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Transcript of Nan Marie Jokerst, Ph.D.

Date: July 22, 2025

Case: Biofrontera, Inc., et al. -v- Sun Pharmaceutical Industries, Inc. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

BIOFRONTERA EXHIBIT 1027

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4 BIOFRONTERA INC., BIOFRONTERA BIOSCIENCE GMBH,
5 BIOFRONTERA PHARMA GMBH, AND BIOFRONTERA AG
Petitioner,

6 V.

7 SUN PHARMACEUTICAL INDUSTRIES, INC.
8 Patent Owner

9 Case IPR2024-01312
10 Patent 11,697,028

11 ORAL, REALTIMED DEPOSITION OF

12 NAN MARIE JOKERST, PH.D.

13 JULY 22, 2025

14 TAKEN VIA ZOOM VIDEOCONFERENCE
15 -----

16
17
18 JOB NO.: 593088

19 PAGES: 1 - 180

20 REPORTED STENOGRAPHICALLY BY:

21 ANNETTE PELTIER, CSR, CRR
22

1 ORAL, REALTIMED DEPOSITION OF NAN MARIE
2 JOKERST, PH.D., produced as a witness at the
3 instance of the Petitioner, and duly sworn, was
4 taken in the above-styled and numbered cause on
5 July 22, 2025, from 8:02 a.m. to 1:09 p.m.
6 Central time, before Annette Peltier, CSR, Texas
7 Certified Realtime Reporter, in and for the
8 State of Texas, reported by machine shorthand
9 pursuant to the PTAB Rules of Civil Procedure
10 and the provisions stated on the record or
11 attached hereto.

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A P P E A R A N C E S

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ALSO PRESENT:

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VIA REALTIME FEED:

Gabrielle Higgins/Witness
Bridget Belcher
Raymond Habbaz
Chad Landmon
Kendall Gurule
Megan Hart

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* * No Exhibits to be Attached Per Counsel * *	

1 THE COURT REPORTER: Ms. Higgins,
2 I see several of your people are in the
3 realtime. I'm assuming you want a copy of the
4 deposition?

5 MS. HIGGINS: Yes, ma'am.

6 * * * *

7 EXHIBIT TECH: Thank you to
8 everyone for attending this meeting remotely,
9 which we anticipate will run smoothly.

10 Please remember to speak slowly
11 and do your best not to talk over one another.

12 Please be aware that we are
13 recording this proceeding for backup purposes.

14 Any off-the-record discussions
15 should be had away from the computer.

16 Please remember to mute your mic
17 for those conversations.

18 Please have your video enabled to
19 help the reporter identify who is speaking. If
20 you are unable to connect with video and are
21 connecting via phone, please identify yourself
22 each time before speaking.

1 We'll provide a complimentary,
2 unedited recording of this deposition with the
3 purchase of a transcript.

4 I apologize in advance for any
5 technical-related interruptions.

6 Thank you.

7 NAN MARIE JOKERST, PH.D.,
8 Having been first duly sworn, testified upon her
9 oath as follows:

10 MR. LANDMON: All set for me to
11 get started?

12 THE COURT REPORTER: Yes, sir.

13 MR. LANDMON: Great. Thank you.

14 MS. HIGGINS: I'm sorry. Should
15 we just announce the appearances on the record,
16 please?

17 MR. LANDMON: Yeah, we can -- we
18 can do that; so I'll get started. I'm Chad
19 Landmon with Polsinelli on behalf of the
20 Biofrontera petitioners. With me is James
21 Murphy, Kendall Gurule, and Megan Hart.

22 MS. HIGGINS: This is Gabrielle

1 Higgins on behalf of Sun Pharma. I am at the
2 DLLP firm, and with me is Dr. Bridget Belcher.

3 EXAMINATION

4 BY MR. LANDMON:

5 Q. All right. Dr. Jokerst, as you already
6 heard, I'm Chad Landmon; and as you know, we've
7 seen each other a few times before.

8 But I assume you understand today that
9 you're being deposed in the IPR proceeding to --
10 in relation to the '028 patent which is U.S.
11 Patent Number 11,697,028; is that right?

12 A. Yes, that's correct.

13 Q. Okay. And just before we get started,
14 just wanted to go through -- I know you've been
15 through this and you and I have been through
16 this a couple of times before, but just wanted
17 to go through a couple of instructions and
18 things to -- things to think about.

19 Obviously I'll be asking you questions
20 and ask that you respond to those questions. I
21 will do my best not to interrupt you; and
22 apologies in advance if I do, but ask that you

1 do the same and try not to interrupt me and
2 allow the court reporter to get everything down.

3 We'll be taking breaks periodically,
4 as you know, but, you know, if you ever need a
5 break, just let me know and we'll do our best to
6 accommodate that; and I may ask that you finish
7 answering a question or two, but other than
8 that, we can certainly go on to a break.

9 Your counsel here today may have some
10 objections. Generally, you still need to answer
11 the question unless she instructs you not to.

12 After the deposition is over, as you
13 know, the court reporter will prepare a written
14 transcript and allow you the opportunity to
15 review that.

16 Does all that make sense?

17 A. Yes, it does.

18 Q. Is there any reason you can't testify
19 truthfully today?

20 A. No, there is not.

21 Q. Okay. And just given the remote nature of
22 the deposition, which obviously can be strange,

1 I just wanted to ask you, you know, first off,
2 where are you physically?

3 A. I'm physically in the Desmarais D.C.
4 office in a conference room.

5 Q. And who's in the room with you?

6 A. Gabrielle Higgins.

7 Q. Is there anyone else in the room?

8 A. No, there's no one else in the room.

9 Q. Do you have any materials with you?

10 A. So I have some materials with me here. I
11 can list them if you'd like me to.

12 Q. Yeah, if you -- if you can.

13 A. Okay. I have Exhibit 2050, Declaration of
14 Nan Marie Jokerst, Ph.D.; I have Appendix A, the
15 challenged claims; Appendix B, the '028 claim
16 chart; and Appendix C, the Materials Considered.

17 I also have Exhibit 1001, U.S. Patent
18 11,697,028; Exhibit 1014, Lundahl U.S. Patent
19 6,223,071; Exhibit 1004, Larsen '703; and
20 Exhibit 1005, Bansal.

21 Q. Do you have anything open on your computer
22 screen other than this Zoom link?

1 A. No.

2 Q. Okay. And are you in communication with
3 anyone during this deposition by text, chat,
4 e-mail, or any other means?

5 A. No.

6 Q. Have you been retained as an expert in any
7 other matter since the last time I took your
8 deposition?

9 A. So since you took my deposition last,
10 which would be the ITC proceeding, I have not
11 been retained for any other expert engagements.

12 Q. And since I took your deposition, have you
13 given deposition or trial testimony in any
14 matter other than the ITC proceeding?

15 A. No, I have not.

16 Q. What did you do to prepare for today's
17 deposition?

18 MS. HIGGINS: And I instruct the
19 witness not to reveal any communications with
20 counsel.

21 A. So I met with counsel and reviewed
22 documents.

1 Q. (BY MR. LANDMON) And when did that
2 meeting take place?

3 A. Yesterday.

4 Q. Who did you meet with?

5 A. Gabrielle Higgins, Bridget Belcher, and
6 Raymond Habbaz.

7 Q. How long was that meeting?

8 A. The meeting was approximately eight hours.

9 Q. And what documents did you review during
10 that meeting?

11 MS. HIGGINS: And I'm going to
12 instruct the witness that he doesn't get a list
13 of documents that were shown to you by counsel,
14 but you can generally tell him what you
15 reviewed.

16 A. Documents associated with my expert report
17 for this IPR.

18 Q. (BY MR. LANDMON) Did you review any
19 documents that are not cited in your expert
20 report?

21 A. No.

22 Q. Did you review any of your trial testimony

1 or deposition testimony from the IPR proceeding?

2 A. No -- I'm sorry. Wait a second. You said
3 IPR proceeding. You meant ITC proceeding,
4 right?

5 Q. I did.

6 A. Sorry. I knew you meant ITC.

7 MS. HIGGINS: Can you reask the
8 question, please, Counsel?

9 MR. LANDMON: Of course.

10 Q. (BY MR. LANDMON) Did you review any of
11 your trial testimony or deposition testimony
12 from the ITC proceeding?

13 A. No, I did not.

14 Q. Thank you for catching my mistake,
15 Dr. Jokerst.

16 Did you -- in preparing for today's
17 deposition, did you speak to anyone other than
18 the attorneys you mentioned?

19 A. No, I did not.

20 Q. And in preparing your expert declaration
21 here, did you discuss that with anyone other
22 than the attorneys from Desmarais?

1 A. I'm not sure what you mean by that. Could
2 you be more specific, please?

3 Q. Yeah.

4 Was there anyone else you spoke to in
5 connection with your expert declaration other
6 than attorneys from Desmarais?

7 A. No.

8 Q. Did you -- have you -- sorry about that.

9 So in your declaration, you also say
10 that you reviewed the declaration of
11 Dr. Roberts.

12 Do you recall that?

13 A. Yes. There were two declarations of
14 Dr. Roberts.

15 Q. Okay. And have you spoken to Dr. Roberts?

16 A. No, I have not.

17 Q. When were you approached by Desmarais
18 about serving as an expert in this IPR?

19 A. I believe it was in the May time frame,
20 but I'm not entirely certain of the date.

21 Q. And is any part of your compensation in
22 this matter dependent on the substance of your

1 report?

2 A. No.

3 Q. Is any part of your compensation dependent
4 on the outcome of the IPR proceeding or the ITC
5 proceeding?

6 A. No.

7 Q. Other than your role as an expert witness
8 with respect to the ITC and IPR, do you have any
9 other involvement with the parties at issue
10 here?

11 A. No, I do not.

12 Q. And you don't own any stock in Sun Pharma
13 or Biofrontera, right?

14 A. No, I do not.

15 Q. And have you posted any statements about
16 this IPR proceeding or the ITC case to social
17 media?

18 A. No.

19 Q. So I don't recall if you mentioned this.
20 Do you have your CV in front of you? It's
21 Exhibit -- I think it's Exhibit 2051.

22 A. No, I do not.

1 Q. Okay.

2 MR. LANDMON: Can we have that
3 exhibit pulled up?

4 EXHIBIT TECH: Absolutely. Stand
5 by.

6 (Whereupon Exhibit Number 2051 was
7 marked for identification.)

8 MS. HIGGINS: Mr. Landmon, can you
9 also have the tech publish the exhibit in case
10 Dr. Jokerst wants to look at the exhibit as a
11 whole? Can we do that?

12 MR. LANDMON: I think we --
13 Maddie, is that something you could do?

14 EXHIBIT TECH: Yes, I can -- I can
15 do that. I can also give the witness control
16 over the document. I can do both, whatever we
17 want.

18 MS. HIGGINS: Okay. Mr. Landmon,
19 why don't you see what the witness is
20 comfortable with. She'll let you know.

21 MR. LANDMON: So can we have that
22 document back up?

1 EXHIBIT TECH: Yep. I just
2 published it in the chat, and I'm bringing it
3 back up.

4 Q. (BY MR. LANDMON) So, Dr. Jokerst, I've
5 put in front of you what's marked as
6 Exhibit 2051.

7 Is -- is this the CV that you've
8 provided in connection with your expert
9 declaration for the IPR proceeding?

10 A. Yes. On the first page, this is my CV,
11 yes.

12 Q. Okay. Do you know when this document was
13 last updated?

14 A. I believe it was updated around --
15 somewhere between May and July of 2025.

16 Q. And is there anything that should be added
17 or changed about this since the last time you
18 updated it?

19 A. No.

20 Q. Okay.

21 MR. LANDMON: Okay. We can
22 probably pull that down.

1 Q. (BY MR. LANDMON) So, Dr. Jokerst, I was
2 going to ask that you now open the -- the
3 Lundahl reference that's Exhibit 1014. I think
4 you mentioned you had that in front of you,
5 right?

6 A. Yes, I do.

7 Q. Okay. Let me -- let me know when you have
8 it open.

9 (Whereupon Exhibit Number 1014 was
10 marked for identification.)

11 A. All right. I have it open.

12 Q. (BY MR. LANDMON) Lundahl doesn't disclose
13 a multi-panel device, right?

14 A. That is correct.

15 Q. And it would be fair to say that Lundahl
16 is silent as to a multi-panel device, right?

17 A. Yes. Lundahl is a single-panel device.

18 Q. And it -- it -- it's silent. It doesn't
19 say anything about a multi-panel device, right?

20 A. I believe that's correct.

21 Q. If you could turn with me to column 4, and
22 I'm going to ask you to -- to focus on --

1 starting on line 29, you'll see a sentence
2 starting with "A flat emitting surface." Let me
3 know when you're there.

4 A. Yes, I'm there.

5 Q. Okay. And you see that Lundahl says: "A
6 flat emitting surface would not deliver a
7 uniform light dose to all contours of the face."

8 And then -- and then it goes on. Do
9 you see that?

10 A. Yes, I do.

11 Q. It's fair to say that this sentence and --
12 and paragraph in Lundahl is not talking about a
13 multi-panel device, right?

14 MS. HIGGINS: Objection, vague.

15 A. I wouldn't necessarily draw that
16 conclusion.

17 Q. (BY MR. LANDMON) Okay. So you would
18 conclude that Lundahl's reference to a flat
19 emitting surface is -- is referring to a
20 multi-panel device?

21 A. No, not explicitly; however, a multi-panel
22 device could have a flat emitting surface in one

1 configuration.

2 Q. And when Lundahl refers to a "flat
3 emitting surface" there, it's referring to just
4 to a singular surface, correct, a single panel?

5 A. Lundahl does not say that the flat
6 emitting surface is -- he -- he makes no
7 statement about whether it is multiple panels or
8 single panels. He simply doesn't state that.

9 Q. Okay. And a POSITA reading that -- I
10 should back up.

11 In your declaration you refer a lot to
12 a -- a POSITA. Do you remember that?

13 A. Yes.

14 Q. And you understand that a POSITA is a
15 person of ordinary skill in the art, correct?

16 A. Yes.

17 Q. Okay. And a person of ordinary skill in
18 the art reading this sentence would understand
19 Lundahl to be referring to a single flat
20 emitting surface, right?

21 A. Well, a POSITA would read Lundahl that
22 says, "A flat emitting surface would not deliver

1 a uniform light dose," et cetera, et cetera; but
2 Lundahl does not say a single flat emitting
3 surface, and so I would not read that into
4 Lundahl because it's not stated.

5 Q. Okay. So it's your opinion in reading
6 this that a flat emitting surface does not refer
7 to a single flat emitting surface?

8 A. Well, I think it's important to read the
9 patent as stated and not add words to the patent
10 as stated.

11 Q. Yeah. So I wasn't trying to add words.

12 It says, and I'll quote: "A flat
13 emitting surface," end quote. It's your opinion
14 that that does not refer to just a single flat
15 emitting surface, right?

16 A. So a flat emitting surface is simply that,
17 a flat emitting surface; and so a flat emitting
18 surface could be made up of multiple units. It
19 does not mean that a flat emitting surface would
20 be a single unit.

21 Q. Okay. So it's your opinion that the word
22 "A" doesn't refer to something that's in the

1 singular, right? Is that -- is that your
2 understanding of the English language?

3 A. No.

4 A flat emitting surface would be a
5 flat emitting surface, but the constituents
6 associated with what makes up that flat emitting
7 surface may not be singular.

8 Q. Okay. So it's your opinion -- and -- and
9 I just want to focus -- focus on the word "A" --
10 that the word "A" in the English language does
11 not always refer to a -- something that's
12 singular.

13 Is that -- is that your opinion here?

14 A. So I think that a flat emitting surface is
15 exactly that, a flat emitting surface, which is
16 singular; however, it does not speak to the
17 constituents that make up that flat emitting
18 surface.

19 Q. And it's your opinion that a flat emitting
20 surface disclosed here might not be able to
21 deliver a uniform light dose to all contours of
22 the face simultaneously, right?

1 A. So Lundahl states in column 4, roughly
2 line 29 on, that: "A flat emitting surface
3 would not deliver a uniform light dose to all
4 contours of the face simultaneously because the
5 non-planar facial and scalp surfaces could not
6 be placed at a constant distance from the
7 emitting surface."

8 I believe Lundahl is correct in that
9 statement.

10 Q. Okay. And Lundahl provides a U-shaped
11 device that can better follow the contours of a
12 patient's face, right?

13 A. Yes.

14 Lundahl stipulates that the U shape is
15 designed to better illuminate a human face.

16 Q. And that's one of the solutions that
17 Lundahl provides over a single flat panel to
18 provide therapy to the contours of a patient's
19 face, right?

20 MS. HIGGINS: Objection, form.

21 A. So Lundahl very specifically -- in fact,
22 once again, in column 4, line, roughly 12, says

1 that there are many components that are
2 important.

3 So I'll read a little bit from
4 Lundahl, quote: "The present invention differs
5 from conventional light sources because of the
6 biological requirements imposed on a PDT light
7 source. A much higher degree of precision and
8 integration is required for the components of
9 the present invention."

10 And I'll move down a little bit. "To
11 achieve this, each functional block within the
12 present invention comprises carefully selected
13 and engineered components."

14 So, for example, there are reflectors,
15 there's cooling, there's the U-shaped tube,
16 there is the ballast, the electrical system; so
17 there -- these many engineered components are
18 engineered to work together to provide a PDT
19 structure, according to Lundahl.

20 Q. (BY MR. LANDMON) Dr. Jokerst, I'd -- I'd
21 asked -- it will be a much quicker day if you
22 focus on my questions and provide answers to

1 those, so -- so -- so let me back up a little
2 bit here.

3 One of the problems you -- you
4 identify and Lundahl identifies is that a
5 patient's face has different contours, right?

6 A. Yes, that's correct.

7 Q. And it's your opinion and Lundahl's -- and
8 Lundahl states that a flat panel can't provide
9 therapy around the contours of a patient's face
10 because it's a flat panel, right?

11 A. Yes, that's correct.

12 Q. And one of the solutions Lundahl provides
13 is providing a U shape to provide therapy around
14 a patient's face, right?

15 A. So my emphasis on the multiple components
16 is because the U shape is only one of multiple
17 components that were carefully engineered
18 together to provide illumination via the --
19 vis- -vis PDT to the patient's face.

20 Q. But you agree that it's one of the
21 components, right?

22 A. It is one of multiple components, that is

1 correct.

2 Q. Okay. If I can get you to turn to --
3 and -- and I think you said you had the Larsen
4 reference, which is Exhibit 1004, in front of
5 you.

6 (Whereupon Exhibit Number 1004 was
7 marked for identification.)

8 A. Yes. Let me go to that reference.

9 Q. (BY MR. LANDMON) Let me know when you've
10 got it open.

11 A. Okay. I have it open.

12 Q. Okay. And if I can get you to turn to the
13 second page and -- and Figure 1. Let me know
14 when you have that.

15 A. Yes, I have it open.

16 Q. Okay. And Larsen shows a multi-panel
17 device, right?

18 A. Larsen characterizes this device as a -- a
19 device with five applicators.

20 Q. And you'd agree that "applicators" are
21 "panels," right?

22 A. In the context of this IPR, "applicators"

1 have been construed as "panels."

2 Q. And the -- the panels here in Figure 1 are
3 not in a single flat plane, right?

4 MS. HIGGINS: Objection, form.

5 A. So the drawing in Figure 1 for the five
6 panels does not show them in a straight line.
7 It's a little bit difficult to tell if they're
8 in a flat configuration or not from this
9 drawing, but the -- the top and bottom of the
10 panels is not in a straight line.

11 Q. (BY MR. LANDMON) Okay. But -- and you
12 agreed with me, you remember, a couple of weeks
13 ago at the ITC trial, right?

14 MS. HIGGINS: Objection. We're
15 not going to get into the ITC trial unless
16 you're specifying there was CBI all over the
17 I -- ITC trial, and -- and so I want to make
18 sure that to the extent you're referencing
19 testimony there, we're being specific about
20 that. So --

21 MR. LANDMON: Got it.

22 MS. HIGGINS: -- so I -- you --

1 you can ask questions, but we are not referring
2 to the ITC record in this proceeding in a way
3 that could violate the protective order over
4 there, and so I want you to be specific.

5 MR. LANDMON: No. Absolutely,
6 Counsel.

7 Q. (BY MR. LANDMON) And -- and, Dr. Jokerst,
8 please -- please keep CBI in mind. I -- I will
9 never, at least intentionally, ask you about any
10 information from the ITC proceeding that is
11 still protected CBI regardless of whether it's
12 really confidential information or not.

13 But I'd like to focus on your last day
14 of trial testimony, which nothing in that day
15 was marked as CBI in any of the proceedings.

16 You recall your last day of trial
17 testimony, right?

18 A. I recall testifying on my last day, but I
19 don't recall all of the testimony.

20 Q. Okay. Do you recall telling me that the
21 panels shown in Figure 1 of Larsen were angled
22 with respect to each other?

1 MS. HIGGINS: Objection, form.

2 A. Yes, that is correct and consistent with
3 my previous statement herein, that the panels do
4 not lie in an absolutely straight line.

5 Q. (BY MR. LANDMON) And you agree that
6 Larsen discloses angling its panels with respect
7 to each other, right?

8 A. Can you point to the place in Larsen where
9 he stipulates that?

10 Q. Sure. Why don't you look at claim 11.

11 A. Yes.

12 Claim 11 reads, "A device, according
13 to claim 10, wherein the at least one applicator
14 compromises several single applicators hinged
15 together so as to be adjustable at angles with
16 respect to one another."

17 Q. So the panels of Larsen can be bent with
18 respect to each other into different shapes or
19 angles, right?

20 MS. HIGGINS: Objection, form.

21 You can answer.

22 A. So Larsen said, several applicat- --

1 several single applicators hinged together so as
2 to be adjustable at angles with respect to one
3 another.

4 Q. (BY MR. LANDMON) Right.

5 So you'd agree that a POSITA reading
6 this would understand Larsen as disclosing a
7 multi-panel device in which the panels can be
8 adjusted into different shapes and angled with
9 respect to one another, right?

10 A. Yes. He says adjustable at angles with
11 respect to one another.

12 Q. Okay. And a POSITA would understand that
13 with the Larsen device, you could form a
14 U shape, correct?

15 MS. HIGGINS: Objection, form.

16 A. I don't think that there is any explicit
17 stipulation in Larsen that says that.

18 Q. (BY MR. LANDMON) Well, you just read that
19 provision to me.

20 Do you not -- is it your opinion that
21 a POSITA would not understand Larsen to be able
22 to be formed into a U shape?

1 MS. HIGGINS: Objection, form.

2 A. So claim 11 of Larsen says that "several
3 single applicators hinged together so as to be
4 adjustable at angles with respect to one
5 another"; but strictly reading Larsen, he does
6 not mention a U shape anywhere.

7 Q. (BY MR. LANDMON) And it's your opinion
8 that a POSITA would not understand Larsen as
9 disclosing a device that could be formed into a
10 U shape?

11 A. So once again, Larsen does not explicitly
12 state that anywhere. So a POSITA would have to
13 interpret Larsen in order to come to that
14 conclusion.

15 Q. And is it your opinion that a POSITA would
16 interpret Larsen as being able to be formed into
17 a U shape?

18 MS. HIGGINS: Objection, form.

19 A. I think a POSITA would need to interpret
20 Larsen to extend Larsen into a U shape because
21 he said "at angles."

22 So I -- a POSITA would need to read

1 claim 11 and extend Larsen pretty far into a
2 U shape because Larsen does not explicitly say a
3 U shape, that the device can be put into a
4 U shape.

5 Q. (BY MR. LANDMON) And would a POSITA, in
6 fact, do that and interpret Larsen to disclose a
7 device that could be formed into a U shape?

8 A. I think a POSITA would be able to
9 interpret Larsen to be adjustable -- read Larsen
10 as adjustable at angles with respect to one
11 another for several single applicators and would
12 be able to move eventually to the conclusion
13 that although Larsen does not stipulate this or
14 discuss this anywhere in the patent, that that
15 would be one possible configuration of the
16 panels of Larsen; although, once again, Larsen
17 does not explicitly state that anywhere in the
18 patent.

19 Q. And would that interpretation -- strike
20 that.

21 Would -- would a device under that
22 interpretation by a POSITA produce a more

1 consistent distance from the illuminator to the
2 treatment surface of a patient's head?

3 MS. HIGGINS: Objection, form.

4 A. Not necessarily.

5 Q. (BY MR. LANDMON) And -- and I probably
6 asked the wrong question.

7 Would that produce -- would that
8 enable a POSITA to adjust the panels of Larsen
9 in a manner to produce a more consistent
10 distance from the treatment surface of a
11 patient's head as opposed to a single-panel
12 device?

13 A. That would depend upon the circumstances
14 associated with the specific use case.

15 Q. What do you -- what do you mean by that?

16 A. Well, for example, if the treatment area
17 was very small on the face and the single panel
18 illumination area was larger than this small
19 area, then a U shape would make no difference to
20 the treatment.

21 Q. What if the treatment surface was around
22 the entirety of a patient's head?

1 A. Which portions of -- the head is -- is
2 large, and so do you have a specific use case in
3 mind?

4 Q. Let's -- let's go -- let's start with from
5 ear to ear.

6 If the treatment surface is from ear
7 to ear of the patient, would the fact that
8 Larsen has adjustable panels produce a more
9 consistent distance from the illuminator to a
10 treatment surface rather than a single-panel
11 device?

12 A. So can you be more specific than "ear to
13 ear"? Ear to ear over the head, ear to ear --
14 or ear to ear --

15 Q. Let's start with ear to ear around the
16 front of the face.

17 A. Okay. Ear to ear around the front of the
18 face.

19 So the face is not flat. And is that
20 entire area the treatment surface, or is the
21 treatment surface a subset of the area that you
22 described?

1 Q. Now we're going to start with the entire
2 area.

3 A. The entire area.

4 MS. HIGGINS: Objection, form.

5 A. What is the size of the single panel?

6 Q. (BY MR. LANDMON) I don't know that it
7 matters.

8 A. From the sense -- from an optical
9 technical sense, the relative size of the
10 treatment area to the size of the panel can make
11 a difference.

12 Q. So maybe -- maybe my question is unclear,
13 but I'm not talking about uniform illumination
14 here. We're only asking about the distance.

15 So I'm asking about does the flexible,
16 adjustable device, five-panel device of
17 Larsen -- would a POSITA understand that having
18 that adjustability would provide the ability to
19 have a more consistent distance from the
20 illuminators to -- to the treatment distance
21 rather than having a single-panel device?

22 MS. HIGGINS: Objection, form;

1 assumes a fact not in evidence.

2 A. So could you restate the question?

3 Q. (BY MR. LANDMON) Okay. Would a POSITA
4 understand that a -- the flexible adjustable
5 five-panel device of Larsen would provide the
6 ability to have a more consistent distance from
7 the illuminators to the treatment surface around
8 a patient's head rather than a single-panel
9 device?

10 MS. HIGGINS: Same objection.

11 A. So I would characterize Larsen as a
12 five-panel device. I would not necessarily add
13 the adjectives that you had ascribed to Larsen.

14 But regardless of Larsen, when we
15 imagine if Larsen could be placed into a shape
16 that was a U-shaped configuration and placed in
17 front of the face of a human, then the distance
18 between the panels and the skin of the human
19 would be more consistent than if a flat plane
20 were placed at the same distance from the front
21 of the face, given that the curvature of the
22 face would be similar to the curvature expressed

1 by the panels at a distance from the face when
2 the panels were in a U-shaped configuration.

3 Then the distances, on average, would
4 be more similar across the entire U-shaped panel
5 than a flat panel that was sufficiently large.

6 Q. (BY MR. LANDMON) Okay. I think we can
7 put Larsen aside for now. I'm sure we'll come
8 back to it.

9 But let's go back to Lundahl. Again,
10 I think that's Exhibit 1014, just for the
11 record.

12 A. Okay. All right. I have Lundahl open.

13 Q. Great.

14 According to Lundahl, the output from
15 a fluorescent tube is not inherently uniform,
16 right?

17 A. Lundahl does contend that the output from
18 a fluorescent tube is not inherently uniform,
19 yes.

20 Q. So achieving satisfactory performance from
21 a fluorescent tube for PDT involves some
22 electrical challenges, according to Lundahl,

1 right?

2 A. According to Lundahl, that includes many
3 challenges, one of which is an electrical
4 challenge, yes.

5 Q. Okay. So let's focus first on the
6 electrical challenge.

7 One electrical challenge faced by
8 fluorescent tubes is controlling voltage and/or
9 the tube current, right?

10 A. Yes.

11 I'd like to go to Lundahl to make sure
12 that I'm representing him correctly. So let me
13 look at "Electrical Features," column 7.

14 So could you restate your question,
15 please?

16 Q. Sure.

17 One electrical challenge faced by
18 fluorescent tubes is controlling voltage and/or
19 tube current, right?

20 A. That is correct.

21 Q. And Lundahl addresses this challenge by
22 using ballasts, right?

1 A. So -- so can you say what the challenge
2 is, explicitly?

3 Q. Yeah, the challenge I just asked about,
4 the electrical challenge of controlling voltage
5 and/or tube current.

6 A. Is to use ballasts. Yes, that is correct.

7 Q. LEDs don't require the use of the same
8 type of ballast or -- as fluorescent tubes,
9 right?

10 A. Yes, LEDs do not require the same
11 electrical ballasts as fluorescent tubes.

12 Q. Because LEDs don't face the electrical
13 challenge of heating cathodes and controlling
14 the voltage and/or tube current, right?

15 A. While LEDs do not face those challenges
16 electrically, LEDs face other challenges
17 electrically. So that is correct, they do not
18 face the same challenges as fluorescent tubes.

19 Q. And a POSITA would have known that prior
20 to 2015, right?

21 A. A POSITA would have been aware that the
22 electrical system to run fluorescent tubes,

1 which are called ballasts, and the electrical
2 system to run LEDs are different.

3 Q. And another electrical challenge faced by
4 fluorescent tubes identified by Lundahl is
5 reducing damage to cathodes from an initial
6 starting current surge, right?

7 A. I'm going to refer again to Lundahl.

8 Q. If you'd turn your attention to column 8,
9 lines 6 to 9.

10 A. Yes.

11 Lundahl says: "Additional windings of
12 the transformer also provide a current to heat
13 the tube cathodes. This lowers the starting
14 voltage requirements and reduces damage to the
15 cathodes from the initial starting current
16 surge."

17 Q. And LEDs don't need a starting voltage
18 surge, correct?

19 A. LEDs do not require a starting voltage
20 surge, that is correct.

21 Q. So a POSITA would have understood prior to
22 2015 that an LED light source wouldn't face the

1 electrical challenge of reducing damage to
2 cathodes from an initial starting current surge,
3 right?

4 A. So could you repeat that question?

5 Q. Yeah.

6 A POSITA would have understood prior
7 to 2015 that an LED light source wouldn't face
8 the electrical challenge of reducing damage to
9 cathodes from an initial starting current surge,
10 right?

11 A. That's actually incorrect.

12 So an LED has an anode and a cathode;
13 and if there is an initial starting current or
14 voltage surge when initiating electrical bias to
15 the LED, it indeed could damage the LED.

16 Q. And -- and a POSITA in 2015 would have
17 known how to address that challenge, right, for
18 an LED?

19 A. Yes. A POSITA would have understood that
20 applying a -- what we call a voltage spike or a
21 current spike to an LED could cause damage to an
22 LED.

1 Q. And a POSITA would have understood how to
2 prevent that from happening, right, for an LED?

3 MS. HIGGINS: Objection, form.

4 A. So a POSITA would have understood that a
5 voltage strike -- a voltage spike or a current
6 spike could damage the LED and would attempt to
7 ensure that the electrical system provided no
8 such voltage spike or current spike.

9 Q. (BY MR. LANDMON) And those electrical
10 systems were well-known by POSITAs at the time,
11 right, in 2015?

12 MS. HIGGINS: Objection, form,
13 vague.

14 A. So by "those electrical systems," are you
15 referring to the electrical systems to run LEDs?

16 Q. (BY MR. LANDMON) An electrical system
17 that would provide no voltage spike or current
18 spike to damage an LED was well-known prior to
19 2015, right?

20 MS. HIGGINS: Objection, form,
21 vague.

22 A. So a person of skill in the art would know

1 how to construct in 2015 an electrical system
2 that would avoid producing or applying a voltage
3 spike or a current spike to an LED.

4 Q. (BY MR. LANDMON) And just so I understand
5 this -- and by now you very much know I'm not an
6 engineer.

7 But fluorescents require a starting
8 surge, right?

9 A. So I want to be respectful of the Lundahl
10 patent.

11 Does he use the word "surge" anywhere?

12 Q. So I -- I guess I'm not asking about
13 Lundahl. I'm just asking about fluorescents and
14 what was known, but it -- it was known at the
15 time that fluorescents required a starting
16 surge, right?

17 MS. HIGGINS: Objection, form.

18 You can answer if you can.

19 A. So I wouldn't characterize it as a
20 "surge." I don't think -- unless Lundahl uses
21 that word expressly, as a person of skill in the
22 art, I wouldn't apply the word "surge" to what a

1 ballast provides as a starting electrical input
2 to a fluorescent tube.

3 Q. (BY MR. LANDMON) How -- how would you
4 characterize it?

5 A. Well, I frankly think Lundahl does a very
6 good job of describing the fluorescent -- the
7 operation of a fluorescent tube, and so let
8 me -- let me quote him. Let's see, because he
9 talks about the starting characteristics.

10 Okay. For example, in column 7, line
11 25, he discusses: "Furthermore, for most tube
12 designs, it is necessary to heat the cathodes to
13 achieve proper tube starting. Control of the
14 voltage and/or tube current characteristics as
15 well as heating of the cathodes is accomplished
16 with external circuitry which is usually
17 engineered and packaged into a single device
18 commonly referred to as a 'ballast.'"

19 So I think he states very well the --
20 the concerns associated with starting a
21 fluorescent tube as provided by the ballast.

22 Q. And LEDs don't need to be heated, right?

1 A. Could you be more specific?

2 Q. So you just read to me that fluorescent
3 tubes needed to be heated.

4 A. Yes. That's -- the -- well, the cathode
5 needs to be heated.

6 Q. The cathode needs to be heated.

7 In an LED device, there's no cathode
8 that needs to be heated, correct?

9 MS. HIGGINS: Objection, form.

10 A. Well, the use case is very important.

11 So, for example, in one study that I
12 was asked to do by an automotive company,
13 starting the illuminator in Alaska under very,
14 very low temperatures was problematic for some
15 LEDs; and so the suggestion was to heat the LEDs
16 prior to illuminating them.

17 Now, this was prior to 2015. This was
18 many, many years ago; but in that use case, it
19 actually was important to provide heating to the
20 LED prior to starting the LED. So the use --

21 Q. (BY MR. LANDMON) In --

22 A. -- case is very important.

1 Q. In Alaska?

2 A. They were characterizing the LEDs as a
3 function of temperature, and so Alaska was one
4 example of where an automotive -- an automobile
5 would be used such that the electronics needed
6 to be heating -- heated before starting to avoid
7 damage.

8 Q. And that's relevant for a POSITA -- that's
9 a relevant teaching for a POSITA developing a
10 lighting device for PDT, right?

11 A. Well, once again, the use case is very
12 important.

13 So if the PDT was typically performed
14 indoors in a heated doctor's office, then that
15 particular use case outdoors in a car in Alaska
16 would not apply.

17 Q. So let -- let's focus on LEDs for PDT,
18 which is what we're talking about here.

19 So would those LEDs need to be heated?

20 A. If the PDT device, once again, were inside
21 in a doctor's office, then prior to starting,
22 the LEDs would not need to be heated.

1 Q. Another electrical challenge faced --
2 faced by fluorescent tubes is degradation within
3 the tubes, right?

4 A. That is one possible consideration, yes.

5 Q. And Lundahl identifies that as a
6 consideration, right, if I can turn your
7 attention to column 8, lines 11 to 15?

8 A. Lundahl stipulates that: "The output must
9 be adjusted as the tubes age to compensate for
10 degradation within the tubes themselves."

11 Q. (BY MR. LANDMON) LEDs don't have tubes
12 that degrade, right?

13 A. The LED degradation mechanism is well
14 understood and was well understood in 2015, that
15 LEDs do not have tubes that degrade, that is
16 correct.

17 Q. Lundahl also identifies a problem with
18 fluorescence that he calls optical output
19 ripple, right? I'll turn your attention to
20 column 8, lines 54 to 59.

21 A. Lundahl says in column 8, starting at
22 about 51 -- or at 51: "These ballasts convert

1 120 VAC line voltage available from a standard
2 wall outlet into a high frequency (about
3 25 kilohertz) sinusoidal current suitable for
4 driving the fluorescent tubes. High frequency
5 operation is desirable to reduce the optical
6 output ripple which is present in all
7 fluorescent tubes and to increase the overall
8 output. Output ripple is a small variation in
9 the tube output related to the sinusoidal
10 alternating tube current used to sustain the
11 plasma arc."

12 Q. And LEDs aren't subject to small
13 variations in the tube output relating to the
14 sinusoidal alternating tube current, right?

15 A. So since LEDs do not have tubes, they are
16 not subject to the alternating tube current;
17 however, LEDs can exhibit what we call flicker,
18 which is similar to the sinusoidal tube output
19 in that the -- to the observer, the LED output
20 seems to increase and decrease as a function of
21 time very quickly.

22 Q. And a POSITA prior to 2015 would have been

1 aware of the flicker issue with LEDs, right?

2 MS. HIGGINS: Objection, form;
3 lacks foundation.

4 A. So a POSITA in 2015 would have understood
5 how to design an electrical system that would
6 not allow the LEDs to appear to produce flicker.

7 Q. (BY MR. LANDMON) And fluorescent tubes
8 also had an electrical challenge of outputting
9 UV emission, right?

10 A. Could you repeat that question? I didn't
11 understand it.

12 Q. Yeah.

13 Fluorescent tubes also present a
14 problem in the fact that they output UV
15 emission, right?

16 A. So I believe Lundahl describes this.

17 Q. I turn your attention to column 9,
18 starting at line 1 of Lundahl.

19 A. "The emitting area" -- column 9, line 1 of
20 Lundahl says: "The emitting area of the present
21 invention is covered with a low UV transmission
22 plastic shield. In a preferred embodiment of

1 the present invention, plastic shield 40 is made
2 from polycarbonate. When fluorescent tube
3 technology is utilized, there is a small
4 quantity of UV emission present in the output.
5 Polycarbonate has a very low transmission in the
6 UV region of the spectrum, and it effectively
7 filters out any residual UV emission from the
8 visible light output of the unit."

9 Q. Okay. So UV emission is a problem when
10 exposed to patients, right?

11 MS. HIGGINS: Objection, form.

12 A. So I would say that because Lundahl
13 indicated that UV emission should be filtered
14 out, he did view it as a negative associated
15 with the fluorescent light output.

16 Q. (BY MR. LANDMON) And he suggests -- or
17 the Lundahl reference suggests using a
18 polycarbonate shield to filter the UV emission
19 out, right?

20 A. Yes, that's correct.

21 Q. LEDs don't output UV emission, right?

22 A. No, that's not correct.

1 Q. Okay. They -- they do output a UV
2 emission that is --

3 A. U --

4 Q. -- a problem for patients?

5 A. So UV LEDs do output UV emission.

6 Q. The -- the LEDs that are utilized in PDT
7 devices emit UV?

8 A. So I'm not aware of all UV LEDs that are
9 used in all PDT devices, but it is well
10 understood that UV LEDs can output and, in fact,
11 do intentionally output UV.

12 Q. And would a POSITA prior to 2015 have used
13 a UV LED in a PDT device?

14 MS. HIGGINS: Objection, form.

15 A. Possibly, yes.

16 Q. (BY MR. LANDMON) So in light of the
17 teachings of Lundahl that UV emissions are a
18 problem for PDT devices, it's your opinion that
19 a POSITA would have chosen a UV LED instead of
20 an LED that doesn't emit UV light for PDT?

21 A. So UV LEDs are commonly used in a variety
22 of LEDs where color specificity is very

1 important. So the UV LED pumps of fluorophore
2 that is typically embedded in the coating,
3 typically in epoxy-based coating on the surface
4 of the LED.

5 So if an application had a very
6 specific wavelength regime that could be
7 addressed by a fluorophore and could not be
8 addressed by a specific semiconductor band gap
9 in an LED of which there are finite wavelengths
10 available, then a UV LED with a -- pumping a
11 phosphor coating in the LED very well could be
12 used.

13 Q. Okay. You understand the wavelengths
14 disclosed in Lundahl for PDT, right?

15 A. Yes, I do.

16 Q. And those wavelengths are effective for
17 the PDT treatment disclosed in Lundahl, right?

18 A. Yes, they are, according to Lundahl, yes.

19 Q. Okay. And a POSITA attempting to create a
20 PDT device with the same wavelengths used by
21 Lundahl for PDT would not use a UV LED prior
22 to 2015, right?

1 MS. HIGGINS: Objection, form.

2 A. I'm not sure that that's the case because,
3 once again, a UV LED pumping a phosphor would be
4 a suitable solution for a PDT device prior to
5 2015.

6 Q. (BY MR. LANDMON) Even though it led to UV
7 emissions exposing the patient to UV emissions?

8 A. So I think that is something that is not
9 necessarily the case when using a UV LED.

10 So if the UV LED is pumping a phosphor
11 and all of the UV is used in pumping the
12 phosphor, which is typically the design goal of
13 an LED, then there is no longer UV light
14 emitting from the surface of the UV LED, which
15 includes the phosphor which has been used to
16 up-convert the wavelength of the UV to a
17 different wavelength, such as blue or red or
18 yellow or green or many -- many colors of
19 phosphors are used for LEDs.

20 Q. Okay. And so I think we finally got back
21 to where I started.

22 So LEDs used in a PDT device prior

1 to 2015 would not emit -- would be known by a
2 POSITA to not emit UV, correct?

3 MS. HIGGINS: Objection, form.

4 A. So once again, that is not a correct
5 statement because the LEDs would be emitting UV,
6 but that UV would be absorbed in the coating of
7 the LED, which is not part of the LED structure
8 but, rather, the coating.

9 It was all -- the design for these
10 LEDs, the goal was to absorb all of the UV so
11 that it did not emit from the UV plus coating
12 structure.

13 Q. (BY MR. LANDMON) And a POSITA would
14 understand, then, that the POSITA would not need
15 to use a polycarbonate shield to address any UV
16 emission to the patient as described in Lundahl,
17 correct?

18 A. So assuming that the LEDs did not emit any
19 UV harmful to the patient, then the use of a
20 polycarbonate shield would not be necessary
21 using those LEDs.

22 Q. All right. And you said "assuming," but

1 you've already agreed that those LEDs you just
2 described do not emit UV to -- that would harm a
3 patient, right?

4 MS. HIGGINS: Objection,
5 mischaracterizes the witness' testimony.

6 A. So that is a goal of the UV LEDs; however,
7 it would need to be measured and asserted for
8 any particular LED.

9 Q. (BY MR. LANDMON) And it's still your
10 opinion, just so I'm clear, that even if that
11 LED did emit harmful UV, it's your opinion here
12 that a POSITA still would use such an LED on a
13 PDT device and expose patients to UV light?

14 MS. HIGGINS: Objection, form.

15 A. No. A POSITA would not -- a POSITA would
16 try to avoid exposing patients to UV.

17 Q. (BY MR. LANDMON) So a POSITA would choose
18 an LED that does not expose a patient to UV
19 prior to 2015?

20 A. That -- that would be correct, yes.

21 Q. So another electrical challenge that
22 Lundahl discusses for fluorescent tubes --

1 or strike that. Let me back up.

2 Another challenge that Lundahl
3 discloses by fluorescent tubes is potential
4 breakage with a potential to injure patients,
5 right?

6 A. I think he does mention that somewhere.

7 Q. Yeah.

8 So let -- I can turn your attention --
9 and I think we were just there, but column 9.

10 Again, the -- the conversation we were
11 having started at line 1; but if you go down to
12 the bottom around line 9 to 10, it says that
13 "there's a shield to protect the patient from
14 injury in the event of tube breakage," right?

15 A. Yes.

16 So Lundahl says "the shield 40 also
17 protects the patient from injury in the event of
18 tube breakage."

19 Q. And LEDs don't break as easily as
20 fluorescent tubes, right?

21 MS. HIGGINS: Objection, form;
22 vague.

1 A. Typically, LEDs, because they are solid
2 state devices and do not typically contain
3 exposed glass, similar to that that would be
4 present in a fluorescent tube, would not break
5 in the same way that a fluorescent tube would
6 break.

7 Q. (BY MR. LANDMON) And a POSITA would have
8 known that prior to 2015, right?

9 A. Yes, that is correct.

10 Q. So the use of a polycarbonate shield to
11 protect patients from injury from breakage of
12 fluorescent tubes -- strike that.

13 The use of the polycarbonate shield to
14 protect patients from injury from breakage of
15 the fluorescent tubes does not affect the
16 uniformity of light of Lundahl, right?

17 MS. HIGGINS: Objection, form.

18 A. I would have to review Lundahl again.

19 So often there are diffusers used to
20 diffuse light. It is emitted from an emission
21 source prior to the light being incident on the
22 object of illumination.

1 And I would need to review Lundahl to
2 understand if the polycarbonate shield also acts
3 as a diffuser, an optical diffuser, or not. I
4 don't remember if he stipulates that.

5 Q. (BY MR. LANDMON) In the passage we just
6 read, it's only identified as protecting
7 patients from UV emissions and from the -- from
8 injury in the event of a tube breakage, right?

9 A. In column 9, lines 1 through 10, that is
10 correct.

11 Q. Lines 1 --

12 A. I don't know if -- oh, I'm sorry.

13 Q. No, no. Go ahead.

14 A. I was going to say, I don't know if
15 elsewhere in the patent he talks about the
16 polycarbonate shield being used as a diffuser or
17 not. I'd have to review Lundahl.

18 Q. Okay. And if he does not identi- -- if --
19 if -- strike that.

20 If the Lundahl reference does not
21 identify the polycarbonate shield is acting as a
22 light diffuser, you would agree that it doesn't

1 impact the uniformity of light emitted from the
2 device, right?

3 MS. HIGGINS: Objection, form.

4 A. So actually, if we look at column 6,
5 line 55, Lundahl says, "The present invention
6 provides a highly uniform output irradiance
7 without the use of an additional diffusing
8 element. However, it is also envisioned that a
9 diffusing element could also be incorporated
10 into the shield 40."

11 Q. Sorry. What column are you on?

12 A. Column 6, line 55 to 59.

13 Q. And it's your opinion that if it -- if --
14 if the polycarbonate shield does have a
15 diffusing element, that can potentially impact
16 uniformity?

17 A. So a diffusing element might or might not
18 impact uniformity, depending upon the specific
19 use case.

20 Q. So again, focused on -- on fluorescent
21 tubes, fluorescent tubes also utilize visible
22 light emitted from the back of the tubes, right?

1 And that was a poorly asked question.

2 Fluorescent tubes emit light around
3 the entirety of the tube, right?

4 A. So the -- and yes, fluorescents emit light
5 around the circumference of the tube in the
6 areas where light is emitted; however, there are
7 portions of the tube which are lower emission or
8 dark spaces.

9 Q. Okay. So we'll get to those later.

10 Let's talk about the areas of the
11 tubes where they do emit light.

12 And I think you mentioned reflectors
13 before, right?

14 A. Yes, that's correct. Lundahl does use
15 reflectors.

16 Q. So Lundahl uses reflectors to reflect the
17 light that is emitted from the back half of the
18 tube, correct?

19 A. So that is correct.

20 On column 8, starting at line 62,
21 Lundahl says, "In order to utilize the visible
22 light emitted from the back of the tubes, and to

1 increase the uniformity of the output
2 distribution, a reflector 50 is positioned
3 approximately 10 millimeters from the rear
4 surface of the tubes."

5 Q. LEDs are point source emitters that don't
6 have light emitting out of the back, right?

7 A. That is correct. LEDs are point source
8 emitters that emit from the sides and front of
9 the device.

10 Q. So an LED wouldn't face the challenge of
11 utilizing visible light emitting from the back
12 of an LED, right?

13 A. Visible light or any light does not
14 typically emit from the back of the LED,
15 although -- let me -- let me back up a second.

16 So there are some types of LEDs that
17 are called "inverted LEDs" where the light is
18 emitted from the back of the LED as well as the
19 sides and possibly also the front.

20 So it is incorrect to say that all
21 LEDs do not emit from the back, but specific
22 types of LEDs do emit only from the front and

1 the sides.

2 Q. Would a POSITA have used an inverted LED
3 in a PDT device?

4 A. Yes. If the wavelength of the LED were
5 appropriate, then a POSITA might very well have
6 used an inverted LED in a PDT device.

7 Q. Does Larsen disclose inverted LEDs in its
8 PDT device?

9 A. I will have to look at Larsen.

10 I don't know if Larsen stipulated the
11 type of LED that he used in his device, whether
12 it was front-emitting, back-emitting, or -- or
13 some LEDs emit only from the side.

14 Do you want me to review Larsen to see
15 if he stipulates the type of LED?

16 Q. No. I can review that later.

17 But sitting here today, you don't
18 recall Larsen disclosing inverted LEDs, right?

19 A. I don't recall Larsen stipulating any
20 particular type of LED except stipulating LED;
21 and so the Venn diagram of LEDs includes
22 back-emitting LEDs, front-emitting LEDs,

1 side-emitting LEDs, and combinations thereof.

2 Q. When you want to shine light forward on a
3 patient's face, a POSITA would choose a
4 back-facing LED?

5 A. Yes. What you would do is you would take
6 the back-facing LED and face the emitting
7 surface toward the patient.

8 Q. So then wouldn't they be front-facing?

9 A. No.

10 So the LED emission vis- -vis top or
11 bottom depends upon the growth of the epitaxial
12 layers of the LEDs on the substrate. So
13 inverted LEDs, such as a lot of gallium nitride
14 LEDs, are grown on a transparent sapphire
15 substrate.

16 And because the p-type contact on
17 gallium nitride LEDs is very challenging for
18 heat dissipation concerns, often the top contact
19 is not transparent; and so the emission from
20 those gallium nitride LEDs comes through the
21 substrate from the back of the LED. So that
22 would be an inverted or back-emitting LED. And

1 you would mount the front of the LED, which has
2 the -- the opaque contact, p-type contact, on
3 the printed circuit board so that the back of
4 the LED was emitting on toward -- or toward the
5 patient's face.

6 Q. Okay. So an inverted LED -- and I guess I
7 misunderstood that -- it still just shows light
8 in one direction?

9 A. Yes. There are inverted -- well, let me
10 back up. That -- yes.

11 So inverted LEDs can emit in the
12 forward direction. They can also emit if you --
13 there are inverted LEDs that emit from the front
14 and the back. And what you do is have a contact
15 that is a contact around the periphery of the
16 top surface of the LED so that light can be
17 emitted from the top surface as well as the back
18 surface.

19 But then there's a current crowding
20 problem and heating issues, and so those LEDs
21 are typically used only in very specific
22 applications that demand light emission from the

1 back and the front of the LED.

2 Q. And a POSITA designing a PDT device in
3 2015 wouldn't use one of those complicated LEDs,
4 right?

5 MS. HIGGINS: Objection, form.

6 A. So it really depends upon what the
7 designer's desires were for the particular PDT
8 device.

9 I wouldn't obviate the use of those
10 types of LEDs out of hand because they could be
11 used for a PDT device, although it might be a
12 bit more complex to design. It might be easier
13 to design in some manner.

14 Q. (BY MR. LANDMON) Fluorescent tubes also
15 had challenges with temperature, right?

16 A. Let me go back to Lundahl. I believe
17 Lundahl described fluorescent tube temperature.

18 So in column 9 of Lundahl, line 13, he
19 says: "Since cathode and tube wall temperatures
20 strongly affect the output distribution, a
21 cooling system is provided to ensure proper bulb
22 operation."

1 Q. And is the temperature problem an issue
2 that nonuniform temperature could potentially
3 impact the uniformity of light from fluorescent
4 tubes?

5 A. I believe Lundahl speaks to this.

6 In column 9, line 59 -- sorry, line
7 39, Lundahl states, quote: "The straight
8 section of the tube between the cathode area and
9 curved section of the 'U' tubes produces
10 slightly more output in the center portion of
11 the curved section. This has been attributed to
12 differences in the phosphor coating thickness
13 caused by the bending process. To further
14 increase irradiance uniformity, the reflector
15 vents 52 are located in the reflector 50 so that
16 cooling air flows primarily over the straight
17 section and the end portions of the curved
18 section. Less cooling air flows over the middle
19 of the tubes between the sets of reflector vents
20 52, causing the tube wall temperature to be
21 higher in this region. Since the output
22 irradiance for this tube increases (to a point)

1 with tube wall temperature, the hotter central
2 region of the tube produces higher output
3 irradiances than the rest of the tube and
4 compensates for the lower emission efficiency of
5 the central region."

6 Q. And a POSA would have known in 2015 that
7 LEDs don't have a nonuniform temperature
8 distribution like the fluorescent tubes of
9 Lundahl, right?

10 MS. HIGGINS: Objection, form.

11 A. So within an LED structure, there can be a
12 nonuniform temperature distribution.

13 So if you will recall, I talked about
14 current crowding. Current crowding in LEDs,
15 given a specific contact structure, can cause
16 temperature variations within the epitaxial
17 emitting layers of the LEDs and can affect the
18 output irradiance of the LEDs as a function of
19 the position of the angle of the Lambertian
20 output of the LED.

21 Q. (BY MR. LANDMON) And a POSITA in 2015
22 would have known had -- who had dealt with

1 temperature variations for LEDs to control for
2 it, correct?

3 MS. HIGGINS: Objection, form.

4 A. So temperature variations in LEDs can
5 occur as a function of age and are fairly
6 subtle, and so a POSITA would have understood
7 that it would be -- would be important to
8 properly cool the LEDs to avoid damage and to --
9 particularly for LEDs that were subject to
10 current crowding or other heat-related damage.

11 Q. (BY MR. LANDMON) So Lundahl discloses
12 that the number of tubes used and the spacing
13 between them were chosen to achieve desired
14 uniformity and power output, right?

15 A. So let me quote Lundahl again.

16 Q. I'd point you to column 6, lines 43 to 45.

17 A. Yes.

18 So this is -- this is one aspect of
19 the multiple aspects that we have been talking
20 about here this morning that Lundahl used to
21 achieve uniformity.

22 So the number of tube -- oh, I'm

1 sorry, I'm quoting Lundahl now, column 6, line
2 43.

3 Quote: "The number of tubes used and
4 the spacing between them were chosen to achieve
5 desired uniformity and power output
6 specifications. Optimum output distribution has
7 been found to occur when seven tubes 10(1)
8 through 10(7) are placed in the chassis in a
9 symmetric pattern with respect to opposite edges
10 of the unit with the following -- with the
11 following approximate lateral spacing: 7
12 centimeters between the center tube 10(4) and
13 each of the two tubes 10(3), 10(5) adjacent to
14 the center tube 10(4); 5 centimeters between the
15 tubes 10(3), 10(2) and 10(5), 10(6), i.e., the
16 next pairs of tubes out from the center; and
17 3.5 centimeters between tubes 10(2), 10(1) and
18 10(6), 10(7), i.e., the outermost pairs of tubes
19 at the sides of the unit."

20 Q. So a POSITA would understand, reading
21 Lundahl, that the spacing of the light sources
22 can affect uniformity, right?

1 A. Well, so in this preferred embodiment of
2 Lundahl, he is very specific about the tube
3 spacing. So for this specific tube spacing,
4 that is how he achieves the uniformity that he
5 reports in his patent.

6 Q. And a POSITA would understand, reading
7 Lundahl, that the spacing between the light
8 sources can affect uniformity, right?

9 A. So Lundahl indicates that this optimized
10 spacing is how he achieves his uniformity.

11 Q. And varying the -- a POSITA would
12 understand prior to 2015 that varying the
13 spacing can affect uniformity, right?

14 A. So Lundahl is very specific about this
15 particular spacing; and so there isn't any
16 indication from Lundahl, if this spacing were
17 not used, if uniformity could be achieved.

18 Q. If I could turn you to Lundahl, column 6,
19 lines 22 to 25, do you see there that he teaches
20 a POSITA that: "Uniformity can also be adjusted
21 by varying the lateral spacing of the tubes"?

22 Do you see that?

1 A. So column 6, line 22, says: "Another
2 advantage of the arrangement is that uniformity
3 can also be adjusted by varying the lateral
4 spacing of the tubes, relative horizontal
5 spacing as shown in Figure 2."

6 And then he goes on, in column 6, to
7 identify the optimum output distribution of the
8 seven tubes and the specific spacing that I just
9 recited.

10 Q. Okay. And one of the reasons that he
11 teach -- that -- strike that.

12 One of the reasons that the Lundahl
13 reference teaches that uniformity can be
14 adjusted by varying the lateral spacing of the
15 tubes is he discloses, starting in column 6,
16 starting around line 25, that it's important to
17 compensate for the fact that output from a flat
18 plane emitting light source drops near the
19 edges, right?

20 A. So Lundahl says in column 6, line 24-ish:
21 "This is important since it is necessary to
22 compensate for the fact that the output from a

1 flat plane emitting light source drops near the
2 edges. Varying the lateral spacing of the tubes
3 creates the same effect as folding the edges of
4 a larger illuminator in on itself, thus
5 emulating an infinity plane emitter with a
6 compact unit."

7 And then he goes on, once again,
8 column 6, roughly line 43, to describe the exact
9 number of tubes and the exact spacing to achieve
10 his uniformity goals in this patent.

11 Q. Yes.

12 I'm just trying to focus right now on
13 the -- the fact that it was known that output
14 from a flat plane emitter drops near the edges,
15 right?

16 MS. HIGGINS: Objection, form.

17 A. So Lundahl says that in column 6, line 26,
18 that: "The output from a flat plane emitting
19 light source drops near the edges."

20 Q. (BY MR. LANDMON) Okay. That was known by
21 a POSITA in 2015, right?

22 A. So it depends upon the design of the flat

1 plane emitter, so because if any flat plane
2 emitter is finite and -- do you want to assume
3 we're using this as a PDT device?

4 Q. I'm -- I'm just trying to focus on what
5 Lundahl discloses.

6 Lundahl says: "Output from a flat
7 plane emitting light source drops near the
8 edges."

9 And I just wanted to understand that
10 you agree that a POSITA would understand that in
11 2015.

12 A. Yes. A POSITA would understand that a
13 flat plane emitter, which Lundahl is implying is
14 of finite proportions compared to the -- the
15 measurement area, indeed will have a light
16 source -- that the -- that the output from a
17 flat plane emitting light source drops near the
18 edges, using Lundahl's assumptions.

19 Q. And that output would drop near the edges
20 if one had a flat plane emitting light source
21 that used fluorescent tubes, right?

22 MS. HIGGINS: Objection, form.

1 A. Could you repeat that question?

2 Q. (BY MR. LANDMON) Yeah.

3 It would have been known by a POSITA
4 prior to 2015 that output would drop near the
5 edge -- edges of a flat plane emitting light
6 source that used fluorescent bulbs, correct?

7 MS. HIGGINS: Objection, form.

8 A. So one of Lundahl's attempts to -- to
9 address this compensation for the output from a
10 flat plane emitting light source dropping near
11 the edge, as he says in column 6, line 27, is to
12 "vary the lateral spacing of the tubes, creating
13 the same effect as folding the edges of a larger
14 illuminator on itself, thus emulating an
15 infinite plane emitter with an exact unit."

16 So Lundahl is attempting to address
17 that, and so the construction of the flat plane
18 emitter is important; however, for a finite flat
19 plane emitter of any construction, there is
20 necessarily a drop-off in light illuminat- -- or
21 light output at some point.

22 Q. (BY MR. LANDMON) And that's regardless of

1 the type of light source used, right?

2 MS. HIGGINS: Objection, form;
3 assumes a fact not in evidence.

4 A. So that's not correct.

5 Q. (BY MR. LANDMON) Okay. I guess what I'm
6 trying to understand -- so there's a drop-off in
7 the flat -- a drop-off in output from a flat
8 plane emitting surface near the edges, right?

9 A. If it is a finite dimension -- so, for
10 example, so -- so that would be true for a
11 finite dimension flat plane emitter; however, if
12 you consider the sun, the sun in some instances
13 is considered as a flat plane emitter, ignoring
14 the radius of curvature of the sun since it is
15 so far from the Earth. And so as a flat plane
16 emitter, we see on Earth no drop-off from the
17 edges of the sun because it is considered to be
18 what's called a paraxial ray source because of
19 its distance.

20 And so we need to be very careful to
21 be specific about the use case for a flat plane
22 emitter.

1 Q. Okay. You know you're here about a PDT
2 patent, right?

3 A. Yes, I do.

4 Q. And you know Lundahl is a PDT device,
5 right?

6 A. Yes, I do.

7 Q. And you know when Lundahl refers to a flat
8 plane emitting light source, he's referring to
9 some finite flat plane emitting light source,
10 right?

11 A. Yes, I do; however, your question did not
12 use the word "finite"; and so I have to be
13 scientifically accurate in my testimony.

14 Q. All right. So if I'm addressing the sun,
15 I understand.

16 Let's address a flat plane emitting
17 light source that is finite that might be used
18 in a PDT device.

19 I'm just trying to understand whether
20 the type of -- of a light bulb or LED matters
21 for the drop-off in light output, and maybe I
22 should ask this question: Output from a flat

1 plane emitter that's finite drops near the
2 edges, regardless of the type of light source
3 used, right?

4 MS. HIGGINS: Objection, form;
5 assumes a fact not in evidence.

6 A. So if the flat plane emitter is finite,
7 regardless of the type of light source used, at
8 some point there will be drop-off of the light
9 output power; however, Lundahl stipulates in his
10 patent that he addresses this to some extent.

11 Q. (BY MR. LANDMON) I understand Lundahl has
12 a solution, but we're not talking about his
13 solution.

14 I'm talking about this sentence here
15 where he talks about the fact that output from a
16 flat plane emitting light source drops near the
17 edges. I know you disagree with that for the
18 sun, but for a PDT panel, I think you agree that
19 what he says is correct, right?

20 MS. HIGGINS: Ob- --

21 A. Yes --

22 THE WITNESS: I'm sorry. Go

1 ahead.

2 MS. HIGGINS: Objection, form.

3 A. So that is correct, at some -- at some
4 point away from the emitter. However, the light
5 distribution can vary significantly, and the
6 point at which it drops off can vary
7 significantly based on the specific design of
8 the emitter.

9 Q. (BY MR. LANDMON) Okay. And would that
10 drop-off happen if the light source uses
11 fluorescent bulbs?

12 A. So can you stipulate what that drop-off
13 is?

14 Q. Yeah.

15 Would a POSITA understand that the
16 drop-off that Lundahl discloses -- the drop-off
17 in output from a flat plane emitting light
18 source drops near the edges, would a POSITA
19 understand that that would happen with a device
20 using fluorescent bulbs?

21 A. So looking at Lundahl, Lundahl says that
22 he emulates an infinite plane emitter with a

1 compact unit; however, at some point in space
2 for a finite emitter, there will be a drop-off
3 in light output.

4 Q. And -- and that drop-off would happen
5 regardless of whether the device is using
6 fluorescent bulbs or LEDs, right?

7 MS. HIGGINS: Objection, form;
8 assumes a fact not in evidence.

9 A. So if the illuminator was a finite
10 illuminator, then the illuminator at some point
11 in space will have a drop-off of the light
12 output.

13 MS. HIGGINS: Mr. Landmon, we've
14 been going for an hour and a half. Is this a
15 good time to take a break?

16 MR. LANDMON: I think so. Just
17 give me one second. I just want to look at
18 something.

19 And sorry, if I could just ask one
20 more question.

21 Q. (BY MR. LANDMON) What you just described,
22 Dr. Jokerst, a POSITA would have understood that

1 in 2015, right?

2 MS. HIGGINS: Objection, form.

3 A. Can you state again what I -- I don't like
4 to -- can you state what I would be agreeing to?

5 Q. (BY MR. LANDMON) You stated -- and I'll
6 quote your answer. You said, quote: "So if the
7 illuminator was a finite illuminator, then the
8 illuminator at some point in space will have a
9 drop-off of the light output," end quote.

10 And I'm just asking, a POSA would have
11 understood that in 2015, right?

12 A. Yes, a POSA would have understood that
13 statement that I made that you just read back to
14 me in 2015.

15 Q. Okay. Thank you.

16 MR. LANDMON: Yeah. Now is a good
17 time to go on a break. Why don't we go off the
18 record?

19 MS. HIGGINS: And if we take ten
20 minutes, does that work?

21 (Break taken from 9:34 a.m. to
22 9:51 a.m.)

1 Q. (BY MR. LANDMON) Dr. Jokerst, I want to
2 change subjects a little bit.

3 I think I asked you before, just want
4 to make sure: You reviewed the declaration of
5 Dr. Roberts, right?

6 A. I reviewed two declarations of Dr. Heather
7 Roberts, yes.

8 Q. Okay. And you understand that Dr. Roberts
9 is a dermatologist, right?

10 A. Yes, I do understand that Dr. Roberts is a
11 dermatologist.

12 Q. And she offers light therapies as part of
13 her practice, right?

14 A. Yes. As described -- as described in her
15 reports, she offers light therapies as part of
16 her practice.

17 Q. And that includes PDT, right?

18 A. Yes, that includes PDT.

19 Q. And you know that she's used the
20 older BLU-U 4170 device, right?

21 A. As described in her report, yes.

22 Q. Okay. And she's used that for -- for 20

1 years in her practice, right?

2 A. I would have to review her report again in
3 order to recollect how many years it's been. I
4 don't remember how many years.

5 Q. Okay. Well, let's -- I'm sure that fact
6 will be relevant, but why don't we open it just
7 so we're there on the same page.

8 Do you have her declaration in front
9 of you? I don't recall.

10 A. I do not have her declaration in front of
11 me. Is that something that we can produce?

12 Q. Yeah. We can -- we can pull it up and
13 also provide it to you so you -- you know, by a
14 link here. It's Exhibit 2015.

15 (Whereupon Exhibit Number 2015 was
16 marked for identification.)

17 MR. LANDMON: If I can ask Maddie
18 if you can pull that up for us.

19 EXHIBIT TECH: Stand by. Got it.

20 Q. (BY MR. LANDMON) And Dr. Jokerst, I'll
21 probably point you to certain paragraphs, but
22 obviously, if you ever need to look at anything

1 else, just let us know and we can give you
2 control of the document.

3 MR. LANDMON: But if I can ask
4 Maddie to turn to paragraph Number 33.

5 THE WITNESS: Before we do that --
6 Maddie, thank you -- I see the Roberts
7 declaration in the chat, but when I go to it --
8 when I click on the chat, it only shows me a
9 file name that I can save.

10 Do I -- it doesn't seem to be able
11 to click on it and open it. Do I need to save
12 it and then open it?

13 EXHIBIT TECH: Yes. You may need
14 to download it, especially if it's a large file.

15 THE WITNESS: Okay. The challenge
16 is on this computer, when I download it, I don't
17 know where it goes.

18 MS. HIGGINS: I have a --

19 THE WITNESS: Let's see. Yeah,
20 I'd like to access the entire document, but when
21 I save it, I don't see it on this PC. Let me
22 try OneDrive. Oh, shoot. Okay. Well, it says

1 do I want to set up OneDrive. Nope, I'm not
2 going to do that.

3 Let me try one more thing. I'm
4 going to try saving it in downloads because it
5 should just open when it -- here we go. Maybe
6 it will let me just open it. So I'm trying with
7 Adobe to just open it directly. Oh, got it.
8 Okay. Excellent. All right. Hang on just a
9 second.

10 MR. LANDMON: So yeah.

11 MS. HIGGINS: I don't --

12 MR. LANDMON: Why --

13 MS. HIGGINS: I just -- Counsel,
14 I just have a hard copy in the room. Are you
15 okay with Dr. Jokerst looking at? It's a clean
16 hard copy of Exhibit 1015. Is that okay for her
17 to look at?

18 MR. LANDMON: Certainly. Yeah.

19 THE WITNESS: It would be way
20 better, yes.

21 MS. HIGGINS: If she prefers.

22 THE WITNESS: Yes, I prefer that.

1 MS. HIGGINS: Okay. I'm putting
2 in front of Dr. Jokerst a clean copy of 1015.

3 THE WITNESS: Okay. Thank you.

4 MR. LANDMON: Sorry. Is it 1015
5 or 2015?

6 MS. HIGGINS: Sorry. It is --

7 THE WITNESS: 2015.

8 MS. HIGGINS: 2015. I misspoke.

9 MR. LANDMON: No, no, no. This
10 way, we're all on the same page.

11 Q. (BY MR. LANDMON) So Dr. Jokerst, maybe
12 I'll ask you a first question: Is this one of
13 the two Roberts declarations that you reviewed?

14 A. Yes, it is.

15 Q. And if I can turn your attention to
16 paragraph 33.

17 A. Yes.

18 Q. Okay. You -- you see there that
19 Dr. Roberts says that she's used the -- the
20 older BLU-U device for over 20 years?

21 A. Yes.

22 She says in paragraph 33: "I first

1 purchased a BLU-U for my practice in 2004. I
2 have continued to use the BLU-U in my office for
3 20 years."

4 Q. Yeah.

5 And then if you go down to paragraph
6 35, she says that she has used the BLU-U to
7 treat patients with AKs, right?

8 A. Yes. She writes in paragraph 35, quote:
9 "I have used BLU-U to treat patients with
10 actinic keratoses and acne on the face, neck,
11 hands, arms, chest, and back," unquote.

12 Q. Okay. And if you turn to -- I don't know
13 if it's really turning, but look at paragraph
14 36. She discusses treating patients on their
15 chest or back; and she says that when she does
16 that, she has the patient turn to the right or
17 left to wrap the U of the device around each
18 half of their chest and back.

19 Do you see that?

20 A. Yes. In paragraph, excuse me, 36, she
21 states, quote: "When treating patients' chests
22 or backs, I have had the patient turn to the

1 right so the, quote/unquote, 'U' of the device
2 wraps halfway around their chest and back. Then
3 I have turned them to the left so the,
4 quote/unquote, 'U' of the device wraps around
5 the other half of their chest and back,"
6 unquote.

7 Q. And -- and the reason she does that is
8 to -- that a -- that a normal sized patient
9 wouldn't fit within the U facing straight onto
10 the center of the U, their chest or back, right?

11 MS. HIGGINS: Objection, form.

12 A. So I can't speak for Dr. Roberts, and I'm
13 not a medical professional. So I -- I really
14 can't opine on that. I -- I don't know.

15 Q. (BY MR. LANDMON) Have you looked at the
16 old BLU-U device?

17 A. I have not seen it in person.

18 Q. Have you evaluated its dimensions?

19 A. Yes, I have looked at its dimensions.

20 Q. Okay. And you realize that a -- a normal
21 sized person wouldn't fit within the U facing
22 straight onto the U, correct?

1 MS. HIGGINS: Objection, form.

2 A. I would probably fit, but I might not be
3 considered normal size.

4 I think there is a size of person that
5 would not fit such that their chest was facing
6 the curved region or their back was facing the
7 curved region of the old BLU-U device.

8 Q. (BY MR. LANDMON) And it's your opinion
9 here that the fluorescent tubes of Lundahl
10 include an area of reduced emission known as
11 Faraday dark spaces, right?

12 A. Yes. There is -- there are multiple areas
13 of reduced emission, and Lundahl describes one
14 that is -- he calls the Faraday dark space.

15 Q. And the -- the more uniform center portion
16 of the tube output is used for patient
17 treatment, correct?

18 A. So what Lundahl says in his patent is that
19 only the -- if we turn to Figure 4A in the
20 Lundahl patent, he says that only the curved
21 center region, denoted as 10A, has uniform
22 illumination and that the arms listed as 10B on

1 the right and left have reduced emission.

2 So Lundahl is very specific on
3 paragraph -- or in paragraph -- I'm sorry.
4 Excuse me.

5 Column 5, line 38: "According to a
6 preferred embodiment of the present invention,
7 seven 36-inch U-shaped F34T8 Ultra Blue
8 fluorescent tubes 10(1) through 10(7) provide a
9 maximum visible light-emitting area 36
10 centimeters high by 46 centimeters wide" -- and
11 this is incorrect, as I include in my report,
12 which I can go over if you want me to. It's a
13 typo. It should be 79 centimeters wide -- "with
14 a minimum therapeutically active area 36" --
15 sorry -- "30 centimeters high by 46 centimeters
16 wide (approximately 1350 centimeters squared).
17 As shown in Figure 1, the tubes have a generally
18 arcuate central region 10A and arms 10B
19 extending from respective arms" -- excuse me --
20 "respective ends in the central region."

21 Q. And in your declaration in this IPR
22 proceeding, you have annotated various figures

1 of Lundahl to show the areas of reduced
2 emission, correct?

3 A. Yes.

4 Q. So you have your declaration --

5 A. Yes. I was going to open my declaration,
6 but please go ahead.

7 Q. Yeah.

8 So your declaration -- again, it's
9 Exhibit 2050. I'm going to direct you -- if you
10 use the page numbering on the bottom right, it's
11 Page 58, but it's -- just for clarity's sake,
12 it's -- it's paragraph 93, and there's a figure
13 above paragraph 93.

14 Do you see that?

15 (Whereupon Exhibit Number 2050 was
16 marked for identification.)

17 A. Let's see. So is this Page 53?

18 Q. (BY MR. LANDMON) So, yeah, it's Page 53
19 if you look at the page number in the center.
20 If you look at the bottom --

21 A. Oh, but for the exhibit -- got it.

22 Q. Yeah. That --

1 A. Exhibit Page 58, I'm sorry.

2 Q. No, no. It probably makes things more
3 confusing than they need to be, but bottom right
4 is -- marked Exhibit 2050, Page 58; and there's
5 a figure you have annotated above paragraph 93.

6 Do you see that?

7 A. That's correct.

8 Q. Okay. And that's -- just so we're all on
9 the same page, that's your annotation over
10 Figure 4A from Lundahl?

11 A. That is correct.

12 Q. Okay.

13 A. That's my annotation over Figure 4A from
14 Lundahl.

15 Q. Okay. And on -- and I think you already
16 described this, but the two straight side areas
17 on the left and the right you have circled in
18 red and labeled them "areas of reduced
19 emission," right?

20 A. So these areas of reduced emission are
21 associated with the Faraday, Anson, and Crookes
22 dark spaces. What Lundahl refers to as the area

1 of reduced emission is the straight arms 10B
2 below the dashed horizontal line.

3 Q. Okay. So is it your opinion that the
4 straight arm portions all below the dashes are
5 areas of reduced emission?

6 A. That is what I believe -- let me look
7 again at Lundahl. Let's see.

8 So that -- that is what Lundahl says,
9 but let me quote Lundahl specifically as related
10 to Figure 4. I'll find Lundahl.

11 So in column 6, line 21, Lundahl says:
12 "Only the more uniform center portion of the
13 tube output is used for patient treatment."

14 And that is the curved central region
15 in that Figure 4A on Exhibit 2050, Page 58.

16 Q. Above -- and that's the area that's above
17 the horizontal line?

18 A. Above the dashed horizontal line that
19 separates the curved central region from the
20 straight arms, 10B.

21 Q. So are -- the straight arms that are
22 underneath that horizontal line, are they used

1 to illuminate a treatment surface?

2 A. Lundahl says that, in column 16: "Only
3 the more uniform center portion of the tube is
4 used for patient treatment."

5 Q. Again, just -- I -- I think you said
6 column 16; but you meant column 6, right?

7 A. I'm sorry. Column 6, yes.

8 Q. Yeah, I figured. I just want -- wanted
9 the record to be clear.

10 So according to Lundahl, the straight
11 portions underneath the dotted line in Figure 4A
12 on Page 58 of your report are not used to treat
13 patients?

14 A. So what Lundahl says is consistent with
15 that. Lundahl says, quote: "Only the more
16 uniform center portion of the tube output is
17 used for patient treatment."

18 Q. Which means the less uniform, straight
19 part underneath the dotted line are not used for
20 treatment.

21 Is that -- is that your opinion?

22 A. Well, I think we have to be careful about

1 exactly what Lundahl says.

2 So Lundahl says, quote: "Only the
3 more uniform center portion of the tube output
4 is used for patient treatment."

5 So any -- then output from the arms
6 10B, based on what Lundahl says, would not be --
7 would not be a portion of the tube output used
8 for patient treatment.

9 Q. Okay. You understand, though, that
10 Dr. Roberts has testified in her declaration
11 that the straight side portions of the U-shaped
12 tube is used by her to treat patients' chest and
13 back, right?

14 A. I'll need refer to her declaration.

15 Is there a portion of her declaration
16 you'd like to point me to?

17 Q. Sure. I think we were talking about it
18 before, but it's paragraph 36.

19 MS. HIGGINS: I'm going to object
20 to form; vague.

21 A. So I wouldn't agree with that statement
22 about Dr. Roberts' use of the BLU-U, the old

1 BLU-U.

2 Q. (BY MR. LANDMON) And why would you not
3 agree with that?

4 A. So Dr. Roberts does not give an indication
5 of the areas that she is treating in this
6 paragraph 36 other than the general chest and
7 back, and so the areas treated may very well lie
8 within the curved central region of the old
9 BLU-U.

10 Q. What's the distance -- on -- on -- so,
11 again, focusing back on paragraph 58 of your
12 report and the annotated figure you have up top,
13 what's the distance between that horizontal line
14 and the -- the top of the curve of the tube?

15 A. That data may be somewhere in my report,
16 but I don't know that number off the top of my
17 head. Do you have a reference in my report for
18 that?

19 Q. I -- I don't have a reference in your
20 report. I'm just trying to understand how
21 Dr. Roberts would use that for treating a
22 patient given the -- the small size of that

1 distance.

2 MS. HIGGINS: Objection, form.

3 A. I wouldn't say, based on the photos that
4 I've seen of the old BLU-U, that that's a small
5 area of -- a small treatment area.

6 Q. (BY MR. LANDMON) You understand that the
7 patient has to be at least -- strike that.

8 You -- you understand that a patient
9 has to be between two and four inches of the
10 tube in order to be treated, right?

11 A. That is what Lundahl says in his patent,
12 yes; and my understanding is that is true for
13 the BLU-U, as well.

14 Q. Okay. So to treat at least half of a
15 patient's chest or back, it's your opinion that
16 the treatment can only be done from that small
17 area that extends above the horizontal line in
18 Figure 4A that you've annotated and then it's at
19 least two inches away from the tube at the top,
20 correct?

21 MS. HIGGINS: Objection, form;
22 hypothetical.

1 A. So I -- so -- so it is my understanding
2 that the old BLU-U, a patient's irradiated
3 treatment surface must be between two and four
4 inches from the central region, as identified,
5 for example, in the Lundahl patent in the
6 central curved region.

7 I do not have information from
8 Dr. Roberts' report vis- -vis paragraph 36 as to
9 what area she is treating on the patient's arms,
10 hands, chest, or back, faces or neck, and so I
11 don't have information as to how that treatment
12 was affected by or was -- was performed by
13 Dr. Roberts.

14 Q. (BY MR. LANDMON) Do you have any idea
15 what the distance is in the space below the line
16 in annotated Figure 4A above paragraph 93 in
17 your report?

18 A. Well, if we go to the Lundahl patent -- I
19 have limited space, so I'm going to move
20 Dr. Roberts off to the side here.

21 If we go to the Lundahl patent, he
22 does stipulate what the maximum visible light

1 emitting area is and the minimum therapeutically
2 active area, and so I think it would be
3 reasonable to say that the difference laterally
4 for those two areas -- or I'm sorry, for those
5 two lengths along the longer edge would be the
6 length of the arms 10B of the tube.

7 I do not believe that Lundahl
8 stipulates explicitly the length of 10B that
9 would need to be calculated.

10 Q. How would one determine what that
11 dimension is?

12 A. So the length of 10B? The two straight
13 arms?

14 Q. Yes.

15 A. So upon further reflection, I think that
16 it would not be possible to calculate this based
17 on the information from Lundahl for the
18 following reason: He indicates in column 5 --
19 let's see here -- that the maximum light --
20 let's see. Here we are. The maximum
21 light-emitting area, which is 36, and should
22 read, then, by 79 centimeters wide,

1 approximately 2,850 centimeters squared, with a
2 minimum therapeutically active area
3 30 centimeters high by 46 centimeters wide,
4 approximately 1,350 centimeters squared.

5 So I'm going to correct my earlier
6 testimony and say that this is a measurement
7 that is at the -- this is the therapeutically
8 active area, and so I don't think we can
9 completely map those areas. Let me think about
10 this.

11 So I will say that Lundahl states that
12 the fluorescent tubes, 101 through 27, provide a
13 maximum visible light-emitting area
14 36 centimeters high by, and once again
15 corrected, 76 centimeters wide, with a minimum
16 therapeutically active area 30 centimeters high
17 by 36 centimeters wide.

18 Oh, actually, he does give some more
19 information. So I need to read a little bit
20 above this. So in column 5, in Exemplary Light
21 Sources, he says, "According to a preferred
22 embodiment of the present invention, 7 36-inch

1 U-shaped F34T8 ultra blue fluorescent tubes."

2 So the tubes -- the long distance of
3 the tubes, the long edge of the tubes is
4 36 inches. So that is one data point that could
5 be used.

6 And that is consistent with his
7 maximum visible light-emitting area,
8 36 centimeters high by 46 centimeters wide. So I
9 think there are clues.

10 So there's also the reflectors. So if
11 we look at the reflectors, Figure -- let's see.
12 Figure 5B in Lundahl, he gives a distance and --
13 and angle, and so there is a curved region of
14 the reflector and a straight region of the
15 reflector; and so that might also provide
16 another series of data points that would help to
17 understand -- although this is the reflector,
18 this is not the tube -- help to understand that
19 distance.

20 Q. Do the reflectors expand the area that can
21 be used for treatment?

22 A. So Lundahl indicates that the reflectors

1 contribute to the uniformity. Let me find the
2 section that says that.

3 So that is one contributor to the
4 uniformity.

5 Okay. So column 8, line 62 in -- from
6 Lundahl, quote: "In order to utilize the
7 visible light emitted from the back of the tubes
8 and to increase the uniformity of the output
9 distribution, a reflector 50 is positioned
10 approximately 10 millimeters from the rear
11 surface of the tubes. The reflector 50 is made
12 of polished aluminum sheet, which is bent to
13 approximately conform to the" figuration --
14 "configuration of the tubes."

15 Q. Do the reflectors expand the treatment
16 area of the device to go beyond the lower dotted
17 line in Figure 4A that you have on Page 58 of
18 your report?

19 MS. HIGGINS: Objection, form.

20 A. So Lundahl very clearly stipulates that
21 the areas -- that the only area of uniform
22 illumination for treatment is the curved central

1 region.

2 So as he says in column 8, line 62,
3 "in order to utilize the visible light emitted
4 from the back of the tubes and to increase the
5 uniformity of the output distribution, a
6 reflector 50 is positioned approximately 10
7 millimeters from the rear surface of the tube."

8 So Lundahl stipulates clearly that the
9 reflector is used to increase the uniformity of
10 the output distribution, but Lundahl only
11 indicates that the uniformity of the output
12 distribution is appropriate for patient use in
13 the central curved region.

14 Q. (BY MR. LANDMON) Okay. I think you can
15 put that aside.

16 A. What is "that"?

17 Q. Whatever you had in front of you, you can
18 put aside.

19 A. Okay.

20 Q. We're going to change subjects.

21 A. Dr. Roberts' declaration?

22 Q. Yeah. We're going to change subjects.

1 Put that aside, and you can put your declaration
2 aside.

3 Do you have -- and forgive me, because
4 I don't remember what you identified. Do you
5 have the Bourget or Bourget article? Do you --

6 A. I do not have that --

7 Q. Okay.

8 A. -- but we might be able to get it.

9 Q. Okay. It's Exhibit 2011.

10 (Whereupon Exhibit Number 2011 was
11 marked for identification.)

12 A. All right. I have it on screen.

13 Do we have a hard copy? And we do.

14 MS. HIGGINS: And Mr. Landmon, I
15 have a hard copy of Exhibit 2011. Is it okay if
16 I put it in front of the witness?

17 MR. LANDMON: Yes. Thank you.

18 THE WITNESS: Thank you.

19 Q. (BY MR. LANDMON) Okay. And maybe I
20 should ask quickly: Do you know how to
21 pronounce the author's last name? Is it
22 Bourget? Bourget?

1 A. So in French, it would be Bourget, but
2 many -- he's in Madison, Wisconsin, so it could
3 be Bourget. I -- I have no idea. I'll --
4 I'll -- either one I will recognize.

5 Q. Okay. Sounds great.

6 So you rely -- so we're referring to
7 Exhibit 2011. You rely on the Bourget article
8 in your declaration, right?

9 A. I cite this article -- can you -- can you
10 point to my declaration where I use it?

11 Q. Well, it's in your Materials Considered
12 list, right?

13 A. Yes. I just want to look in my
14 declaration at -- at where and how I used it.

15 Q. Yeah. I -- so I'm going to ask you some
16 questions about it. I don't have the cites in
17 front of me, but we can always get there if we
18 need to.

19 So you recognize that you reviewed
20 this, though, as part of your materials
21 considered, right?

22 A. Yes, that is correct.

1 Q. Okay. And it was published in 2008?

2 A. Yes, that is correct.

3 Q. And the Bourget article would have
4 reflected, then, the knowledge of a POSITA prior
5 to 2015, right?

6 A. Yes, I agree with that.

7 Q. Okay. So let's take a look at the
8 abstract to start with.

9 Let me know when you're there.

10 A. Yes, I'm there.

11 Q. Okay. So the abstract -- I'll -- I'm
12 about halfway down. Maybe a little halfway
13 down, there's a sentence that starts in the
14 middle, saying -- it's talking about LEDs, and
15 then says, "they are solid state devices which
16 are much more robust than any glass envelope
17 lamp and contain no hazardous materials like
18 fluorescent lamps."

19 Do you see that?

20 A. Yes, I do.

21 Q. Okay. So Bourget teaches that well
22 before 2015 LEDs were preferred because they

1 didn't contain hazardous materials like
2 fluorescents, right?

3 MS. HIGGINS: Objection, form.

4 A. Well, Bourget is largely correct, but not
5 entirely correct because some LEDs do contain
6 hazardous materials -- not the same hazardous
7 materials as fluorescent lamps and not in the
8 same volume, but still contain arsenic which is
9 considered to be hazardous.

10 Q. (BY MR. LANDMON) So your -- your opinion
11 here is that Bourget is wrong when he says that
12 LEDs contain no hazardous materials like
13 fluorescent lamps?

14 A. So no, he's correct in that they contain
15 no hazardous materials like fluorescent lamps.
16 So the fluorescent lamp hazardous material is
17 generally considered to be mercury, and some
18 elements of some phosphors are considered to be
19 hazardous.

20 There are tiny amounts of hazardous
21 materials in LEDs, but they are not like
22 fluorescent lamps, those hazardous materials.

1 Q. They are less hazardous than fluorescent
2 lamps?

3 A. They're -- they are typically embedded in
4 a latticed structure in the LED, whereas if a
5 fluorescent lamp breaks, the mercury can escape
6 easily, whereas the hazardous substance cannot
7 escape from an LED; but if you grind up an LED
8 and eat it, it will not -- you will suffer
9 because there are some hazardous materials in
10 the LED epitaxial layers and, in some cases, in
11 the substrates.

12 Q. You'd agree that a POSITA prior to 2015
13 would have been motivated to use an LED instead
14 of a fluorescent lamp to reduce the use of
15 hazardous materials, right?

16 MS. HIGGINS: Objection, form.

17 A. I -- I would say to reduce the use of
18 mercury that is in the vapor of a fluorescent
19 lamp.

20 Q. (BY MR. LANDMON) And you see there in
21 that same sentence that Bourget teaches that
22 LEDs are much more robust than fluorescent

1 lamps.

2 Do you see that?

3 A. Yes, I see that Bourget says that.

4 Q. And you agree that a POSITA prior to 2015
5 would generally want to use a component that is
6 more robust, right?

7 MS. HIGGINS: Objection, form.

8 A. So that is generally true.

9 What Bourget is -- is characterizing
10 in terms of robustness is unclear from this
11 statement. In some ways solid state devices are
12 more robust than glass envelope lamps; and in
13 other ways, they could be considered less
14 robust.

15 But for what Bourget is saying here,
16 there are some aspects of LEDs that are more
17 robust than glass envelope lamps.

18 Q. (BY MR. LANDMON) And given the problem
19 with fluorescent lamps containing mercury, if
20 they're accidentally broken, you're aware that
21 as of 2008, most municipalities had regulations
22 requiring special disposal of fluorescent lamps,

1 right?

2 A. I'm not aware of the particular year, but
3 I do know that many municipalities at some point
4 did institute disposal of fluorescent tubes as a
5 hazardous waste disposal.

6 Q. Well, if you can look on the first page in
7 the third column there, there's a paragraph
8 starting: "LEDs are very rugged devices."

9 Do you see that?

10 A. Yes, I'm there.

11 Q. Okay. And about seven lines down, you see
12 a sentence saying that: "Most municipalities
13 also require special disposal of these lamps to
14 properly handle the mercury."

15 Do you see that?

16 A. Yes, I do.

17 Q. Okay. And then you go on -- he goes on to
18 state -- Bourget goes on to state that: "LEDs
19 contain no hazardous material, so this is not an
20 issue."

21 Do you see that?

22 A. Yes, I do.

1 Q. Okay. And you would agree with me that
2 prior to 2015, a POSITA would have wanted to use
3 a component that has less hazardous materials,
4 right?

5 MS. HIGGINS: Objection, form.

6 A. So in our engineering classes, we teach
7 subjects that include the lifecycle of products;
8 and disposal and cost of disposal as part of the
9 lifecycle of a product, as well as the
10 environmental impact of a product, is something
11 that we encourage engineers to assess and review
12 for the systems that they build.

13 Q. (BY MR. LANDMON) And --

14 A. So --

15 Q. I'm sorry. Go ahead.

16 A. So a -- a responsible engineer would want
17 to use materials in a design that were of less
18 hazardous waste impact or having lower
19 environmental impact.

20 Do all engineers do that? No. But it
21 is something that we certainly teach to our
22 engineers.

1 Q. And that was the case prior to 2015, as
2 well, right?

3 A. Yes, it was.

4 Q. And you agree with me that Bourget teaches
5 that LEDs have a longer lifetime than
6 fluorescents, right?

7 A. Yes. Bourget, in his abstract, says,
8 quote: "LEDs also have a much longer lifetime
9 than incandescent, fluorescent, and high-density
10 discharge lamps." And he quotes the U.S.
11 Department of Energy, unquote.

12 Q. And if we turn to the second page of
13 Bourget, do you see there there's a Figure 2?

14 Do you see that?

15 A. Yes.

16 Q. Okay. And that figure purports to show
17 the longer lifetime of LEDs as compared to other
18 forms -- other light forms, including
19 fluorescents, right?

20 A. Yes, Figure -- the bottom of Figure 2,
21 that shows the lifetime in hours for various
22 lamps.

1 Q. And you'd agree --

2 A. Yes. Go ahead.

3 Q. Sorry. You'd agree with me that a POSITA
4 prior to 2015 would generally want to use a
5 component with a longer lifetime, right?

6 MS. HIGGINS: Objection, form.

7 A. So, yes, I would agree that a POSITA would
8 want to use a component with a longer lifetime;
9 however, subsequent studies have shown -- and I
10 believe these were prior to 2015 -- that in the
11 systems that use LEDs, while the LED lifetime is
12 longer, it is often the drive electronics for
13 the LEDs that fail before the LEDs fail.

14 And so taking a full system approach
15 is very important; but certainly on a
16 component-by-component basis, if cost were an
17 equivalency among different components, then
18 lifetime would be -- lifetime would be a factor;
19 but there will be many other factors, as well,
20 including cost, form factor, difficulty of
21 assembly, difficulty of tests, and, of course,
22 for an illuminator, the output illumination and

1 what that output illumination looked like/would
2 need to represent.

3 And, for example, for PDT, it's a --
4 it's a -- a very -- very strict requirement for
5 PDT. So there -- there are many things that
6 would need to be looked at.

7 Q. (BY MR. LANDMON) And if you could turn
8 back with me to the first page, do you see in
9 the -- the second column it, down in the bottom,
10 has a paragraph starting with "Advantages," a
11 heading of "Advantages"?

12 A. Yes, I see that.

13 Q. Okay. And do you see it relates -- it's
14 the last line on this column and going to the
15 top of the next, states that: The newest
16 high-power LEDs are more efficient than
17 incandescent and fluorescent bulbs"?

18 A. Yes, that's correct.

19 So it says: "The newest high-power
20 LEDs are more efficient," open quote --
21 "(radiated power output divided by electrical
22 power output), than incandescent and fluorescent

1 lamps."

2 Q. And you would agree with me that a POSITA
3 prior to 2015 would generally want to use a
4 light source that is more efficient, right?

5 MS. HIGGINS: Objection, form.

6 A. So while there are many considerations,
7 efficiency would be one consideration that a
8 POSITA, in designing a structure or a device,
9 would take into account, in addition to many
10 other factors that could include, as I said
11 previously, form factor, light output,
12 configuration, a variety of factors when
13 constructing a device.

14 But certainly higher efficiency would
15 mean that the structure would operate with less
16 electricity overall, and so that would be one
17 consideration that a POSITA would take into
18 account.

19 Q. (BY MR. LANDMON) And if you could turn
20 with me again, staying on the same page, the
21 first page there, the last -- so just look with
22 me at the last paragraph you see, starts with

1 "The small size of LEDs."

2 A. Yes, I see that.

3 Q. Okay. And Bourget states that they --

4 "The small size of LEDs allows unprecedented
5 flexibility in lighting fixture design."

6 Do you see that?

7 A. Yes.

8 Q. And you would agree with me that a POSITA
9 prior to 2015 would generally want to use a
10 component that has greater flexibility in
11 design, right?

12 MS. HIGGINS: Objection, form;
13 overbroad.

14 A. So as I said a few minutes ago there are
15 many considerations to take into account.

16 Flexibility may or may not be a consideration
17 for some applications.

18 So, for example, in some luminaires
19 that are meant to emulate a traditional light
20 bulb, such as those that Thomas Edison worked
21 on, are able to have the LEDs literally in a
22 coil. They appear to light up a coil, and

1 that's primarily for visual purposes and
2 artistic purposes.

3 So in that case, flexibility in
4 lighting fixture design would be important.

5 But in some applications, the small
6 size of LEDs would not matter for a lighting
7 fixture design. So it's very design- and
8 usage-dependent.

9 Q. (BY MR. LANDMON) Okay. I think you can
10 put Bourget aside for now.

11 I wanted to turn back to your
12 declaration that's Exhibit 2050.

13 A. Yes.

14 Q. And wanted to ask you to turn to -- it's
15 marked Page 50 at the bottom right or Page 45 in
16 the center, but there's a section called "Claim
17 Construction." Let me know when you're there.

18 A. Okay. I'm there.

19 Q. Okay. And you -- you see you have a
20 paragraph there that starts -- that discusses
21 that: "The parties agreed on the following
22 construction for 'uniformly illuminating'" --

1 I'm sorry -- "'uniformly illuminate a treatment
2 surface' or 'uniformly illuminating a treatment
3 service,' which was adopted by the
4 Administrative Law Judge in the related ITC
5 proceeding."

6 Do you see that?

7 A. Yes, I see that.

8 Q. And you applied that construction in your
9 declaration here?

10 A. Yes, I did.

11 Q. Okay. And just so we're all clear, the
12 construction of those terms -- the agreed-upon
13 construction is "irradiating light over the
14 active emitting area such that the measured
15 irradiance at a treatment surface of the patient
16 is at least within 60 percent of the measured
17 maximum," right?

18 A. That's correct.

19 Q. Okay. So if -- do you also have the
20 Lundahl reference still in front of you or
21 somewhere --

22 A. I can get it, yes.

1 Q. Okay. Exhibit 1014.

2 A. Yes, I have it.

3 Q. So if I can turn you to column 15 at lines
4 22 to 27...

5 A. I found it.

6 Q. Okay. And do you see that Lundahl
7 discloses that the measured output over the
8 active emitting area of its device is within
9 70 percent of the measured maximum of a -- over
10 a distance of two and four inches?

11 A. Yes.

12 Q. Okay. So Lundahl discloses a higher
13 standard of uniformity than what's required by
14 the '028 patent, right?

15 MS. HIGGINS: Objection, form.

16 A. Well, let's -- let's read all of that
17 paragraph of Lundahl. So I'm going to read from
18 column 15, starting at line 22.

19 "It has been found that according to a
20 preferred embodiment of the present invention,
21 the measured output over the active emitting
22 area is within 70 percent of the measured

1 maximum when measured with a cosign response
2 detector at distances of four inches and two
3 inches and within 60 percent of the measured
4 maximum over all operation distances."

5 So Lundahl uses the 60 percent
6 criterion that is reflected in the claim term
7 for, quote, "uniformly illuminate a treatment
8 surface," unquote, and quote, "uniformly
9 illuminating a treatment surface," unquote.

10 Q. (BY MR. LANDMON) And that 70 percent that
11 Lundahl discloses that its preferred embodiment
12 accomplishes is higher than the 60 percent set
13 forth in the parties' agreed construction for
14 "uniformly illuminating," right?

15 MS. HIGGINS: Objection, form.

16 A. No. I would say that the --
17 within 60 percent of the measured maximum
18 overall operation distances is what Lundahl
19 refers to and what would be considered
20 consistent with the agreed-upon claim
21 construction for, quote, "uniformly illuminate a
22 treatment surface," unquote, and, quote,

1 "uniformly illuminating a treatment surface,"
2 close quote.

3 Q. (BY MR. LANDMON) At a distance of four
4 inches and two inches, does Lundahl disclose a
5 greater uniformity than what's required by the
6 "uniformly illuminate" and "illuminating" for
7 the '028 patent?

8 MS. HIGGINS: Objection, form.

9 A. So Lundahl says that the measured output
10 over the active emitting area is
11 within 70 percent of the measured maximum when
12 measured with a cosign response detector at
13 distances of four inches and two inches and
14 within 60 percent of the measured maximum
15 overall distances.

16 So when we look at the claim term, it
17 is the 60 percent of the measured maximum over
18 all operation distances quoted in Lundahl that
19 applies to the claim term.

20 Q. (BY MR. LANDMON) Right.

21 And I'm trying to understand in
22 Lundahl, it discloses a 70 percent uniformity

1 at four inches and two inches, right? I mean,
2 do I understand that right?

3 A. So no. I -- that's not correct.

4 So Lundahl discloses 70 percent at
5 four inches for all -- for measurements of four
6 inches, and 70 percent for measurements at two
7 inches; but for all of those measurements, for
8 the irradiating light over the active emitting
9 area, the measured irradiance at the treatment
10 surface, which includes both four inches and two
11 inches, Lundahl says is within 60 percent of the
12 measured maximum for all operation distances.

13 Q. So at four inches, what is the uniformity
14 achieved by Lundahl?

15 A. So for only measurements at four inches,
16 Lundahl achieves 70 percent.

17 Q. And what is the uniformity Lundahl
18 achieves at two inches?

19 A. At two inches, Lundahl separately
20 achieves 70 percent, but those 70 percent may be
21 different -- in fact, will be different
22 measurements of the irradiance.

1 And so when you combine the
2 measurements at the four inches and the two
3 inches, which represents the irradiated light
4 over the active emitting area, then the measured
5 irradiance at the treatment surface for both of
6 those measurements is within 60 percent of the
7 measured maximum.

8 Q. Is the 70 percent that Lundahl achieves
9 at four inches a greater uniformity than
10 the 60 percent required by the parties' claim
11 construction with respect to the '028 patent?

12 MS. HIGGINS: Objection, form;
13 lacks foundation.

14 A. So the agreed-upon construction is, quote,
15 "irradiating light over the active emitting area
16 such that the measured irradiance at a treatment
17 surface of the patient is at least within
18 60 percent of the measured maximum."

19 So this agreed-upon construction is
20 the measured irradiance at a treatment surface
21 of the patient, and so that needs to be applied
22 for the -- both the distances, four inches and

1 two inches, of Lundahl.

2 So while Lundahl may achieve
3 70 percent of the measured maximum when measured
4 with a cosign response detector at four inches
5 and also at two inches, when they measure --
6 when those measurements are combined, thus --
7 thus representing, from Lundahl's perspective,
8 all operation distances, then the -- the minimum
9 is within 60 percent of the measured maximum.

10 So the claim construction discusses
11 irradiating light over the active emitting area.
12 It does not say at two inches or four inches.
13 It says over the active emitting area.

14 So Lundahl is consistent with
15 60 percent for all operation distances with the
16 claim construction, at least within 60 percent
17 of the measured maximum.

18 Q. (BY MR. LANDMON) You agree that
19 70 percent is greater than 60 percent, right?

20 A. Mathematically, without any reference to
21 anything else, 70 is larger than 60.

22 Q. Do you have the '028 patent in front of

1 you?

2 A. I can go to it. Yes.

3 Q. Okay. And if you could turn with me -- so
4 in the '028 patent, turn with me to column 8.

5 A. All right. I'm at column 8.

6 Q. And I'm going to direct you to the bottom
7 of that column. And if you see, starting at
8 line 65, it says, "Even more preferably, the
9 measured output over the emitting area is within
10 80 percent of the measured maximum over a
11 distance of two and four inches."

12 Do you see that?

13 A. Yes; however, I also see further up that
14 in column 8, line 58, quote: "In one
15 embodiment, the measured output over the active
16 area (over the entire active emitting area) is
17 within 60 percent of the measured maximum (over
18 the entire active emitting area) measured with a
19 cosign response detector over all operation
20 distances."

21 Q. Right.

22 But the '028 teaches that even more

1 preferably, they achieve a measured output over
2 the emitting area that's within 80 percent over
3 the measured maximum over a distance of two and
4 four inches, right?

5 A. No.

6 So what the '028 patent says is: "In
7 one embodiment, the measured output power over
8 the active emitting area (over the entire active
9 emitting area) is within 60 percent of the
10 measured maximum (over the entire active
11 emitting area) measured with a cosign response
12 detector over all operation distances."

13 Now, more preferably, the measured
14 output over the emitting area is within
15 70 percent of the measured maximum over a
16 distance of two and four inches. So they go on
17 to say more preferably, but they certainly don't
18 say that this is what they have achieved with an
19 embodiment.

20 I mean, they could say we'd love to be
21 at 90 percent, and it doesn't say here that
22 they -- this is aspirational. It is not

1 something that is in an embodiment.

2 Q. Why don't you turn to Figure 8 with me.

3 A. I'm at Figure 8.

4 Q. Okay. And these are measurements taken of
5 an actual treatment surface, right?

6 A. I believe that's correct, but let me refer
7 to the patent again to be absolutely sure.
8 Okay.

9 Okay. I'm sorry. What was the
10 question?

11 Q. Yeah, and so maybe we can start there. I
12 assume you went to column 8?

13 A. Yes, I'm at column 8, reading about
14 Figure 8, starting at about 43.

15 Q. And you see that they describe there that
16 Figure 8, on the other hand, illustrates the
17 light uniformity produced by an embodiment of
18 the invention, right?

19 A. Of the present invention, yes.

20 Q. Okay. So if you go back to Figure 8, you
21 can see there that in that embodiment for the
22 large portion of what was measured, they

1 achieved over a 90 percent uniformity, correct?

2 A. Yes. It appears that the A prime, which
3 are the small dots, corresponds to a 90 percent
4 to 100 percent in this particular graph.

5 I'm not sure, however, if this was
6 measured. It says, "the light uniformity
7 produced by an embodiment of the present
8 invention. The targeted treatment area is the
9 same as that measured in Figure 7."

10 Okay. Measured...

11 So -- so whatever Figure 8 is, whether
12 it's measured or not, certainly Figure 8 does
13 show that within the angles and, I believe,
14 the Y axis -- actual- -- oh, height is in
15 inches.

16 Okay. So for the angle and height in
17 inches that this graph represents, that this --
18 the tiny dots are corresponding to A prime,
19 which is 90 to 100 percent, and then the dashed
20 lines are corresponding to B prime, as it shows
21 in this particular graph.

22 Q. The A prime area in that graph of Figure 8

1 takes up the majority of that figure, right?

2 A. The majority of the space in the gridded
3 portion of the figure for which the X axis is
4 angle and the Y axis is height, yes.

5 Q. And you'd agree that 90 to 100 percent
6 uniformity is higher than 60 percent uniformity,
7 right?

8 A. Yes. 90 to 100 percent uniformity is
9 higher than 60 percent uniformity.

10 Q. Do you still have your declaration in
11 front of you?

12 A. Yes, I do.

13 Q. Turn to what's marked Page 27 at the
14 bottom right or Page 22 in the middle.

15 Let me know when you're there.

16 A. I'm there.

17 Q. And if you look at paragraph 46...

18 A. Yes.

19 Q. So if you see under the figure -- so at
20 the bottom of this page, you state that, "Since
21 LEDs are discrete directional point sources, the
22 distance between LEDs affects the ability of the

1 LEDs to illuminate a light source."

2 Do you see that?

3 A. Yes.

4 Q. And you go on to state: "To uniformly
5 illuminate a surface, careful design and
6 engineering of the LEDs is critical, including
7 factors such as LED divergence angle, LED
8 Lambertian output" --

9 A. Yep.

10 Q. -- "(intensity output as a function of
11 divergence angle), LED drive current, number of
12 and positioning of LEDs, and heat dissipation."

13 Do you see that?

14 A. Yes.

15 Q. Okay. Divergence angles were known for
16 LEDs before 2015, right?

17 A. So LEDs -- one characteristic of LEDs when
18 you looked at a data sheet would be the
19 divergence angle or the divergence half angle,
20 and those were known in 2015.

21 Q. And divergence angles -- let me back up.

22 So what are divergence angles?

1 A. So an LED emits as a point source, and so
2 you can imagine that the point source is -- the
3 light is coming as if from a point and then
4 coming at -- sort of in a triangle shape.

5 If we refer to Exhibit -- EX2050,
6 Page 27, the previous page, I have a picture of
7 what those triangles essentially look like.

8 Now, the divergence angle is typically
9 defined as the 1 over E squared intensity of the
10 peak intensity of the LED.

11 So the Lambertian output of an LED
12 essentially is a peak at a zero degree
13 divergence angle, and then the LED intensity, as
14 a function of radial position from the LED,
15 drops off as a function of distance.

16 So some companies define the LED
17 divergence angle as 1 over E squared, which is
18 more typical of the peak LED output intensity.
19 Some companies characterize it as the 1 over E
20 of the peak intensity.

21 So it's very important to look at the
22 LED specification to understand how the vendor

1 defines divergence angle for their particular
2 product.

3 MR. LANDMON: We've been going for
4 a while. Why don't we go off the record, maybe
5 take our lunch break.

6 MS. HIGGINS: Are you ready for
7 lunch now?

8 THE WITNESS: I'd really rather go
9 'til 12:30. Would that be okay? Or if
10 everybody wants to break, I'll break.

11 MR. LANDMON: Well, we're going to
12 take a break anyways. If you want, we can come
13 back and go for another 20 minutes and then do
14 lunch. It's up to you. I -- I need a 10-minute
15 break.

16 THE WITNESS: Okay. So -- so
17 let's just break for lunch, then, rather than
18 break and come back again.

19 MR. LANDMON: That's what I
20 figured. Okay. Thank you.

21 (Break taken from 11:05 a.m. to
22 11:50 a.m.)

1 Q. (BY MR. LANDMON) All right. Before we
2 get started, good afternoon, Dr. Jokerst.

3 So we left off talking about
4 divergence angles. Do -- do divergence angles
5 tell a POSA about the spread of light over a
6 distance?

7 A. That's one aspect of spreading light over
8 a distance. It's not the only aspect that
9 describes it, but it is one aspect that
10 describes it, yes.

11 Q. And if a POSITA knows the distance from a
12 light source to a surface, the spread of light
13 at that distance can be calculated, right?

14 A. So it would also be -- so the spread of
15 light, yes; the intensity, no.

16 Q. Okay. And the '028 patent achieves
17 uniform illumination as required by the claims,
18 right?

19 A. So the '028 patent describes uniform
20 illumination as described in the claims of the
21 '028 patent. Is that what you're asking?

22 Q. I -- it was a -- an inartful question.

1 The -- the '028 patent describes a
2 device that achieves uniform illumination as
3 required by the claims of the patent, right?

4 A. Yes. As a -- as required by the claim
5 construction for uniform illumination, yes.

6 Q. And in your opinion, a POSITA could follow
7 the disclosures of the '028 patent to achieve
8 uniform illumination as set forth in the agreed
9 construction, right?

10 A. Yes. They could follow the '028 patent to
11 construct a device that would achieve uniform
12 illumination as described in the claim
13 construction.

14 Q. The '028 patent doesn't disclose the
15 specific divergence angles of the LEDs used in
16 the described illuminators, right?

17 A. That's correct. They do not describe the
18 specific divergence angles of the LEDs used in
19 the illuminator.

20 Q. And the '028 patent does not discuss the
21 specific spacing between LEDs in the described
22 illuminators, right?

1 MS. HIGGINS: Objection, form.

2 A. Let me take a look at the '028 patent.

3 So they do talk about LED density and
4 LED power. I'm sorry, could you restate your
5 question?

6 Q. (BY MR. LANDMON) Yeah. The '028 patent
7 does not disclose the specific spacing between
8 LE -- the LEDs described in the illuminators?

9 A. Yes. It does not describe the --
10 explicitly the spacing, but it does talk about
11 LED density and LED power output.

12 Q. And you'd agree with me, right, that light
13 emitted from a -- if light is emitted from a
14 surface, the spread of the emitted light is not
15 bound by the edges of the light-emitting
16 surface, right?

17 A. I -- I don't understand your question from
18 an optical, technical point of view. What --
19 what do you mean by "bound by"? Because it --
20 it -- a -- a -- a boundary will affect the
21 output of the light, so could you -- could you
22 explain your question a bit, maybe give --

1 Q. Sure.

2 A. -- an example?

3 Q. Yeah. Let's -- let's use an example.

4 That's probably a -- a good idea.

5 So if you have a -- a panel of light
6 and the panel is -- is 12-by-12, just a square
7 for simplicity's sake, the spread of the emitted
8 light would not be confined to the 12-by-12
9 space as you move away from the illuminator,
10 right?

11 MS. HIGGINS: Objection,
12 hypothetical.

13 A. It very possibly could be if it was
14 designed to be.

15 Q. (BY MR. LANDMON) If it was -- it -- it
16 could be, but there are also instances where you
17 could have a flat panel where the spread of
18 light would spread beyond the, in this example,
19 12-by-12 space of the light-emitting surface,
20 right?

21 MS. HIGGINS: Objection,
22 hypothetical.

1 A. If it was designed to do that, that could
2 be an optical system that could be designed.

3 Q. (BY MR. LANDMON) And in the panels
4 disclosed in Larsen, the light emitting from
5 those panels is not confined just to the
6 dimensions of the disclosed panels, correct?

7 MS. HIGGINS: Objection, form.

8 A. I would say that is unclear in Larsen.

9 Q. (BY MR. LANDMON) Okay. So if we turn --
10 do you have your declaration in front of you
11 still?

12 A. Yes, I do.

13 Q. Okay. And we were -- right before the
14 break we were on Page 27 on the bottom right, 22
15 in the center, where you're depicting light
16 coming out of LEDs, at least in -- in paragraph
17 46.

18 Do you see that?

19 A. Yes, I do.

20 Q. Okay. And if the outer boundaries of the
21 panel that those LEDs are attached to coincide
22 with the right and left end edges of the LEDs,

1 you'd agree that light would extend beyond the
2 boundaries of those panels by the time you got
3 to the treatment surface, correct?

4 MS. HIGGINS: Objection, form.

5 A. So for those particular LEDs, excuse me,
6 unlike Larsen, I show an LED that does not have,
7 for example, a reflector on the surface of the
8 LED, but show the unencumbered divergence angle
9 of a hypothetical LED. So it's -- it's really
10 meant as -- as a generalization of LEDs.

11 In Larsen there are reflectors on the
12 LEDs, and so that could be a design through
13 which the emission does not extend beyond the
14 extent of the LEDs.

15 But for my particular example shown in
16 46, that does not contain any superstructure on
17 the LED such as a mirror or a lens. The extent
18 of the LED output does go beyond the extent of
19 the edges of the outermost LEDs.

20 Q. (BY MR. LANDMON) And the LEDs that you
21 have depicted in your hypothetical in paragraph
22 46 were available to a POSITA designing a PDT

1 device prior to 2015, correct?

2 A. Yes. This -- the type of LED that I
3 showed just very generally would have been
4 available to a person of skill in the art prior
5 to and in 2015; but once again, this is a -- a
6 very generalized picture.

7 Q. And you mentioned the reflectors in
8 Larsen, and you said -- I don't want to put
9 words into your mouth, but it -- it's possible
10 that the reflectors would -- and I don't
11 remember the words you used, but it's possible
12 that those reflectors could have directed the
13 light so it did not extend beyond the panel
14 edges in Larsen.

15 Is -- is that your testimony?

16 A. So let's go to Larsen, and let's look at
17 what he says about those reflectors.

18 So I'm looking at Figure 2a and the
19 reflectors -- let's see. I'm just going to look
20 at Larsen here so I correctly -- okay.

21 So in column 5 -- let's see. I might
22 need to go back. Let me go back one -- one page

1 to column -- I'm sorry, not columns in Larsen.
2 So 70, the -- paragraph 70: "The Figures 2a,
3 2b, and 2c show plain-surfaced printed circuit
4 boards with light sources mounted in the
5 applicators 13. These can be used in the
6 working model according to Figure 2a to 2c
7 individually, side-by-side (in large numbers),
8 or in combination with an applicator. Further,
9 the printed circuit boards on which the light
10 sources are mounted can be favor -- can
11 favorably be produced as multilayer, also
12 containing the electromagnetic transmitter --
13 field transmitter coils 65 shown in Figure 2d.
14 According to Figure 2a, the applicators 13 in
15 the working model are mounted in a shifting
16 order with semiconductor diodes (LED) and/or
17 laser diodes 17 and 17a" -- something a little
18 bit unreadable -- "(the following called light
19 sources) whereby shifting the order of the light
20 sources 17 means that the" reflective --
21 "respective light source 17a of one row is
22 placed at the point of intersection of the two

1 diagonals through the two respective light
2 sources 17, which are placed adjoining on both
3 sides. The light sources 17 and 17a are mounted
4 with reflectors 18, which collect the radiation
5 and bundle it in front of the applicator 13."

6 So it's unclear from Larsen exactly
7 what the -- the reflectors are doing, except
8 this, quote/unquote, bundling, which is not a
9 commonly used word in optics; but I would say,
10 reading Larsen, that it would affect the output
11 of those LEDs and lasers.

12 Q. And it's -- it's unclear. So you would
13 agree with me that the reflectors could also be
14 dispersing the light in -- in a broader manner
15 beyond the edges of the panel, right?

16 MS. HIGGINS: Objection, form;
17 lacks foundation.

18 A. No. I wouldn't agree with that, because
19 when we look at Figure 2d, the shape of the
20 reflector shown in Figure 2d is one of
21 concentrating the light rather than distributing
22 it more broadly.

1 Q. (BY MR. LANDMON) Sorry, what figure did
2 you mention?

3 A. Figure 2d in Larsen.

4 Q. Thanks.

5 So putting Larsen aside, with the
6 hypothetical LED as -- as you have drawn on
7 Page 27 -- or you've depicted on Page 27 of your
8 declaration, a POSITA would be able to calculate
9 how far past the edges of the light-emitting
10 surface the -- the light would be emitted,
11 right?

12 MS. HIGGINS: Objection, form.

13 A. So knowing the divergence angle of the
14 LED, knowing the peak power, knowing the 1 over
15 E squared point, looking at the specifications
16 of the LED, knowing the distance of the LED to
17 the surface at which we are measuring the
18 divergence, it would be possible to -- to give
19 an intensity profile of the emitted light at a
20 surface.

21 Q. (BY MR. LANDMON) And if there was a gap
22 between two LEDs, a POSITA would know how to

1 calculate the spread of light in order to cover
2 that gap between the two LEDs, right?

3 MS. HIGGINS: Objection, form.

4 A. So this can actually get pretty
5 complicated, and so I would refer to some of the
6 testimony cited herein of the inventors of
7 the '028 patent that often it's easier to simply
8 try something out and measure it because the --
9 the simulation of these types of arrays can be
10 very difficult to do.

11 So it is possible, but it is often
12 easier to simply measure and adjust and more
13 practical.

14 Q. (BY MR. LANDMON) Let's turn to a
15 different section of your declaration.

16 Turning to Page 79, 79 on the
17 right-hand side of --

18 A. Yeah, on the exhibit. I got that.

19 Q. Right. I think I'm -- no, that is right.
20 Yep.

21 Let me know when you're there.

22 A. I'm there.

1 Q. Okay. And if you see in -- in
2 paragraph 128, you're discussing the "optical
3 dead spaces."

4 Do you see that?

5 A. Yes.

6 Q. And you say there in paragraph 128 that,
7 "Spacing the LEDs: As taught by Lundahl,
8 spacing of light sources would create gaps,"
9 which you define as optical dead spaces, "in
10 areas of the target treatment area that would
11 impact the uniform illumination, because LEDs
12 and fluorescent tubes do not have the same light
13 output characteristics as explained in
14 Section 7."

15 Do you see that?

16 A. Yes, I see that; and that's entirely true.

17 So, for example, looking at the
18 spacing in the center of the Lundahl patent and
19 the BLU- -- the old BLU-U, there's about seven
20 centimeters between those tubes; and I inspected
21 the RhodoLED XL, and that's nearly double the
22 distance between LED rows in the RhodoLED XL.

1 And so it's -- it's extremely
2 different, the spacing of the tubes in the
3 Lundahl device and the BLU-U compared to the
4 realization, for example, in the RhodoLED XL.

5 Q. Why don't we turn to that in your
6 declaration. If we turn to Page 151 at the
7 bottom right -- let me know when you're there.

8 A. Yes, I'm there.

9 Q. And if you see there, you have a -- a
10 figure from the RhodoLED XL user manual.

11 Do you see that?

12 A. Is that in paragraph 227?

13 Q. Yes.

14 A. Yes. That's Figure 1. LED panels with
15 LED distribution and emission spectrum of
16 RhodoLED XL from the user manual, Figure 1, yes.

17 Q. And you'd agree that the RhodoLED XL has
18 gaps between the LEDs and the panel, right?

19 A. Yes. There are gaps between the LEDs, but
20 once again, I want to highlight that the
21 distance, for example, between the center rows
22 of LEDs compared to Lundahl and the BLU-U, the

1 old BLU-U -- the old BLU-U in Lundahl is nearly
2 twice as large as the gaps on the RhodoLED XL
3 rows of LEDs, and there are seven tubes in the
4 Lundahl device and there are nine rows of LEDs
5 here.

6 So extremely different from the
7 perspective of -- well, just extremely
8 different.

9 Q. So I understand you have that opinion. I
10 just want to focus on the gaps in the LEDs of
11 the RhodoLED XL device. There are gaps; you've
12 said that.

13 It's also your opinion that with
14 the -- despite these gaps, that the LEDs provide
15 uniform illumination, right?

16 A. Yes, the RhodoLED XL does provide uniform
17 illumination.

18 Q. And is it the divergence of lights from
19 the LEDs that allows the RhodoLED XL to achieve
20 uniform illumination across its five panels?

21 A. Well, it's a large variety of factors that
22 allows the RhodoLED XL to achieve this.

1 So, for example, the higher density of
2 LEDs close to the shorter edges and the higher
3 power output of those LEDs close to the second
4 shorter edges, the spacing of the LEDs and, of
5 course, the LEDs themselves, knowing the
6 divergence angle, the Lambertian power output,
7 the emission spectrum.

8 So there are a lot of attributes
9 associated with the design and engineering of
10 the panel that would come into play. Also, the
11 cooling will affect the LED output, as well.

12 So there are -- there are multiple
13 factors associated with achieving uniform
14 illumination as defined in the claim
15 construction.

16 Q. Okay. Let's turn back to Larsen,
17 Exhibit 1004.

18 A. Okay. I have Larsen.

19 Q. Great.

20 If you could turn with me to claim 5.

21 A. Yes, I'm there.

22 Q. Claim 5 mentions a device, according to

1 claim 1, wherein the light sources are
2 individually selected, switched on or off.

3 Do you see that?

4 A. Yes. That's written as claim 5.

5 Q. And you see that claim 5 depends from
6 claim 1, right?

7 A. Yes, that's -- it says "a device according
8 to claim 1."

9 Q. Okay. And claim 1, if you look up above
10 that, mentions that the light sources consists
11 of at least one semiconductor diode and/or at
12 least one laser diode, right?

13 A. Yes. That's included in claim 1.

14 Q. And you'd agree that a semiconductor diode
15 is an LED, right?

16 A. A semiconductor diode could be an LED,
17 yes.

18 Q. And Larsen defines "semiconductor diode"
19 as an LED, right?

20 A. I believe he does, but let me clarify
21 that.

22 Q. I could point you to paragraph 70.

1 A. Yes. He equates semiconductor diodes as
2 LEDs.

3 Q. Okay. So the light sources referred to in
4 claim 5 can be LEDs, right?

5 A. So because claim 5 says "a device
6 according to claim 1" and claim 1 says the light
7 sources consists of at least one semiconductor
8 diode and/or at least one laser diode, then the
9 light sources could be LEDs.

10 Q. And Larsen teaches panels containing
11 multiple light sources, right?

12 A. So Larsen indicates -- you know what?
13 Let -- let me verify that.

14 Oh, I'm sorry. You didn't say
15 multiple types of light sources, you just said
16 multiple light sources.

17 Q. Yes.

18 A. Yes.

19 Larsen indicates panels in Figure 2 to
20 A, B, C, D, multiple light sources.

21 Q. And those light sources can be LEDs, as
22 we've discussed, right?

1 A. Yes.

2 Let me go back to the description of
3 Figure 2A.

4 So he says in paragraph 70:
5 "According to Figure 2A, the applicators 13 in
6 the working model are mounted in a shifting
7 order with semiconductor diodes and/or laser
8 diodes 17 and 17A."

9 So he does indicate that there are
10 multiple light sources in Figure 2A, for
11 example.

12 Q. And those light sources can be LEDs?

13 A. Those light sources can be LEDs. Larsen
14 indicates that.

15 Q. And if you turn off an individual LED in a
16 panel containing multiple LEDs, that will change
17 the output power of the panel, right?

18 MS. HIGGINS: Objection, form.

19 A. So could you state that question again?

20 Q. (BY MR. LANDMON) If you turn off an
21 individual LED in a panel containing multiple
22 LEDs, that can change the output level of the

1 panel, correct?

2 MS. HIGGINS: Objection, form;
3 vague.

4 A. So Larsen doesn't suggest doing anything
5 of that type; and depending upon the design of
6 the panel, that may or may not change the output
7 of the panel.

8 Something we tell our engineering
9 students to do is build redundancy into our
10 systems, and so there's something called "fault
11 tolerance." And so for a lot of the systems
12 that we design, if one or two components, for
13 example, in an array would fail, the system
14 would still meet the qualifications necessary
15 for operation.

16 I don't know how Larsen's panels are
17 designed for fault tolerance, but certainly,
18 fault tolerance is -- is a principle that we
19 teach to our students.

20 Q. (BY MR. LANDMON) So thanks for the
21 explanation of fault tolerances, but I was
22 asking about Larsen.

1 Larsen claim 5 -- we've already
2 addressed this -- says that you can turn on and
3 off an LED, and you've already agreed to that.

4 So all I'm asking is if, as instructed
5 by claim 5, an LED on a panel is turned off,
6 wouldn't that mean that the panel -- that
7 they -- sorry, that the output power of the
8 panel would be changed?

9 MS. HIGGINS: Objection to the
10 extent it mischaracterizes the witness'
11 testimony.

12 A. Yeah, so I -- I don't think I agree to
13 what you had said.

14 So claim 5 states: "A device
15 according to claim 1 wherein the light sources
16 are individually selected, switched on or off."

17 Claim 1 says -- we have: "The light
18 source consists of at least one semiconductor
19 diode and/or at least one laser diode."

20 So what Larsen is talking about in
21 claim 5 is switching from one light source to
22 another light source, and let me -- let me look

1 at Larsen, where he discusses this.

2 He talks about this switch select
3 system, so let me find that.

4 All right. In paragraph 74, starting
5 about a third of the way down: "With the help
6 of the control mechanism 16, the invented device
7 is adjustable within a relatively large range
8 with reference to duration, amplitude, and
9 frequency of surge of current. So the
10 semiconductor diode 17, 17A, and 18, as well as
11 laser 17 diodes with the same realization as
12 semiconductor diode 17 can be used as light
13 sources. For that purpose, the control
14 mechanism is equipped with a switch select
15 system for operating different types of
16 semiconductor diodes and/or with laser diodes.
17 Both semiconductor diodes and/or laser diodes
18 with tunable wavelengths can be operated which
19 is a great advantage, and therefore, the printed
20 circuit boards can be equipped with a more
21 intensive radiation effect."

22 So the switching that -- or the -- the

1 selected light sources that are referred to in
2 claim 5, in light of or according to claim 1, is
3 switching between two types of light sources
4 across the -- the invented device, across the
5 entire device.

6 Q. (BY MR. LANDMON) So when it says a light
7 source can be turned on and off -- not it
8 says -- it claims a light source can be turned
9 on and off, that is not referring to turning an
10 LED on and off? That's -- that's your opinion
11 here?

12 MS. HIGGINS: Objection, form; and
13 to the extent it mischaracterizes the claim.

14 A. So, no, that's not what I'm saying.

15 So claim 5 reads: "A device according
16 to claim 1, wherein the light sources are
17 individually selected, switched on or off."

18 So that selection is between two types
19 as described in claim 1: "The light source
20 consists of at least one semiconductor diode
21 and/or at least one laser diode."

22 And so what that means is that you are

1 switching between -- so you are indeed switching
2 all of one type of emitter off and turning the
3 other type of emitter on, or they might both be
4 on at the same time and you're switching one
5 off; but it is definitely a switch between two
6 types of light sources as described in claim 1,
7 and that is switched over the invented device;
8 in other words, over the entire invented device.

9 Q. (BY MR. LANDMON) All right. You've --
10 you've read claim 1, and claim 1 says: "The
11 light source consists of at least one
12 semiconductor diode" -- which we know is an LED,
13 or -- "and/or at least one laser diode."

14 You understand the word "or" means
15 that the light source can be just LEDs, right?

16 A. Yes. The light sources -- because it says
17 "or," the light sources can be LEDs.

18 Q. Right. So let's back up.

19 So claim 1 is directed to a device
20 that can have just LEDs as a light source,
21 correct?

22 MS. HIGGINS: Objection, form.

1 A. Yes. It seems that claim 1 reads: "The
2 light source consists of at least one
3 semiconductor diode and/or at least one laser
4 diode."

5 And because there is an "or," it could
6 be purely LEDs.

7 Q. (BY MR. LANDMON) Okay. So then when
8 claim 5 says that the light sources can be
9 switched on and off, it refers to or can refer
10 to a device where the LEDs are being switched on
11 and off, correct?

12 MS. HIGGINS: Objection, form.

13 A. So my understanding of claim 1 is that,
14 consistent with Figure 2a, that there are
15 multiple types of light sources, also consistent
16 with paragraph 74 that says that the "purpose of
17 the control mechanism is equipped with a switch
18 select system for operating different types of
19 semiconductor diodes 17 and/or with laser
20 diodes."

21 So there can be different types of
22 semiconductor diodes, which Larsen says are

1 LEDs, that the claim 5 switch select switches
2 between on and off.

3 Q. (BY MR. LANDMON) Okay. So you'd agree
4 that claim 5 in the disclosures in Larsen
5 support switching on or off LEDs on the Larsen
6 panels, right?

7 A. So the Larsen panels will have two
8 different types of devices. Two different types
9 of LEDs seem to be allowed in Larsen. It does
10 not have to have a laser source because of the
11 "or."

12 And these two types of light sources
13 can be switched between, as discussed in
14 paragraph 74.

15 Q. So "on or off" doesn't mean "on and off."
16 "On and off" means something different -- it's
17 your opinion that an "on and off" in claim 5
18 does not mean simply switching a light source on
19 and off but means switching between light
20 sources. Is that your reading of this patent?

21 MS. HIGGINS: Objection, form.

22 A. So -- so looking at the body of the patent

1 for guidance, paragraph 74, it says to me
2 clearly that the control -- let's go back a
3 little bit.

4 So: "With the help of the control
5 mechanism 16, the invented device is adjustable
6 within a relatively large range with -- with
7 reference to duration within a relatively" --
8 sorry, I'm reading the same one again --
9 "duration, amplitude, and frequency of surge of
10 current so that the semiconductor diodes 17,
11 17a, and 18, as well as laser 17 diodes with the
12 same realization as semiconductor diode 17, can
13 be used as light sources. For that purpose, the
14 control mechanism is equipped with a switch
15 select system for operating different types of
16 semiconductor diodes 17 and/or with laser
17 diodes."

18 So what this says to me is that you
19 can switch between different types of sources,
20 which may both -- as you indicated, could be
21 LEDs, but the on/off would mean that you switch
22 across the invented device, one light source off

1 and one light source on in the switch select
2 system. That's what Larsen seems to imply in
3 paragraph 74.

4 Q. (BY MR. LANDMON) So just so I'm clear,
5 your reading of claim 5 is not that claim 5 says
6 that -- sorry -- is not that claim 5 discloses
7 that LEDs can be -- be individually switched on
8 and off. That's your reading of claim 5?

9 A. That's correct. My reading of claim 5 --

10 Q. That's --

11 A. -- is that the entire light source across
12 the invented device, one -- where there are two
13 light sources, that one light source -- there
14 are two light sources which can be switched
15 between the light sources and --

16 Q. But that --

17 A. -- those light sources might be Figure --
18 as shown in Figure 2a.

19 Q. And you do not read claim 5 as saying that
20 the LEDs can be individually switched on or off?

21 A. So all of one type of light source can be
22 selected and switched on or off. So to me, the

1 "individually" refers to a type of light source.
2 So if we look at Figure 2a, Larsen shows two
3 types of light sources as he describes in
4 paragraph 74; and so you would select one type
5 of light source or select the other type of
6 light source.

7 Q. And you could switch them on or off or no?

8 A. So the light sources selected can be
9 switched on or off according to claim 5; and
10 given 74, paragraph 74, that would be the switch
11 select system that switches between the two
12 types of light sources.

13 Q. Okay. So even though claim 5 does not
14 talk about switching between light sources, it's
15 your opinion and your reading of claim 5 that
16 what it really says is you can switch between
17 light sources, not that you can switch on and
18 off a light source. Is that -- is that your
19 reading of claim 5?

20 MS. HIGGINS: Objection, form;
21 lacks foundation.

22 A. So could you repeat your question again?

1 It was a little long.

2 Q. (BY MR. LANDMON) Even though claim 5 does
3 not talk about switching between light sources,
4 it's your opinion and your reading of claim 5
5 that what it really says is you can switch
6 between light sources, not that you can
7 individually switch on and off light sources.
8 Is that your reading?

9 A. I wouldn't say that's quite right.

10 So what I'm saying is, in claim 5, it
11 says the "device according to claim 1, wherein
12 the light sources."

13 So in claim 1, there are multiple
14 light sources, as -- as -- multiple types of
15 light sources, as we see in, for example,
16 Figure 2a.

17 And so the switch select system
18 referred to in paragraph 74 clearly says that
19 Larsen is interested in switching between
20 different types of light sources; and so what
21 claim 5 talks about is switching between types
22 of light sources across the entire invented

1 device.

2 Q. So what do you think "on and off" means?

3 A. So if you're going to switch -- let's --
4 let's take an example.

5 If we have blue LEDs and red LEDs, if
6 you want to switch across the entire invented
7 device between blue LEDs that might be arranged
8 as we see in Figure 2a, interspersed with red
9 LEDs, that we use the switch select system to
10 switch from one type of LED to another type of
11 LED; and that's described in paragraph 74.

12 Q. So switching topics a little bit, you --
13 you'd agree with me that, based on Larsen, a --
14 a POSITA would have been aware of a five-panel
15 illuminator prior to 2015, right?

16 A. Yes. Larsen discloses five applicators in
17 a device that is -- one application he
18 identifies is a PDT.

19 Q. And based on Lundahl, you'd agree with me
20 that a POSITA was aware of a PDT device that
21 could treat both sides of a patient's face,
22 right?

1 A. So --

2 MS. HIGGINS: Objection, form.

3 A. -- if we look at Lundahl, Lundahl very
4 clearly stipulates in, for example, Lundahl
5 Figure 4A what the uniform illumination area
6 would be; and that is in the curved central
7 region and not the arms -- straight arms
8 indicated as 10B.

9 For different people of different
10 sizes, that will cover different portions of
11 different parts of their body. So I don't think
12 I can generalize about how much it covers except
13 that it covers that particular portion of the
14 tube.

15 And Lundahl also gives in column 5,
16 right around 38, line 38, a maximum visible
17 light-emitting area and a therapeutically active
18 area.

19 Q. (BY MR. LANDMON) And if you look at
20 Figure 1 of Lundahl, it's attempting to show
21 a -- a patient's head within the device, right?

22 A. This is a cross-section that shows that --

1 the patient's head relative to somewhere in the
2 device.

3 Q. And at least in this size patient -- which
4 I think you're right, focusing on the size of
5 the patient -- but I think in this size patient
6 they depict here, Lundahl is depicting treating
7 both the -- the right and left side of a
8 patient's face, right?

9 MS. HIGGINS: Objection, form;
10 vague.

11 A. Well --

12 Q. (BY MR. LANDMON) Let me -- let me back
13 up.

14 Lundahl is at least teaching treating
15 the right and left cheeks of a patient's face,
16 correct?

17 A. Well, actually, this figure doesn't tell
18 us much about where the patient is positioned
19 with respect to in and out of the page. So if
20 the -- if we were treating the patient's neck,
21 for example, the head might be coming out of the
22 page from us.

1 So it's -- it's hard to -- to
2 ascertain from this figure that shows a dotted
3 outline of a head where that head lies in what
4 we would call in optics the Z-plane coming -- or
5 the Z-axis coming in and out of the page.

6 Q. You're aware that Lundahl discloses its
7 ability to treat both the left and right cheeks
8 of a patient, correct?

9 A. Yes, and that is Figure -- I believe it's
10 8.

11 Q. And you are aware that Lundahl teaches
12 that it can provide uniform illumination of the
13 right and left cheeks of a given patient,
14 correct?

15 A. So I believe that refers to Figure 8, but
16 let me look at the text to be -- oh, no, not
17 Figure 8. I'm in the wrong -- in the wrong
18 place. Hang on. What patent am I on? Okay.
19 We're in -- okay.

20 Are you in Lundahl? Sorry, I was in
21 the wrong patent. Okay.

22 So Lundahl does say in column 2,

1 line 35: "Another object of the invention is to
2 provide an illuminator for PDT that produces
3 visible light of consistent uniformity in terms
4 of both spectral characteristics and intensity
5 over a diversely contoured surface."

6 And further down at 44 he says: "A
7 further object of the present invention is to
8 provide an illuminator for irradiating the face
9 or scalp of a patient."

10 So if that meets the criterion of your
11 question, then I would say that is what
12 Lundahl's -- this is a subset of Lundahl's
13 identified objects.

14 Q. You're aware that the BLU-U 4172 was on
15 the market prior to 2015, right?

16 A. Yes.

17 Q. You're aware that Sun Pharma promoted it
18 to be used to treat -- to provide uniform
19 illumination and to treat patients where both
20 the left and right side cheeks of a patient
21 could be treated at one -- at the same time,
22 right?

1 A. Yes, that's correct.

2 Q. And Sun Pharma wasn't lying to doctors
3 when it said that, right?

4 A. No.

5 Q. So you're familiar with the elements
6 claimed in the '028 patent generally, right?

7 A. Can you tell me what "elements" mean?

8 Q. The -- the features claimed in the '028
9 patent claims.

10 A. Yes.

11 Q. Okay. And the claims of the '028 patent
12 don't recite a spring arm holding the five LED
13 panels, right?

14 MS. HIGGINS: I'm going to object
15 to the form.

16 A. So in column 5 of the '028 patent, I
17 believe this will address your question. It
18 describes Figures 1A -- I'm sorry, Figures --
19 oh, let's see.

20 All right. So starting at about 20 in
21 column 5: "The stand 80 includes a base 81 and
22 a vertical pillar 82. The base 81 may further

1 include wheels 87, at its bottom, in order to
2 allow the user to horizontally move the
3 illuminator to an appropriate position. The
4 wheels 87 may include locks such that the
5 stand 80 is prevented from further horizontal
6 movement once positioned. In addition, the
7 vertical pillar 82 may be attached to the
8 base 81 at a pivot point. The pivot point 83
9 allows the vertical pillar 82 to be rotated to
10 increase the range of positioning for the
11 illuminator. At the top end, the vertical
12 pillar 82 includes a connecting arm 85, which
13 may serve as a mounting structure for the main
14 body 100. The connecting arm includes a hinge
15 point 86 such that the main body 100 can be
16 moved vertically relative to the stand 80."

17 So I -- I would ask you to restate
18 your question, but I believe what you're asking
19 is, is in the '028 patent, realized by 85, 86.

20 So if you could restate your question,
21 please.

22 Q. (BY MR. LANDMON) Sure.

1 Is there anything in the claims of
2 the '028 patent that recite a spring arm holding
3 the five LED panels?

4 MS. HIGGINS: Objection, form.

5 A. So I would say that the combination of 85
6 and 86 is for the '028 patent essentially the
7 spring arm that -- so where did the term "spring
8 arm" come from?

9 Q. (BY MR. LANDMON) Where is -- where --
10 maybe my question's not specific enough --

11 A. Okay.

12 Q. -- Dr. Jokerst.

13 I'm asking you about the claims of
14 the '028 patent.

15 A. Oh, the claims. Okay.

16 Q. And is there anything in the claims
17 reciting a spring arm holding the five LED
18 panels?

19 MS. HIGGINS: Objection, form;
20 lacks foundation.

21 A. So claim 16, for example, stipulates: "A
22 system for photodynamically diagnosing or

1 treating a patient comprising a mobile base
2 supported by at least four wheels, a pillar
3 perpendicular to the base, a controller disposed
4 to be supported by the pillar, an arm mounted to
5 the top portion of the pillar, and an
6 illuminator connected at the end of an arm, the
7 arm being hinged to allow adjustment of a
8 position of the illuminator relative to the
9 base."

10 So the arm 85, 86 in Figure 4 is, to
11 me, the equivalent of what one might call a
12 swing arm, but you would have to define for me
13 exactly what a swing arm is.

14 Q. (BY MR. LANDMON) I was actually asking
15 about a spring arm, but --

16 A. Oh, sorry. Spring arm.

17 Q. Yeah.

18 So let -- let's go back to your
19 declaration on Page 150. You've -- the top of
20 that page, let me know when you're there.

21 A. I'm there.

22 Q. All right. You see a -- you have a

1 section called the "Claimed Invention is
2 Commercially Successful"?

3 A. Yes.

4 Q. Okay. And you've offered an opinion in
5 your declaration, then, relating to what you
6 argue is the commercial success, right?

7 A. Yes.

8 Q. You're not an expert in accounting, right?

9 A. That is correct.

10 Q. And you're not an expert in any kind of
11 financial topic, right?

12 A. That is correct.

13 Q. And you don't have any experience in
14 medical device sales, correct?

15 A. That's correct.

16 Q. And you didn't personally examine the
17 sales of the RhodoLED XL, right?

18 A. That's correct.

19 Q. And you don't offer any independent
20 analysis of these sales vis- -vis commercial
21 success, right?

22 MS. HIGGINS: Objection, form.

1 A. I reviewed the declaration of Dr. Vander
2 Veen, and so I don't know if that counts for
3 what you're asking or not; but I reviewed his
4 declaration and looked at it in some detail.

5 Q. (BY MR. LANDMON) Did you look at any
6 sales information regarding the RhodoLED that
7 was not set forth in Dr. Vander Veen's
8 declaration?

9 A. For this IPR, I only looked at Dr. Vander
10 Veen's declaration.

11 Q. And you referenced a press release from
12 Biofrontera regarding "the placement of 100
13 lamps."

14 Do you see that?

15 A. Would you like to direct me to a
16 paragraph?

17 Q. I would. Give me one moment.

18 So if you'd look on paragraph 240,
19 which is on Page 160, and in the middle of that
20 paragraph you reference "Biofrontera announcing
21 that it had placed the 100th commercial RhodoLED
22 XL."

1 Let me know when you find that.

2 A. Yes. This is a direct quote from a
3 article on December 23rd, 2024, Exhibit 2046.

4 Q. And that placement of the 100th lamp is
5 one of the reasons that you concluded that it
6 was a commercial success, right?

7 A. So it was more the placement of the number
8 of the RhodoLED XL devices relative to the
9 RhodoLED, the old -- the old model, and also the
10 price premium associated with the RhodoLED XL
11 compared to the RhodoLED, the old -- the old
12 model.

13 Q. You don't know how many devices
14 Biofrontera had expected to sell by that point
15 in time, right?

16 MS. HIGGINS: And you're limiting
17 your answer to what she's reviewed for this IPR
18 as opposed to confidential information that she
19 may also be aware of that we're not disclosing
20 here?

21 Please limit your -- please --
22 please consider limiting your answer -- or I --

1 I instruct the witness if -- if there's
2 confidential information, do not reveal it and
3 just say you cannot fully answer the question.

4 Q. (BY MR. LANDMON) Let me ask the question
5 that, Dr. Jokerst, you didn't use any of the
6 confidential business information from the ITC
7 in preparing your declaration for the IPR,
8 right?

9 A. That's correct.

10 Q. Okay. So in preparing -- or in your
11 declaration for the IPR, you obviously note this
12 100th placement; and I'm asking, in evaluating
13 the success of the product based -- based on the
14 placement of 100 lamps, you don't know how many
15 lamps Biofrontera expected to sell in that
16 period of time, right?

17 MS. HIGGINS: Objection, form.

18 A. So I would need to look at Dr. Vander
19 Veen's report. I -- I do know that I reviewed
20 some earnings calls that -- for example, in
21 paragraph 243, in Exhibit 2050, Page 162,
22 "Luebbert called the RhodoLED XL

1 'state-of-the-art' and stated that 'providing a
2 larger PDT lamp to our customers is an important
3 milestone in our overall strategy.'"

4 So I don't remember if in the nonCBI
5 information that I reviewed, if there was any
6 projections from Biofrontera, but I will stick
7 with what's in my report and what is in
8 Dr. Vander Veen's report, just -- just to be
9 safe.

10 Q. (BY MR. LANDMON) Did you ever talk to
11 Dr. Vander Veen?

12 A. For this, I --

13 MS. HIGGINS: Go ahead. I was
14 just going to ask her to limit it to this IPR,
15 but she can answer her -- her --

16 MR. LANDMON: That -- that -- and
17 that -- and I appreciate you both. That was the
18 question I meant to ask.

19 Q. (BY MR. LANDMON) So in connection with
20 this IPR, did you ever speak to Dr. Vander Veen?

21 A. So for this IPR, I did speak with
22 Dr. Vander Veen.

1 Q. And when was that?

2 A. I really can't remember. It seems like a
3 long time ago.

4 Q. And what did you guys talk about? Well,
5 let me back up.

6 Was that one occasion or multiple
7 occasions?

8 A. One occasion.

9 Q. Was it before the ITC hearing?

10 A. Yes, it was before the in-court hearing.

11 Q. Okay. And was it before Dr. Vander Veen
12 wrote his declaration for the IPR?

13 A. Yes, it was.

14 Q. And what did you guys talk about?

15 A. So Dr. Vander Veen asked me specific
16 technical questions, and I responded to those
17 specific technical questions.

18 Q. How long did you guys talk?

19 A. I want to say 20 minutes.

20 Q. Was it in person?

21 A. No.

22 Q. Was it by Zoom?

1 A. It was -- I think it was over the phone.

2 Q. Was anybody else on that call?

3 A. Yes. Gabrielle Higgins, I believe, was on
4 that call.

5 Q. Was anyone else in addition to her on that
6 call?

7 A. Not that I can recall, but that's based on
8 my memory.

9 Q. Okay. And what sort of technical
10 questions did he have?

11 A. What characteristics did the RhodoLED XL
12 exhibit that were consistent with the '028
13 patent was one question. If we go to Dr. Vander
14 Veen's report, I can refresh my memory, because
15 I don't -- I remember they were technical
16 questions that were appropriate for me to
17 answer, but I don't remember exactly the
18 questions.

19 Q. Does he reference in his declaration all
20 the topics that you discussed?

21 A. I don't know if he referenced all of them,
22 but I believe -- I -- I -- I don't remember if

1 he referenced any or all. I -- I have no idea,
2 but I -- if I could look at his report, I could
3 refresh my memory.

4 Q. Okay. Yeah, no. We might go there in a
5 minute.

6 Did you guys talk about the commercial
7 success of the RhodoLED XL?

8 A. No. He only asked me technical questions
9 at that point.

10 Q. Did he provide you with any information in
11 the conversation? I mean -- so let me back up.

12 I know you've seen his declaration
13 because we've been talking about that; but other
14 than seeing his declaration, did he provide you
15 with any information?

16 A. For the purposes of the IPR, no, until I
17 saw his declaration.

18 MR. LANDMON: Now would probably
19 be a good time for a break. Let's go off the
20 record.

21 (Break taken from 12:55 p.m. to
22 1:04 p.m.)

1 Q. (BY MR. LANDMON) Dr. Jokerst, thank you
2 for all your time, once again.

3 MR. LANDMON: Subject to any
4 questions from your counsel, I don't have any
5 further questions.

6 MS. HIGGINS: Okay. Let's take a
7 quick ten-minute break, and we'll be back. So
8 it's 2:04. We'll be back at 2:15 or sooner.
9 Okay.

10 MR. LANDMON: Okay. Thanks.

11 MS. HIGGINS: Thank you.

12 (Break taken from 1:04 p.m. to
13 1:08 p.m.)

14 MS. HIGGINS: Okay. We have no
15 questions for Dr. Jokerst at this time. I think
16 we are done here, and we can go off the record
17 unless, Madam Court Reporter, you have anything
18 you need from us.

19 THE COURT REPORTER: No, ma'am.
20 The only thing I would ask you is the final is
21 going to be delivered tomorrow. Do you want
22 your final tomorrow, as well?

1 MS. HIGGINS: Yes.

2 THE COURT REPORTER: Okay.

3 Perfect. Thank you, everyone. Appreciate it.

4 You guys have a great day.

5 (Deposition concluded.)

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1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4 BIOFRONTERA INC., BIOFRONTERA BIOSCIENCE GMBH,
5 BIOFRONTERA PHARMA GMBH, AND BIOFRONTERA AG
Petitioner,

6 V.

7 SUN PHARMACEUTICAL INDUSTRIES, INC.
8 Patent Owner

9 Case IPR2024-01312
10 Patent 11,697,028

11 Certificate of Shorthand Reporter

12 I, Annette Peltier, CSR, Texas Certified
13 Realtime Reporter in and for the State of Texas
14 do hereby certify:

15 That Nan Marie Jokerst, Ph.D., the witness
16 whose deposition is herein before set forth, was
17 duly sworn before the commencement of such
18 deposition and that such deposition was taken
19 before me and is a true record of the testimony
20 given by such witness.

21 I further certify that the adverse party,
22 Respondents, were represented by counsel at the

1 deposition.

2 I further certify that the deposition of Nan
3 Marie Jokerst, Ph.D. occurred via Zoom
4 videoconference on July 22, 2025, commencing at
5 8:02 a.m. Central time to 1:09 p.m. Central
6 time.

7 I further certify that I am not related to
8 any of the parties to this action by blood or
9 marriage, I am not employed by or an attorney to
10 any of the parties to this action, and that I am
11 in no way interested, financially or otherwise,
12 in the outcome of this matter.

13 IN WITNESS WHEREOF, I have hereunto set my
14 hand this 23rd day of July, 2025.

15

16


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