says on line 63.

Q. And then starting at line 64, Reiff states, light 108 is provided with two light sources 28 one of which is fluorescent lamp 30 emitting white light and LEDs 32 emitting red, blue, or UV light, for example.

Do you see that?

A. Yes. I see that sentence, yes.

Q. Why would a person of ordinary skill implement a lighting device that includes a white light source like a fluorescent light

as well as a red or blue light source?

A. Well, the answer -- that's a very good question, Mr. Dorsky. And the question can be found in the background of the invention. We learn a lot about the motivation of an inventor from what he or she says is their preferred applications. And this -- in section 2, which is entitled, Description of the related art, it's very clear that the inventors are interested in a number of applications, but military applications in particular.

So let me read just a little bit of this. In line -- well, let's go to line 11. In general, lighting is necessary for a multitude of industrial and military applications, including in warehousing areas, military tents, and military vehicles. And in some of these applications, specialized lighting may be required. I worked for the naval research lab for several years, so I understand what they're talking about.

Such specialized lighting includes the use of invisible light. The word invisible is in quotes. Ergo the use of a red or blue

light for tasks including map reading, tent lighting, or cockpit lighting.

Okay. The notes now jump down. Jumping down into the third paragraph, line 24. The light produced by fluorescent lamps may be detectable and is therefore undesirable. In order to provide invisible light, a light source emitting blue or red light, for example, may be used.

They talk about then the difficulty of converting conventional sources to red or blue. And there's a section here -- oh, here is what I'm interested in. Down at line -- we're still in column 1 and line 43. It says, When specialized lighting is used or is necessary for the task -- for a task, the light having a red, blue infrared or UV light source is often a portable light which must be transported between areas. These specialized lights may not be large enough to illuminate -- and this is a very interesting comment -- a large tent as ergo command center or curing room.

Okay. So the answer to your question is that there are a number of

applications -- and by the way, it's not just military -- medical applications where you would like to have, let's say, red light. Now, the command -- in a command center, you probably want white, because they're not at the front. It's in the rear area. So white is fine. And you want to have high-quality white light for that application.

But for, let's say, reading maps inside of a large truck, you might want red. And that has to do with military security.

Does that answer your question?

Q. Yes. I just have a quick follow-up. You mentioned use of red in a medical setting. What would that be for?

A. Oh, sure. We do a lot of work at the University of Illinois, my laboratory, in using different color lights for medical therapeutics. So, for example, dermatological conditions, such as Bowen's carcinoma, and even common acne require -- have been found to be very sensitive to red or blue light. So -- and in fact, I don't know if any child in your family has been affected by infant -- oh, just my brain went -- where the liver is not

functioning normally at birth. My son had this. Oh, come on.

Q. Not cirrhosis, is it?

A. No, it's not cirrhosis. When a child is born in the --

Q. NICU?

A. Yes. But, anyway, there are boxes -- I'll think of it probably when we're 10 minutes down the road. But they're called light boxes and they're in NICUs, that's absolutely right, and they emit blue right. So the spectrum has to be tailored for that particular application.

So there are a number of -- oh, and when the spectrum doesn't matter, there are applications in the growth of plants, for example. It's well known in the horticulture community, for example, and just in biology in general, that various colors of light promote the growth of plants. So if you are into a certain type of lily, for example, you'll find that certain colors of lights promote growth. That's well known. It's been studied for the last 20, 30 years.

Q. Let me change gears a bit here.

And I would like to talk a bit about color temperature. Now, would you agree that, generally speaking, perceived color, such as red or violet, can be defined by its wavelength?

A. No, it's not defined by its wavelength, but by its spectrum. Because unless you're talking about lasers, all other light sources produce light over a -- over a certain range. It's known as its spectrum. The spectrum is the intensity of light as a function of wavelength.

Q. The spectrum is a range of wavelength; is that correct?

A. If you think of a conventional graph of math, it's plotting x where x is intensity. You know, how much intensity am I detecting at a certain wavelength as a function of wavelength.

So think of the vertical axis y as intensity. And then the horizontal axis, which we often call x, or the abscissa, if you want to be fancy about it, that's the wavelength. And so my lab, for example, for more than 50 years, has recorded spectra of light sources or

the way in which atoms and molecules absorb light. Spectra tell the entire story.

Q. If I told you there was light emitted with a -- and let me restate that question.

If I told you there was a lighting source that emitted light with a wavelength of 700 nanometers, would you understand that to correspond to red light?

MR. MESSING: Objection.

Form.

A. It's right at the edge of the human response. If you ate your carrots, like your mother told you to when you were a kid, then your eye will be able to see 700 nanometers. Most of us, and I'm one, call the limit of the visible 700 nanometers. And the lower limit is 400. That's violet.

Q. Now let me ask the question a bit differently.

A. Okay.

Q. Would a human perceive light with a wavelength of 500 nanometers to be red light?

A. No.

Q. Or actually let me -- let me ask --

let me re-ask the original question. Would a human perceive light at a wavelength of 700 nanometers to be red light, if the human perceived the light?

A. Yes. It would be a very dull red. It's right at the limits of what you can perceive. Beyond that, it just disappears into blackness. You don't see anything.

Q. And a human would perceive light with a wavelength of 400 nanometers to be blue light; is that correct?

A. It would be a deep violet. Because that's right at the other edge of your -- of the human eye's ability to perceive light. That's why we say the visible region extends in wavelength from 400 nanometers to 700 nanometers. But we're all different as individuals. Again, if you haven't eaten your carrots as a kid, then you won't see probably 400 nanometers, because there's a particular chemical in carrots that extends your eye response.

Q. Can you please turn to your reply declaration at page 58.

A. I would be happy to do that. By

the way, the answer to your earlier question, 500 nanometers is bluish-green. I tell my students it looks like the water off of Maui. That's the color.

58. I'm there.

Q. Okay. And at the top of 58, you include a graph of -- well, let me just stop there. At the top of page 58, there's a graph included, correct?

A. Yes.

Q. And this graph comes from Exhibit 1043?

A. Correct.

Q. And the x-axis of this graph is wavelength in nanometers, correct?

A. That is correct.

Q. And the y-axis of this graph is spectral energy density; is that correct?

A. Correct. You can just think of it as intensity -- you know, how strong is the light -- at any given wavelength. Don't worry about the units. Just think of it as intensity.

Q. Now, based on this chart on page 58 of your reply declaration, if we select a

particular wavelength from the x-axis, it would correspond to any of the color temperatures we see as we go up, depending on the spectral energy density or intensity, right?

A. Well, if you mean what I think you mean, the answer is probably correct. It just says that for the temperatures that I show here -- and by the way, these are plots of what is called the black body spectrum or Planckian radiation. The name Planckian, by the way, comes from the name of Max Planck, a German physicist who was the first to develop an equation that described the light emitted by the sun. So his equation is called the Planck's Equation, and it won a Nobel Prize for it. But the effort was to find a physical explanation for why the sun radiates the spectrum that it does. Because, as you know, the spectrum of the sun extends all the way across the visible, from the violet, all the way to the edge of the infrared, in the deep red.

So these numbers that are shown here are the temperatures that correspond to his equation. What he found was -- and it was

really amazing -- he found a single equation that only has one number that you change, and that is something called the temperature. So if you plug 5500k into his equation, you get that green curve. If you plug 4500 into his equation, you get the -- I don't know what -- is that orange, I guess, curve, and so on.

Q. So we just discussed a few minutes ago that, generally speaking, a 700-nanometer wavelength would correspond to a red color, correct?

A. Yeah. It's right at the edge of what you could see. It would be a very dull red. Very difficult to see.

Q. What would you say is the wavelength of a red that you could readily see?

A. Oh, a bright red is about 630 nanometers.

Q. So on this graph on page 58 of your declaration, if you went to 630 nanometers and then drew a line vertically through that point, the color red -- or light of the color red at 630 nanometers could have different color temperatures depending on the intensity of the light; is that right?

A. Yes. It says that there is red light in all of those. There's also some green. There's also some yellow. And that's why, say, 5500k appears to be white.

In fact, the temperature of the sun is about 5800k. It's actually 5780 or something like that. But it says that there are contributions from all of the wavelengths that you see. It's just that the intensity is quite different. And notice that the peak is also shifting. As the temperature goes up, the peak shifts to shorter wavelengths.

And that's why, if we go to a store, let's say Home Depot -- we've talked about Home Depot earlier today -- and you purchase a lamp that has a temperature of 5000 kelvin, it will have a sort of a blue aura or tinge to it. Why? Because the peak is moving to shorter wavelengths, and the blue is on the short wavelength side of the visible. That's where blue and violet are. On the other side is, you know, red, orange, and yellow.

Okay. So that's why if you want what, you know, they call cool white -- which is kind of interesting, because it actually has

a higher color temperature -- you want to get a bigger number. In contrast, if you want more red, you'll want a spectrum that is lower temperature and shifted to longer wavelengths.

Let me give you just an example from everyday life that all of us are familiar with. The sun radiates a spectrum that we're all familiar with. But it's important to realize that the green curve that is shown here is very close to what the sun radiates at noon when the sun is overhead. So it's very intense, and the color is white, a brilliant white.

But what does the sun look like at sunset or at sunrise? It doesn't look that way at all. Now, remember the sun is radiating exactly the same. The sun hasn't changed at all. But as it approaches the horizon, the shorter wavelengths are filtered out and it looks like a dull red. So the spectrum looks like the 3500k or even some spectra that are shown on the next page of my declaration at 1000. So as it approaches the horizon and eventually, you know, disappears, it's a dull red. Okay. So we see that every day.

Q. Okay. Let's turn to page 63 of your declaration. Please let me know when you get there.

A. Okay. I'm at 63.

Q. And at the top of page 63 is an image of that CIE 1976 diagram from Exhibit 2031, which is Dr. Krames' report, correct?

A. Yes. That's correct. That's the one you introduced me to, Mr. Dorsky, last time we met.

Q. And I'd like to get an understanding of how you're presenting this diagram. Now, the colored portions of this graph at the top of page 63 of your declaration, that's generally referred to as the color space; is that right?

A. Well, there are different terms that are referred to. I think the only term -- term that makes sense is that it's a CIE chromaticity diagram.

Q. What would you specifically -- what term would you specifically use to describe the colored portion of this diagram? Would it be the color space?

A. I don't know what you mean. It's -- the chromaticity diagram has all of the colors that the human eye is able to perceive. And this is a result -- the CIE diagrams, the first one of which was published in 1931 -- I think we discussed this last time -- was an effort to quantify color. And ever since then, color has become a science in its own right, as has illumination engineering. So to take color from the realm of the subjective that we call them colors or hues or whatever, the CIE diagram was an effort to quantify all this and with a graph.

Q. Yeah, I'm not -- just to be clear, you know, to help this along, I'm not asking about the history or the reason for creating this graph. I'm trying to make sure we're using the same terminology so, you know, we're not ships passing in the night here.

So in looking at this graph at the top of page 63, the square of the graph, there's a blue line at the top that diagonally trends downward. Do you see that?

MR. MESSING: Objection.

Form.

A. You mean the one that's labeled CCT?

Q. No, no, no. The one is labeled spectrum locus.

A. Oh, spectrum locus. Okay. That's the perimeter of the diagram.

Q. Right. And above that perimeter, there are no colors, correct?

A. That's correct.

Q. And below the perimeter, there's a colored area of this chart, correct?

A. Yes.

Q. What terminology would you use to refer to the colored area of this chart? Is color space the right word?

A. No. Now I understand your question. No, that is the chromaticity diagram. The white space outside of it means nothing. There's nothing there.

The chromaticity diagram -- if you see the whole diagram -- we're just looking at the a segment of it, and I only put it in my report because you raised the subject at my last depo.

No. So the chromaticity diagram

has an odd horseshoe shape to it because that's just the nature of the human eye. So all of the color is the chromaticity diagram, and that's all the chromaticity diagram is. But it has every color that the human eye is able to perceive.

Q. Is it your opinion that every single point in the chromaticity diagram would necessarily have its own unique CCT value?

MR. MESSING: Objection. Scope.

A. No. Because the CCT value only applies, as my report says -- and I'll be happy to read what my report says. In fact, that would be a really good thing to do. Yeah. Let me read paragraph 114, because you're raising questions that I've addressed at length in my report.

Paragraph 114 says this: Further, the diagram shown below is known as a chromaticity diagram, which portrays, within the horseshoe-shaped diagram, the entire gamut of colors available to the human eye. The visible light produced by a lamp or a luminaire can be categorized by the chromaticity

coordinates x and y, which are on the axis of the graph below.

And I can read the rest of it, but I won't do that. Let me jump on --

Q. Just to be clear, I just want to make sure you're aware of the question I'm asking because this isn't really addressing that question. My question to you is: Is it your opinion that every point in the chromaticity diagram, so every unique chromaticity coordinate, does it have its own unique CCT value?

MR. MESSING: Objection to form.

A. Mr. Dorsky, no, I did understand your question, and that's why I was preparing to read more from my report in paragraph 115, because it addresses your question. And the answer, in short, is that there are very few points on a chromaticity diagram that have a CCT value, and that is the entire point, that the vast majority of points do not have a CCT value.

Q. And when you say the vast majority of points in the chromaticity diagram do not

have a CCT value, what points, for example, would not have a CCT value?

A. I'm beginning to wonder if you read my report. I'm hurt, Mr. Dorsky. I've described that at length. And, in fact, let me just read it to you. Paragraph 115. As labeled in the chromaticity diagram above, the black curve is known as the Planckian locus. This curve gives the XY coordinates and the CCT values for a select group of lamps and luminaires; namely, Planckian radiators that emit the spectrum calculated by Planck.

As explained with respect to the two earlier figures above, only those lamps and luminaires emitting light having spectra closely approximating or matching the black body Planckian spectra will be characterized by a CCT value as shown in this chromaticity diagram. For those lamps having chromaticity coordinates lying off the Planckian locus, the CCT has little or no meaning. Because why? Like black body temperatures, the CCT is correlated or intertwined with the Planckian spectrum. The CCT therefore has no -- little or no meaning apart from its Planckian

spectrum.

Q. So the Planckian locus or the black body Planckian spectra refers to white light, correct?

A. No, it doesn't -- as the diagram shows, it can apply to blue and red as well. That's one of the main points made in my report.

Q. And you're referring to the diagram at the bottom of page 60 of your reply declaration, correct?

A. 60 or -- just looking.

Q. Let's stay on page 60 for a moment here. The black body Planckian locus is the curved line in the figure at the bottom of page 60 with certain points on it labeled with CCT values, correct?

A. Yes. That is correct. It's the black curve. And you'll notice the diagram at the bottom of page 60, there's several specific points that are called out.

Q. Okay. And now that locus, that Planckian locus does not extend into the top left or green portion of the chromaticity diagram, correct?

A. That's true. But it does go between the blue and the red.

Q. So the color green, light of the color green does not have a CCT; is that correct?

A. That is correct. If you're not on this curve, a CCT value cannot be assigned.

Q. So if light is the color red but it's not on this curve, that color red light would not have a CCT?

MR. MESSING: Objection. Form.

A. That is correct. That is correct. All you can do at that point is cite the chromaticity coordinates, and that's, in fact, what the community does.

Q. And the same question for the color blue on the bottom left of the diagram on page 60, if light is emitted at a color blue that is not lying on the Planckian locus, that color blue light would not have an associated CCT; is that correct?

A. That is correct. But let me add, just for the sake of information, that as I discuss in my report, particularly with regard

to Reiff, it is very easy, actually, to design LED, you know, red or blue sources that will have chromaticity coordinates on that Planckian locus and, therefore, justify the assignment of a CCT. That's an important point to recognize.

Q. But Reiff doesn't say that the color red or color blue that it's using is on the Planckian locus, correct?

MR. MESSING: Objection.

A. That is correct, Mr. Dorsky. But, again, let's be careful to give POSITAs their due. A POSITA reading this that has been in illumination engineering, or as I said in my definition of a POSITA, that the person should have at least two years of post-baccalaureate experience with lighting design.

And so this is something that is well known to illumination engineer professionals. Those who are in color science, which has become a huge field, professional field, know very well what I'm saying is the case.

Q. So for those colors in the chromaticity diagram that do have an associated CCT value, is it your opinion that each such

color has a unique CCT that is not assigned to any other color?

MR. MESSING: Objection to form.

A. Well, that's the definition of CCT. That every point along that line that -- the so-called Planckian locus, has a CCT value. You see several of them expressly called out on page 60.

I also show other CCT -- oh, in the diagram that you pointed out at my last depo, Exhibit 2031, same thing. Notice that the blue curved bar on page 63, Exhibit 2031, you see the purple or blue, and it expressly says, correctly, CCT is only valid along that red curve.

Q. Where does it say that?

A. Do you see in the middle of it, it says CCT?

Q. I see the label CCT. But where does this diagram say that CCT is only valid along that red curve?

A. Well, you see the bar only goes along the Planckian locus.

Q. I do -- I see black lines

intersecting that Planckian locus that are labeled with CCT values.

Do you see those?

A. Oh, yeah, I see that. But those are not meaningful, particularly for white light, which is really important to the '336 patent. The only time -- and we can talk about the details for that. But in the illumination industry, which is the subject of this entire matter, we're interested in high-quality light. The only way that you get that is being on the Planckian locus and have a CCT.

But I will say emphatically that these lines, these black lines that are drawn at an angle are not correct. Imagine -- let me direct your attention, since we're on this diagram, page 63. Let's look at 3000 kelvin. If you were to believe this graph, I could sell a light in, you know, Home Depot, Menards, wherever, and you would take it home, you'd turn it on, and it's bright yellow.

Do you see the yellow-green up there?

Q. I do.

A. But I could also have the same

label of 3000 kelvin, according to this diagram, which is very false, and it would be pink-ish red.

And, in fact, in my report, I quoted Taru Oksala that was cited by Dr. Krames in his report. And Dr. -- well, I don't know if Taru is a doctor or not. But Taru Oksala agrees with me.

The problem -- the problem is that there are certain applications, let's say for lighting for a rock band concert, where you don't care -- excuse me -- you don't care what the color of the light may be. It can be garish.

But the Planckian locus is very special. It was developed by Planck to describe natural sources of light: The sun, the stars, even lava in a lava flow. The light emit -- almost virtually all natural sources of light in the universe follow the Planckian locus. Okay. So that's why Planck devoted so much effort into developing this mathematical relation.

Well, that Planckian locus has guided white light development, because it's

only on that locus that I can make white sources that look like the sun. So that's why the industry is really strict about -- if all of us on this call decided we wanted to start a company tomorrow and we wanted to sell white lights, well, what we're all going to have to do is, depending on the way the white light is generated, we're going to have to spend a couple of years. That's what we had to do with the company I started. Two years to develop a combination of colors to get onto that curve. So it's not -- that's why you see Duv?

Q. Yes. I was about to ask you about Duv.

A. Yeah.

Q. And doesn't Duv identify, based on the distance from the Planckian curve, which color the CCT you've selected corresponds to?

MR. MESSING: Objection to form.

A. I'll just say that the answers to your questions can be found -- I don't know if I've provided it in this matter. But the Illumination Engineering Society -- which, by the way, is cited in the '336 patent as one of

the professional organizations that regulate lighting. The Illumination Engineering Society is the one that sets standards for what CCT means. And you can get their standard for their definition.

And for interior lighting, for white light, you must stay far closer to the Planckian locus than this diagram that we're looking at on page 63 implies. Because what I just described to you -- two lamps had the same label, and one is yellow and the other is pink. Do you know what that would do to the white light industry in this country? They can't tolerate that. So you can't -- you must be right along this line if you're going to sell a product.

So now for -- as I said, for rock concerts, outdoor music and so forth, it's been found convenient by some communities to introduce this concept of Duv. But we must stay away from it like the plague if we're trying to make high-quality light sources, which is what the illumination industry does.

And so whether it's Chaimberg or the '336 patent, they all talk in the beginning

about this is an illumination product that's intended for interior illumination.

Q. Right.

A. We must be as rigorous as the community is.

Q. Okay. And I understand, Dr. Eden. And I understand you're trying to explain these concepts.

But just to be clear, if you're not concerned with high-quality interior lighting, you agree that a CCT value, such as 4000k, could encompass lights having different colors if you didn't care about the colors, such as your rock venue example, correct?

MR. MESSING: Objection to form.

A. I'm saying it might be correct. Your standards can be relaxed. But all of the references that are of interest in this matter, including Reiff, who is -- Reiff is providing illumination -- continuous exposure to humans. And so regulations are very clear that we cannot play fast and loose with this.

And so, in fact, the diagram that we're looking at on 63 that was provided by you

and maybe Dr. Krames -- I don't know -- backs up what I'm saying.

Do you see the legend to the graph which is part of the chromaticity coordinates on page 63? Do you see that legend?

Q. I see the legend.

A. Do you see the one that's the triangle that's red? And that's illuminant A.

Q. I see that, yes.

A. Do you know where illuminant A is on the diagram?

Q. You can tell me where it is.

A. It's just below that black line. It's on the -- it's right on the Planckian locus.

(Simultaneous speakers.)

A. It's a standard.

Q. Okay. And just to be clear, though, illuminant A is a little to the right of that line that says 3000k, correct?

A. Yes. So the temperature wouldn't be 3000. It's, you know, 2900.

Q. And where the -- in the graph on page 63 of your reply declaration, where that line intersects -- that line labeled 3000k

intersects the Planckian curve, that intersection would be 3000 kelvin color temperature, correct?

A. That would be a legitimate CCT value.

Q. And that's --

A. The black line is not a legitimate CCT value.

Q. Now, staying on the black line and moving on this diagram on page 63 of your declaration, if I move just slightly down from that spot on the Planckian curve, let's say to a v-prime value of .51, but I'm still on that line that says 3000k, that would also have a color temperature of 3000k, correct?

MR. MESSING: Objection to form.

A. I don't understand what you were just describing. If it's stay -- the bottom line is this: If you're on the Planckian locus, CCT values are legitimate. If you go off -- if you go off the Planckian locus, which is the vast majority of chromaticity space, the best way to do it is use either XY or UV coordinates. There are some communities

that -- and you can read this in the IES standard for CCT, determining CCT, calculating it. It will say that some communities use CCT plus a Duv value. But it's just the distance from the exit.

In the end, only the chromaticity coordinates -- because the Duv tells you the distance from the -- so you still have to have what in math we call an ordered pair. You need two parameter -- if you get off the CCT line, you now must have two numbers to define the color. It can be the CCT that is closest. That's just a convenient system. But you must also have a Duv value.

And that's why -- it's really interesting in Dr. Krames' report that Taru Oksala says that.

Q. And I understand -- you know, I understand that you want to describe this some more. But I'm asking a very specific question.

Using this diagram at the top of page 63 of your reply declaration, you agree that where the black line labeled 3000k intersects with the Planckian locus, that point is 3000 kelvin, right? We're in agreement

there?

A. Well, if you look closely, there is a red dot there.

Q. Yes. That red dot is 3000 kelvin, correct?

A. Notice it's a red dot, because it's correlated with the Planckian locus. So that is a true 3000 kelvin CCT.

Q. Sure. Now, in this chromaticity diagram --

A. Right.

Q. -- if you selected a point along this line labeled 3000k that intersects with a v-prime value of .51 -- do you see the v-prime values on the left side of the graph?

A. Yes, of course.

Q. So .51 would be about halfway between .50 and .52, correct?

A. Right. It would be down your curve.

Q. Yes. So if you drew a horizontal line from .51 across this diagram, and where that horizontal line intersected with the black line labeled 3000k, that point would also have a correlated color temperature of 3000k,

correct?

MR. MESSING: Objection.

Form.

A. No, it does not. So getting back to your point, Mr. Dorsky, it's not correct to say that a point at -- dropping down that line -- I'm seeing that these lines, these black lines, are very artificial. And they are not correct and they are not followed by the illumination industry.

The only -- the only -- for illumination, the only numbers that matter -- or the only place to be that matters is being on that red curve, period.

Q. So to be clear, it's your understanding that no two points in the chromaticity diagram can share the same CCT value; is that right?

A. That's what I said from day 1. I said it last time you and I got together, my friend.

MR. DORSKY: Okay. Why don't we take a break here. I think we've been going about an hour.

THE WITNESS: Okay. That's

fine.

THE VIDEOGRAPHER: The time is now 3:52. We are now off the record.

(Recess from 3:52 p.m. to 4:02 p.m.)

THE VIDEOGRAPHER: The time is now 4:02. We are back on the record.

BY MR. DORSKY:

Q. All right. Dr. Eden, I am introducing in the chat window an exhibit that was previously marked 1042.

(Exhibit 1042 was marked for identification.)

BY MR. DORSKY:

Q. Please let me know when you have that exhibit.

A. Okay. Let's see. I'm sorry, Mr. Dorsky, and what is the exhibit? It might be in my hard copy file.

Q. I don't think it is. It's Exhibit 1042.

A. Okay. Can you identify?

Q. It's a technical memorandum called

IES Method for Determining Correlated Color Temperature.

A. Oh, yes. Yes, yes, yes. Okay. Very good.

Q. I think the technical assistance person said if you hit ALT+Tab, you might get it.

A. Yes. And that's what I did.

(Technical discussion.)

MR. DORSKY: Why don't we go off the record and see if we can solve this.

THE VIDEOGRAPHER: The time is 4:04. We're now off the record.

(Off-the-record discussion from 4:04 p.m. to 4:23 p.m.)

THE VIDEOGRAPHER: The time is 4:23. We're back on the record.

BY MR. DORSKY:

Q. All right. So, Dr. Eden, you have before you Exhibit 1042, correct?

A. Yes, that's correct.

Q. And do you recognize this document?

A. Yes, I do. Very familiar with it.

Q. And this is an IES memorandum that

you cite and quote from in paragraph 120 of your reply declaration, near the bottom of page 65, correct?

A. Yes. That's very -- that's very true.

Q. And IES here refers to the Illuminating Engineering Society; is that right?

A. Yes.

Q. And that's the same society you mentioned before the break that sets standards in the lighting industry?

A. Yes, that's correct.

Q. And this particular memorandum was assigned the number TM-40-24, correct?

A. Yeah. That's correct. And I'd like to point out that it is what is known as an American National Standard. It says that at the bottom of the cover sheet.

Q. Okay. Yes. If you go to the end of this document, the very last page, this Exhibit 1042 appears to end right after section 1.1 titled, Introduction, correct?

A. Oh, why is the whole document not there? The table of contents is correct.

Q. Do you recall seeing the rest of this memorandum when you prepared your reply declaration?

A. Oh, yes, I have it. I purchased the standard because my work involves it. So the way this works is the Illuminating Engineering Society serves as the focal point for all standards. Also, they do this, as the second page says, that they work in collaboration with ANSI, which is the American National Standards Institute. So, whereas ANSI develops standards for a broad range of industries, IES is assigned -- or concerned with developing standards only for illumination engineering or color science, but primarily illumination engineering.

So I do have this standard in my computer at home, and I do not know why the entire standard is not here. I know I cited this first paragraph, but the rest of it is just about a computational procedure.

Maybe that's why. But I thought -- I thought we copied the entire document. So I'm not sure why -- why there's not more.

MR. MESSING: I should note

for the record that we did serve a corrected copy on 4/14 that does include all 19 pages of this exhibit.

MR. DORSKY: Thank you, Jeffrey. That was going to be my next question.

BY MR. DORSKY:

Q. Dr. Eden, are you that aware that, after you submitted your reply declaration, Luminex's counsel served a more complete version of this memorandum in this proceeding?

A. Well, I was not aware of that until a few moments ago, but I am thrilled to hear that that happened.

Q. All right. I am introducing into the chat window an exhibit that I would like to have marked Eden Exhibit A.

(Exhibit A was marked for identification.)

BY MR. DORSKY:

Q. Please let me know if you can access that document.

A. Yes.

(Technical discussion.)

THE VIDEOGRAPHER: The time is 4:29. We are now off the record.

(Off-the-record discussion from 4:29 p.m. to 4:36 p.m.)

THE VIDEOGRAPHER: The time is 4:37. We're now back on the record.

BY MR. DORSKY:

Q. Dr. Eden, I previously provided a document that I marked Eden Exhibit A that had a file name CCT Measurement Standard (IES 2025).

Have you received that document?

A. Yes, I have.

Q. And please take a look at that exhibit, and can you please confirm that Exhibit A has the same title as Exhibit 1042 you previously looked at?

A. Yes, that's correct. It now has the full document.

Q. And Exhibit A also has the same memorandum number at the top right, TM-40-24, correct?

A. Yes. That's the standard number.

Q. And this Exhibit A is longer than Exhibit 1042, correct?

A. Yes. For some reason, the first version of the standard only had the opening paragraph.

Q. And this Exhibit A includes sections up through 4.0, use and limitations, correct?

A. I'm sorry. I just missed that.

Q. This Exhibit A documents that I marked includes sections beyond the Introduction up through section 4.0, Use and Limitations, correct?

A. That is correct. And there's also A and B and C, as well as D.

Q. Now, please turn to that section 4.0 on page 3 of Exhibit A, titled, Use and Limitations, and let me know when you get there.

A. 4.0. Okay. Use and Limitations. Yes, I'm there.

Q. Okay. And in the first bullet point in section 4.0 of Exhibit A, starting in the second sentence, this IES memorandum states, quote, That is, with all other factors

being equal, two lights with the same CCT can vary in appearance; this variation is generally in the pink-green dimension. Likewise, light sources with the same Duv value can vary in the blue-yellow dimension.

Do you see that?

A. Yes, I do. That statement is correct.

Q. And then in the next bullet point, under section 4.0, the first sentence states, CCT and Duv (in chromaticity) do not convey absolute color appearance; the same stimulus with the same CCT and Duv can appear very differently if, for example, the surround condition is different or the state of adaptation of the observer is different.

Did I read that correctly?

A. Yes, you did.

Q. So in particular in that first bullet point, this IES memorandum is acknowledging that two lights having the same CCT value can, in fact, vary in color appearance, correct?

A. What they're talking about is -- no, not with two points having the same CCT

value. Let's read it more carefully. CCT and Duv are required to be used together for a complete specification of chromaticity. That is simply repeating what I said earlier, that a CCT value alone specifies points on the Planckian locus, and that is the only region of the chromaticity diagram that is to be used for interior lighting.

Now, if you're in the vast remainder of the chromaticity diagram, CCT will not specify the location in chromaticity space. The old method -- or I should say -- thank you -- the rigorous method is to use -- thank you so much, Cathy -- is to use the chromaticity coordinates x and y or u and v.

But as we've been discussing over the -- I don't know -- last hour or so, there are some that would prefer -- there are reasons to identify the position in chromaticity space by the CCT value that is closest to the point in question, plus a Duv value. And this is what I said in my report. I dealt with it at great length.

Q. The third sentence of that first bullet point states that two lights with the

same CCT can vary in appearance.

Do you agree with that?

A. No, I don't. It's only -- you have to understand it in the context of using that system that we were just talking about. And that was precisely the point of my report. And that's what -- if I might, I think it's really important that I just go back to the report and tell you --

Q. Well, I'm not -- Dr. Eden, I'm not looking for you to read your report to me. I'm trying to understand this reference that you cited and relied on in your report.

A. Correct.

Q. So the sentence that I'm referring to in the first bullet of section 4.0 of Exhibit A states that, That is, with all other factors being equal, two lights with the same CCT can vary in appearance.

And you disagree with that statement, correct?

A. Yes, I do. And the reason I'm suggesting that I read the report, because it deals with this -- this very point. That's why I spend so much time on it.

Q. And I have your report. I just want to --

A. Okay.

Q. You've answered my question. My next question: After the semicolon in that sentence, it says, This variation is generally in the pink-green dimension.

Do you see that?

A. That's assuming a negative value of Duv.

Q. And now, if we look at your report at the top of page 63 of your reply declaration, those CCT lines that I referred to earlier are angled in the pink-green dimension, correct? They are angled beginning in pink-ish or going upwards from pink to green, or you could say downwards from green to pink, correct?

MR. MESSING: Objection to form.

A. Well, below the line is pink, because it's a mixture of red and purple. And above the line -- the point, Mr. Dorsky, is that if get away from the Planckian locus you will have this problem. And that's why -- if

you'll allow me your indulgence --

Q. If you're going to read from your declaration, Dr. Eden, I ask that you don't do that. I have that declaration, and I don't need you to read it into the record. We have a copy of that.

A. Okay. But it answers your question.

Q. Okay. I'm asking about this reference and what this reference says.

A. But this addresses that reference. It also addresses Dr. Krames' comment. It addresses the comment from a gentleman -- or a person -- I don't know if it's a male -- Taru Oksala who said the same thing, that if you want -- I don't have his entire quotation in front of me, because I don't have Dr. Krames' report. But he said, if you want natural white light, you have to be on the Planckian locus.

Q. So the Planckian locus is for white light, correct?

A. No. It's for -- that's a really great question, and you're not quite right. It is for emulating natural sources of light. The reason that Max Planck developed this

relationship is he was trying to describe natural sources of light. All natural sources of light, be it from the sun, the stars, a hot metal bar, an incandescent lamp -- we're all familiar with tungsten filaments -- they all emit a spectrum that is described by the Planckian locus.

Q. And that spectrum is generally types of white light; is that fair?

A. No. White -- what we would call white light is a section of it. But a sun setting is not white light, but it's still on the Planckian locus.

And the point is, why do we -- why do we stress the importance of being on this line so much? And the reason is that in color science and illumination engineering, it's been known for almost a half century that human beings prefer to be bathed in light that is as close to natural as you can get. And that's the Planckian locus.

Q. So --

A. That's why it's so strict, the regulations in the community.

Q. So --

A. Can you get offline, sure, but not for illumination.

Q. Okay. And so do -- other than points along the Planckian locus itself, do any points within the chromaticity diagram have an associated CCT?

MR. MESSING: Objection. Form.

A. What do you mean, "have an associated CCT"?

Q. Okay. So the -- looking at the CIE diagram at the top of page 63 of your reply declaration, for example.

A. Yes.

Q. And let's pick the line, the black line, labeled 2500 kelvin. Where that black line intersects with the Planckian locus, that red dot, that would be a CCT of 2500k, correct?

A. Yes. That's what we decided earlier. All of the points along the line shown as red dots are real CCT values.

Q. And if you go just a tiny point right above that line in this chromaticity diagram, just a hair above that red line, does that point have a CCT?

A. Not strictly speaking, because of the practical difficulties of getting exactly onto the line. The industry has a very strict standard of how far you can be off the line, but it's very small.

Q. Oh, so you can be off the line of the Planckian locus and still have a CCT, correct?

A. Well, you have the right, the authority to publish a CCT value, but the requirement is so strict that, on this graph, you would barely see the deviation.

Q. What is the allowed deviation on the --

A. I don't recall.

Q. But there is a deviation that's allowed from the Planckian locus that it can still be the same CCT value, correct?

A. Only because of the practical difficulties of getting onto the line. But all -- especially for interior illumination where you're subjecting humans to prolonged exposure, the industry is extremely strict.

Q. Okay. But in that case that you just mentioned, two points in the chromaticity

diagram would have the same CCT, correct?

A. No, they don't have the same -- this is where I'm having difficulty communicating with you. The CCT value is only -- correct is the -- for any point on that line, you can identify them by a single number, the CCT value. When you get off the line, there are systems for using CCT in combination with something else called Duv, to locate it. It's just a system.

But I want you to understand that once you get off the line, a single CCT value does not -- in fact, no CCT value expresses the color. And that's why this gentleman Taru Oksala says -- the whole point of his quote that Dr. Krames cites is be careful, if you see a CCT value, don't think that you're going to get the same product.

Q. Right. Because one CCT value could refer to two different colors, right?

A. Well, it can if you're off the line. But what I'm saying -- what I'm saying, Mr. Dorsky, is that in general illumination, which is the subject of the '336 patent, Chaimberg, everything that we're considering in

this matter, is concerned with general illumination. And so this issue of, you know, pinkish green or pinkish -- pinkish blue -- excuse me -- pinkish blue, green, yellow, whatever, is intolerable.

Q. So --

A. So that's why, on page 64, I highlight -- it's italicized. Because everything we're talking about today, everything that was presented to me at the last depo, fails to recognize this. In fact, even the quotation that Dr. Krames presented shows that there's a lack of understanding.

And I said this: This issue is the very core of the confusion patent owner and Dr. Krames describe that inevitably results from attempts to assign a CCT value to lamps having chromaticity coordinates lying off the Planckian locus.

Q. I have your declaration. You don't need to read it into the record.

I guess my question is: Is it your opinion that CCT values can only be assigned to points along the Planckian locus in the chromaticity diagram?

A. Yes. You can use a CCT value that is close, but it's meaningless in the way that CCTs were designed. It's only a method for locating where you are on the chromaticity diagram. You can use whatever coordinate system you want. Usually, we use x and y or u and v. But I hope you understand that just looking at the jumping-off point from the Planckian curve and say marking that x and then a distance d to wherever you are, that's the new y, it's just a different system for -- it's a map.

Q. So you wouldn't know --

(Simultaneous speakers.)

A. Excuse me. Please allow me to finish.

The confusion comes in assuming that the CCT value that -- for this location method is somehow meaningful, and it's not meaningful.

Q. Are you finished with your statement?

A. Yes, I'm done. It's all yours.

Q. So if you had a point in this chromaticity diagram that's not on the

Planckian locus, the CCT value you assigned to it would be meaningless?

A. That is correct.

Q. So you wouldn't know, for example, if it was the same or different from another point off the Planckian locus in this chromaticity diagram?

A. Yes. Ultimately, the only system that makes any sense is a set of ordered -- what in math they call ordered pairs that tell you where you are in chromaticity space. And then the u and v or x and y coordinates are what they are.

So people in -- that use lighting for the entertainment industry, they will not bother with the CCT and Duv method. Apparently, it is helpful to some designers who understand the limitations of it. But CCT was developed only for the Planckian locus. That is the -- that is what Planck did. And it was designed for natural sources of light, all of which obey his equation.

So whether it's a lava flow or it's a meteor streaking across the sky, the spectrum from that fits the Planckian locus. And that's

what the -- that's why I stressed at the beginning of our conversation, what is the origin of the CCT. It is a single number that tells you which one of the curves on page 58, Exhibit 1043, that you're on. Because it's a natural source of light.

Q. So on page 63 of your reply declaration, the CIE diagram at the top, why do you believe that the straight black lines labeled with CCT values are included in the diagram?

A. Because it's a convention in some industries where the color doesn't matter that much.

Q. So in some industries where the color doesn't matter that much --

A. No, no, no.

Q. -- there may be multiple points in the chromaticity diagram that, in that industry, correspond to a single CCT value?

A. Well, that's why I have stressed that all of this is in the hands of a POSA. And so traditions vary wildly between the general illumination area -- I'm sitting under white lights that -- that are built by --

designed and built by the illumination industry and they're white lights -- and other industries.

As I said, there are a number of areas, such as mood lighting, music concerts, architectural settings, libraries, in buildings where you will see a wide palette of colors. So designers in that area are very creative and they want to draw from a wide palette.

CCT, by its very nature, severely limits the palette. And that's one point I tried to make in my report. So it turns out it will accommodate blue and red and you will be right on the Planckian locus.

Q. Okay. And so just so I understand -- I'm not sure if you responded to my exact question. But in some industries where color, perhaps, doesn't matter as much, there may be multiple points in this chromaticity diagram that correspond to a single CCT value; is that right?

MR. MESSING: Objection.

Form.

A. No. They don't have a single CCT value. The notation -- what I'll call the

take-off point from the Planckian locus line -- remember, this method that the American National Standard, the IES standard is describing, is nothing more than a graphical tool, a way to locate where you are.

For some industries, it's easier -- and this has to do with color science. I've spoken with a number of people in color science over the years. It's its own discipline. And so -- and they are -- they're interested in how humans perceive color. But almost never are they interested in being on the Planckian locus. They're off -- and, of course, the vast majority of the chromaticity diagram is off that curve.

Q. Maybe I asked the question incorrectly.

A. Okay.

Q. Let me try it differently.

A. Sure.

Q. In some industries where color doesn't matter as much, perhaps, those industries may use a single CCT value to describe multiple points in the chromaticity diagram; is that fair?

MR. MESSING: Objection.
Form.
A. It's fair as long as you understand that the CCT number that is used does not have any meaning except as a tool to find -- it's like a compass, trying to find out where you are on the diagram.
Do you see what I'm saying?
And that is the cause of the confusion. Because using a number on the curve leads people to believe, oh, it should look a lot like, you know, let's say, a 3000 kelvin source. And it doesn't. It looks very different. I mean, we just saw this. These black lines that you've seen, you go in one direction, and the source looks bright yellow. At 3000 kelvin, look at this, if you go to the top of that line that they say is okay -- and it probably is for a rock band lighting, to say, oh, it's bright yellow. But if you go in the other direction, it's pink.
So do you understand how outrageous that is to suggest that there's a single CCT value?
Q. That is what this is stating, and

that is what the IES memorandum is stating, correct?

A. It's only an identification -- a location tool. People in the industry know that it's not the same as having a lamp that is -- the spectrum is identified by a single number that we call the CCT.

So this was introduced as a matter of convenience, nothing else. Be careful not to fall into that trap. That's what caused the problem that Dr. -- or Mr. or Ms. Oksala was talking about, and that quote from Dr. Krames. It was a beautiful quote. I'm so glad that Michael included it, because it said, be careful because you're going to get a lamp that looks crazy different.

In other words, what they're saying is don't use the CCT value because it's incorrect.

Q. Now, can you determine the CCT value for a point on the Planckian locus using the CIE diagram?

A. You can. Usually, it's the other way around. What you do is you measure the spectrum of your object. Let's say it's a --

an incandescent bulb, right? Or you go into a hardware store and you buy a bulb that's actually LEDs but it has phosphor coating and it gives -- it looks orange and it gives you -- it correlates with a true CCT value of, say, 2700 kelvin.

Q. So how would you calculate or measure or determine a CCT value for -- let me restate that.

Can you calculate or determine the CCT value for a point in the chromaticity diagram?

A. Sure. That's what we've done since the beginning.

Q. And what tools would you need to do that?

A. Spectrometer and what's called an integrating sphere. At the company I cofounded, we had a 40-inch -- I think it was 48-inch diameter integrating sphere. And as the name implies, it's a huge steel chamber, and the inside of it is coated with a particular white powder that's known to scatter light efficiently, and then you have detectors around it. And you determine the spectrum of

your source. And then you -- and then you calculate for a given temperature. In fact, these calculations are talked about in the -- in this -- in this Illuminating Engineering Society standard that we had before us. It tells you how to calculate the CCT from that.

And if it's -- if the spectrum does not match earth having a shape that we were talking about on both pages 58 and 59 -- 59 has lower temperatures below 2000 kelvin. But if your -- if your spectrum is -- deviates from those, then what you have to do as a light designer is to add more blue, green, red, whatever is necessary, wherever the spectrum is deficient, you must add light to get it so that the curve looks like those on page 58 and 59.

Q. Do you describe in your declarations anywhere the use of a spectrometer and integrating sphere or any of those tools?

A. No, I did not, because it didn't seem relevant. I'm not sure that it would have been widely appreciated for me to add a great deal of unnecessary detail. But it's the reason I made this standard available to you.

MR. DORSKY: Jeff, I just

have a few more questions. I know we're running up against an hour since we came back. I imagine it's going to take more than 15 minutes. Is that fine? Or do you want to take a break?

Let's take a break here.

THE VIDEOGRAPHER: The time is 5:05. We're now off the record.

(Recess from 5:05 p.m. to 5:12 p.m.)

THE VIDEOGRAPHER: The time is now 5:12 and we're now back on the record.

BY MR. DORSKY:

Q. Dr. Eden, I may have asked this before, but let me just ask again to make sure. Is it fair to say that color temperature describes white light?

MR. MESSING: Objection to form.

A. Well, I thought I described very carefully in my report and testimony today that CCT can -- values can control what -- and describe -- excuse me -- light sources from the

blue to the red as shown by the Planckian curve, assuming that they're on the Planckian curve.

Q. So do you disagree that color temperature describes white light?

A. Color temperature describes some white light.

Q. Let me ask that a different way. Color temperature is used to describe white light. Do you disagree with that?

A. No, it can be. It can be.

Q. But you believe it's also used to describe other colors of light?

A. No. See, the problem is, is that you appear to be in favor of using subjective descriptions of light and the way -- and its spectrum. The entire reason why CCT was developed -- well, there were two reasons. One was to develop light sources that closely approximate natural sources of light, because humans, for reasons that I don't fully understand, prefer to be bathed in natural light. I certainly do.

The problem comes in if you get off the Planckian locus, as we've been talking

about, the CCT is no longer of value because it's tied directly to the spectrum of light that is emitted by natural sources. So when you use white, that's a subjective term. What do you mean by white?

Now if you say I have a source, and it has a CCT value of 3000 kelvin, now you've told me exactly what the spectrum looks like because it's quantitative. And that's what I'm trying to pull you towards is the quantitative description of light. That is the only accurate one.

Q. So if someone told you they had two sources of white light, you would need to know the CCT of each source to determine if they're the same or different colors?

A. Exactly. Isn't that why we call one CCT, quote, warm light, and another one cool light? Isn't that exactly what's happening?

Q. Let me introduce a document previously marked Exhibit 1039.

(Exhibit 1039 was marked for identification.)

///

BY MR. DORSKY:

Q. And, Dr. Eden, I believe you already have a copy of this document on your desktop.

(Technical discussion.)

BY MR. DORSKY:

Q. So, Dr. Eden, do you recognize this document, Exhibit 1039?

A. I do, indeed. I was the one that found it.

Q. Yes. In this document you show an excerpt from and cite at the bottom of page 60 and the top of page 61 of your reply declaration, correct?

A. Well, let me check the page numbers real quick. Yes. Yes, this is from an article written by Wendy Luedtke for an online blog. And I just found it because the figure was a nice one. And she does a good job, I believe, of describing a number of subjects. So that's why I chose this.

Q. And this blog post is from April 2019, correct?

A. That is correct.

Q. And it's from a forum called ETC;

is that right?

A. Yes. That's the name of the online blog.

Q. Do you know what ETC is?

A. I looked into the blog just a little bit, but I was just more looking for a nice description of chromaticity diagram. So I didn't look into the details behind the blog.

Q. Do you happen to know who runs this blog?

A. No. I never would have thought to ask.

Q. Please turn to page 2 of this exhibit. And page 2 here, this includes the diagram that you have on page 60 of your reply declaration, correct?

A. Yes, that's correct.

Q. And if you continue on to the top of page 3 of Exhibit 1039, do you see the second sentence of the very first paragraph on page 3 of Exhibit 1039 states, Color temperature describes white light so that's the generally white area of the diagram?

Do you see that?

A. Yes, I do.

Q. Do you disagree with that statement?

A. Well, I mean, your own eyes can tell you that her choice of words is not precise, because look at the white area. And it doesn't coincide with a large section of the Planckian locus.

Q. So --

A. You see the light -- what I'll call the whiter -- well, it's not even correct to call it whiter. But you see the lighter, the yellow going off to the -- towards the -- I'll call it the northeast part of the diagram and -- but notice that the Planckian spectrum goes all the way from the red, as I've been talking about in my report, and it goes over to the blue. So the CCT describes far more than just white light.

Because of the -- I looked at a number of blogs going back in time, and the general interest seems to be in illumination and color and so forth. They're primarily interested in white light.

Q. So you disagree with the statement in this Exhibit 1039 that color temperature

describes white light, so that's the generally white area of the diagram. Am I right?

MR. MESSING: Objection to form.

A. I just think it's imprecise. Color temperature does describe light that is perceived by humans to be white. But it also describes a light that's deep red, that's like the light that's -- that we see from the moon just as -- or excuse me -- the sun as it's setting, and it's not white. But it's described by the Planckian locus.

Q. Now, CCT would not be used to describe a deep red light, correct?

A. Sure it would. Why not?

Q. Well, deep red does not appear on the Planckian locus, right?

A. No. It sure does. That's what I've talked about in my report.

Q. So the very bottom right corner of the chromaticity diagram --

A. Yeah. You're disappointing me, Mr. Dorsky. I thought you had read my report. Because over on the right-hand side, see how that dives down? Those are perfectly good CCT

values. And that's what I talked about in connection -- excuse me -- in connection with Reiff, that when he describes red and violet, a POSITA would know -- somebody in light illumination would know that, oh, I can easily design -- in fact, it's easier to design a Planckian source that is orange than one that is white.

Q. But there are reds in the chromaticity diagram that are not on the Planckian locus, correct?

A. Absolutely. But that's not -- the negative side of that is not the point.

The point is that if I'm in a business where I'm developing light sources, let's say, like Reiff, for the military, and this is an application where human beings are going to be immersed in this light for hours on end, then I would know that I have to do my level best to develop a source that lies on the Planckian locus. Because studies by the hundreds have shown that human beings respond to natural sources of light. So I want to emulate that. And it turns out in the orange and red, that's easy to do.

Q. How about in the deep blue?
A. It's more difficult, but it can be done.
Q. What deep blue value -- CCT value is on the Planckian curve?
A. Well, I think I address that in my report. I think the numbers that I settled on that you would have a source that all of us would say is blue, but it's -- on the Planckian locus, it's going to have to be above about 12,000 kelvin, but I'm being very rough there. I hope you will understand that.
Q. And if you picked a deep blue on the lower left corner of the chromaticity diagram, that would not have an associated CCT, correct?
MR. MESSING: Objection.
Form.
A. Well, I've -- that question has been asked and answered. The bottom line is -- and it's probably not necessary to keep repeating it -- that if the chromaticity coordinates are on the Planckian locus, then it does have a CCT -- it has a valid CCT.
Q. Okay. I'm not sure I asked and had

that question asked and answered. So I'll ask again. If you picked a deep blue color for your light on the lower left corner of the chromaticity diagram, it's not on the Planckian locus, that color would not have an associated CCT, correct?

A. That is true for anywhere in the chromaticity diagram. If it is not on the Planckian locus, you cannot assign a CCT. I mean, you can, but it has no meaning.

Q. Okay. Let's -- oh, sorry, go ahead.

A. No, no. I was just to going to say, the CCT value has its origins, its birth, in a Planckian spectral distribution which emulates the natural world. That's where all of this came from, Mr. Dorsky.

Q. If we go down to page 6 of this Exhibit 1039, please let me know when you're there.

A. I'm close. There I am.

Q. Okay. Below the graph at the top of page 6, do you see, it states, here is a CCT of 4300 kelvin with three different Duv values?

Do you see that?

A. Yes, I do.

Q. And then if you scroll to the top of page 7, there is a line intersecting the Planckian curve or locus labeled 4300 kelvin. And there are three different stars on that line, one colored green, one colored white, and one colored pink.

Do you see that?

A. Yes, I do.

Q. So this Exhibit 1039 is telling us that all three of these points on the line labeled 4300 kelvin have a CCT of 4300 kelvin even if they correspond to different apparent colors, correct?

MR. MESSING: Objection to form.

A. No, that is absolutely incorrect. They could not be more incorrect, Mr. Dorsky. And we have talked about this already.

This is the same subject we were talking about with respect to the IES method. The CCT -- this is the point. This is why there is a huge problem. And it was mentioned by Taru Oksala, exactly the same issue. The CCT is only used for -- as a -- the number has

lost its original meaning. And that's why these sources are blue, purple, yellow, pink. They're all over the spectrum.

Do you understand that the CCT is no longer the sole way of identifying the color produced by a luminaire, a light source? And that's why it's intolerable for white light production. And that's why the industry does not use what Wendy Luedtke is talking about here.

This may be useful for areas of applications where the color can be all over and nobody cares. In fact, maybe they enjoy it.

But it is of zero value in talking about the light sources that are central to this matter. Whether it's Chaimberg or '336, all of which are interested with interior illumination, you must rigorously be on that Planckian curve or it leads to this dreadful situation. And that's what I talked about in my report. I doubt if you will let me read it into the record.

Q. I don't think you need to read it into the record.

A. I thought you might feel that way.

But, anyway, it talks -- I spend a tremendous amount of time talking about -- and it says the -- this issue is the very core of the confusion patent owner and Dr. Krames -- and you're not alone, there are other people -- describe. So -- but if you're in the white light industry, you know this issue very well, and it's not a problem.

Q. So do you disagree with Ms. Wendy Luedtke's statement in Exhibit 1039 that the figure on page 7 of Exhibit 1039 shows a CCT of 4300 kelvin with three different Duv values?

A. I don't disagree with her the way that she means it. But CCT becomes nothing more -- it loses its meaning. That's the language that I used in my report, Mr. Dorsky. CCT loses the meaning that all of us in the general illumination area cling to to this day. And we have to insist on it, because it's the only way to get reproducibility.

See, what this is, is chaos. If you're interested in generating a particular color, then you must stick to the Planckian locus.

Now, if you don't care if the color is varying all over the map -- and there are a lot of wonderful applications where that's the case -- then wonderful. And if that's a general method -- the confusion comes about is they use the same expression, CCT.

Q. But if I gave you a CCT value and a Duv value, I could describe an exact point on the chromaticity diagram, correct?

A. Yes. As long as you understand that the CCT value has no meaning other than a marker from which you launch off into the chromaticity diagram. Let's say in the chromaticity diagrams we were looking at -- let's say the one on page 63, and you're up there in the left-hand corner. You've got a green-yellow source. All right. It's a green yellow light. It looks awful. Mercury produces a color like that. It looks like Mello -- what's the soda drink? Mountain Dew.

Q. Mountain Dew?

A. It looks like Mountain Dew. Okay. And so the closest CCT is -- oh, let's call it, you know, 3700. And I hope you understand that the CCT at 3700 is a light that is far removed

from Mountain Dew.

But it is a -- for some applications, it is a convenient way to identify where you are and what's -- the most important thing is, is that specialists in color science understand that. So somebody in color science that's interested in mood lighting, or whatever, would not be interested -- I'm sure this is true -- developing a white light. It's too boring, and it's very demanding.

Q. What is the difference between color temperature and correlated color temperature?

A. Well, the two terms are often used as synonymous, as being synonymous. But the correct -- and it's more for convenience. It's just the way we are as humans. We adopt over a period of time terms that are not necessarily correct, but they're convenient.

The correct term is the correlated color temperature. And I address this in my report.

Q. So color temperature and correlated color temperature mean the same thing?

A. They can be. You just have to be careful and look at the context. This is true of many things in life, right? You cannot just take a label -- somebody says something to you or there's a publication, you have -- I teach my students, you have to look at the context, read the details, and then you can determine.

But correlated is the strictly correct term. And that's why it's used in the '336, it's used in Chaimberg, and all of the other references that are of interest to us in this matter. Because the correlation means it's correlated to the Planckian spectrum, because that's the spectrum that is emitted by natural sources of light.

Q. And you could use Duv as in the image on page 7 of Exhibit 1039 to correlate a color off the Planckian locus to the Planckian locus.

A. Yeah. But now, see, the problem, Mr. Dorsky, is what you're suggesting exacerbates the problem because now the word "correlation" loses its meaning. You use the word "correlate."

Q. Right.

A. It doesn't correlate at all. The reason that the Planckian locus is so powerful is that it is tied directly to a quantitative measure of natural light sources which long ago -- in fact the first fluorescent tube was introduced in 1934 at the Chicago World's Fair. And they got a white spectrum by mixing the primary colors, and they got onto the Planckian locus, and they started selling them in 1934. So that's where the correlation is.

But as soon as you take all meaning out of the word "correlate" -- what does it correlate with if I go off Duv, it doesn't correlate with anything.

Q. Well, you agree that these CCT lines, for example, at the top of page 7 of Exhibit 1039, are angled in the same fashion as the CCT lines, for example, in the image at the top of page 63. So they're not angled in some wacky direction with respect to each other, right?

A. No. That's arbitrary. That's a convention. It's not tied to something fundamental. So your statement is absolutely incorrect.

Q. But if you have the angle of the black line intersecting with the Planckian curve, then using Duv, you can correlate a point on the CCT line to its intersection point on the curve, can't you?

MR. MESSING: Objection. Form.

A. I'll say that the lines, the black lines that you keep referring to and Duv, are only of interest to people who want to live their lives, they want to operate their business, their products, whatever, well off of the Planckian locus. They're not interested in natural sources of light. And they have very good reasons for not being on the Planckian. And admittedly the Planckian locus gives a very restricted, I'll call it, operating space.

But for those of us who care about general illumination, the illumination you and I and everybody on this call are bathed in at the moment, I think we would object a lot to the idea of removing the anchor that illumination has to the Planckian locus. In fact, I know for a fact customers would object.

We developed, with a company that I

founded, lamps that were sold into the cinematography space and videography. It was literally used in Hollywood. And we had to work for two years to get three CCT values that were spaced by about 500 kelvin. It took us that long to get the spectrum to match a Planckian but -- and I'm sorry if it sounds like I'm boasting, I don't intend to. But it won two awards from the National Association of Broadcasters. Why? Because the light was -- it was a beautiful white, and it was right on the Planckian. It takes a lot of time and work.

And that's not necessary for a number of applications. That's not necessary.

Q. Now, Dr. Eden, during any point during this deposition, did you discuss your testimony with Luminex's counsel?

A. No.

MR. DORSKY: Thank you, Dr. Eden. I have no further questions at this time and I pass the witness.

MR. MESSING: I'd like to take a short break just to go over

my notes before I attempt a redirect.

THE VIDEOGRAPHER: The time is now 5:37. We're now off the record.

(Recess from 5:37 p.m. to 5:45 p.m.)

THE VIDEOGRAPHER: The time is now 5:45. We're now on the record.

EXAMINATION

BY MR. MESSING:

Q. Good evening, Dr. Eden.

A. Good evening.

Q. I just have a few redirect questions. I'll try to keep this short so we can all get home and start our weekends.

Do you recall earlier today reviewing paragraph 14 of your reply report?

A. Paragraph 14 of the -- yes. Yes, I do recall discussing that with Mr. Dorsky.

Q. Did you testify regarding certain obviousness modifications to the Chaimberg reference?

A. Yes, I think that was a topic at

some point.

Q. And did you mention certain hazards or design considerations that a POSITA would consider in working with the Chaimberg reference?

MR. DORSKY: Object to form.

A. Well, my report does mention that. I think I made a few comments about that. I think I mentioned electric shock hazard in particular.

Q. Can I direct your attention to page 2 of your report, beginning with claim -- or paragraph 6.

A. Paragraph 6. I'll be there in a minute.

Oh, yes. Yes, yes, yes. I remember this paragraph well. I enjoyed writing this.

Q. What were you describing in paragraph 6 and 7 of your reply report?

MR. DORSKY: Object to form.

A. Well, I was describing a theme that has come up in both of my reports, and I think I mentioned it to Mr. Dorsky. I had the wrong paragraph in my head, though. I think the

record will show that I had the impression that it was in paragraph 21.

But I'll just -- I'll just read a little bit of it. That's probably the best way to save time. The second sentence in paragraph 6 says, I emphasized that the choice of switch location by an illumination or an electrical engineer is, in practice, determined by the industrial, commercial, public, or residential application at hand. As an example, for luminaires to be installed in an office building or high bay commercial building, such as a Walmart or Amazon shipping facility that are designed to produce light having one of two daylight "CCT values" (such as 4000 kelvin and 4500 kelvin), the CCT switches are likely to be installed in a junction or driver box or other inaccessible location. The reason, of course, is that accessibility is of low priority for this application. And then I go on to say, if a decision is made later to change the CCT for employee or customer comfort, technicians will make the change (as opposed to the user or luminaire customer).

So I'm not sure it's necessary to read the rest of this. But I'm trying to make the point that, as I've said several occasions, at some point, we must turn things over to someone skilled in the art. We'll understand what applications there are and how best to tailor an invention to that application. That's the intent of this.

Q. Just to be clear, these considerations discussed in paragraph 6 and 7, and I believe you mentioned 21, as well, the hazards and considerations that you were referring to when discussing your obviousness analysis?

MR. DORSKY: Object to form. Leading.

A. Well, I did talk about other hazards, about -- paragraph 7 goes on to say, in other situations, such as restaurants or residential installations, the CCT switch will often be accessible to luminaire customers because one or more changes in the CCT value are desired.

In other words, as it says, the desirability for access to a CCT switch would

be high in businesses where, let's say, mood lighting is desirable after sunset. We've all seen lights being dimmed after -- in the evening at restaurants. But like everything, there are hazards associated with putting the CCT switch anywhere.

And so the point of all of this is to -- is to illustrate that, in the end, a -- someone skilled in the art, in consultation with a customer, will have to decide what is the best arrangement to be made.

So I'm not sure if that answers your question or not, but that was the intent of these sections.

Q. To switch gears a little bit now. Do you also recall discussing the '424 provisional during your cross-examination earlier today?

A. Oh, yes, we discussed it a great deal.

Q. Dr. Eden, based on your review of the '424 provisional, how many times is electrical wiring mentioned?

MR. DORSKY: Object to form.

A. Well, I think we focused on the one

time that I recall, and I'm not sure if I can find that sentence. But it is only mentioned once that I recall.

Q. Is there any other description of the electrical wiring beyond that one mention that you stated?

A. No. Other than as I mentioned, with Mr. Dorsky, the wiring or -- the wiring is probably not a good word. But the interconnections in the circuit diagram, let's say, in Figure 4.

And the sentence we're talking about is page 4, line -- I had it just a moment ago. Oh, there it is. I'm sorry. It's line 24, electrical wiring, not illustrated, extends through a wiring aperture 103 and the housing 105. That's why we spent so much time talking about aperture 103.

Q. Let me direct your attention to paragraph 59 of your report on page 30.

A. Of my report, the second declaration?

Q. Yes, I'm sorry. The reply declaration.

A. Okay. Thank you. And what page

did you say, Mr. Messing?

Q. Page 30, on the bottom of the page, and that's paragraph 59.

A. I'm there.

Q. Could you please explain what you're stating in paragraph 59?

MR. DORSKY: Object to form.

A. Of course. And everybody on this call knows that I already have a propensity for reading parts of my report into the record, so please allow me to do so now.

Paragraph 59 says, in fact, the quote, electrical wiring not illustrated, end of quote, of the '424 provisional need not be an electrical cable of the luminaire as required to satisfy claim 13.

As I testified during my deposition, it is possible to hard wire a luminaire inside one's house wiring without a cable of luminaire. And then the citation is to Exhibit 2030, 91, lines 12 to 16.

Therefore, the '424 provisional's isolated mention of, quote, electrical wiring not illustrated, end of quote, does not provide written description support for claim 13's,

quote, electrical cable of the luminaire, end of quote. And the statement is very true.

Q. To switch gears a little bit. Can you please pull up the '336 patent, which I think is Exhibit 1001.

A. Yes, I have it. Which page would you like to go to?

Q. Directing your attention to the very end, to claim 1.

A. Okay.

Q. Please let me know when you're there.

A. It's easy to find. I'm there.

Q. Okay. What does claim 1 recite about the electrical cable?

MR. DORSKY: Object to form.

A. The electrical cable first appears in claim element, I guess you would call it 3 or C, whichever notational system one likes. And it says this: An electrical cable comprising of first end, and a second end, wherein the first end is coupled to the at least one electrical component.

And it goes on to say in the next claim element, and a switch coupled to the

electrical cable wherein the switch is disposed remotely from the housing, wherein the switch has a plurality of positions, wherein each position of the plurality positions of the switch corresponds to a discrete correlated color temperature, CCT, output by one or more light sources of the luminaire.

Did I answer your question?

Q. Yes, you did. And if you could please go now to claim 13.

A. Okay. I'm there. In this case, this is a claim we've all read a great deal. A switch for controlling a correlated color temperature (CCT) of light emitted by a luminaire, the switch comprising a body, second claim element, at least one first coupling feature disposed on the body, wherein the at least one first coupling feature is configured to electrically couple to an electrical cable of the luminaire, and an actuator disposed on the body, wherein the actuator has a range of positions wherein each position of the range of positions of the actuator corresponds to a CCT of the light emitted by the luminaire.

Q. In your review of the '424

provisional application, did you see anything providing written description support for the electrical cable as used in claim 113?

MR. DORSKY: Object to form. Leading.

A. No. I've been talking about that for a good part of the day today, Mr. Messing, that --

Q. Thank you, Doctor. Did you impose any other interpretation on the phrase "electrical cable" when drafting your declarations beyond how it is used in these asserted claims?

MR. DORSKY: Object to form.

A. No. I used the description of an electrical cable of the luminaire according to the description in the '336 patent. That seemed to be the only correct way in which to try to interpret other potential prior art.

Q. Can I please turn your attention back to the -- to your reply report, this time at page 22, paragraph 41.

A. I'm on page 22.

Q. Do you recall testifying earlier today that Chaimberg included an exemplary

switch with three positions?

A. Yes.

Q. And could you explain what you were describing here in paragraph 41 of your reply report?

MR. DORSKY: Object to form.

A. Well, again, for the sake of time, let me just read it.

Chaimberg repeatedly states that its luminaire includes "at least two sets of LEDs of different correlated color temperatures." Ergo, Exhibit 1003, the abstract. I'll just skip the citation.

In considering Chaimberg, therefore, one skilled in the art would have understood that the luminaire could include additional LEDs having CCT values other than those explicitly discussed in Chaimberg, which is 3000 kelvin and 5000 kelvin.

And this statement is correct.

MR. MESSING: Thank you, Dr. Eden. No further questions.

MR. DORSKY: And, Dr. Eden, I have no further questions, as well. Thank you again for your time.

THE WITNESS: Well, I'd like to thank you, gentlemen, as well as everybody within the sound of my voice. Thank you for your time.

THE VIDEOGRAPHER: Okay. Before we go off the record, we have some housecleaning. Do we have any orders for transcripts or video?

MR. DORSKY: I believe my orders have already been submitted for Signify.

MR. MESSING: For Luminex, I'm not sure if we've submitted. We just need the standard delivery and just the transcript.

MR. DORSKY: Just to be clear, Signify does have an expedited one, I believe.

COURT REPORTER: Mr. Messing, do you need a rough draft?

MR. MESSING: Yes, please.

THE VIDEOGRAPHER: With that, the time is now 6:03. We are now off the record.

REPORTER'S CERTIFICATE

I, Greta H. Duckett, Certified Court Reporter, Registered Professional Reporter, and Certified Realtime Reporter, hereby certify that on Friday, April 25, 2025, I reported the remote deposition of JAMES GARY EDEN, who was first duly sworn or affirmed to speak the truth in the matter of the foregoing cause, and that the pages herein contain a true and accurate transcription of the examination of said witness by counsel for the parties set out herein.

I further certify that I am neither of kin nor of counsel to any of the parties to said cause, nor in any manner interested in the results thereof.

This 28th day of April, 2025.

_____

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JAMES GARY EDEN DATE

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Illuminating ENGINEERING SOCIETY

TECHNICAL MEMORANDUM:
IES METHOD FOR DETERMINING CORRELATED COLOR TEMPERATURE (CCT) AND DISTANCE FROM THE PLANCKIAN LOCUS OF LIGHT SOURCES

AN AMERICAN NATIONAL STANDARD

JAMES GARY EDEN
EXHIBIT A
4/25/2025 Greta Ducket, CRR

Approved American National Standard ANSI

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ANSI/IES TM-40-24

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AN AMERICAN NATIONAL STANDARD

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1.0 Introduction and Scope

1.1 Introduction

Correlated color temperature (CCT) is an important metric that has been used for decades to engineer and specify light sources. In recent years, it has been increasingly common to augment CCT with distance from the Planckian locus (D_{uv} or Duv), which allows for a complete specification of a light source's chromaticity and a better indication of the relative color appearance of the light. Despite being clearly defined as "the absolute temperature of a blackbody whose chromaticity most nearly resembles that of the light source,"[1] or the "temperature of a Planckian radiator having the chromaticity nearest the chromaticity associated with the given spectral distribution" on the 1960 UCS, where (u, v) are the coordinates of the Planckian locus and the test stimulus,[2] there is no exact way to calculate CCT. It requires a highly accurate approximation, which can be accomplished in many ways.

More than a dozen methods for calculating a value for CCT were proposed and documented in scientific literature between the 1930s and 2023.[3–20] These methods have utilized a wide variety of approaches, including lookup tables with various interpolation formulas, equation-based methods reliant on modelling elements of a chromaticity diagram, and several types of iterative methods. The error for each method can be determined for a range of test chromaticity coordinates with known CCT values, and past evaluations have shown that errors can range from less than a thousandth of a kelvin to several hundred kelvins,[10,18,21–23] depending on the exact implementation.

Prior to the publication of this Technical Memorandum, no method for calculating CCT (nor Duv) has been formalized by a relevant lighting standards organization. This omission may have occurred because almost all the previously identified methods have suitable speed and accuracy for commercial applications (e.g., photometric testing), which usually only require a single calculation, so the speed does not matter, and small differences in CCT are perceptually irrelevant.

However, in some cases an accurate calculation method with known precision is required, such as when precise CCT values of reference illuminants are calculated for standards documents and when results need to be reproduced to several significant digits. Further, some situations where CCT is calculated require both fast and efficient calculations—for example, during optimizations where millions or billions of CCT calculations may be performed, or in control hardware providing real-time information on CCT. Finally, having a single, standardized method for calculating CCT and Duv that is widespread in its use is advantageous for providing consistency and eliminating uncertainty.

1.2 Scope

This document formalizes a recommended method, for the purposes described in **Section 1.1**, for computing the CCT and Duv of a light source (or theoretical illuminant) given the input of its chromaticity coordinates, which are typically calculated from a spectral power distribution. It provides all necessary data and formulae to perform calculations and provides a summary of recent work that justifies the choice of this method. It also provides a brief explanation of the use and limitations of CCT and Duv.

The recommended method is a modification[12] of a method first published by Robertson in 1968.[17] The main advancement with respect to the original is the introduction of a finer-resolution lookup table (LUT; see **Annex A**), which substantially improves the accuracy of the method. The recommended method, hereafter referred to as the IES method, uses an increment of 1% for each row of the table, resulting in an LUT that has 372 rows covering the range of 1000 to 40,000 K, instead of the original method, which had 31 rows covering 1667 K to 100,000 K. The same interpolation method is utilized, with a small correction to prevent errors around 1635 K, where the sign of the slope of the isotemperature lines changes. Recommendations are provided to maximize the efficiency of the calculation, including precomputing key values that can accompany the main LUT.

This recommended method has the following features and benefits:

1. CCT error of less than 0.1 K over the range of 1000 to 40,000 K[23] (see **Section 3**)

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2. Duv error less than 0.0001 over the range of 1000 to 40,000 K[23] (see **Section 3**)
3. More computationally efficient (shorter calculation time) than other methods currently available that achieve comparable performance[23]
4. Requires minimal data storage (approximately 70 kB in CSV file format)[12]
5. Straightforward calculations that are easy to replicate in different implementations
6. Easily adapted, via recalculation of the LUT, if the color matching functions or uniform chromaticity scale (UCS) diagram used to determine CCT were to be updated

2.0 Calculation Procedure

The method has three phases: LUT generation; LUT search and interpolation to determine CCT; and calculation of Duv. It is only necessary to perform the LUT generation portion once, as the LUT values do not change based on the light for which the CCT is being calculated. It is provided in **Annex A**, but the generation procedure is also described here for thoroughness.

2.1 LUT Generation

Minimally, the LUT includes sequential values for temperature (of a Planckian radiator) and corresponding CIE 1960 (*u*, *v*) chromaticity coordinates. These can be calculated according to CIE 15:2018.[24] The standard 372-row LUT specified for this method ranges from 1000 K to nominally 40,000 K with an increment of 1%, and should be calculated to 15 decimal places as provided in **Annex A**. That is, the first row corresponds to a temperature of 1000 K, the second a temperature of 1000 × 1.01 = 1010 K, the third 1010 × 1.01 = 1020.1 K, and so forth to a maximum of 40,107.8769032694 K. To maintain the accuracy levels of the specified method, all values in the LUT should be computed with 15 significant digits (or 64-bit double precision). If the range of interest is smaller than 1000 K to approximately 40,000 K, a truncated LUT may be used, but the temperature values are required to correspond to those calculated beginning with 1000 K and increasing with a 1% increment; otherwise, the determined CCT values will not match exactly with those calculated using the larger (recommended) LUT.

To improve the speed of subsequent calculations, several quantities used in the method can be pre-computed for each combination of temperature, *u* coordinate, and *v* coordinate that comprise a row of the most basic LUT—index value *j*. These values are related to the slope (*m*) of the isotemperature line at the given temperature, and the temperature (*T*):

- m_j
- $1/(1 + m_j^2)^{0.5}$
- $1/T_j$
- $1/T_{j+1} - 1/T_j$
- $m_j \times m_{j+1}$

Steps for computation of m_j are provided in **Annex B**, and all values are provided in **Annex A**.

With these five quantities, the standard LUT becomes 8 columns by 372 rows. It is approximately 70 kB in CSV format but can also be programmed directly into the calculation program.

It is important to note that while current definitions of CCT and Duv specify that they be calculated in the CIE 1960 (*u*, *v*) chromaticity diagram, it is possible to implement this method for other chromaticity diagrams by recalculating the LUT, as described in **Annex C**.

2.2 LUT Search and Interpolation

Given the LUT, the next step is to find the two rows corresponding to the closest points to the (*u*, *v*) chromaticity of the light source in question, which is referred to as the *test coordinate*. The test coordinate should be calculated from a light source spectral power distribution with as high a precision as possible—rounding values for (*u*, *v*) coordinates can increase the calculation error. Reduced precision (i.e., fewer decimal places) may reduce the calculation accuracy such that errors exceed the specified thresholds.

Searching can be done most efficiently with a Fibonacci search sequence[12,25,26] or with a binary search, although any search technique will yield the same two rows, including a linear search from the beginning of the

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LUT. Pseudocode for a Fibonacci search is provided in **Annex D**.

Once the two rows are identified, **Equation 2-1** is used to interpolate the CCT value (T_{cp}).

$$T_{cp} = \left[\frac{1}{T_j} + \frac{|d_j|}{|d_j| - |d_{j+1}|}\left(\frac{1}{T_{j+1}} - \frac{1}{T_j}\right)\right]^{-1}, \quad \textbf{(2-1)}$$

where:

j and j+1 are the index values of the two LUT rows corresponding to the closest points to the test coordinates

d is the distance between the test coordinates and the nearest isotemperature line

T is the temperature of the specified row

It is important to note that **Equation 2-1** is slightly modified from the original version proposed by Robertson in 1968.[17] The use of absolute values for the distance terms ameliorates potential errors due to the slope of the isotemperature line changing from positive to negative. Without this modification, errors around 1625 K—outside the range originally considered in 1968—would be slightly inflated.

2.3 Duv Calculation

Once the CCT is known, Duv (symbol D_{uv}) is calculated as the Euclidian distance between the test chromaticity coordinates ($u_{test,Tcp}$, $v_{test,Tcp}$) and coordinates of a Planckian radiator of the same CCT ($_{uPlanckian,Tcp, vPlanckian,Tcp}$), as shown in Equation 2-2. It is important that the latter be recalculated at the specific CCT, rather than using the value of the closest Planckian radiator in the LUT.

$$D_{uv} = \sqrt{\left(u_{test,Tcp} - u_{Planckian,Tcp}\right)^2 + \left(v_{test,Tcp} - v_{Planckian,Tcp}\right)^2} \quad \textbf{(2-2)}$$

3.0 Performance

This TM follows recent work comparing the speed and accuracy of various CCT calculation methods. In that analysis, the IES method had a maximum CCT error of 0.097 K and a maximum Duv error of 0.0000012 for a set of 1,270 reference chromaticity coordinates. Notably, these error levels are attainable from other methods that can be adjusted by increasing the resolution of the LUT or that are iterative in nature and reach a preset stopping criterion.

A key advantage of the IES method is that it was found to be the most computationally efficient method that could achieve a maximum CCT error less than 0.1 K and a maximum Duv error of less than 0.0001, which are approximately an order of magnitude smaller than typically reported. While absolute calculation time is dependent on programming efficiency and computing power, recent research[23] showed the time for each conversion of chromaticity coordinates to CCT and Duv to be 80 nanoseconds when programmed in C and run on an institutional computer, and approximately 1.5 milliseconds when programmed in Python and run on a typical office laptop computer.

4.0 Use and Limitations

Regardless of calculation method, the use and limitations of CCT have been well documented.[e.g.,27] Key items to remember when using CCT and Duv include:

- CCT and Duv are required to be used together for a complete specification of chromaticity.[16] Either alone is insufficient for characterizing even the relative appearance of a light stimulus. That is, with all other factors being equal, two lights with the same CCT can vary in appearance; this variation is generally in the pink-green dimension. Likewise, light sources with the same Duv value can vary in the blue-yellow dimension.
- CCT and Duv (and chromaticity) do not convey absolute color appearance; the same stimulus with the same CCT and Duv can appear very differently if, for example, the surround condition is different or the state of adaptation of the observer is different.[16] For example, a light with CCT of 4000 K and Duv of 0.0000 may appear cool blue next to one with CCT of 2700 K, but warm next to one with CCT of 6500 K.
- CCT and Duv reduce the complex information contained in a spectral power distribution to a pair

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of numbers. They should not be used as a proxy for other quantities derived from a spectral power distribution (e.g., alpha-opic flux),[28] especially when accuracy of calculations is important. For example, melanopic flux for lights with the same CCT, Duv, and luminous flux can vary by a factor of 2 or more.

- There is not a universally preferred CCT and Duv or single nominally white CCT and Duv,[29–32] and older findings regarding an illuminance-CCT preference band have been discredited.[33] Many factors, such as spectral power distribution, culture, geography, adaptation state, and personal preferences can affect preferred chromaticity.
- The CIE system of colorimetry, on which CCT and Duv calculations rely, is based on standard observers and does not account for interobserver variability. This variability can lead to different real observers having different perception of "matches" between lights characterized as having the same chromaticity (i.e., the same CCT and Duv).[34,35]

This Technical Memorandum and the IES method for calculating CCT and Duv do not address any of these issues. Nonetheless, they represent an important advancement because they provides a formalized method for calculating CCT and Duv, which will allow for consistent application in the lighting profession. The method is suitably accurate and computationally efficient, thus facilitating optimizations and real-time calculations in addition to other one-off calculations. Therefore, it is recommended for widespread use.

If the method described in this Technical Memorandum is not used, alternative methods should minimally achieve the same maximum error thresholds: 0.1 K for CCT and 0.0001 for Duv. These can be achieved by several calculation methods, and the specific method implemented should be noted. Alternative methods are likely to be less computationally efficient and require more time per calculation to achieve the same accuracy.

Annex A
Lookup Table

Note: This annex is not part of ANSI/IES TM-40-24. *It is intended for information only.*

Index	Color Temperature	u	v	m_j	$1/(1 + m_j^2)^{0.5}$	$1/T_j$	$1/T_{j+1} - 1/T_j$	$m_j * m_{j+1}$
1	1000.00000000000	0.448010894640648	0.354624980858124	11.53452515075300	0.08637225382345	0.00100000000000	-0.00000990099010	134.079000493862
2	1010.00000000000	0.445681292405968	0.354826175721752	11.62414566195720	0.08571124699541	0.00099009900990	-0.00000980296049	136.225509482143
3	1020.10000000000	0.443353478205085	0.355025626391888	11.71918465612260	0.08502119999877	0.00098029604941	-0.00000970590148	138.520887813795
4	1030.30100000000	0.441027834601749	0.355223233656728	11.82001068149610	0.08430113563075	0.00097059014793	-0.00000960980344	140.977553562295
5	1040.60401000000	0.438704738259149	0.355418897533421	11.92702421013800	0.08355005940775	0.00096098034448	-0.00000951465688	143.609258391070
6	1051.01005010000	0.436384559838273	0.355612517300679	12.04066126310040	0.08276695999222	0.00095146568761	-0.00000942045235	146.431268332494
7	1061.52015060100	0.434067663905223	0.355803991533481	12.16139754560190	0.08195080965621	0.00094204523525	-0.00000932718055	149.460574129875
8	1072.13535210701	0.431754408847424	0.355993218139892	12.28975317758000	0.08110056478149	0.00093271805471	-0.00000923483222	152.716136826410
9	1082.85670562808	0.429445146798627	0.356180094400057	12.42629812167480	0.08021516639607	0.00092348322248	-0.00000914339824	156.219175548753
10	1093.68527268436	0.427140223572579	0.356364517007382	12.57165843110300	0.07929354074777	0.00091433982424	-0.00000905286955	159.993506020297

The full table can be found at https://media.ies.org/docs/standards/TM-40-24_AnnexA.xlsx (Accessed 2024 May 29).

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Annex B
Calculation of the Slope of an Isotemperature Line

Note: This annex is not part of ANSI/IES TM-40-24. *It is intended for information only.*

According to CIE 15:2018,[24] the spectral power distribution of a Planckian radiator at temperature (T) is calculated as shown in **Equation B-1**.

$$M(\lambda,T) = c_1 \lambda^{-5} (e^{c_2/(\lambda T)} - 1)^{-1}) , \quad \textbf{(B-1)}$$

where:

$c_1 = 3.741832 \times 10^{-16}$ (in watts per square meter, W/m^2)

$c_2 = 1.4388 \times 10^{-2}$ (in millikelvins, mK)

The unscaled tristimulus values of the Planckian radiator can then be calculated as shown in **Equations B-2** through **B-4**.

$$X(T) = \int M(\lambda,T)\bar{x}(\lambda)d\lambda \quad \textbf{(B-2)}$$

$$Y(T) = \int M(\lambda,T)\bar{y}(\lambda)d\lambda \quad \textbf{(B-3)}$$

$$Z(T) = \int M(\lambda,T)\bar{z}(\lambda)d\lambda \quad \textbf{(B-4)}$$

These values are integrated over the visible range. In practice, these values are calculated as the sum product; for the table in **Annex A**, the range of 360 to 830 nm was used, with an increment of 1 nm. The first derivative of a Planckian radiator at temperature (T) is calculated as shown in **Equations B-5** and **B-6**:

$$M'(\lambda,T) = \frac{\partial M(\lambda,T)}{\partial T} = c_3(T)\lambda^{-6}\left(e^{c_2/(\lambda T)}-1\right)^{-2} e^{c2/(\lambda T)} , \quad \textbf{(B-5)}$$

$$\text{with } c_3 = \frac{c_1 c_2}{T^2} \quad \textbf{(B-6)}$$

With this, the first derivatives of the tristimulus values can be calculated as shown in **Equations B-7** through **B-9**.

$$X'(T) = \int M'(\lambda,T)\bar{x}(\lambda)\mathrm{d}\lambda \quad \textbf{(B-7)}$$

$$Y'(T) = \int M'(\lambda,T)\bar{y}(\lambda)\mathrm{d}\lambda \quad \textbf{(B-8)}$$

$$Z'(T) = \int M'(\lambda,T)\bar{z}(\lambda)\mathrm{d}\lambda \quad \textbf{(B-9)}$$

From this, **Equations B-10** and **B-11** can be calculated.

$$u'(T) = \frac{4X'(T)[X(T)+15Y(T)+3Z(T)] - 4X(T)\left[X'(T)+15Y'(T)+3Z'(T)\right]}{[X(T)+15Y(T)+3Z(T)]^2} \quad \textbf{(B-10)}$$

$$v'(T) = \frac{6Y'(T)[X(T)+15Y(T)+3Z(T)] - 6Y(T)\left[X'(T)+15Y'(T)+3Z'(T)\right]}{[X(T)+15Y(T)+3Z(T)]^2} \quad \textbf{(B-11)}$$

The slope of the isotemperature line is then calculated as shown in **Equation B-12**.

$$m_i = -u'(T)/(v'(T) \quad \textbf{(B-12)}$$

Annex C
Use of the Recommended Method With Alternative Chromaticity Diagrams

Note: This annex is not part of ANSI/IES TM-40-24. *It is intended for information only.*

The CCT calculation method described in this Technical Memorandum can be applied to other chromaticity diagrams, including those generated from different color matching functions. The only action necessary is to recalculate the LUT using new color matching functions (or cone fundamentals) and/or projective transformation. For example, the method could be used to calculate CCTst and Dst,[36] which are recently proposed analogs to CCT and Duv in the (*s*, *t*) chromaticity diagram built from the CIE 2015 cone-fundamental based tristimulus functions. If any alternative color matching functions or projective transformation is used, the results should be clearly noted to avoid confusion with the specifically defined CCT and Duv quantities.

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Annex D
Pseudocode for Fibonacci Search

Note: This annex is not part of ANSI/IES TM-40-24. *It is intended for information only.*

The standard LUT has j rows indexed from 1 to 372. The temperature, u coordinate, and v coordinate can be denoted as t_j, u_j, and v_j for the jth row, with j in [1, 372]. It should be noted that this discussion focuses on the three primary columns of the LUT.

Given chromaticity coordinates (u_x, v_x), the goal is to find the index, j, for which the distance from (u_x, v_x) to (u_j, v_j) is a minimum. It suffices to find the minimum square of the distance between (u_x, v_x) and (u_j, v_j), as $a^2 < b^2$ implies $|a| < |b|$. This eliminates needing to take square roots for each distance computed.

For convenience, the squared distance can be defined as the function g as shown in **Equation C-1**.

$$g(u_j, v_j, u_x, v_x) = (u_j - u_x)^2 + (v_j - v_x)^2 \quad \textbf{(C-1)}$$

An additional requirement for the Fibonacci search technique is an array of Fibonacci numbers, $F[i]$, that omits the traditional first two elements of the sequence, 0 and 1, and starts instead with next two elements 1 and 2 as shown in **Equations C-2** through **C-4**.

$$F[0] = 1 \quad \textbf{(C-2)}$$
$$F[1] = 2 \quad \textbf{(C-3)}$$
$$F[i] = F[i-1] + F[i-2],\ i \geq 2 \quad \textbf{(C-4)}$$

The length of F, $l+1$, is chosen such that **Equations C-5** and **C-6** hold:

$$F[l-1] < 372 \quad \textbf{(C-5)}$$
$$F[l] \geq 372 \quad \textbf{(C-6)}$$

Then during each stage of the search, four indices are tracked into the table: A *left* and a *right* index that define the limits of the index range in which the point of minimum distance from the target lies; and two indices a and b that lie between *left* and *right* and are successive Fibonacci numbers after *left*. Each step of the search then involves reducing the distance between *left* and *right* to the next lower Fibonacci number by replacing one of the endpoints with the interior point at largest distance from the target and choosing a new interior point that maintains the relationships in **Equations C-7** through **C-9**, with k decreasing at each stage.

$$a = left + F[k] \quad \textbf{(C-7)}$$
$$b = left + F[k+1] \quad \textbf{(C-8)}$$
$$right = left + F[k+2] \quad \textbf{(C-9)}$$

It is important to note that when the row j closest to the target is greater than $F[l-1]$ as defined in **Equations C-5** and **C-6** and $F[l]$ is strictly greater than j-1, **Equations C-7** through **C-9** may generate indices greater than $n-1$; thus, it is important that additional restrictions be placed on a, b, and *right* to avoid referring to nonexistent rows of the LUT, and to maintain strict inequality of a and b as defined in **Equations C-10** through **C-12**.

$$right \leq 372 \quad \textbf{(C-10)}$$
$$b \leq 372 \quad \textbf{(C-11)}$$
$$a < b \quad \textbf{(C-12)}$$

The *left* and *right* indices are initialized to 0 and 372, respectively, and then only set to successive a or b values; hence, **Equation C-10** always holds if **Equation C-11** is enforced. As b is updated, **Equation C-11** will have to be enforced, and as a is updated, **Equation C-12** will have to be enforced. It is important to note that when j is 1, then *left*, a, and b necessarily point to consecutive rows in the LUT, and *right* is either one more than b or equal to b if the solution is at the very end of the table. Thus, the minimum-distance row from the table will be either a or b if *left* is not 1 and *right* is not 372. The latter conditions are ensured by extending the LUT downward and upward so that (u_1, v_{01}) and (u_{372}, v_{372}) are never the closest points to a target (u_x, v_x).

A pseudo-code algorithm for the Fibonacci search as described is given in **Figure C-1**. The variables dsq_left, dsq_right, dsq_a, and dsq_b are used to hold the distances from (u_x, v_x) to the points in the corresponding rows of the table so as to compute the distance to any given row in the table only once.

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```
left = 1;                                                                    1
right = 372;                                                                 2
a = F[l − 2];                                                                3
b = F[l − 1];                                                                4
dsq_left = g(u1,v1,,ux,vx);                                                  5
dsq_a = g(ua,va,,ux,vx);                                                     6
dsq_b = g(ub,vb,,ux,vx);                                                     7
dsq_right = g(uj−1,vj−1,,ux,vx);                                             8
for (i = l − 3; i ≥ 0; i = i − 1) {                                          9
   if (dsq_a < dsq_b) {                                                      10
      /* row a was closer shift to [left, b] */                             11
      right = b;                                                             12
      dsq_right = b;                                                         13
      b = a;                                                                 14
      dsq_b = dsq_a;                                                         15
      a = left + F[j];                                                       16
      if (a > b) {                                                           17
         a = b − 1;                                                          18
      }                                                                      19
      dsq_a = g(ua, va,, ux, vx)                                             20
   } else {                                                                  21
      /* row b was closer, shift to [a, right] */                           22
      left = a;                                                              23
      dsq_left = dsq_a;                                                      24
      a = b;                                                                 25
      dsq_a = dsq_b;                                                         26
      b = left + F[i + 1];                                                   27
      if (b ≥ (right)) {                                                     28
         b = (right − 1);                                                    29
      }                                                                      30
      dsq_b = g(ub, vb,, ux, vx);                                            31
   }                                                                         32
}                                                                            33
if (dsq_a < dsq_b) {                                                         34
   j = a;                                                                    35
} else {                                                                     36
   j = b;                                                                    37
}                                                                            38
/* j is the index of the row of the table closest to (ux,vx) */              39
```

Figure C-1. Pseudocode for Fibonacci search of the standard LUT.

It should be noted that only one of line 32 or line 20 is executed; thus, only one distance computation (call to g) is made per iteration of the loop. In practice, the LUT may have a different number of columns depending on the method of interpolation to be used, and it is useful to store it in a single linear array of length $m*n$, where m is the number of columns. Then it saves a little bit of indexing time to have the search generate $k*m$ instead of k, so as to get the offset of the first element of the jth row of the table. This is easily accomplished by starting with the Fibonacci array generation replacing **Equations C-2** and **C-3** with **Equations C-13** and **C-14**.

$$F[1] = m; \quad \textbf{(C-13)}$$

$$F[2] = m + m; \quad \textbf{(C-14)}$$

Then, **Equation C-4** can be used to generate the rest of the table until $F(l) \geq m * (372)$. Also, line 18 in **Figure C-1** needs to change to $a = b - m$, line 29 needs to change to $b = right - m$, and the (372) in lines 28 and 29 of **Figure C-1** (i.e., *right*) needs to change to $m * (372)$.

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Process for Change to an ANSI/IES Standard Under Continuous Maintenance

This standard is maintained under continuous maintenance procedures, for which IES has an established and documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Committee consideration will be given to proposed changes by June 30 of any given year for proposed changes received by the IES Director of Standards no later than December 31 of the previous year.

Submittal Format

Proposed changes must be submitted to the IES Director of Standards in the announced published format. However, changes may be accepted in an earlier published format, if the differences are immaterial to the proposed change submittal. If the Director of Standards concludes that a current form must be utilized, the proposer may be given up to 20 additional days to resubmit the proposed changes in the current format.

Specific changes in the text or values are required and must be substantiated. Any change proposals that do not meet these requirements will be returned to the proposer. Supplemental background documents to support changes submitted may be included.

Submission to the Committee Chair

The Director of Standards shall forward proposed changes received on appropriate forms to the committee chair for assigning to committee members (responders) to develop responses to submitters of proposed changes.

Review and Clarification

Responders shall review proposals and should contact the proposer if necessary for clarification.

Response Recommendation

Designated responders shall draft a recommended committee response, including any recommended changes to the standard. The 'responders' recommended responses shall be submitted to the committee chair in electronic form usable by Society Staff, including any recommended change to the standard in response to proposals received.

Options for Committee response are limited to:

a) Proposed change accepted for public review without modification
b) Proposed change accepted for public review with modification
c) Proposed change accepted for further study
d) Proposed change rejected

The responders shall provide reasons for any recommendation other than option (a) above.

The designated responders shall not recommend option (c) unless the further study can be completed by October 1 of that year, and providing the Committee can then vote for option (a), (b), or (d) no later than November 15 of that year.

Editing

The Committee chair or his or her designee shall edit the draft responses and circulate the edited drafts to the committee for review.

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Form for Proposing Change to an ANSI/IES Standard Under Continuous Maintenance

NOTE:
Use a separate form for each comment. Submit to the Director of Standards, IES, 85 Broad St, FL 17, New York NY 10004. Email: standards@ies.org. Fax: 212-248-5017.

1. Submitter: _____
   Affiliation: _____
   Address: _____
   City: _____ State: _____ Zip: _____ Country: _____
   Telephone: _____
   Fax: _____
   E-mail: _____

I hereby grant the Illuminating Engineering Society (IES) the non-exclusive royalty rights, including non-exclusive rights in copyright, in my proposals. I understand that I acquire no rights in publication of the standard in which my proposals in this, or other analogous, form are used. I hereby attest that I have the authority and am empowered to grant this copyright release.

Submitter's signature: _____ Date: _____

2. Title of publications and year published _____
3. Clause (section), sub-clause or paragraph number; and page number: _____
4. My proposal (check one):
   [ ] Change to read as follows
   [ ] Delete and substitute as follows
   [ ] Add new text as follows
   [ ] Delete without substitution

Use underscore to show material to be added (<u>added</u>) and strikethrough for material to be deleted (~~deleted~~). Use additional pages if needed.

5. Proposed change:

_____
_____
_____

6. Reason and substantiation:

_____
_____
_____

Select as applicable:
[ ] Additional pages are attached. Number of additional pages:
[ ] Attachments or referenced materials cited in this proposal accompany this proposed change.

Please verify that all attachments and references are relevant, current, and clearly labeled to avoid processing and review delays. Please list your attachments here:

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