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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC,
Petitioners,

v.

U.S. WELL SERVICES, LLC,
Patent Owner.

IPR2025-00031
U.S. Patent No. 10,655,435 B2

ORAL DEPOSITION OF DR. ROBERT A. DURHAM

August 8, 2025

Volume 1

(Reported Remotely)

ORAL DEPOSITION OF DR. ROBERT A. DURHAM, produced as
a deponent at the instance of the PATENT OWNER, U.S. WELL
SERVICES, LLC, and duly sworn, was taken in the
above-styled and -numbered cause on the 8th day of
August, 2025, from 9:39 a.m. to 3:20 p.m., before
Tonie Thompson, Certified Shorthand Reporter in and for
the State of Texas, Registered Professional Reporter,



800.211.DEPO (3376)
EsquireSolutions.com

1 Certified Realtime Reporter, reported by machine
2 shorthand, at the offices of Baker Botts LLP, located
3 at 2001 Ross Avenue, Suite 900, Dallas, Texas 75201,
4 pursuant to the Federal Rules of Civil Procedure and the
5 provisions stated on the record or attached hereto. The
6 deposition shall be read and signed under penalty of
7 perjury.



A P P E A R A N C E S

(All parties present via videoconference.)

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9	EXHIBIT INDEX		
10	NUMBER	DESCRIPTION	PAGE REFERENCED
11	Exhibit 1001	United States Patent Number US 10,655,435 B2	43
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16	(All exhibits that were sent electronically to the court reporter will be marked and attached to the transcript.)		
17	* * *		
18	REQUESTED DOCUMENTS/INFORMATION		
19	(No documents/information requested.)		
20			
21			
22			
23			
24			
25			



P R O C E E D I N G S

(Proceedings commenced at 9:39 a.m. Central Time.)

THE COURT REPORTER: Today's date is August 8, 2025. The time is now 9:39 a.m. Central Time.

This is the oral deposition of Robert A. Durham, Ph.D., and it is being conducted remotely via Zoom. The deponent is located at the offices of Baker Botts in Dallas, Texas 75201.

My name is Tonie Thompson, Certified Shorthand Reporter Number 8348. I am administering the oath and reporting the deposition remotely by stenographic means from my home residence/office within the state of Texas.

The deponent has been identified to me through notice of deposition.

Would counsel please state their appearances and locations for the record, and then I will swear in the deponent.

MR. QUARLES: Rick Quarles with Winston & Strawn, located in Charlotte, North Carolina, on behalf of U.S. Well Services; and with me is Matt Hopkins from the D.C. office.

MR. McDONALD: Jacob McDonald with Baker Botts representing petitioners, Liberty Energy and



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1 Liberty Oilfield Services, in Dallas, Texas; with me is
2 Chad Walters with Baker Botts.

3 THE COURT REPORTER: Thank you.

4 Please raise your right hand, Dr. Durham.

5 THE DEPONENT: (Complies.)

6 THE COURT REPORTER: Do you solemnly swear
7 or affirm that the testimony you will give will be the
8 truth, the whole truth, and nothing but the truth, so
9 help you God?

10 THE DEPONENT: I do.

11 (Deponent sworn in.)

12 THE COURT REPORTER: Thank you, sir.
13 Please lower your hand.

14 THE DEPONENT: (Complies.)

15 THE COURT REPORTER: Counsel, please
16 proceed.

17 DR. ROBERT A. DURHAM,
18 having been first duly sworn, testified as follows:

19 EXAMINATION

20 BY MR. QUARLES:

21 Q. Good morning, Dr. Durham.

22 A. Good morning.

23 Q. I'll be asking you some questions today about
24 your declaration in IPR-2025-00031 regarding U.S. Patent
25 Number 10,655,435. I'll be referring to this patent



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1 today as the "'435 patent."

2 And I believe you said you are located in
3 Dallas today?

4 A. Yes, sir.

5 Q. Have you ever been deposed before?

6 A. Yes, sir.

7 Q. How many times?

8 A. Over 120 times.

9 Q. If you need to take a break at any time today,
10 please let me know. And I'll do my best to take breaks
11 shortly after you ask for one; I will, however, ask that
12 you answer any pending question.

13 Do you understand?

14 A. Yes.

15 Q. If at any point you don't understand my
16 question, will you please restate it -- ask me to restate
17 it or repeat it so that we can assume that if you've
18 answered a question, you've understood it?

19 A. Yes.

20 Q. To help the court reporter, I want to take extra
21 care that we don't talk over each other as well, fair?

22 A. Yes.

23 Q. Do you have any documents in front of you?

24 A. I do have one document. I have an errata sheet
25 of typos that I found in my declaration during my



1 deposition prep.

2 Q. Okay. And other than that, do you have any
3 other papers in front of you?

4 A. Well, I do have the email so I could get on the
5 Zoom call, but that's all.

6 Q. Okay. And do you have -- do you have a laptop
7 or computer in front of you?

8 A. There is a laptop being used for the Zoom
9 recording.

10 Q. And is there anything open other than -- any
11 applications open besides the Zoom window on that?

12 A. No, sir.

13 Q. Okay. So no other applications open, then?

14 A. That's correct.

15 Q. And how long is the errata sheet that you
16 mentioned?

17 A. One page.

18 Q. Would you please read that into the record,
19 provided it isn't too long?

20 A. Yeah, not bad.

21 I've organized it by paragraph, so in
22 paragraph 159, the current text is "multiple drivetrain
23 controller 405." And that should read: multiple
24 drivetrain controller 402.

25 Paragraph 177, current text is "Norris



discloses as one or more processing devices, e.g. pump 1
local controller pump 410, configured to receive a first
parameter" --

(Clarification made by the court reporter.)

A. "Norris discloses one or more processing
devices, e.g. pump 1 local pump controller 410,
configured to receive a first parameter." And the
corrected text should read: pump 2 local pump controller
410.

Paragraph 182, the current text is "e.g.
pressure from sensor 185 and/or the wellhead." And it
should read: e.g. pump 2 piston position pressure and
flow rate.

Paragraph 202, Footnote 206 somehow got
deleted, and that Footnote 206 should read: Exhibit 1004,
Norris paragraph 0022, Figure 2.

Paragraph 264, "Norris discloses one or
more local control devices, e.g. local drivetrain
controller 405, local pump controller 410." And that
should read: local drivetrain controller 405 ECM 415.

Paragraph 299, "Norris discloses limitation
1[e][i]." It should be: 1[e][ii].

Similarly, in paragraph 306, "Norris
discloses limitation 1[e][iii]." It should read: 1F.

Paragraph 377, the reference is



1 "Section Roman Numeral XIII.B.1." It should be: Roman
2 Numeral XII.B.1.

3 And finally, 378, "Section Roman Numeral
4 XII.F.," should read: Section Roman Numeral XII.G.

5 Q. Anything else?

6 A. No.

7 Q. Great. Thank you.

8 How many times have you offered expert
9 opinions in a patent case?

10 A. I don't know. Probably around 25 or 30 times.

11 Q. This is --

12 A. Way --

13 Q. -- where you've written some sort report or
14 given some sort of testimony in a patent case?

15 A. Yes, a declaration or testimony. Somewhere in
16 that range.

17 Q. What is your pay rate for this case?

18 A. 350 an hour for analysis and 485 an hour for
19 testimony.

20 Q. Do you have any patents?

21 A. Me personally, no.

22 Q. Have you ever applied to get a patent?

23 A. No.

24 Q. Do you have any financial interests in Liberty
25 or in the outcome of this IPR?



1 A. No.

2 Q. Did you submit a declaration in connection with
3 this IPR proceeding?

4 A. Yes, sir, I did.

5 Q. Okay.

6 MR. QUARLES: Tonie, would you please bring
7 up file name "EX-1003, Durham Declaration," dot, PDF,
8 which has been marked as -- on the record as
9 Exhibit 1003.

10 (Deposition Exhibit Number 1003
11 referenced.)

12 THE COURT REPORTER: Yes. Please stand by.
13 All right. Off-the-record comments.

14 (Comments made off the written record.)

15 THE COURT REPORTER: We're back on the
16 record at 9:48 a.m. Please proceed.

17 Q. (BY MR. QUARLES) Is this your declaration?

18 A. It appears to be.

19 Q. And is this your signature on page 282?

20 A. Yes, sir.

21 Q. And other than the errata sheet that you
22 mentioned earlier, is there anything that you would like
23 to change in your declaration after your preparation for
24 today's deposition?

25 A. No, sir.



1 Q. Did you meet with anyone to prepare for today's
2 deposition?

3 A. Yes.

4 Q. Is that the counsel that appears on this call?

5 A. Yes, sir.

6 Q. In Sections II and III of your declaration, you
7 list multiple materials that you considered in drafting
8 this declaration.

9 Did you consider any other documents
10 besides those listed in Sections II and III in writing
11 your declaration?

12 A. Do you have a page number or a paragraph number
13 for that -- sections? Here we go.

14 No, sir, no other materials.

15 Q. Let's turn to paragraphs 82 through 84 of your
16 declaration.

17 A. Okay.

18 Q. In paragraphs 82 through 84, you describe
19 Langewis's description of the use of "positive
20 displacement pumps used to inject produced water into the
21 formation in a waterflood oil and gas operation." Is
22 that correct?

23 A. Yes, that's correct.

24 Q. You note in paragraph 82 that Langewis's
25 description "'Net positive suction head' is defined as



1 the head, in feet of liquid above vapor pressure,
2 required at the suction inlet of the pump to completely
3 fill each cylinder on the suction stroke," correct?

4 A. Yes.

5 Q. You also note in paragraph 83 that Langewis
6 describes NPSH mathematically as NPSH required equals H_a
7 plus H_g minus H_{vp} , correct?

8 A. Yes, sir. Well, that's in paragraph 82 still.

9 Q. Where " H_g represents minimum pressure required
10 for acceptable pump performance," correct?

11 A. Correct.

12 Q. Does the minimum pressure required for
13 acceptable performance in Langewis change over time?

14 A. It can change depending on the wear in a pump;
15 that number can change marginally.

16 Q. What do you mean by that?

17 A. Well, just that as the pump wears, the value of
18 H_g can change.

19 Q. And H_g -- in here you say, " H_g represents
20 minimum pressure required for acceptable pump
21 performance," right?

22 A. Yes.

23 Q. What does this reference as use of "acceptable"
24 mean?

25 A. My recollection is acceptable pump performance



1 was pump performance without cavitation, as I recall, at
2 least that.

3 Q. All pump manufacturers should have this value
4 for their pump, correct?

5 A. Yes, I think that's fair, for the pump, for the
6 particular fluid -- I'm sorry. That's not correct. Hg
7 should be -- is pump-dependent. You're correct.

8 Q. So do pump manufacturers change Hg and notify
9 their customers?

10 MR. McDONALD: Objection. Form.

11 A. Could you repeat that question? I think I
12 missed the front end.

13 Q. (BY MR. QUARLES) Do pump manufacturers change Hg
14 and notify their customers?

15 A. I certainly would expect Hg to change with pump
16 design changes. I would not expect that number to change
17 significantly absent a pump design, other than the wear
18 factor that we talked about earlier.

19 Whether they notify their customers, I
20 wouldn't know. That's a pump manufacturer question.

21 Q. So does it remain static after the design is
22 fixed?

23 A. It should remain static, yes -- relatively
24 static, other than wear.

25 Q. So Hg does not change after the design is fixed?



1 A. Correct. The base value of Hg does not change.
2 The -- the practical value of Hg changes based -- as the
3 pump wears. As the springs wear, as the seals wear, that
4 value of Hg can change some amount.

5 Q. What does this reference as use of "acceptable"
6 mean?

7 A. Well, as I mentioned earlier, my recollection is
8 acceptable is at least operating without cavitation.
9 There may be some other things captured in that, but this
10 particular section is talking about cavitation.

11 Q. Is this consistent with how a POSITA would have
12 understood acceptable in the challenged patent?

13 A. I didn't do that comparison between acceptable
14 in Langewis and acceptable in the challenged patent, so I
15 don't think I can answer that question.

16 Q. You gave each claim term its plain and ordinary
17 meaning consistent with the specification of the
18 challenged patent, correct?

19 A. Yes, sir, I did.

20 Q. And "acceptable" was one of those claim terms?

21 A. I don't recall that as one of the claim terms,
22 but maybe if you could point me to which claim it's in,
23 it would refresh my recollection.

24 Q. "Acceptable" as in Claim 1.

25 A. Okay. Acceptable threshold, yes, I recall that



1 now. But, yes, the answer to your question is acceptable
2 is an adjective used to describe threshold in Claim 1
3 and 7 and 13 probably as well.

4 Q. Let's talk about the term "acceptable" in
5 Langewis. Does that have the same meaning in Langewis as
6 in the challenged patent?

7 A. The word "acceptable" generally has the same
8 meaning, meaning it's a -- it's a -- reasonable. I think
9 in Langewis, in that particular section, acceptable was
10 particularly tied towards cavitation. Acceptable here is
11 not specifically tied to cavitation. It's just a
12 threshold, describing the threshold as being acceptable.
13 Although the plain meaning of the term broadly is the
14 same, as it's applied, it's a little bit different.

15 Q. Just so I understand correctly, you're saying
16 the plain meaning of the term "acceptable" in Langewis is
17 the same as in the challenged patent, correct?

18 A. Yes. The plain meaning of the word "acceptable"
19 in Langewis in particular is talking about cavitation.
20 And I don't believe that -- well, I'm certain that
21 "acceptable" here is not tied directly only to cavitation
22 in the '435 patent.

23 Q. What happens if you do not have the minimum
24 pressure in Langewis?

25 A. Cavitate.



1 Q. Does Langewis use the term "desired"
2 interchangeably with "acceptable"?

3 A. I don't think I've studied Langewis with that in
4 mind recently enough to be able to answer that question.

5 Q. So sitting here today, you can't say that
6 Langewis uses the term "desired" interchangeably with
7 "acceptable." Is that correct?

8 A. That's correct. I haven't studied Langewis with
9 that in mind recently enough to be able to answer that
10 question.

11 Q. So Hg represents the minimum pressure required
12 for pump performance to be just good enough, right?

13 MR. McDONALD: Objection. Form.

14 A. Yeah, I don't know that Langewis uses that term
15 "just good enough." Hg is the amount of pressure needed
16 to prevent cavitation at the pump, and then from that you
17 derive your net positive suction head --

18 Q. (BY MR. QUARLES) So Hg represents -- oh, sorry.
19 Go ahead.

20 A. It's pressure necessary to prevent cavitation.

21 Q. So Hg represents the minimum pressure required
22 for -- to prevent cavitation, correct?

23 A. Correct, for that particular pump design, yes.
24 And that's -- Hg is at the pump, not the -- not at the
25 suction head.



1 Q. So a POSITA might prefer a higher pump
2 performance, but this level of performance is acceptable,
3 right?

4 A. According to Langewis, that's correct,
5 acceptable to prevent cavitation.

6 (Clarification made by the court reporter.)

7 Q. (BY MR. QUARLES) In other words, a POSITA might
8 desire a higher pump performance, but this level of
9 performance is acceptable, right?

10 A. Acceptable to prevent cavitation, according to
11 the Langewis.

12 Q. Even though a POSITA might desire a higher pump
13 performance, right?

14 A. It may.

15 MR. McDONALD: Objection. Form.

16 Q. (BY MR. QUARLES) I'm sorry. Did you -- did I
17 miss the response?

18 A. I said a POSITA may desire a different
19 performance or a higher pressure.

20 Q. And below this minimum pressure, the pumps would
21 be at higher risk of damage, right?

22 A. Yes. That's a fair statement.

23 Q. Would a POSITA understand higher risk of pump
24 damage below that minimum pressure?

25 A. Yes, certainly.



1 Q. Is it fair to say that acceptable pump
2 performance here means the lowest level of recommended
3 pump performance?

4 A. And "here," what -- which "here" are you talking
5 about?

6 Q. Acceptable pump performance that -- when we're
7 talking about acceptable pump performance in the context
8 of our questions here, is it a fair statement to say that
9 that would be the lowest level of recommended pump
10 performance?

11 MR. McDONALD: Objection. Form.

12 A. I think what Langewis is saying, again, is
13 that's the pressure needed to prevent cavitation. And
14 that would be, at a minimum, acceptable pump performance
15 in most situations, is no cavitation.

16 Q. (BY MR. QUARLES) So -- just so I make sure I
17 understand -- and let me know if I get this right. A
18 POSITA would understand the term "acceptable pump
19 performance" to mean at least just enough to prevent
20 cavitation. Is that right?

21 A. As Langewis is using the term, yes. That's my
22 understanding -- or that's my recollection of how, excuse
23 me, Langewis was using that term.

24 Q. Could a desired level of pump performance here
25 be higher than an acceptable level of performance, as



1 described in Langewis?

2 A. Yes. You may want a higher -- oftentimes, we do
3 design systems that have a higher positive suction head
4 than the minimum.

5 Q. Would a POSITA generally understand a desired
6 level of performance as higher than an acceptable level
7 of performance?

8 MR. McDONALD: Objection. Form.

9 A. I think that would depend on the circumstances.
10 As I mentioned, we often design systems so that there's a
11 margin of error on the positive suction head. So it
12 would be common to design that at a different level. If
13 you're going to take that beyond just cavitation to other
14 factors of pump performance, then the answer is probably
15 yes.

16 Q. (BY MR. QUARLES) So at least in this context, a
17 POSITA would generally understand a desired level of
18 performance as higher than a merely acceptable level of
19 performance, right?

20 MR. McDONALD: Objection. Form.

21 A. Well, if you're talking about cavitation as
22 Langewis's is saying, then acceptable pump performance in
23 terms of cavitation is preventing cavitation. You may
24 add safety margins so that you're sure to do that, but
25 it's not going to change the binary solution set of



1 cavitation or no cavitation that Langewis is referring to
2 as acceptable.

3 Q. (BY MR. QUARLES) So in the context of preventing
4 cavitation, is it fair to say that a POSITA would
5 generally understand a desired level of performance is
6 higher than an acceptable level of performance in this
7 context?

8 A. I disagree.

9 MR. McDONALD: Objection. Form.

10 A. No. I disagree with that statement.

11 Q. (BY MR. QUARLES) What part of that statement do
12 you disagree with?

13 A. Well, in terms of cavitation and preventing
14 cavitation, once you've tipped over to you have a high
15 enough pressure to prevent cavitation, there's no change
16 in performance past that. Acceptable is zero cavitation.
17 There's no better performance with regards to cavitation
18 past that point.

19 Q. Would it potentially be desirable to operate a
20 pump at a higher performance level than the expected
21 performance level achieved when operating where the net
22 positive suction head equals net positive suction head
23 required?

24 MR. McDONALD: Objection. Form.

25 A. I think I got that, but that was a pretty



1 complex question. Could you repeat that, please?

2 Q. (BY MR. QUARLES) Sure.

3 Would it potentially be desirable to
4 operate a pump at a higher performance level than the
5 expected performance level achieved when operating where
6 the net positive suction head equals net positive suction
7 head required?

8 MR. McDONALD: Same objection.

9 A. Yes, I can agree with that.

10 Q. (BY MR. QUARLES) Let's turn to paragraph 142 of
11 your report.

12 A. Okay.

13 Q. You state, in the first sentence, "Norris also
14 discloses detecting that the first parameter is outside
15 of an acceptable threshold."

16 Do you see that?

17 A. Yes.

18 Q. Does the term "acceptable" limit the claim
19 threshold?

20 A. Yes.

21 Q. Does your understanding of the term "acceptable"
22 in the '435 patent allow the claimed threshold to change
23 over time?

24 A. Certainly.

25 Q. Do acceptable thresholds change over time in the



1 '435 patent?

2 MR. McDONALD: Objection. Form.

3 A. It certainly could, yes. I haven't seen
4 anything that would tie it to a particular number at any
5 particular time.

6 Q. (BY MR. QUARLES) Where is there support for
7 that?

8 A. Support that I didn't see anything is
9 specification of the '435 patent.

10 Q. Support for the fact that -- the statement that
11 acceptable thresholds change over time in the '435
12 patent.

13 A. Well, the support for that is the statement that
14 I made that I did not see anything that would tie it to a
15 particular number -- tie the acceptable threshold to a
16 particular number.

17 Q. So you're saying that the support is the lack of
18 evidence otherwise. Is that right?

19 A. Well, there's no definition that I saw in the
20 '435 patent specification that would limit the threshold
21 to a particular -- one particular value. So from that, I
22 can deduce that, yes, since it wasn't defined that way,
23 then it can change over time.

24 Q. Is there any disclosure in the '435 patent that
25 shows acceptable threshold that changes over time?



1 A. I would want to go back and read through the
2 '435 patent with that question in mind to be able to
3 answer that. I don't have the whole specification
4 memorized.

5 Q. So sitting here today, you can't think of any
6 example where a disclosure in the '435 patent that shows
7 acceptable threshold changes over time, right?

8 A. I think my first answer stands. I would want to
9 review the specification -- I don't have it memorized --
10 in order to answer that question.

11 Q. Okay. If I could request that you review during
12 a future break, and we can come back to that question.

13 A. No, I don't think that's acceptable to review it
14 during that break, to my understanding.

15 Q. Okay. We can come back to this later on.

16 In paragraph 142, you indicate the
17 application controller 401 determines the desired
18 pressure and flow rates at the pressure side manifold 250
19 and wellhead 180, correct?

20 A. It's "pressure side manifold 250b and
21 wellhead 180," but otherwise correct.

22 Q. And in paragraph 142, you also indicate that one
23 of the desired pressure values is the pressure value as
24 measured at the pressure side manifold 250b, correct?

25 A. Yes.



1 Q. You also indicate that one of the desired
2 pressure values is the pressure value as measured at the
3 wellhead 180, correct?

4 A. That's what Norris says, yes.

5 Q. Do desired pressure and flow rates change in
6 Norris over time?

7 A. Yes, I would -- a POSITA would understand that
8 they would change primarily with regard to the pumping
9 schedule of the frack job.

10 Q. And you're not saying here in paragraph 142 that
11 the application controller 401 is determining the desired
12 pressure of a single individual pump, correct?

13 A. Not in this paragraph. I agree with that. Not
14 in this paragraph.

15 Q. And you're not saying that the desired pressure
16 is an operational threshold of an individual pump here,
17 correct?

18 MR. McDONALD: Objection. Form.

19 A. Not in this quote. If you look at the rest of
20 the paragraph, prior to the quote, a piston position RPM
21 and pump output pressure are operational parameters that
22 Norris discloses. But when we're talking about this
23 particular quote of "desired pressure and flow rates,"
24 it's referring to the common pressure side manifold in
25 the wellhead 180.



1 Q. (BY MR. QUARLES) In the context of an
2 operational threshold of an individual pump, specifically
3 operational threshold, you're not saying that those
4 desired pressure -- that the desired pressure is an
5 operational threshold of an individual pump, correct?

6 MR. McDONALD: Objection. Form.

7 A. I believe that you do have a desired pressure as
8 an operational threshold for each pump. That's not what
9 this quote of Norris is talking about, but you certainly
10 would have that expectation that each pump would give a
11 particular output pressure.

12 Q. (BY MR. QUARLES) In paragraph 142, you also
13 indicate that on variation from desired settings,
14 multiple drivetrain controller 402 will signal each local
15 drivetrain controller 405 to increase or decrease pumping
16 operations.

17 Do you see that?

18 A. Yes, sir.

19 Q. You discuss "desired settings," right?

20 A. Yes.

21 Q. But you don't explicitly identify a definition
22 for the term "desired," right?

23 A. That's Norris's term of "desired settings," and
24 he defines it as the desired pressure and flow rates --
25 in this case, pressure side manifold 250b and



1 wellhead 180.

2 Q. But -- and just so you understand my question
3 here: But you don't explicitly identify a definition for
4 the term "desired" here, right?

5 A. No. I believe it's used in its plain and
6 ordinary meaning.

7 Q. But you don't provide a definition for it,
8 right?

9 A. I do not, because it has a plain and ordinary
10 meaning. It doesn't require a particular construction.

11 Q. You also don't explicitly identify a definition
12 for the term "acceptable," right?

13 A. I would say that, taking the paragraph in
14 context, an acceptable threshold -- and between 142 and
15 143, acceptable threshold is the desired settings or some
16 small deviation or error away from that desired setting,
17 taking 142 and 143 together -- and, really, the entire
18 section.

19 Q. Just so you understand my question here: You
20 don't explicitly identify a definition for the term
21 "acceptable," right?

22 A. Oh, correct, because it's used according to its
23 plain and ordinary meaning and doesn't require a
24 construction.

25 Q. You also don't explicitly compare the



1 definitions of the terms "desired" and "acceptable,"
2 right?

3 MR. McDONALD: Objection. Form.

4 A. Well, correct. There is no particular
5 definition other than their plain and ordinary meaning.

6 MR. QUARLES: Okay. We've been going for
7 almost an hour here. Let's -- let's take a break.

8 THE DEPONENT: Sure.

9 THE COURT REPORTER: Hearing no objections,
10 we are off the record at 10:21 a.m.

11 (Break taken at 10:21 a.m.)

12 (Back on the record at 10:42 a.m.)

13 THE COURT REPORTER: We're back on the
14 record at 10:42 a.m. Please proceed.

15 MR. QUARLES: Tonie, would you please bring
16 up file name "EX-1006, Borgstadt," dot, PDF and provide
17 me control?

18 THE COURT REPORTER: Yes. Please stand by.

19 Okay. Exhibit 1006 has been marked and is
20 on the share screen. We are back on the record.

21 (Deposition Exhibit Number 1006
22 referenced.)

23 Q. (BY MR. QUARLES) Let's turn to what's been
24 marked in your declaration as Exhibit 1006 that you cited
25 in your declaration Borgstadt, paragraph 24.



1 THE DEPONENT: Is there a way you could
2 make that just a little bit bigger, Mr. Quarles?

3 MR. QUARLES: Let's see. Let me try that.
4 Is there a way to zoom in, Tonie?

5 THE COURT REPORTER: Yes. The --

6 MR. McDONALD: Is it possible to drop the
7 exhibit in the chat?

8 THE COURT REPORTER: Just a second.
9 Off-the-record discussion or comments here.

10 (Comments made off the written record.)

11 THE COURT REPORTER: We're back on the
12 record at 10:45 a.m. Please proceed.

13 Q. (BY MR. QUARLES) In paragraph 24, Borgstadt
14 states that the performance of the pump unit may be
15 improved by creating a feedback loop to the pump
16 controller, right?

17 A. I'm looking for that. Hold on. Yes, in that
18 first sentence, yes, sir.

19 Q. Borgstadt further states that the pump
20 controller may use output pressure to adjust the drive
21 signal sent to the pump unit, right?

22 A. Yes. That's one of the options.

23 Q. Borgstadt also states that by adjusting the
24 drive signal to the pump controller, from the pump
25 controller to the pump unit, the output at the pump unit



1 can be increased to match a desired output, right?

2 A. Yes, sir.

3 Q. Borgstadt also says the output can be decreased
4 to match a desired output, right?

5 A. Sure. Yes.

6 Q. Borgstadt also says that output flow rate could
7 be used to adjust the drive signal, right?

8 A. Yes. That's one example that he gave in this
9 paragraph.

10 Q. And when output flow rate is used to adjust the
11 drive signal, the output at the pump unit can be
12 increased to match a desired output, right?

13 A. Yes.

14 Q. Borgstadt also states that output flow rate can
15 be used to adjust the drive signal to decrease the pump
16 unit output to match a desired output, right?

17 A. Yes. You can get that from 24, certainly.

18 Q. Borgstadt does not explicitly state that
19 efficiency can be used to adjust the drive signal, right?

20 A. In this paragraph, he does not call out
21 efficiency as one of the examples. He does say measured
22 parameters, for example, may use different measured
23 parameters at the output of the respective units to
24 adjust the performance of the pump unit further in the
25 paragraph. So we would look in the other parts of



1 Borgstadt to see what measured parameters those would,
2 and that would include efficiency. But he does not
3 explicitly use that as one example in paragraph 24.

4 Q. And just to be clear: Borgstadt does not
5 mention the term "efficiency" anywhere in paragraph 24,
6 right?

7 A. Correct. He does not use that as an example in
8 paragraph 24. He does in other places.

9 MR. QUARLES: Tonie, would you please bring
10 up file name "EX-1003, Durham Declaration," dot, PDF.
11 Put that back up, and -- on the share and provide me
12 control.

13 THE COURT REPORTER: Yes. Please stand by.
14 Please proceed.

15 (Comments made off the written record.)

16 THE COURT REPORTER: Okay. Thank you.
17 Please proceed.

18 MR. QUARLES: I'm not sure why, but it's
19 not allowing me to control.

20 (Comments made off the written record.)

21 THE COURT REPORTER: Back on the record
22 when you're ready.

23 Q. (BY MR. QUARLES) Let's turn to paragraph 141 of
24 your report.

25 A. Okay.



1 Q. In paragraph 141, you explain that HVAC
2 thermostats compare the ambient temperature to a
3 temperature setting, correct?

4 A. Yes.

5 Q. And you also explain that the thermostat may
6 increase cooling, for example, after comparing the
7 ambient temperature to a temperature setting, right?

8 A. Yes.

9 Q. Do HVAC temperature settings change over time?

10 A. Yes.

11 Q. And you did not include the term "acceptable" in
12 the second sentence of paragraph 141. Is that correct?

13 A. It doesn't look like they used that word, no.

14 Q. For our discussion purposes, when I speak of
15 "thermostat capability," I'm referring to the
16 capabilities explicitly described in your HVAC example in
17 paragraph 141 of your report. Is that fair?

18 A. Sure.

19 Q. Just so we're on the same page, you are not
20 describing the thermostat as monitoring for a component
21 failure in this excerpt, right?

22 A. Correct.

23 Q. You are also not describing the thermostat
24 performing a component degradation detection, right?

25 A. Correct. That's not explicitly described.



1 Q. When you use the term "temperature setting," you
2 mean the temperature setting selected by a user, right?

3 MR. McDONALD: Objection. Form.

4 A. Selected in some way, yes. Most often, in this
5 case, by a user of a thermostat, but not necessarily.

6 Q. (BY MR. QUARLES) And the term "temperature" --
7 the temperature setting selected by the user would
8 presumably be the user's desired temperature setting,
9 right?

10 MR. McDONALD: Same objection.

11 A. Well, in those -- in those situations where the
12 user selects that temperature setting, then I would agree
13 that the user's desired temperature setting would go into
14 the equation. It may not be limited to that. There may
15 be limitations on what the system or the user can set or
16 is able to set, but it would at least include, in those
17 circumstances, a desired temperature setting.

18 Q. (BY MR. QUARLES) I mean, just, for example, if
19 the temperature setting selected by the user was
20 70 degrees Fahrenheit for cooling, the temperature
21 setting selected by the user would presumably be the
22 user's desired temperature setting, right?

23 MR. McDONALD: Objection. Form.

24 A. I would say the user's desired temperature
25 setting would go into the equation, but that -- but there



1 may be other limits on that entrance. For example, at my
2 hotels, you're limited on what you can set the
3 temperature to be, both on the bottom side and -- on the
4 low side and the high side. And there may be building
5 controls, like there are in many commercial buildings,
6 that limits the user's input. But at least the user's
7 desired setting would go into the equation.

8 Q. (BY MR. QUARLES) And, again, we're talking
9 specifically about the explicit descriptions you've used
10 in your example for this controller, right?

11 A. Yes.

12 Q. And there are no other controls, such as a hotel
13 temperature maximum, described explicitly in your
14 description, right?

15 MR. McDONALD: Objection. Form.

16 A. I disagree that that's not contained in that
17 description, because I did talk about commercial
18 buildings. And if you're going to look at commercial
19 buildings, including hotels, you have to consider those
20 circumstances.

21 Q. (BY MR. QUARLES) You don't explicitly identify
22 any such controls by hotels in your description of the
23 HVAC example, right?

24 A. That's correct, I didn't explicitly call those
25 out.



1 Q. Let's take an example. In the summer, perhaps a
2 user may select a desired temperature setting of
3 70 degrees Fahrenheit, right?

4 A. They may.

5 Q. When the room temperature goes above the user's
6 desired setting of 70 degrees Fahrenheit, the thermostat
7 would send a signal to turn the HVAC unit on to cool the
8 room, right?

9 A. If it is the user's desired setting, the
10 temperature setting. I would say that it's going to take
11 that action regardless of whether or not that temperature
12 setting is the user's desired temperature setting or not
13 or whether it's limited in some way.

14 Q. Well, we've established that the -- the user has
15 selected a desired temperature setting of 70 degrees
16 Fahrenheit, right?

17 A. I don't recall that being a premise to your
18 question, but okay, if that's your -- your hypothetical,
19 then that's fine.

20 Q. And if that's -- just so we're on the same page,
21 let's assume that the user has selected the desired
22 temperature setting of 70 degrees Fahrenheit.

23 A. Okay.

24 Q. Fair?

25 A. Fair.



1 Q. When the room temperature goes above the user's
2 desired setting of 70 degrees Fahrenheit, the thermostat
3 will send a signal to turn the HVAC on to cool the room,
4 right?

5 A. Yes, sir. When it exceeded a deadband setting,
6 but yes, generally speaking, that's correct.

7 Q. And after the HVAC unit turns on and cools the
8 room down to below 70 degrees, plus or minus a relatively
9 minor temperature tolerance, perhaps, the thermostat
10 would send a signal to turn the HVAC unit off, right?

11 A. Generally speaking, that's correct, yes.

12 Q. But a second user could come along and input
13 their own desired temperature setting for the thermostat,
14 right?

15 A. Sure, if they have access to the thermostat,
16 they certainly can.

17 Q. And the second user's desired setting may be
18 different than the first user's desired setting, right?

19 A. That's fair.

20 Q. The second user's desired setting could be
21 72 degrees, right?

22 A. Could be.

23 Q. And yet a third user could come along and input
24 their own desired temperature setting for the thermostat,
25 right?



1 A. If a third user had access to the thermostat,
2 yes.

3 Q. And the third user's desired setting may be
4 different from the first user's desired setting, right?

5 A. May be.

6 Q. And the third user's desired setting may be
7 different from the second user's desired setting, right?

8 A. Could be.

9 Q. The third user's desired setting may be
10 68 degrees Fahrenheit, right?

11 A. Could be.

12 Q. A typical HVAC unit is capable of operating to
13 satisfy any one of the desired -- the three desired
14 settings we've just discussed, right?

15 MR. McDONALD: Objection. Form.

16 A. Absent limits on the size of the unit and the
17 settings on the thermostat, generally speaking, that's --
18 that's at least reasonable in some circumstances that
19 would be true.

20 Q. (BY MR. QUARLES) When we speak of an HVAC's
21 capabilities, then, for purposes of our discussion, let's
22 assume that any such controls are out -- are, you know,
23 not taking into consideration external placed controls
24 that are not contingent on the HVAC operate -- capable
25 operating criteria. Does that make sense?



1 MR. McDONALD: Objection. Form.

2 A. I'm not sure. Maybe you can repeat that.

3 Q. (BY MR. QUARLES) Well, and I'll go back and ask
4 my question again.

5 A. Okay.

6 Q. A typical HVAC unit is capable of operating to
7 satisfy any one of the desired three settings, right?

8 MR. McDONALD: Objection. Form.

9 A. If it's sized so that it could do that for the
10 building and its cooling and there's no external limits
11 on the -- what the desired settings can be, then,
12 generally speaking, that's true, assuming it's sized
13 properly.

14 Q. (BY MR. QUARLES) You mentioned "limits." Those
15 limits are thresholds, right?

16 MR. McDONALD: Objection. Form.

17 A. No. I'd say that they were clamps or -- or
18 "limits" is the best word to use, limits on what the
19 system will allow the user to do. I wouldn't say that's
20 the same as a threshold necessarily. More of a clamp.

21 Q. (BY MR. QUARLES) How are they different -- how
22 are the limits different than a threshold?

23 A. Well, a threshold in this context, in this
24 example, is the temperature setting. You may put limits
25 on what that setting can be, but you're not taking action



1 based on those limits. You're just not allowing the
2 setting to exceed those limits in either direction.

3 Q. You previously mentioned limits on the high side
4 and the low side, right?

5 A. Probably.

6 Q. Are those thresholds?

7 MR. McDONALD: Objection. Form.

8 A. The same answer as the previous question. No,
9 those are not necessarily thresholds in the context of
10 how -- of this example here. Those are limits on what
11 the temperature setting can be, not a threshold you'd
12 measure something against and then take action on.

13 Q. (BY MR. QUARLES) Are operating outside of those
14 limits nonacceptable?

15 MR. McDONALD: Objection. Form.

16 A. Not necessarily, no.

17 Q. (BY MR. QUARLES) When the thermostat is
18 determining whether to drive the HVAC unit to the off
19 position, it's making that determination based on the
20 temperature that the last user set the thermostat to,
21 right?

22 MR. McDONALD: Objection. Form.

23 A. I'm not sure what you mean by drive the unit to
24 the off position. Maybe, could you rephrase that
25 question?



1 Q. (BY MR. QUARLES) Well, we discussed when the
2 room temperature goes above the user's desired setting of
3 70 degrees Fahrenheit, the thermostat would send a signal
4 to turn the HVAC unit on to cool the room, right. We
5 talked about that earlier, right?

6 A. Yes.

7 Q. So when the thermostat is determining whether to
8 turn the HVAC unit to the off position --

9 A. Okay.

10 Q. -- it is making that determination based on the
11 temperature that the last user set, the thermostat
12 selected, right?

13 MR. McDONALD: Objection. Form.

14 A. Yes. It's using that temperature setting as the
15 threshold to say now the temperature is acceptable so
16 turn the unit off.

17 Q. (BY MR. QUARLES) And this setting represents the
18 user's desired temperature setting, right?

19 A. With the caveats that I put on it earlier, yes.

20 Q. Going back to our example. The last user to set
21 the thermostat in our example set it to 68 degrees,
22 right?

23 A. Okay.

24 MR. McDONALD: Objection. Form.

25 A. That's the premise of your question. Okay.



1 Q. (BY MR. QUARLES) So when the temperature goes
2 below 68 degrees Fahrenheit, a POSITA would expect the
3 thermostat to turn the HVAC off, right?

4 A. Correct. Yeah, the temperature is now
5 acceptable so no longer need the cooling.

6 Q. A POSITA would expect the thermostat to have
7 made that decision to turn the HVAC unit off because the
8 temperature was below 68 degrees Fahrenheit, right?

9 MR. McDONALD: Objection. Form.

10 A. Yes, sir, in your example.

11 Q. (BY MR. QUARLES) In this scenario, a POSITA
12 would not expect the thermostat to have made the decision
13 to turn the HVAC unit off, because continuing to operate
14 the HVAC system below 68 degrees Fahrenheit would exceed
15 the HVAC system's capabilities, right?

16 MR. McDONALD: Objection. Form.

17 A. No. I disagree.

18 Q. (BY MR. QUARLES) You disagree that a typical
19 HVAC system would be capable of driving -- of operating
20 an HVAC unit to cool a room below 68 degrees?

21 A. I would say it's very common for HVAC units to
22 be able -- capable of cooling a room below 68 degrees.
23 The thermostat is not making that decision based on the
24 capabilities of the unit, but on the threshold that was
25 set, the temperature setting.



1 Q. So if I understand the statement correctly, the
2 thermostat is making that decision based on what the user
3 set and not the system's capabilities, right?

4 A. Correct. It's based on the threshold that it's
5 comparing to, not necessarily the system's capabilities.

6 Q. A POSITA would understand that the typical HVAC
7 system would be capable of operating to cool room
8 temperature down below 68 degrees Fahrenheit without
9 causing damage to the HVAC system, right?

10 MR. McDONALD: Objection. Form.

11 A. If it's sized to do so, then yes.

12 Q. (BY MR. QUARLES) So here, the thermostat is
13 checking for user's temperature or preference limit,
14 right?

15 A. With the caveats that I put on that setting
16 earlier, the limits and other actions, yes.

17 Q. The thermostat is not checking for a component
18 operational limitation based on the explicit description
19 you've provided, right?

20 A. Correct.

21 MR. McDONALD: Objection. Form.

22 A. Yes, correct. In the basic description I've
23 provided, the thermostat would not have knowledge of the
24 capabilities of the system.

25 Q. (BY MR. QUARLES) The thermostat is not



1 identifying changes in system components, right?

2 MR. McDONALD: Objection. Form.

3 A. I think I would agree with that, correct.

4 Q. (BY MR. QUARLES) It is not identifying component
5 failures, right?

6 A. Correct. That's -- that's true.

7 Q. It is not identifying degrading components,
8 right?

9 A. In this limited example, that's correct.

10 MR. QUARLES: Tonie, would you please bring
11 up file name "EX-1001, US10655435," dot, PDF?

12 THE COURT REPORTER: Yes. Please stand by.

13 (Comments made off the written record.)

14 (Deposition Exhibit Number 1001
15 referenced.)

16 THE COURT REPORTER: We're back on the
17 record at 11:15 a.m.

18 Q. (BY MR. QUARLES) You may recall from our earlier
19 discussion, I asked the question, Does the term
20 "acceptable" limit the claim threshold? right?

21 A. Yes.

22 Q. Let's look at the term "acceptable threshold" in
23 the context of the '435 patent.

24 A. Okay.

25 Q. I'm showing Column 10 of the '435 patent, the



1 first full paragraph. It says, "In some embodiments, the
2 method 160 also includes detecting that a first parameter
3 of the one or more parameters is outside of an acceptable
4 threshold."

5 Do you see that?

6 A. I do.

7 Q. Does acceptable threshold change over time in
8 this paragraph?

9 A. It certainly could.

10 Q. What do you mean by that?

11 A. Well, there's a couple of things. First of all,
12 there's nothing in this paragraph or, to my knowledge,
13 anywhere in '435 patent that ties that threshold to a
14 single value or states that it's inflexible and does not
15 vary over time.

16 Secondly, its acceptable threshold is not
17 tied to any particular parameter. So this acceptable
18 threshold could be applied to various parameters --
19 efficiency, flow rate, pressure are some examples. And
20 when that threshold is applied to a different parameter,
21 you would expect the threshold value to change.

22 Q. Does the '435 patent in this paragraph
23 explicitly disclose affirmatively that it changes?

24 MR. McDONALD: Objection. Form.

25 A. I think it -- I think it does to a POSITA,



1 because it's -- it's not tied to a particular parameter.
2 It's tied to one parameter -- one or more parameters.
3 And a POSITA would recognize that a threshold would not
4 be consistent across multiple parameters. I think that
5 is contained in this paragraph.

6 Q. (BY MR. QUARLES) And if we assume it was tied to
7 a particular parameter, does the acceptable threshold
8 change over time in this paragraph explicitly?

9 MR. McDONALD: Objection. Form.

10 A. It certainly could. There's nothing that limits
11 it to a fixed number or fixed value, so certainly.

12 Q. (BY MR. QUARLES) There's no explicit disclosure
13 that says that it changes the -- in this paragraph,
14 right?

15 A. Well, I -- it does not use the word "change,"
16 but, again, it says one or more parameters. And you
17 would certainly expect -- a POSITA would certainly expect
18 the threshold value to change not only with regard to a
19 single parameter, depending on what's acceptable to the
20 user at the time, but between parameters.

21 Q. You understand what I mean by the term
22 "explicit," right?

23 A. Perhaps not. I'm looking at this through the
24 lens of a POSITA at the time of the patent, and that's
25 what I'm seeing -- what I'm trying to explain.



1 Q. How do you -- how do you understand the word
2 "explicitly" state?

3 A. That it's contained within the disclosure of the
4 paragraph of what a POSITA would understand that
5 paragraph to be teaching.

6 Q. And when we say "explicit," we are saying that
7 specifically it says in words -- not an inference, but an
8 explicit statement of fact -- an explicit statement as
9 opposed to some understanding or what someone might infer
10 from a statement, but an explicit statement.

11 Do you understand the difference between
12 those?

13 MR. McDONALD: Objection. Form.

14 A. I -- I think that if it's contained within the
15 understanding of a POSITA, then that's my understanding
16 of explicit. If you're looking for particular language,
17 maybe you could ask, Does it use these particular
18 words? and I would understand your question better.

19 Q. (BY MR. QUARLES) Does this paragraph
20 specifically use the words that the "acceptable threshold
21 changes over time"?

22 A. No, sir, I don't see that language in this
23 paragraph.

24 Q. Does this paragraph use the words that
25 "acceptable threshold for flow rate would change over



1 time"?

2 A. Are we still back on paragraph -- in Column 10?
3 Because I see that you've changed your screen.

4 Q. Yes.

5 A. No, sir, I don't see that language -- that
6 particular language.

7 Q. Let's look at Column 11. And the first
8 paragraph says -- about midway through the paragraph, it
9 says, "The method 180 may also include controlling one or
10 more of the plurality of pumps individually based on the
11 automated instructions. The method 180 may further
12 include detecting that a measurement associated with a
13 first pump of a plurality of pumps is outside of an
14 acceptable threshold."

15 Do you see that?

16 A. Yes. You've read that correctly so far.

17 Q. In this paragraph, does the patent use the words
18 that "acceptable threshold will change" in this
19 paragraph specifically?

20 A. No, sir, I don't see that language in this
21 paragraph.

22 MR. QUARLES: Tonie, would you please bring
23 up file name "EX-1005, Omont," dot, PDF, and provide me
24 control?

25 THE COURT REPORTER: Yes. Please stand by.



1 (Comments made off the written record.)

2 (Deposition Exhibit Number 1005

3 referenced.)

4 THE COURT REPORTER: We're back on the
5 record at 11:32 a.m. Please proceed.

6 Q. (BY MR. QUARLES) So let's talk about what's been
7 marked in your declaration as Exhibit 1005, which is
8 Omont, specifically paragraph 60.

9 A. Paragraph --

10 Q. 60.

11 A. -- which one? 60. Okay.

12 Q. In paragraph 60, Omont states that portions of
13 additive systems 100, 200, 201 and/or CAM system 300 may
14 compromise various control hardware, right?

15 A. Yes, sir.

16 Q. Omont paragraph 60 states that control hardware
17 may be implemented as cards, modules, circuits, and/or
18 devices forming portions of subsystems 202, 212, 220 of
19 additive system 200, right?

20 A. Yes. You read that correctly.

21 Q. And Omont paragraph 60 says, Control hardware
22 may form portions of control devices 306 and 312 of CAM
23 system 300, right?

24 A. Among other things, yes, that's correct.

25 Q. Omont paragraph 60 does not expressly disclose



1 functionality of control devices, correct?

2 A. Correct. That's described elsewhere in Omont.

3 Q. But not in paragraph 60, right?

4 A. I agree with that.

5 Q. Let's turn to paragraph 61. Omont paragraph 61
6 discusses components that may be implemented as an
7 instance of control hardware 400 as shown in Figure 4,
8 right?

9 A. Correct.

10 Q. More specifically, paragraph 61 discusses how
11 components of subsystem 212 may be implemented as an
12 instance of control hardware 400, right?

13 A. Yes, 212 is one of the subsystems that the
14 components of which may be implemented with an instance
15 of control hardware 400 or a subset of control
16 hardware 400.

17 Q. Components of subsystem 220 may be implemented
18 as an instance of control hardware 400, right?

19 A. Correct. That's another one of the subsystems
20 that Omont describes.

21 Q. And Omont discusses that instances of control
22 hardware may be operable to facilitate communication
23 between the additive system 200 and the CAM system 300,
24 right?

25 A. Yes. That's part of the functionality.



1 Q. Omont paragraph 61 does not expressly disclose
2 that instances of control hardware implemented in
3 sensors 214 facilitate communication with instances of
4 control hardware in system 212, right?

5 MR. McDONALD: Objection. Form.

6 A. Could you repeat that question? I --

7 Q. (BY MR. QUARLES) Sure.

8 A. I missed some of the numbers, I think.

9 Q. Omont paragraph 61 does not expressly disclose
10 that instances of control hardware implemented in
11 sensors 214 facilitate communication with instances of
12 control hardware in subsystem 212, right?

13 MR. McDONALD: Objection. Form.

14 A. I do not see -- right. This paragraph does not
15 describe 214.

16 Q. (BY MR. QUARLES) So just to make sure we're all
17 on the same page: So again, Omont paragraph 61 does not
18 expressly disclose that instances of control hardware
19 implemented in sensors 214 facilitate communication with
20 instances of control hardware in subsystem 212, right?

21 MR. McDONALD: Same objection.

22 A. Same answer. Paragraph 61 does not describe
23 214, so I agree with your statement.

24 Q. (BY MR. QUARLES) Omont paragraph 61 does not
25 expressly disclose that instances of control hardware



1 implemented in sensors 214 transmit data to
2 subsystem 212, right?

3 MR. McDONALD: Objection. Form.

4 A. Correct. Same answer. Paragraph 61 does not
5 discuss explicitly 214.

6 Q. (BY MR. QUARLES) Omont paragraph 61 does not
7 explicitly disclose that instances of control hardware
8 implemented in sensors 204 transmit data to
9 subsystem 212, right?

10 MR. McDONALD: Objection. Form.

11 A. I did not see 204 as a specific structure or --
12 or devices that are discussed in 61, paragraph 61, so
13 I'll agree with your statement.

14 Q. (BY MR. QUARLES) Omont paragraph 61 does not
15 expressly disclose that instances of control hardware
16 implemented in sensors 222 transmit data to
17 subsystem 212, right?

18 MR. McDONALD: Objection. Form.

19 A. Paragraph 61 does not discuss device 222, so I
20 will agree with your statement.

21 Q. (BY MR. QUARLES) Omont paragraph 61 does not
22 expressly disclose that instances of control hardware
23 implemented in sensors 214 transmit data to
24 subsystem 220, right?

25 MR. McDONALD: Objection. Form.



1 A. I think that's the same question, but -- it's at
2 least the same answer: 214 is not explicitly one of the
3 devices discussed in 61.

4 Q. (BY MR. QUARLES) Omont paragraph 61 does not
5 expressly disclose that instances of control hardware
6 implemented in sensors 204 transmit data to
7 subsystem 220, right?

8 MR. McDONALD: Objection. Form.

9 A. 204 is not explicitly discussed in paragraph 61,
10 so I agree.

11 Q. (BY MR. QUARLES) Omont paragraph 61 does not
12 expressly disclose that instances of control hardware
13 implemented in sensors 222 transmit data to
14 subsystem 220, right?

15 MR. McDONALD: Objection. Form.

16 A. Paragraph 61 does not explicitly describe 222,
17 so I'll agree with your statement that that term is not
18 explicitly in paragraph 61.

19 Q. (BY MR. QUARLES) So if I understand correctly,
20 Omont paragraph 61 does not expressly discuss that
21 instances of control hardware implemented in any of
22 sensors 204, sensors 214, or sensors 222 transmit data to
23 subsystem 212, right?

24 MR. McDONALD: Objection. Form.

25 A. It does not explicitly reference 204 -- I'm



1 trying to remember the numbers -- 204, 214, and 222 at
2 all. So it's not directly referenced in this paragraph,
3 I'll agree -- those devices.

4 Q. (BY MR. QUARLES) And if I understand correctly,
5 Omont paragraph 61 does not expressly disclose that
6 instances of control hardware implemented in any of
7 sensors 204, sensors 214, or sensors 222 transmit data to
8 subsystem 220, right?

9 MR. McDONALD: Objection. Form.

10 A. Paragraph 61 does not explicitly discuss 204,
11 214, or 222 in the language of the paragraph, so I'll
12 agree.

13 Q. (BY MR. QUARLES) Let's turn to paragraph 62.

14 THE DEPONENT: Mr. Quarles, I realize I
15 just ran out of water, and it seems we've been going
16 about 65 minutes. So I think, if it's okay, this would
17 be a good time for a quick break.

18 MR. QUARLES: Sure. No problem at all.
19 Five minutes is good enough?

20 THE DEPONENT: Yeah, good enough.

21 THE COURT REPORTER: Okay. Hearing no
22 objections, we are off the record at 1:00 -- excuse me,
23 11:44 a.m.

24 (Break taken at 11:44 a.m.)

25 (Back on the record at 11:53 a.m.)



1 THE COURT REPORTER: We're back on the
2 record at 11:53 a.m. Please proceed.

3 Q. (BY MR. QUARLES) Let's turn to paragraph 62.

4 A. Okay.

5 Q. We're still on Omont. Omont paragraph 62
6 discusses that control hardware 400 may be or compromise
7 processors, special-purpose computing devices, servers,
8 personal computers, PDAs, smartphones, Internet
9 appliances, and/or other types of computing devices,
10 right?

11 A. Yes, sir.

12 Q. Omont paragraph 62 discusses that control
13 hardware 400 may include various components, such as a
14 processor and an integrated circuit, right?

15 A. No, sir. I disagree.

16 Q. You look at the second sentence. It says (as
17 read), "As depicted in Figure 4, the various instance of
18 the control hardware 400 may each include one or more
19 instances of each of a processor 412, a volatile memory
20 418, a nonvolatile memory 420, an integrated circuit 424,
21 an input device 426, an output device 428, and/or a mass
22 storage device 430, and may include or be operable or
23 otherwise associated with an external storage medium
24 434," right?

25 A. No, sir. I disagree.



1 Q. How so?

2 A. There's no "integrated circuit" in that
3 paragraph, at least not called out in the language.

4 Q. The -- it says -- I think it uses the term
5 "interface circuit 424." Is that -- did I say something
6 otherwise?

7 A. Yes, sir. You said "integrated circuit 424."

8 Q. Okay.

9 A. Although, processor 412 and most of these other
10 devices are -- contain integrated circuits, it's not an
11 element called out explicitly in the language.

12 Q. Omont paragraph 62 also discusses that control
13 hardware implemented as or within components of additive
14 system 200 and the CAM system 300 may not include each of
15 the components depicted in Figure 4, right?

16 A. Correct.

17 Q. But they may include a subset of the components
18 depicted in Figure 4, right?

19 A. Yes.

20 Q. Omont paragraph 62 does not explicitly disclose
21 that instances of control hardware implemented in any of
22 sensors 204, sensors 214, or sensors 222 transmit data to
23 subsystem 212, right?

24 MR. McDONALD: Objection. Form.

25 A. Correct. That discussion is not contained in



1 paragraph 62.

2 Q. (BY MR. QUARLES) Omont paragraph 62 does not
3 explicitly disclose that instances of control hardware
4 implemented in any of sensors 204, sensors 214, or
5 sensors 222 transmit data to subsystem 220, right?

6 MR. McDONALD: Objection. Form.

7 A. Correct. That discussion is not contained in
8 paragraph 62.

9 Q. (BY MR. QUARLES) Let's turn to paragraph 63.
10 Omont paragraph 63 discloses that instances of control
11 hardware 400 that are implemented as or within instances
12 of HNC 220 may not include the mass storage device 430,
13 right?

14 A. It may not, correct. "May not include the mass
15 storage device 430."

16 Q. Omont paragraph 63 discloses that instances of
17 control hardware 400 that are implemented as or within
18 instances of HNC 220 may not include the external storage
19 medium 434, right?

20 A. Yes, that's correct.

21 Q. Omont paragraph 63 discloses that instances of
22 control hardware 400 that are implemented as or within
23 instances of WC subsystem 212 may not include the mass
24 storage device 430, right?

25 A. Correct.



1 Q. Or the external storage medium 434, right?

2 A. Correct.

3 Q. Or the input device 426, right?

4 A. Correct.

5 Q. Or the output device 428, right?

6 A. Correct.

7 Q. Omont paragraph 63 does not explicitly disclose
8 that instances of control hardware implemented in any of
9 sensors 204, sensors 214, or sensors 222 transmit data to
10 subsystem 212, right?

11 MR. McDONALD: Objection. Form.

12 A. Correct. Those systems 204, 214, and 222 are
13 not examples that Omont describes in paragraph 63.

14 Q. (BY MR. QUARLES) Omont paragraph 63 does not
15 explicitly disclose that instances of control hardware
16 implemented in any of sensors 204, sensors 214, or
17 sensors 222 transmit data to subsystem 220, right?

18 MR. McDONALD: Objection. Form.

19 A. As sensors are -- elements 204, 214, and 222 are
20 not any of the examples that Omont describes in 63. So
21 correct, yeah.

22 Q. (BY MR. QUARLES) Let's turn to paragraph 64.
23 Omont paragraph 64 discusses components depicted in
24 Figure 4, right?

25 A. It does discuss Figure 4. Certainly not limited



1 to components in Figure 4.

2 Q. Omont paragraph 64 does not explicitly disclose
3 that instances of control hardware implemented in any of
4 sensors 204, sensors 214, or sensors 222 transmit data to
5 subsystem 212, right?

6 MR. McDONALD: Objection. Form.

7 A. It does not -- paragraph 64 does not contain
8 direct reference to 204, 214, or 222. 204, 214, and 222
9 would be incorporated in the various components of the
10 additive system 200 that is referenced in 64 but does not
11 use those particular numbers in the example.

12 Q. (BY MR. QUARLES) So just to make sure we're on
13 the same page: Omont paragraph 64 does not explicitly
14 disclose that instances of control hardware implemented
15 in any of sensors 204, sensors 214, or sensors 222
16 transmit data to subsystem 212, right?

17 MR. McDONALD: Objection. Form.

18 A. I think my answer is exactly the same.
19 Paragraph 64 does not call out the numbers of the
20 elements 204, 214, and 222; however, those elements would
21 be contained, based on the rest of Omont, in the various
22 components of additive system 200. And the control
23 hardware 400 may be part of CAM 300 in those systems, and
24 that is within the scope of the present disclosure. But
25 nevertheless, it does not use those numbers 204, 214, and



1 222 in the examples of 64.

2 Q. (BY MR. QUARLES) Omont paragraph 64 does not
3 expressly disclose that instances of control hardware
4 implemented in any of sensors 204, sensors 214, or
5 sensors 222 transmit data to subsystem 220, right?

6 MR. McDONALD: Objection. Form.

7 A. Almost exactly the same answer. Those
8 components 204, 214, and 222 are contained within the
9 scope of the disclosure 64. It's particularly part of
10 the additive system 200 and CAM system 300.
11 Nevertheless, paragraph 64 of Omont does not reference
12 those numbers directly.

13 Q. (BY MR. QUARLES) In other words, nowhere in
14 paragraph 64 does it expressly say that sensors 204,
15 sensors 214, or sensors 222 transmit data to
16 subsystem 220, right?

17 MR. McDONALD: Objection. Form.

18 A. I think that's the same question and has the
19 same answer that I just gave.

20 Q. (BY MR. QUARLES) And your answer was no?

21 A. My answer was that those components, while not
22 referenced directly by number, are certainly part of the
23 various components of the additive system 200 and are
24 contained within the disclosure of 64 and the previous
25 paragraphs, according to paragraph 64. But nevertheless,



1 it does use -- paragraph 64 itself does not use the
2 numbers 204, 214, or 222.

3 MR. QUARLES: Okay. I think we're a little
4 bit past noon, so it's probably a good time to take a
5 lunch break.

6 THE DEPONENT: Okay. On this end, it can
7 be a shorter one -- 25 minutes, 20 minutes, something
8 like that.

9 THE COURT REPORTER: Okay. Hearing no
10 objections, we are off the record --

11 MR. QUARLES: Let's go with --

12 THE COURT REPORTER: Oh, I'm sorry.

13 MR. QUARLES: Yeah, let's go with
14 30 minutes.

15 THE COURT REPORTER: Okay. Hearing no
16 objections, we are off the record at 12:06 p.m.

17 (Lunch taken at 12:06 p.m.)

18 (Back on the record at 12:40 p.m.)

19 THE COURT REPORTER: We're back on the
20 record at 12:40 p.m. Please proceed.

21 MR. QUARLES: Tonie, would you please bring
22 back up Exhibit 1003, the expert declaration?

23 THE COURT REPORTER: Yes. Please stand by.
24 Mr. Quarles, do you have control?

25 MR. QUARLES: Yes. Thank you.



1 THE COURT REPORTER: Perfect. Please
2 proceed.

3 Q. (BY MR. QUARLES) Dr. Durham, did you speak to
4 counsel over the lunch break?

5 A. Sure.

6 Q. And did you discuss the substance of the
7 deposition?

8 A. No.

9 Q. Okay. Let's turn to paragraph 141 of your
10 report. In paragraph 141 of your report, you discuss an
11 automobile cruise control example that detects that
12 vehicle speed is not in accordance with a speed setting,
13 so the cruise control increases or decreases throttle to
14 adjust the speed -- the vehicle speed to the speed
15 setting, correct?

16 A. That's a fair summary of that sentence.

17 Q. In this cruise control example, the speed
18 setting is the desired setting, right?

19 A. One would expect so, yes.

20 Q. If a user sets the cruise control at 50 miles
21 per hour, the cruise control will try to maintain the
22 vehicle's speed at 50 miles per hour, right?

23 A. Correct. It's varying the throttle -- as I say,
24 increased or decreased throttle -- in order to correct
25 the parameter back inside the acceptable threshold speed



1 setting. It's -- as long as it's below speed setting --
2 I'm sorry. As long as it's at speed setting, it's fine.
3 Below it, it speeds it up. If it exceeds the speed
4 setting, it would decrease throttle.

5 Q. Does the acceptable threshold in your cruise
6 control example change over time?

7 A. It may.

8 Q. Acceptable, in your example, is set by the speed
9 limit. Is that correct?

10 A. Not necessarily.

11 Q. Could it be -- could it be set by the speed
12 limit?

13 A. Sure, it could be.

14 Q. Acceptable, in your example, is set by the
15 driver, and let's take our example of a setting of
16 50 miles per hour. You would agree that, generally
17 speaking, a typical car can maintain 50 miles per hour,
18 right?

19 A. Depending on the vehicle and the road
20 conditions, it could.

21 Q. Assuming no adverse road conditions, typical
22 road conditions on an interstate highway, you would agree
23 that a typical automobile could maintain 50 miles per
24 hour with the cruise control set at 50 miles per
25 hour. Is that right?



1 MR. McDONALD: Objection. Form.

2 A. It's likely.

3 Q. (BY MR. QUARLES) So acceptable, in that example,
4 is set by the driver and has nothing to do with
5 thresholds in the car or its subsystems. Is that
6 correct?

7 MR. McDONALD: Objection. Form.

8 A. I disagree that that would not come into
9 account. Certainly it could in some circumstances.

10 Q. (BY MR. QUARLES) Acceptable, in this example,
11 has nothing to do with any operational -- with any limit
12 of any subcomponent of the car, correct?

13 MR. McDONALD: Objection. Form.

14 A. No. I disagree. You can't say that out of hand
15 at all.

16 Q. (BY MR. QUARLES) The typical car in good working
17 order is capable of going more than 50 miles per hour,
18 right?

19 A. There are many that can. I own at least one
20 that can't.

21 Q. In good working order?

22 A. Yes.

23 Q. The typical car can go over 50 miles per hour
24 without overworking the engine, right?

25 A. Could you repeat that? I'm not sure I got all



1 the words.

2 Q. The typical car can go more than 50 miles per
3 hour without overworking the engine, right?

4 A. Many cars can.

5 Q. The typical car in good working order can go
6 more than 50 miles per hour without overworking the
7 engine, right?

8 A. Many can.

9 MR. McDONALD: Objection. Form.

10 Q. (BY MR. QUARLES) And here, the cruise control is
11 checking for a user preference limit, right?

12 A. It's --

13 MR. McDONALD: Objection. Form.

14 A. It's comparing it to the threshold that's
15 acceptable to the user at that time, which is speed
16 setting, as I stated in the example.

17 Q. (BY MR. QUARLES) So just so I understand
18 correctly, the cruise control is checking for a user
19 preference limit, right?

20 MR. McDONALD: Objection. Form.

21 A. No, I wouldn't call it a user preference limit.
22 I'd call it an acceptable threshold, a speed setting.
23 Certainly the user preference goes into that equation.

24 Q. (BY MR. QUARLES) The cruise control explicitly
25 in your -- the facts presented in your example is not



1 checking for component operational limitation, right?

2 MR. McDONALD: Objection. Form.

3 A. I think component limitations would go into what
4 the acceptable threshold may be, but I did not explicitly
5 call that out.

6 Q. (BY MR. QUARLES) So in your example, nowhere in
7 your example do you explicitly say that the cruise
8 control is checking for a component operational
9 limitation, right?

10 MR. McDONALD: Objection. Form.

11 A. Correct. I do not use that language, although
12 those limitations would have been known to the user and
13 would go into what an acceptable threshold would be.

14 Q. (BY MR. QUARLES) The cruise control is not
15 checking for a failed component, right?

16 A. Cruise control itself is not, that's correct.

17 Q. The cruise control is not checking for a
18 degraded component, right?

19 A. That's correct, it does not make that check.

20 Q. Are there similar speed limits set by a
21 government regulatory authority for pumps during
22 fracturing operations?

23 A. Are there speed limits set -- can you just
24 repeat that, please?

25 Q. Are there similar speed limits set by a



1 government regulatory authority for pumps during
2 fracturing operations?

3 A. No, I don't know of any regulation that would
4 limit the speed of a fracturing pump, not directly at
5 least. I do know in some circumstances there may be
6 government regulations that would go into the equation of
7 what the maximum speed is, the fracturing pump is, for
8 sure, but not in an RPM kind of number.

9 Q. Paragraph 141 of your report, you discuss an air
10 compressor example, right?

11 A. Yes.

12 Q. In your air compressor example, the control
13 system for the air compressor senses the air pressure,
14 right?

15 A. Yes, that's correct.

16 Q. The control system detects that the air pressure
17 is lower than a preferred pressure setting, right?

18 A. Lower than the acceptable threshold for
19 maintaining that air.

20 Q. The control system then signals the air
21 compressor to turn on, right?

22 A. Correct. When air pressure falls below the
23 threshold, it signals the compressor to turn on, correct.

24 Q. To compress air into the tank, right?

25 A. Correct.



1 Q. So on the facts presented in your example
2 explicitly, the control system is not checking for a
3 component failure, right?

4 MR. McDONALD: Objection. Form.

5 A. I would agree with that. A component failure
6 may lead to the low air pressure, but it's not directly
7 checking for that. It may indicate some kind of a
8 failure or a leak.

9 Q. (BY MR. QUARLES) And, again, based on the facts
10 explicitly presented in your example, the control system
11 is not checking for a degraded component, right?

12 MR. McDONALD: Objection. Form.

13 A. Again, I would say that the control system may
14 not be checking directly for a failed component, although
15 the low air pressure may indicate a worn component, for
16 sure, such as a valve seat.

17 Q. (BY MR. QUARLES) So just to make sure I
18 understand, the control system itself is not explicitly
19 checking for a degraded component, right?

20 MR. McDONALD: Objection. Form.

21 A. Not necessarily. Certainly could be, but not
22 necessarily. May just see the indication that the pump
23 is running -- or the compressor is running more often
24 than it could that indicates a failed or worn component.

25 Q. (BY MR. QUARLES) Based on the facts you



1 presented in your example, you did not explicitly
2 describe the control system checking for a degraded
3 component, right?

4 MR. McDONALD: Objection. Form.

5 A. I would agree with that. Certainly didn't
6 exclude that, but I certainly didn't explicitly describe
7 it.

8 Q. (BY MR. QUARLES) And when you say the air
9 compressor turns on in your example, that would require
10 some sort of a -- typically require some sort of a power
11 source, whether it's electricity or battery, to operate
12 the compressor to turn on, right?

13 A. You need some kind prime mover. I would agree.

14 Q. In the absence of that prime mover that would be
15 able to quick -- to turn on an air compressor, would it
16 be desirable to have a -- an air pressure to maintain
17 operability above the pressure setting?

18 A. I'm completely lost. I'm sorry. I didn't
19 follow that question at all.

20 Q. Sure. In the event that that prime mover source
21 is unavailable, let's say you have an air compressor that
22 turns on that is powered by electricity. You have an air
23 tank. When it gets below 30 psi, the compressor turns
24 on, and -- in your example, at 30 psi -- are you with me?

25 A. Okay.



1 Q. And so that pressure setting is 30 -- in our
2 example here, is 30 psi, right?

3 A. It's your example. It's fine.

4 Q. Now, let's say that -- so we'll call that the
5 "pressure setting," fair?

6 A. Okay.

7 Q. Let's say your electricity goes out. Okay?

8 A. Okay.

9 Q. Would it be desirable to have 50 or more -- or
10 actually more than 30 percent -- more than 30 psi in the
11 tank in order to maintain operation for a longer period
12 of time than it would be to have 30 psi?

13 MR. McDONALD: Objection. Form.

14 A. Perhaps.

15 Q. (BY MR. QUARLES) In other words, if you're
16 trying to pump up your tires on your car, for instance,
17 and you know that you need 20 psi to pump up your tires
18 correctly and you lose electricity in your compressor,
19 you would prefer to have -- assuming your tank could
20 support it, you would prefer to have 50 psi in your tank
21 instead of the set limit of 30 psi, right?

22 A. Perhaps. Certainly could.

23 Q. So in that instance, 50 psi would be a desired
24 setting instead of the -- a more desirable setting than
25 the 30 psi, right?



1 MR. McDONALD: Objection. Form.

2 A. No. I disagree that it's more desirable. It's
3 just for a different set of circumstances.

4 Q. (BY MR. QUARLES) Well, based on the circumstance
5 where you need 20 psi to pump up your tires and you want
6 to pump up your tires and your tank can support 50 psi,
7 it would be desirable to have 50 psi in the tank instead
8 of merely the 30 psi, correct?

9 MR. McDONALD: Objection. Form.

10 A. Perhaps. And under circumstances you're
11 planning to try to air up your tires with the power out,
12 maybe.

13 Q. (BY MR. QUARLES) Can you think of an instance
14 where you would not rather have the 50 psi versus the
15 30 psi if you have no way to -- if your electricity is
16 out and your air compressor doesn't work and you have no
17 other way to get your extra 20 psi in there?

18 A. Sure.

19 Q. And what would that situation be?

20 A. Well, perhaps you don't want to air up your
21 tires with the power out. Perhaps some of your hoses or
22 other components can't handle 50 psi.

23 Q. Now, wait --

24 A. Perhaps the compressor is not substantial to go
25 up to 50 psi. There's lots of things that go into that



1 equation. Now, you're asking me, Could a user set it up
2 at 50 to air up a tire at 20? Sure, he could.

3 Q. And in our example, we established that the tank
4 would support it -- let's assume the car can support it.
5 Let's assume all the tires, all the valves, all of the
6 related and associated components can support it --
7 support the extra air in the tires.

8 Would 50 psi be desirable to have instead
9 of the 30 percent -- that 30 psi?

10 MR. McDONALD: Objection. Form.

11 A. Regardless of how many hypotheticals you put on,
12 the same answer is going to be true. Perhaps. You
13 certainly could set it at 50 psi under those
14 circumstances. I think it would depend on the individual
15 user, whether they wanted 30 or 50, and the rest of the
16 surrounding circumstances.

17 Q. (BY MR. QUARLES) Isn't it true that if you only
18 had 30 based on the -- 30 psi in the situation we've
19 described, then you wouldn't be able to pump up your
20 tires as well once it dropped below 30, right?

21 A. I disagree. Can't make that blanket statement.

22 Q. You mention in one of your examples that
23 compressed air may be used for air-driven tools, right?

24 A. Sure. Yes, as an example.

25 Q. What does a typical air-driven tool -- how much



1 psi does that require?

2 MR. McDONALD: Objection. Form.

3 A. Depends totally on the tool.

4 Q. (BY MR. QUARLES) Can you name a specific tool?

5 Like, let's say -- let's say we have a typical air wrench
6 for replacing some lug nuts on a car. You've got the air
7 tool for that purpose. You know what I'm talking about?

8 A. I certainly have seen examples of those air
9 tools, yes.

10 Q. What would that typical air tool require for
11 psi?

12 A. I don't think you can put a typical number on
13 that. It depends on the tool.

14 Q. Well, what would be the minimum?

15 A. I don't know every -- every example of every air
16 tool that exists, so I can't give you a minimum number.

17 Q. Can you think of one example?

18 A. Yes.

19 Q. And what would be the minimum air pressure
20 required for that one example?

21 A. I can't give you a minimum air pressure, but I
22 can give you the rate of the desired air pressure for a
23 particular air wrench that we have in the lab, and it's
24 70 psi. It's not to say it won't operate below 70, but
25 that's the manufacturer's recommended number, or above.



1 Q. So it requires 70 psi to operate according to
2 manufacturer's recommendations. Did I understand that
3 correct?

4 A. Correct. That's the manufacturer's recommended
5 pressure, 70 psi or above. I think it has some upper
6 limits too, but I don't recall them.

7 Q. Would it be desirable to have -- to operate that
8 tool at a higher psi than 70?

9 A. I --

10 MR. McDONALD: Objection. Form.

11 A. You certainly can operate it at a higher psi
12 than 70, up to its rated -- upper rated, but you really
13 don't get any benefit.

14 Q. (BY MR. QUARLES) There's no benefit to, say,
15 operating it at 75 psi?

16 A. No, sir.

17 Q. So in your air tank example, let's say you're
18 operating that tool and you've set your pressure where
19 the pressure will turn on at, let's say, 75 psi -- or the
20 compressor will turn on at 75 psi --

21 A. Okay.

22 Q. -- to maintain adequate pressure for your -- for
23 the tool. And what was the name of the tool you
24 mentioned?

25 A. An air wrench.



1 Q. The air wrench?

2 A. Impact wrench or impact --

3 Q. Impact wrench?

4 A. Yeah, impact head, I guess.

5 Q. So you need a minimum of 70 psi to operate near
6 the air wrench and you're trying to maintain your air
7 tank, so you will -- to have significant pressure to
8 operate the air tool, right?

9 A. Okay. I think, yeah, that's the example I gave.

10 Q. So you set it -- your setting, your air pressure
11 setting is set for 75 psi in that -- in the scenario
12 we've talked about where the compressor will turn on if
13 it gets below 75 psi. Is that right?

14 A. Okay. Well, that's your -- that's your
15 hypothetical, yes.

16 Q. Now, that's assuming that the -- does the
17 acceptable threshold of 70 psi set by the manufacturer
18 change over time?

19 MR. McDONALD: Objection. Form.

20 A. That's not the acceptable threshold in the
21 example.

22 Q. (BY MR. QUARLES) No, I'm talking about -- we're
23 not talking about the acceptable threshold in the tank at
24 this point. I've moved to the -- to the -- you mentioned
25 that there is a 70 psi rating on the air tool, right?



1 A. Yes. Right. That's manufacturer's recommended
2 minimum.

3 Q. Does the accepted threshold of 70 psi set by the
4 manufacturer change over time?

5 A. Yes, I would expect that it would. As the
6 device wears, you may need a higher pressure in order to
7 get it to operate as it ages and wears.

8 Q. Going back to our hypothetical example. We want
9 to operate this impact wrench as long as possible. Are
10 you with me?

11 A. Okay.

12 Q. We have an air tank that's supplying the air
13 pressure to our impact wrench, right?

14 A. Yes, sir.

15 Q. And we want to operate the air -- the impact
16 wrench as long as possible after the power goes out to
17 the air compressor. Okay?

18 A. All right.

19 Q. Would it be desirable to have pressure in the
20 tank of 80 psi, for instance, over 75 psi?

21 MR. McDONALD: Objection. Form.

22 A. I would say if you're trying to operate in the
23 conditions where you're trying to maximize the amount of
24 time the wrench can operate with the power out, then
25 you're going to set that threshold of the air pressure



1 higher. And it would -- more likely than not, you want
2 to set it as high as your system can handle.

3 Q. (BY MR. QUARLES) Well, let's say, though, for --
4 I mean, in our example, the pressure is set at 75, is the
5 pressure setting where you will start pumping -- you
6 know, if power is available, start pumping more air into
7 the tank.

8 A. Okay.

9 Q. That's what we had as our setting, right?

10 A. Okay.

11 Q. So that's going to stay the same. Like, in our
12 hypothetical example, that setting is set at 75 psi in
13 this example.

14 A. Okay.

15 Q. Now, what will change is the actual pressure in
16 the tank, fair?

17 A. Correct.

18 Q. And when the compressor -- when that compressor
19 turns on --

20 A. Assuming there's some mismatch between the
21 amount of air the tool uses and the amount of air the
22 pressure can compress, then you would have a change in
23 tank. If those match, you would not.

24 Q. Well, the compressor may stay on once it hits
25 a -- once it hits that setting of, say, 75 psi, the



1 compressor may turn on, and depending on the system, it
2 may -- that compressor may not turn off until it gets to
3 80 psi, right?

4 A. Could be, depending on the deadband of the
5 control system.

6 Q. Because it would be desirable to have more in
7 the tank so that you're not constantly turning on and off
8 the compressor, you would want to have -- pump extra air
9 into the tank such that you -- generally speaking, you
10 would want to pump up more than that set point, right?

11 MR. McDONALD: Objection. Form.

12 A. No, sir. That's just going to depend on the
13 deadband of the control system. Not any desire of any
14 user; it's just the way the control system operates.

15 Q. (BY MR. QUARLES) And that control system may --
16 as we said, the setting, the compressor may turn on at
17 75 psi --

18 A. Okay.

19 Q. -- and it may turn off at 80 psi. Is that fair?

20 A. If, for example, the pressure switch had a five
21 psi deadband, then, yes, it would.

22 Q. So in that scenario -- and let's say when
23 you're -- then it gets to -- your power -- so is it fair
24 to say, in that scenario, your pressure in your tank
25 could be anywhere between 75 psi and 80 psi? Fair?



1 A. At what point in time?

2 Q. At any point in time if the temperature -- if
3 the pressure is -- if the pressure setting is set to turn
4 on the compressor at 75 percent -- at 75 psi --

5 A. Uh-huh.

6 Q. -- and the compressor is set to turn off at
7 80 psi --

8 A. Okay.

9 Q. -- then would you agree that at any given time,
10 minus maybe some -- maybe some tolerances, we would
11 expect to have between 75 psi and 80 psi in the tank?
12 Would you agree with that?

13 A. Yes, sir, subject to the caveats you put on it,
14 I agree.

15 Q. Now, let's say we're in that scenario and the
16 power goes out, so there's no way for the compressor to
17 turn on to increase the pressure in the tank.

18 A. Okay.

19 Q. In that scenario, if a user wanted to spend --
20 wanted to be able to operate the impact wrench for a
21 longer period of time, that user would desire to have the
22 80 psi in the tank over the 75 psi in the tank.

23 Do you agree?

24 MR. McDONALD: Objection. Form.

25 A. Well, he may hope for that. He doesn't have any



1 control of that at that point, but I guess if he's trying
2 to operate it longer, it would at 75, he would be happier
3 if it was at 80, sure.

4 MR. QUARLES: Tonie, would you please bring
5 back up Omont and provide me control?

6 THE COURT REPORTER: Yes. Please stand by.
7 Do you have control, Mr. Quarles?

8 MR. QUARLES: Yes. Thank you.

9 THE COURT REPORTER: Okay. Back on the
10 record.

11 Q. (BY MR. QUARLES) Let's turn to paragraph 65 in
12 Omont. Omont paragraph 65 discusses control
13 hardware 400, right?

14 A. That is mentioned, yes, along with other items.

15 Q. Omont paragraph 65 does not expressly disclose
16 that instances of control hardware implemented in any of
17 sensors 204, sensors 214, or sensors 222 transmit data to
18 subsystem 212, right?

19 MR. McDONALD: Objection. Form.

20 A. I don't see 212 in that -- was it 212 you asked
21 about? I don't see 212 in that paragraph as one of the
22 examples. But it would be contained in Omont's
23 disclosure, each instance of control hardware 400, but
24 it's not one of the examples he gave.

25 Q. (BY MR. QUARLES) But -- and, again, it doesn't



1 expressly disclose that instances of control hardware
2 implemented in any of sensors 204, sensors 214, or
3 sensors 222 transmit data to subsystem 212, right?

4 MR. McDONALD: Objection. Form.

5 A. I -- I disagree with that characterization. I
6 think that such a disclosure is contained explicitly in
7 paragraph 65.

8 Q. (BY MR. QUARLES) Paragraph 65 does not use the
9 words that "sensor 204 transmits data to subsystem 212,"
10 right?

11 A. I can agree with that.

12 Q. Paragraph 65 does not use the words that
13 "sensors 214 transmit data to subsystem 212," right?

14 A. I can agree with that.

15 Q. Paragraph 65 does not use the words that
16 "sensors 222 transmit data to subsystem 212," right?

17 A. I agree with that.

18 Q. And just so I understand, paragraph 65 does not
19 use the words that sensors -- "any of sensors 204,
20 sensors 214, or sensors 222 transmit data to
21 subsystem 212" right?

22 A. Correct. That's not one of the examples that
23 Omont gave in that paragraph.

24 Q. Omont paragraph 65 does not use the words that
25 "any of sensors 204, sensors 214, or sensors 222 transmit



1 data to subsystem 220," right?

2 A. Correct. 220 is not one of the examples Omont
3 used in that paragraph.

4 Q. Let's look one paragraph up. Paragraph 64 --

5 A. I'm sorry. I'm sorry. I'm going to have to
6 amend that answer, because that paragraph 65 does
7 reference -- make sure I get it right. One second.

8 (Reviews document.)

9 It's hard going back and forth -- figure
10 here that it's referring to. It does reference HMI 228,
11 which is part of system 220. So I would say yes, it does
12 say it communicates that information to HMIs 228, which
13 is part of system 220.

14 Q. Does paragraph 65 -- paragraph 65 does not use
15 the words that -- specifically that "sensors 204 transmit
16 data to subsystem 220," right?

17 A. No. It calls out various components of
18 system 220, for example, controllable devices 224 and
19 HMI 228. So it certainly discloses that, but it does not
20 use the word 220 -- use the number 220 to describe that.

21 Similar answers for 212 as well. It calls
22 out controllable devices 216, which are part of 212. So
23 that's explicitly in there as well. It just doesn't use
24 the number 212 to describe it.

25 Q. Which sentence are you looking at for this?



1 A. Well, towards the bottom of the paragraph, For
2 example, the executed instruction and/or generated output
3 information may be for controlling the controllable
4 devices 216, which is part of 212; and 224, which is part
5 of 220.

6 Q. And in that example that you've -- that
7 sentence, it actually doesn't -- it says "the executed
8 instructions," but it does not indicate where those
9 executed instructions are from, right,
10 which (indiscernible) --

11 A. I disagree --

12 (Clarification made by the court reporter.)

13 A. I disagree. Reading the entire paragraph, "Each
14 instance of control hardware 400 may be operable to
15 execute coded machinery-readable instructions, et cetera.
16 Various instances of control hardware 400 may receive
17 information generated by sensors 204" --

18 (Clarification made by the court reporter.)

19 A. "Various instances of control hardware 400 may
20 receive information generated by the sensors 204, 214,
21 222."

22 And then we go down to that sentence, the
23 executed instructions and/or generated output information
24 may be for controlling the controllable devices 216, 224
25 and/or from monitoring the sensors 204, 214, 222, and



1 other operational aspects of the additive system 200.

2 Take all that together and you say yes,
3 system 212 and 220, at the minimum, receive information
4 from sensors 214, 204, and 222. And that's also clear in
5 Figure 2 of Omont.

6 Q. (BY MR. QUARLES) If I understand correctly, the
7 term is that -- the term it uses is control hardware
8 "may" and not that it does. Is that right?

9 A. I think "may" includes does. It also says it
10 may not under some circumstances. As we discussed with
11 paragraph 64, perhaps you don't have all the pieces in
12 every instance, but at least those instances in 220 and
13 212 do receive those data.

14 Q. But sitting here today, you can't call me to a
15 specific place in paragraph 65 that specifically calls
16 out sensors 204 -- naming sensors 204 by name
17 (quote/unquote, sensors 204) -- transmitting data to
18 subsystem 220, right?

19 A. Same answer. I disagree. I think it certainly
20 does say that in that paragraph. It does not use the
21 number 220, but it says those sensors 204, 214, and 222
22 transmit data to subsystem 220. In fact, sensors 222 are
23 part of subsystem 220.

24 Q. And then in paragraph 65, there's one example
25 here that says, Control hardware 400 may receive



1 information generated by the sensors 204, 214, and 222,
2 as well as information input by human operator, right?

3 A. Where are you?

4 Q. Yeah --

5 A. Oh, the bottom of page 17? Yes, For example,
6 various instances of control hardware 400 may receive
7 information generated by the sensors and information
8 input by human operator or information received from
9 external or internal memory, among other possible
10 information sources.

11 It's pretty broad.

12 Q. And then the next sentence after that talks
13 about that control hardware may execute programs and
14 generate output information, right?

15 A. Right. Each instance of the control
16 hardware 400 may execute programs, routines, or other
17 coded instructions, perhaps resulting in the generation
18 of output information.

19 Q. And the first example does not say which
20 component received the information generated by the
21 sensors, right?

22 A. It says, Each instance of control hardware 400,
23 so it's each of them.

24 Q. And it only says "control hardware," right?

25 A. "Control hardware 400," yes.



1 Q. It says "various instances," not each, right?

2 A. I disagree. Each instance of the control
3 hardware 400 may execute programs, routines, and/or other
4 coded instructions based on such information, perhaps
5 resulting in the generation of output information.

6 Q. Yeah, I'm speaking of the sentence that says,
7 "For example, various instances." That particular
8 sentence says "various instances," not each instance,
9 right?

10 A. That particular sentence says various instances,
11 yes, sir.

12 Q. And that's not the same as each and every
13 instance, right?

14 A. Right. The "each instance" is in the next
15 sentence.

16 Q. But for the sentence we're talking about, it
17 says "various instances," right?

18 A. It does.

19 Q. And in that sentence, "For example, various
20 instances" -- that starts off with "For example, various
21 instances," it does not specifically refer to any
22 subcomponent of Omont, right?

23 A. It does.

24 Q. Where?

25 A. Various instances of control hardware 400, which



1 is a subcomponent of Omont. Sensors 204, 214, 222, which
2 are subcomponents of Omont. HMIs 228, 310, 316 are
3 subcomponents of Omont. Internal memory, external
4 memory, control hardware 400 again, other possible
5 information sources all are subcomponents of Omont.

6 Q. It does not specifically refer to any
7 subcomponent that receives the information by the
8 sensors, though, right?

9 A. It does. Control hardware 400.

10 MR. QUARLES: Tonie, would you please bring
11 up file name -- well, it's the EX-1003, Dr. Durham's
12 declaration, again, please?

13 THE COURT REPORTER: Yes --

14 THE DEPONENT: If we're moving in a new
15 direction, Counsel, we've been going, it looks like,
16 right at an hour. My water glass is empty. I'd like a
17 break soon.

18 MR. QUARLES: Now is as good a time as any.

19 THE DEPONENT: Okay. Thank you.

20 THE COURT REPORTER: Hearing no objections,
21 we are off the record at 1:39 p.m.

22 (Break taken at 1:39 p.m.)

23 (Back on the record at 1:51 p.m.)

24 THE COURT REPORTER: We're back on the
25 record at 1:51 p.m. Please proceed.



1 MR. QUARLES: Tonie, would you please bring
2 back up Dr. Durham's declaration?

3 THE COURT REPORTER: Yes. Please stand by.
4 All right. Do you have control of the
5 document, Mr. Quarles?

6 MR. QUARLES: Yes.

7 Q. (BY MR. QUARLES) Okay. Let's turn to
8 paragraph 401 of your report.

9 A. Okay. I'm there.

10 Q. Here, the limitation involves a claimed first
11 parameter, right?

12 A. A first parameter, yes, sir.

13 Q. Let's talk about what this limitation requires
14 regarding the claimed first parameter.

15 For our discussion purposes, when I use the
16 term "first parameter," I'm referring to the claimed
17 first parameter, fair?

18 A. Okay.

19 Q. So turning to paragraph 403 of your report. You
20 describe how measured parameters are transmitted from
21 pump units to the pump controller, right?

22 A. Correct, and a pump modulator.

23 Q. Are you saying that measured parameters are the
24 claimed first parameter required by limitation 1[e][i]?

25 A. One of those parameters would be a first



1 parameter. If we go down the rest of the claim, we'll
2 see that.

3 Q. More specifically, are you saying that measured
4 flow rate is a first parameter?

5 A. Yes.

6 Q. Are you saying that measured pressure rate is a
7 first parameter?

8 A. Measured pressure, not pressure rate
9 necessarily.

10 Q. Are you saying measured efficiency is a claimed
11 first parameter?

12 A. Yes.

13 Q. Okay. So you're saying that measured flow rate,
14 measured pressure, and measured efficiency are all
15 claimed -- are all the claimed first parameter?

16 A. They're each examples of a first parameter, as
17 disclosed by Borgstadt.

18 Q. And have you reviewed the institution decision,
19 Paper 9?

20 A. Yes, I saw it.

21 MR. QUARLES: Tonie, would you please bring
22 up Paper 9, which is the institution decision?

23 THE COURT REPORTER: Yes. Please stand by.
24 (Paper 9 referenced.)

25 THE COURT REPORTER: Okay. Do you have



1 control of the document, Mr. Quarles?

2 MR. QUARLES: Yes.

3 THE DEPONENT: Could you drop that into the
4 chat, Madam Court Reporter?

5 THE COURT REPORTER: Yes. Please stand by.
6 (Complies.)

7 THE DEPONENT: Okay. I've got it.

8 THE COURT REPORTER: Do you have control of
9 the document, Mr. Quarles?

10 MR. QUARLES: Yes.

11 Q. (BY MR. QUARLES) Is this an accurate copy of the
12 institution decision you reviewed?

13 (Scrolling document.)

14 A. (Reviews document.)

15 It appears to be. I don't see any missing
16 pages.

17 Q. On page 46 of the institution decision, in the
18 first full paragraph, it says, "Patent owner argues
19 petitioner's reliance on Borgstadt as disclosing the
20 first parameter of Claim 1 overlooks the four different
21 requirements specified in Claim 1 for the first
22 parameter: (1) it must be received from a first device;
23 (2) it must be transmitted to a second device; (3) it
24 must be detected to be outside of an acceptable
25 threshold; and (4) it must be utilized to generate



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1 automated control instructions."

2 Do you see that?

3 A. I see that sentence, yes.

4 Q. On page 47 of the institution decision, in the
5 first full paragraph, it says, "We agree with patent
6 owner's reading of Claim 1 as requiring that the same
7 parameter must satisfy all of the specified requirements
8 for the first parameter."

9 Do you see that?

10 A. Yes.

11 Q. Do you agree with the board's institution
12 decision that states the claim first parameter must be
13 received from a first device, transmitted to a second
14 device, detected to be outside of an acceptable
15 threshold, and utilized to generate automated control
16 instructions?

17 A. Yes.

18 Q. Do the claims require that the automated control
19 instructions be generated at the second device and adjust
20 one or more aspects of the second device?

21 A. Yes. They -- automated control instructions are
22 generated at the second device, and then there are
23 adjustments based on those control instructions of the
24 second device.

25 Q. So you're saying -- if I understand correctly,



1 do the claims require that the automated control
2 instructions be generated at the second device and adjust
3 one or more aspects of the second device?

4 A. No, that's not quite right.

5 Q. What's not right about that?

6 A. Well, you adjust one or more aspects of the
7 second device based on the control instructions. The
8 control instruction doesn't adjust. The control devices
9 adjust based on the control instructions.

10 Q. Can you explain that again?

11 A. I'll just read the claim language. "One or more
12 control devices configured to receive the automated
13 control instructions and automatically adjust one or more
14 aspects of the second device based on the control
15 instructions."

16 That's what the claim requires.

17 Q. So do you agree that the claims require that the
18 automated control instruction be generated at the second
19 device?

20 A. Yes.

21 Q. And do you agree that the claims require the
22 automated control instructions adjust one or more aspects
23 of the second device?

24 A. I do not.

25 Q. And the claims require -- recite "automatically



1 adjust one or more aspects of the second device based on
2 the control instructions," right?

3 A. It does recite that.

4 MR. QUARLES: Tonie, would you please bring
5 back up the declaration?

6 THE COURT REPORTER: Yes. Please stand by.
7 Do you have control of the document,
8 Mr. Quarles?

9 MR. QUARLES: Yes.

10 Q. (BY MR. QUARLES) Let's turn to paragraph 405 of
11 your declaration?

12 A. Okay.

13 Q. In paragraph 405, in the third sentence, you
14 say, "Borgstadt teaches the pump unit's efficiency may be
15 used for diagnosing a pump failure."

16 Do you see that?

17 A. Yes.

18 Q. In the next sentence, you say, "Further,
19 Borgstadt teaches that the pump modulator 107 will
20 compare the pump unit's current efficiency value with the
21 threshold value provided. If the pump Unit 110 is
22 operating at an efficiency lower than the threshold
23 value, the pump modulator 107 recognizes that the pump
24 unit has encountered an abnormal operating condition and
25 a warning is issued at step 308."



1 Do you see that?

2 A. Yes.

3 Q. So in paragraph 405, you identify only the
4 efficiency value being compared against the threshold,
5 right?

6 A. I disagree.

7 Q. What other values do you explicitly name and
8 with the words of some other value being compared against
9 the threshold other than efficiency value?

10 MR. McDONALD: Objection. Form.

11 A. Output flow rate 130; output pressure 132.

12 Q. (BY MR. QUARLES) Are you referring to your last
13 sentence there where you say -- it starts "Borgstadt
14 teaches." Are you referring to that sentence?

15 A. Yes.

16 Q. And you're citing Borgstadt paragraph 23 for
17 that statement, right?

18 A. Yes.

19 Q. Besides that last sentence, are the remaining
20 sentences in that last -- in that paragraph limited to
21 the comparison of efficiency values explicitly?

22 A. Yes. That's the example given in paragraph 33,
23 is efficiency. The time that came with the rest of 33
24 and 23, we understand that that same process occurs with
25 regards to the flow rate and pressure. That's just the



1 example -- the detailed example Omont provided in
2 paragraph 33.

3 Q. Yeah. Just so I understand, other than that
4 last sentence, the remaining sentences in that
5 paragraph are limited to comparison of efficiency values,
6 correct?

7 A. Right. The primary example in paragraph 33 of
8 Omont is efficiency, but it also applies to output
9 pressure and flow rate.

10 Q. Well, but you don't explicitly say that in those
11 sentences, if we -- other than that -- what you're
12 calling the "last sentence," right?

13 A. In the previous sentences before the last
14 sentence, I'm focused -- that discussion -- on the
15 specific example that Borgstadt gave in paragraph 33,
16 which is comparing efficiency. In the final sentence,
17 I'm capturing the rest of 33 and 23 that teaches a POSITA
18 that it's not limited to just efficiency. That's just
19 the example that's given.

20 Q. And for that last sentence, you're citing
21 Borgstadt paragraph 23 for that, right?

22 A. And for that -- for that quote, but it also
23 incorporates the teachings of the entire 33 is referenced
24 as well as in that paragraph. So the paragraph 405 taken
25 as a whole.



1 Q. Well, to be clear, though, you're citing one
2 reference -- you're citing one -- one quote for that last
3 sentence, and it's Footnote 388, right?

4 A. That's correct. That's where that direct quote
5 came from.

6 Q. And in Footnote 388, you cite only to
7 paragraph 23, right?

8 A. Correct, for that direct quote.

9 Q. So let's look at paragraph 23.

10 MR. QUARLES: Tonie, would you bring up
11 Borgstadt?

12 THE COURT REPORTER: Yes. Please stand by.
13 Do you have control of the document,
14 Mr. Quarles?

15 MR. QUARLES: Yes. Thank you.

16 Q. (BY MR. QUARLES) There is a quote in that last
17 sentence, says (as read), "The performance of a pump at
18 118 may include, but is not limited to, the output flow
19 rate 130, the operator pressure 132, or the output
20 efficiency 134," right?

21 A. Almost. It says, "The measured performance of a
22 pump," and the rest of your reading was correct.

23 Q. Exactly. The measured performance. And I
24 believe, in your report, it said the performance of a
25 pump. It doesn't say the measured performance.



1 A. Yeah. I left out "measured" as well. Thank you
2 for pointing that out. I guess that needs to go on the
3 errata sheet as well.

4 Q. Now, in paragraph 23, there is no mention of a
5 threshold, right?

6 A. Correct. That's just telling us what the
7 parameters of the pump are as -- as referenced by
8 paragraph 33 of Borgstadt.

9 MR. QUARLES: Tonie, would you please bring
10 back up the report -- the expert report?

11 THE COURT REPORTER: Yes. Please stand by.

12 (Comments made off the written record.)

13 THE COURT REPORTER: Okay. Do you have
14 control of the document, Mr. Quarles?

15 MR. QUARLES: Yes, I do. Thank you.

16 Q. (BY MR. QUARLES) In paragraph 410, you say that
17 Borgstadt -- "In Borgstadt, each local pump controller,
18 the pump modulator, and the master controller all
19 generate automated control instructions based on
20 receiving measured parameters such as pressure, flow
21 rate, and pump efficiency."

22 Do you see that?

23 A. Yes.

24 Q. Are control instructions generated at the master
25 controller 106?



1 A. Yes, they are.

2 Q. And those control instructions are executed at
3 the pump modulator and the local pump controller?

4 A. Correct.

5 Q. And by executing those instructions, you mean
6 that those instructions automatically adjust one or more
7 aspects of the device that executes those instructions?
8 Is that right?

9 A. No. No, sir. The control devices automatically
10 adjust the aspects based on the instructions.

11 Q. In paragraph 403, in the first sentence, you
12 say, "Borgstadt Figure 1 illustrates measured
13 parameters -- pressure, flow rate, efficiency --
14 transmitted from pump unit, each a first device, to pump
15 controller and a pump modulator, each a second device."

16 Do you see that?

17 A. Yes.

18 Q. So in paragraph 403, you meant the pump
19 controller and pump modulator to the second device. Is
20 that correct?

21 A. Yes. Those are each examples of a second device
22 in Borgstadt.

23 Q. And the master controller 106 is a different
24 component than the pump controller 108 in Figure 1 of
25 Borgstadt, right?



1 A. Yes.

2 Q. And the master controller 106 is a different
3 component than the pump modulator 107 in Figure 1 of
4 Borgstadt, right?

5 A. Yes.

6 Q. In paragraph 405 of your report, we see that
7 limitation 1[e][ii] requires detecting that the first
8 parameter is outside of an acceptable threshold, right?

9 A. Yes, sir.

10 Q. Would a POSITA understand the term "first
11 parameter" in this limitation to be the same first
12 parameter of limitation 1[e][i]?

13 A. Yes.

14 Q. In paragraph 405, you describe how "Borgstadt
15 teaches the pump unit's efficiency may be used for
16 diagnosing a pump failure," right?

17 A. Yes.

18 Q. When you use the term "pump unit's efficiency"
19 in paragraph 405, do you mean the pump unit's current
20 determined efficiency?

21 A. I tie that back to the parameters in
22 paragraph 23, which include measured pump efficiency,
23 according to Borgstadt.

24 Q. So is that a "yes" or a "no" to my question?

25 A. I don't think it's a yes/no answer.



1 Q. So when you use the term "pump unit's
2 efficiency" in paragraph 405 --

3 A. Okay.

4 Q. -- are you referring to the pump unit's current
5 determined efficiency?

6 MR. McDONALD: Objection. Form.

7 A. No. I'm referring to the pump unit's current
8 efficiency value that's one of the measured pump
9 parameters disclosed by Borgstadt.

10 Q. (BY MR. QUARLES) Can you say that again?

11 A. Yes. I'm -- that next sentence, "the pump
12 modulator 107 will compare the pump unit's current
13 efficiency value with the threshold value provided." And
14 then paragraph 23 tells us that pump efficiency is one of
15 the measured parameters of the pump.

16 Q. So just to be clear, what pump unit efficiency
17 are you referring to here in paragraph 405?

18 A. Pump unit's current efficiency value, which is a
19 measured value, according to Borgstadt.

20 Q. Okay. You're saying measured efficiency?

21 A. Correct. That's -- paragraph 23 tells us that
22 "performance of the pump may include, but is not limited
23 to, output flow rate, the output pressure, the output
24 efficiency," which further in paragraph 23, I understood,
25 those are measured values.



1 Q. You also discuss how Borgstadt teaches that the
2 pump modulator will compare the pump unit's current
3 efficiency value with the threshold value provided,
4 correct?

5 A. Yes.

6 Q. Are you saying the current efficiency value is
7 the claimed first parameter required by limitation
8 1[e][ii]?

9 A. That's one of the examples that I provide.

10 Q. By the term "current efficiency value" in this
11 case, are you referring to the current measured
12 efficiency value?

13 A. Well, I don't think it's limited, but yes, I
14 would include the current measured efficiency, certainly.
15 It may also be a determined efficiency, but it's not
16 limited determined.

17 Q. So in your example, then, specific -- in the
18 context of your example, what current efficiency value
19 are you referring to here in paragraph 405 when you refer
20 to the pump unit's current efficiency value?

21 A. That's Borgstadt's example, and it's the current
22 efficiency value. It could be measured; it could be
23 determined. This example doesn't limit that.

24 Q. Still referring to paragraph 405. You say that
25 "Borgstadt teaches that their process, comparing



1 efficiency to a threshold, is not limited to only
2 efficiency, but that the performance of a pump at 118 may
3 include, but is not limited to, the output flow rate 130,
4 the output pressure 132, or the output efficiency 134,"
5 correct?

6 A. Yes, that's correct.

7 Q. Are you saying that output flow rate 130 is the
8 claimed first parameter required by limitation 1[e][ii]?

9 A. It's one example that I provide.

10 Q. And are you saying that output pressure 132 is
11 the claimed first parameter required by limitation
12 1[e][ii]?

13 A. It's one example of the first parameter.

14 Q. And are you saying output efficiency 134 is the
15 claimed first parameter required by limitation 1[e][ii]?

16 A. It's one example of the first parameter.

17 Q. Look at paragraph 409 of your report. Here, we
18 see that limitation 1[e][iii] requires generating
19 automated control instructions at the second device
20 based, at least in part, on the first parameter, correct?

21 A. Correct.

22 Q. Would a POSITA understand the reference to term
23 "first parameter" used in limitation 1[e][iii] to be a
24 reference to the same first parameter as used in
25 limitation 1[e][i] and 1[e][ii]?



1 A. Yes.

2 Q. Looking at paragraph 410, you say that "each
3 local pump controller, the pump modulator, and the master
4 controller all generate automated control instructions
5 based on receiving measured parameters such as pressure,
6 flow rate, and pump efficiency," right?

7 A. Yes. You read that correctly.

8 Q. Are you saying that measured parameters are the
9 claimed first parameter required by limitation 1[e][iii]?

10 A. Those three measured parameters are the three
11 examples I used above, and I've used them here again.

12 Q. So you're saying that -- the answer to that was
13 yes, then, right? Just for clarification. You're saying
14 the measured parameters are, right?

15 A. I think my answer was, I called out the measured
16 parameters in the previous Section 1[e][ii] and I'm
17 calling them out again. So those are each three
18 different examples of a first parameter disclosed by
19 Borgstadt.

20 Q. Are you saying that pressure is the claimed
21 first parameter required by limitation 1[e][iii]?

22 A. That's one example.

23 Q. And when you use the term "pressure" here in
24 paragraph 410, do you mean measured pressure?

25 A. Correct, measured pressure as disclosed in those



1 paragraphs that I reference for that sentence.

2 Q. Are you saying that flow rate is the claimed
3 first parameter required by limitation 1[e][iii]?

4 A. Flow rate is one of the examples that I've
5 provided consistently throughout this discussion of a
6 first parameter.

7 Q. When you use the term "flow rate" here in
8 paragraph 410, do you mean measured flow rate?

9 A. That's what I say, yes.

10 Q. Are you saying pump efficiency is the claimed
11 first parameter required by limitation 1[e][iii]?

12 A. That's one example of a first parameter
13 disclosed by Borgstadt.

14 Q. When you use the term "pump efficiency" here in
15 paragraph 410, do you mean measured pump efficiency?

16 A. Yes, sir, the same measured pump efficiency we
17 discussed above regarding paragraph 23 of Borgstadt and
18 referenced here as well.

19 MR. QUARLES: Tonie, would you please bring
20 back up Borgstadt?

21 THE COURT REPORTER: Yes. Please stand by.
22 Do you have control of the document,
23 Mr. Quarles?

24 MR. QUARLES: Yes.

25 Q. (BY MR. QUARLES) Let's look at paragraph 23.



1 Beginning around line 10 of paragraph 23, Borgstadt says
2 "the pump controller 108 has the capability to determine
3 efficiency 134 of the pump Unit 110."

4 Did I read that right?

5 A. I'm still trying to find that. 234 -- "In
6 certain embodiments, a pump controller," yes, "108 has
7 the capability to determine efficiency 134 of the pump
8 Unit 110."

9 Q. Starting on line 13, Borgstadt says "the pump
10 controller 108 may determine the efficiency of the pump
11 Unit 110 using the performance curve of the pump Unit 110
12 and taking into account the pressure or flow rate at the
13 output 118 of the pump Unit 110 and the desired pressure
14 or flow rate the pump Unit 110 is directed to provide."

15 Did I read that right?

16 A. Yes, sir.

17 Q. And in the next sentence, Borgstadt says "the
18 pump controller 108 may simply compare the desired
19 pressure and flow rate a pump Unit 110 is asked to
20 provide with the actual pressure and flow rate provided
21 by that pump Unit 110 to determine the pump efficiency
22 134."

23 Did I read that right?

24 A. Yes.

25 Q. So a POSITA reading these three excerpts from



1 paragraph 23 would understand the pump controller to be
2 calculating the pump's current efficiency value here,
3 right?

4 A. In those particular sentences, yes. The rest of
5 23 says that it's also a measured performance, the output
6 efficiency. So it could be either way.

7 Q. And so we're on the same page here, the pump
8 controller is determining the current efficiency value
9 using a performance curve, right?

10 MR. McDONALD: Objection. Form.

11 A. No. I don't think that's a fair representation
12 of the paragraph. I think the pump controller has that
13 capability, but it is not, in all cases, determining.
14 Sometimes it's measuring (indiscernible) --

15 Q. (BY MR. QUARLES) In the excerpts -- were you
16 still -- did you have more?

17 A. Yeah. I said measuring the output efficiency.

18 Q. In the three sentences that we discussed, the
19 pump controller is determining the current efficiency
20 value using a performance curve, right?

21 A. I disagree. That's mischaracterization of those
22 sentences.

23 Q. The sentence starting on line 13 that's in
24 Borgstadt says "the pump controller 108 may determine the
25 efficiency of a pump Unit 110 using the performance



1 curve."

2 In that sentence, the pump controller is
3 determining the current efficiency value using a
4 performance curve, right?

5 A. What that sentence says is in one embodiment,
6 the pump controller may determine the efficiency, in that
7 one example in that one embodiment. It doesn't say it's
8 doing it all the time.

9 Q. So in that -- in that example, the pump
10 controller is using a performance curve to determine the
11 current efficiency value, right?

12 A. "In one embodiment, the pump controller 108 may
13 determine the efficiency using the performance curve."
14 That's what it says.

15 Q. And that's as opposed to a sensor providing that
16 measured value, right?

17 A. If, indeed, in that one embodiment, the pump
18 controller is determining the efficiency using the
19 performance curve and take into account the pressure and
20 flow rate, that is an alternative embodiment to the
21 embodiment above where that output efficiency is
22 measured.

23 MR. QUARLES: Tonie, would you please bring
24 back up the expert report?

25 THE COURT REPORTER: Yes. Please stand by.



1 Okay. Do you have control of the document,
2 Mr. Quarles?

3 MR. QUARLES: Yes. Thank you.

4 Q. (BY MR. QUARLES) Let's look at paragraph 399 of
5 your report. You discuss sensors --

6 A. Okay.

7 Q. -- providing flow rate to the controllers,
8 right?

9 A. I'm sorry. I was -- I missed your question.
10 I'm sorry.

11 Q. No problem.

12 In paragraph 399 of your report, you
13 discuss sensors providing flow rate to the controllers,
14 right?

15 A. Yes.

16 Q. And the sensor is providing flow rate -- so the
17 sensor is providing flow rate to the controller, right?

18 A. That's one example, right, of the sensing
19 devices.

20 Q. And in the example that you provide here, the
21 sensor -- the controller is not using a performance curve
22 here to calculate the flow rate, right?

23 A. Correct. I'm talking here about the embodiment
24 where all three -- a flow rate, output pressure, and
25 output efficiency -- are measured values.



1 Q. So if, for example, a controller was using a
2 performance curve to calculate the flow rate, that would
3 be different than the sensor providing a flow rate
4 directly to the controller, right?

5 A. I would say even in that circumstance, there
6 would be another sensor, but it would not be a sensor
7 measuring flow rate. It could be a sensor measuring, for
8 example, pump speed and the calculated flow rate. That
9 would be a different sensor.

10 MR. QUARLES: Tonie, would you please bring
11 up the '435 patent?

12 THE COURT REPORTER: Yes. Please stand by.
13 Okay. Do you have control of the document,
14 Mr. Quarles?

15 MR. QUARLES: Yes.

16 Q. (BY MR. QUARLES) Beginning at line 4 of
17 Column 10, the '435 patent discloses detecting a first
18 parameter is outside of an acceptable threshold.

19 Do you see that?

20 A. Yes, in that paragraph, yes, sir.

21 Q. The '435 patent explains that the first
22 parameter is associated with a first pump, right?

23 A. In this paragraph, yes.

24 Q. The '435 patent further explains that once the
25 first parameter is detected to be outside of an



1 acceptable threshold, it may automatically turn off the
2 first pump, right?

3 A. It may, in this -- in this embodiment, yes.

4 Q. Does the acceptable threshold change over time
5 in that disclosure?

6 A. We've been through this paragraph before, and I
7 believe it does -- can.

8 Q. So, for example, let's say there's a pump that
9 exceeds one of its operational limits, right?

10 A. That would be an example of an acceptable
11 threshold.

12 Q. As a result of the exceedance, a parameter
13 associated with the pump is received, right?

14 A. Can you repeat that question? I didn't quite
15 follow it all the way through.

16 Q. As a result of the exceedance, a parameter
17 associated with the pump may be received?

18 A. No, sir. I disagree with that statement.

19 Q. You disagree that a parameter associated with
20 the pump may be received?

21 A. No, sir. That's fine.

22 Q. And if that received parameter is to be -- is
23 determined to be outside of an acceptable threshold,
24 then, according to the system of the '435 patent, the
25 system may turn off that pump, right?



1 A. In this embodiment, it may, correct.

2 Q. So a POSITA would understand, based on this
3 disclosure, that if a pump exceeded an operational limit,
4 for example, then that pump may be turned off in
5 response, right?

6 MR. McDONALD: Objection. Form.

7 A. That may be an example that would fit into these
8 embodiments if you accept that acceptable threshold as a
9 operational limit.

10 Q. (BY MR. QUARLES) Let's turn to Column 11,
11 line 11. The '435 patent discloses that the method may
12 include detecting that a measurement associated with a
13 first pump is outside of an acceptable threshold, right?

14 A. That's what it says, yes.

15 Q. And after detecting that the measurement is
16 outside of an acceptable threshold, the method includes
17 automatically taking the first pump offline in response
18 to the detection, right?

19 A. Yes, in this embodiment, that's one response.

20 Q. So a POSITA would understand that detection of a
21 measurement outside of an acceptable threshold could be
22 an indication the pump is not working properly, right?

23 A. Could be, yes, sir, particularly in this
24 embodiment.

25 Q. A POSITA would understand that detection of a



1 measurement outside of an acceptable threshold could be
2 an indication the pump has exceeded an operational limit,
3 right?

4 MR. McDONALD: Objection. Form.

5 A. It could be.

6 Q. (BY MR. QUARLES) Starting on line 15, the
7 '435 patent discloses that the method also includes
8 determining that the one or more parameters are
9 indicative of a potential failure condition.

10 Do you see that?

11 A. No, sir. You said line 15? I don't see that at
12 all.

13 Q. Starting on line 15.

14 A. No, sir, I don't see that.

15 THE DEPONENT: My water glass tells me
16 we've been going about another hour or so, so a break
17 soon would be appreciated.

18 MR. QUARLES: Sure. Let's -- that's fine.
19 How long do you need?

20 THE DEPONENT: Just 10 minutes is fine.

21 MR. QUARLES: Let's see. Okay. Yeah --
22 yeah, let's go with 10 minutes, then. And -- and I will
23 likely -- you know, I don't think we have a whole lot
24 more to go through before I pass the witness, so just a
25 heads-up.



1 THE DEPONENT: Okay. Thank you.

2 THE COURT REPORTER: Okay. Hearing no
3 objections, we are off the record at 2:49 p.m.

4 (Break taken at 2:49 p.m.)

5 (Back on the record at 3:02 p.m.)

6 THE COURT REPORTER: We're back on the
7 record at 3:02 p.m. Please proceed.

8 MR. QUARLES: Tonie, can you bring back up
9 the '435 patent?

10 THE COURT REPORTER: Yes. Please stand by.
11 Okay. Mr. Quarles, do you have control of
12 the document?

13 MR. QUARLES: Yes.

14 Q. (BY MR. QUARLES) Starting on line 15 of
15 Column 10, the '435 patent discloses that the method also
16 includes determining that the one or more parameters are
17 indicative of a potential failure condition.

18 Do you see that?

19 A. Yes, sir. In that embodiment, that's true.

20 Q. So a POSITA would understand that detection of a
21 measurement outside of an acceptable threshold could be
22 an indication of a failing pump, right?

23 A. Yes, sir, it could be.

24 Q. A POSITA would understand that detection of a
25 measurement outside of an acceptable threshold could be



1 an indication of a degraded pump, right?

2 A. I would say, yes, taking -- taking the document
3 as a whole and that paragraph as a whole, that would be
4 fair.

5 Q. '435 describes in some embodiments, the
6 method 160 also includes logging operation data,
7 including a number of strokes and pumping hours performed
8 by a pump of the plurality of pumps and determining a
9 maintenance schedule based at least in part on the
10 operation data.

11 Do you see that?

12 A. Yes, sir.

13 Q. A POSITA would understand that one of the
14 purposes for determining a maintenance schedule is to --
15 may be to address worn components, right?

16 A. I would say that's -- generally, that's a fair
17 statement. One of the things you do in a maintenance
18 schedule is address worn components.

19 MR. QUARLES: Hey, I think that's all my
20 questions, so I pass the witness.

21 MR. McDONALD: Okay. Could we take maybe a
22 10-, 15-minute break, get my notes together, and . . .

23 MR. QUARLES: Sure.

24 MR. McDONALD: Okay.

25 THE COURT REPORTER: Okay. Hearing no



1 objections, we are off the record at 3:08 p.m.

2 (Break taken at 3:08 p.m.)

3 (Back on the record at 3:17 p.m.)

4 THE COURT REPORTER: We're back on the
5 record at 3:17 p.m. Please proceed.

6 MR. McDONALD: We have no further
7 questions, so that's all for today. And then Dr. Durham
8 will reserve the right to read and sign.

9 THE COURT REPORTER: All right. And with
10 that, thank you, Counsel. Let's --

11 MR. QUARLES: One --

12 THE COURT REPORTER: Uh-oh.

13 MR. QUARLES: One other, then.

14 Q. (BY MR. QUARLES) Just a quick question --
15 question for Dr. Durham is: Did you talk -- did you talk
16 to counsel during this last break?

17 MR. McDONALD: I'm sorry, Counsel. I think
18 you've had your examination.

19 MR. QUARLES: Yeah. That's -- okay. No
20 further questions.

21 THE COURT REPORTER: Okay. Counsel, thank
22 you. Let's verify our orders for the record before we
23 disconnect.

24 Mr. Quarles, I show that you guys received
25 one [sic] realtime feed of today's deposition; you would



1 like a rough draft by end of day today; and you need
2 your final certified sent over ASAP, but no later than
3 August 12th; and you would like your transcript and
4 exhibits delivered electronically via PDF.

5 Is that correct?

6 MR. QUARLES: With one exception: We would
7 like it by Monday, if we -- if that's possible.

8 MR. HOPKINS: That changed.

9 THE COURT REPORTER: The final certified?

10 MR. HOPKINS: Yeah, if that's possible.

11 THE COURT REPORTER: Okay. Thank you,
12 guys.

13 MR. McDONALD: Thank you.

14 THE COURT REPORTER: Perfect.

15 And then for you, Mr. McDonald or
16 Mr. Walters, I show that we are going to send the
17 deponent's copy for read-and-sign to your office; you
18 also received one realtime feed today; you would like
19 today's proceedings sent electronically via PDF; and you
20 do not need an expedited final transcript or a rough
21 draft.

22 Is that correct?

23 MR. McDONALD: That's right. Yes, ma'am,
24 that's right.

25 THE COURT REPORTER: Thank you.



1 This concludes our record at --

2 THE VIDEOGRAPHER: Hold on; hold on. I
3 just need to ask: As far as the backup audio today, will
4 any attorneys need to order that or is it just for the
5 reporter?

6 MR. HOPKINS: Just for the reporter.

7 THE VIDEOGRAPHER: Thank you very much.

8 MR. HOPKINS: Uh -- after we go off the
9 record, I'll say it.

10 THE COURT REPORTER: Thank you. This
11 concludes our record at 3:20 p.m.

12 (Proceedings concluded at 3:20 p.m.
13 Central Time.)

14 (Deponent will read and sign transcript.)
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1 CHANGES AND SIGNATURE

2 DEPONENT NAME: DR. ROBERT A. DURHAM

3 DATE: AUGUST 8, 2025

4 Please indicate changes on this sheet of paper,
5 giving the change, page number, line number, and reason
6 for the change. Please sign each page of changes.

6	PAGE	LINE	CHANGE	REASON
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I, DR. ROBERT A. DURHAM, have read the foregoing deposition and hereby affix my signature that same is true and correct, except as noted on the previous page(s), and that I am signing this under penalty of perjury.

DR. ROBERT A. DURHAM, VOLUME 1

___ No changes made. ___ Amendment Sheet(s) attached.



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1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC,
6 Petitioners,

7 v.

8 U.S. WELL SERVICES, LLC,
9 Patent Owner.

10 IPR2025-00031
11 U.S. Patent No. 10,655,435 B2

12 * * *

13 REPORTER'S CERTIFICATION/FILING CERTIFICATE
14 ORAL DEPOSITION OF DR. ROBERT A. DURHAM
15 TAKEN ON AUGUST 8, 2025

16 I, Tonie Thompson, Certified Shorthand Reporter in
17 and for the State of Texas, Registered Professional
18 Reporter, Certified Realtime Reporter, pursuant to the
19 Federal Rules of Civil Procedure, hereby certify to the
20 following:

21 That this deposition transcript is a true record of
22 the testimony given by DR. ROBERT A. DURHAM, the deponent
23 named herein, on _____ after said deponent was
24 duly sworn/affirmed by me.

25 That the deposition transcript was submitted on the
_____ day of _____, 2025, to _____, for



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1 examination, signature and return to me by
2 _____, 2025.

3 That the deposition transcript ____ was returned to
4 Esquire Deposition Solutions on _____, 2025, was
5 properly executed by the deponent to the deposition
6 officer, and the attached change/correction sheet
7 contains any changes, and the reasons therefor, made by
8 the deponent.

9 That the deposition transcript ____ was not returned
10 to the deposition officer by the deponent.

11 That the original deposition transcript, or a copy
12 thereof, together with copies of all exhibits, was
13 delivered on the _____ day of _____, 2025, to
14 _____ for the safekeeping and use at trial.

15 That the amount of time used by each party at the
16 deposition is as follows:

17 MR. McDONALD.....00 HOURS:00 MINUTES
18 MR. QUARLES.....04 HOURS:02 MINUTES

19 That pursuant to information given to the deposition
20 officer at the time said testimony was taken, the
21 following includes counsel for all parties of record:

22 (Please see Appearances index, page 3.)

23 That a copy of this certification was served on all
24 parties shown herein.

25 (Continued on the next page.)



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1 Certified to by me this 11th day of August, 2025.

2 

3 Tonie Thompson
4 Texas CSR Number 8348
5 Expiration Date: 01/31/2027
6 NCRA Number 27999
7 Expiration Date: 09/30/2026
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1 I, DR. ROBERT A. DURHAM, have read the foregoing
2 deposition and hereby affix my signature that same is
3 true and correct, except as noted on the previous
page(s), and that I am signing this under penalty of
perjury.

4
5
6 
DR. ROBERT A. DURHAM, VOLUME 1

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9
10 ____ No changes made. 1 Amendment Sheet(s) attached.
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