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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND	)	
LIBERTY OILFIELD SERVICES, LLC,	)	
Petitioners,	)	
	)	
vs.	)	Case No. IPR2024-01274
	)	Patent No. 11,091,992
	)	
U.S. WELL SERVICES, LLC,	)	
Patent Owner.	)	
	)	

DEPOSITION OF MICHAEL NIKOLAOU, PH.D.
CONDUCTED VIA VIDEO CONFERENCE

August 28, 2025
7:00 a.m. PST

REPORTED BY: Brigid M. Donovan, RPR, CCR
WA CCR NO.: 2070
AZ CCR NO.: 50902
OR CSR NO.: 21-0023 (exp. 12/27)
CA CSR NO.: 14520

1 REMOTE APPEARANCES:

2
3 For Petitioners:
4 Chad C. Walters, Esq.
5 chad.walters@bakerbotts.com
6 BAKER BOTTS, LLP
2001 Ross Avenue, Ste 1100
Dallas, Texas 75201

7 For Patent Owner:
8 Rick Quarles, Esq.
9 rquarles@winston.com
10 WINSTON & STRAWN
300 South Tryon Street, 16th Floor
Charlotte, North Carolina 28202

11 Also Present:
12 Andrew Grado

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1 INDEX

2

3 EXAMINATION BY:

Page

4 Mr. Walters

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147

5 Mr. Quarles

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LIBERTY EXHIBIT 1023, Page 3

Liberty Energy, Inc. and Liberty Oilfield Services LLC v. U.S. Well Services, LLC, IPR2024-01274

1 EXHIBITS FOR IDENTIFICATION:

2 (Provided electronically to the reporter)

3 Number

Page

4 No exhibits were offered.

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1 REPORTED REMOTELY FROM PINAL COUNTY, ARIZONA

2 Thursday, August 28, 2025

3 7:00 a.m. PST

4 --oOo--

5
6 MICHAEL NIKOLAOU, PH.D.

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

9
10 E X A M I N A T I O N

11 BY MR. WALTERS:

12 Q. Good morning, Dr. Nikolaou. Can you state
13 your full name?

14 A. Good morning. My name is Michael Nikolaou.

15 Q. And where are you physically located right
16 now?

17 A. I am physically located in my house in
18 Houston, Texas.

19 Q. Are you by yourself?

20 A. I am by myself.

21 Q. You've been deposed before?

22 A. I have been deposed before, yes.

1 Q. About how many times?

2 A. A few, single digit number. I don't remember
3 the exact number, but I say four or five, six times
4 perhaps.

5 Q. Okay. Were all those depositions in IPR
6 proceedings?

7 A. No. Some of them were on different issues.

8 Q. What issues were those?

9 A. Intellectual property. And there was a case
10 on whether a company infringed on other company's patent
11 or whether a patent was valid. Or there was a case
12 where a company claimed that a former employee took
13 technology after that employee left the company and
14 started their own company using part of that technology.
15 These are the things I can remember of right now.

16 Q. Were your non-IPR depositions related to
17 district court trial proceedings?

18 A. Please help me understand what exactly that
19 term means. Are you asking whether I testified in court
20 or...

21 Q. The depositions -- pleadings with which those
22 depositions were associated, were those proceedings

1 district court trial proceedings?

2 A. Well, eventually the cases went to trial. In
3 a couple of them, I testified in court.

4 Q. Okay. You understand that you've been sworn
5 to testify truthfully to the best of your ability today?

6 A. I do.

7 Q. Is there any reason you cannot testify
8 truthfully today?

9 A. There is no reason whatsoever.

10 Q. What did you do to prepare for today's
11 deposition?

12 A. I reviewed my declaration. I reviewed the
13 material I used for this declaration. And I had
14 discussions with counsel regarding the above.

15 Q. Okay. When did you have discussions with
16 counsel?

17 A. Yesterday and the day before yesterday.

18 Q. Okay. And who was present at those meetings?

19 A. Those meetings were online, and it was both of
20 them actually. Yesterday and the day before yesterday
21 were with Mr. Quarles, who is attending this meeting as
22 well.

1 Q. Anyone else?

2 A. No.

3 Q. About how long did you meet with Mr. Quarles?

4 A. It was about four hours the day before
5 yesterday and about six hours yesterday.

6 Q. Okay. What rate are you being compensated at
7 for this for your time in this matter?

8 A. I am compensated at \$700 an hour.

9 Q. Okay. And you prepared a declaration in
10 support of patent owners' motion to amend in this
11 proceeding?

12 A. Correct.

13 Q. And that declaration is Exhibit 2007?

14 A. Let me of confirm really quickly 2007
15 declaration. Yes, that's the one.

16 Q. About how long did you spend to prepare your
17 declaration including reviewing material to assist in
18 preparing the declaration?

19 A. It was several days. And I can look at my
20 notes to give you a better estimate perhaps. Would you
21 like me to do that?

22 Q. Sure.

1 A. Let me check. So it's about 35 hours.

2 Q. Okay.

3 A. Based on my records.

4 Q. Okay. And do you have access to clean
5 versions of the exhibits and documents that are used in
6 this IPR?

7 A. Yes, I do have clean versions, and they are
8 all in my computer in a zip file -- zip folder rather
9 that I received yesterday to make sure that everything
10 is unmarked and clean.

11 Q. Okay. And I know you just referenced some
12 notes, and I would ask that to the extent you reference
13 any documents or notes other than the clean versions of
14 the exhibits and documents in this IPR, if you reference
15 anything else, in answering a question, I'd ask that you
16 let me know.

17 A. Understood, yes. The notes I looked at, to
18 just give you an estimate of hours spent on this, was
19 just an Excel sheet where I log how much time I spent on
20 this. That's the only one. Other than that, I only
21 have access to all the exhibits in the declaration.

22 Q. Okay. Thank you. The 992 patent that's the

1 subject of this proceeding is titled System for
2 Centralized Monitoring and Control of Electric Powered
3 Hydraulic Fracturing Fleet; is that right?

4 A. Correct.

5 Q. Can you describe the novelty of the 992
6 patent?

7 A. The novelty of the 992 patent is in the
8 specifics of how to actually accomplish what the title
9 claims, namely centralized monitoring and control of
10 electric powered hydraulic fracturing -- hydraulic
11 fracturing fleet.

12 Q. Is it fair to say that the novelty relies in
13 the centralized monitoring and control aspect?

14 A. It's in the specifics of how this is
15 accomplished.

16 Q. What do you mean by this?

17 A. I mean that there is specific mentions of
18 elements that are included to accomplish centralized
19 monitoring and control of electric powered hydraulic
20 fracturing fleets, and that's what the patent claims to
21 be novel.

22 Q. Okay. Can we look at the issued claims of the

1 992 patent?

2 A. Yes.

3 Q. Specifically claim one. Claim one is an
4 independent claim, correct?

5 A. Yes. And you are referring to the actual
6 document of the 992 patent Exhibit 1001?

7 Q. Yes.

8 A. Very good, yeah. Go ahead. One more time,
9 please, what was the question?

10 Q. The issue claims include two independent
11 claims, claim one and claim eight; is that right?

12 A. Yes, it's a system and a method.

13 Q. And independent claim one includes a
14 limitation, a centralized control unit coupled to the
15 electric pump wherein the centralized control unit is
16 configured to monitor the electric pump, correct?

17 A. Correct.

18 Q. And claim eight includes the limitation
19 monitoring at a centralized control unit the
20 electrically powered pump. You see that?

21 A. Yes.

22 Q. Fair to say that all the independent claims

1 excuse me -- strike that.

2 It fair to say that all the claims of the 992
3 patent include the centralized monitoring concept?

4 A. Well, what do you mean include that concept?
5 Are you saying whether they are related to that concept
6 or whether they may refer to other concepts not included
7 in these two claims? Can you help me with that, please?

8 Q. Sure, I'll ask it again. So is it fair to say
9 that all the claims of the 992 patent require
10 centralized control and monitoring of an electric pump?

11 A. The claims describe how the centralized
12 control and monitoring of the electric pump would
13 actually be done according to the proposed ideas in the
14 patent, yes.

15 Q. So I'll ask it again. Is it fair to say that
16 all the claims of the 992 patent require centralized
17 control and monitoring of an electric pump?

18 A. Let's see. I mean, the claims refer to other
19 elements there, but the basic claim one and claim eight,
20 the system and the method, include the centralized
21 control. And what follows, the remaining elements,
22 explain how this can be accomplished in the context

1 presented in these two claims, one and eight.

2 Q. The other claims outside of one and eight are
3 all dependent claims that depend from either claim one
4 or claim eight; is that right?

5 A. I understand this to be correct, yes.

6 Q. Okay. And are there any other claims or can
7 you identify the claims, any claims of the 990 patent --
8 992 patent that do not require centralized control and
9 monitoring of an electric pump?

10 A. So all of the claims go back by referencing
11 either claim one or claim eight. So they all refer to
12 these basic two claims, one and eight.

13 Q. Is it fair to say that all the claims of the
14 992 patent thus require centralized control and
15 monitoring of an electric pump?

16 A. They refer to that. They refer to a system
17 that includes that, the centralized control and
18 monitoring of an electrically powered pump.

19 Q. Okay. Can you describe your experience in
20 centralized monitoring and control of electric powered
21 fracturing fleets?

22 A. My experience in control systems is actually

1 fairly broad and lengthy in the sense that I have been
2 doing both research, teaching, and consulting on control
3 systems. Now, on the specific aspects of hydraulic
4 fracturing, I haven't actually completed a specific
5 project where I did that to design a control system for
6 a fracturing operation.

7 However, I do have experience in dealing with
8 controlling electric submersible pumps or other kinds of
9 pumps for drilling operations or for production
10 operations or controlling pumps in other context, not in
11 oil and gas production, exploration and production but
12 in chemicals, refining, and such processes.

13 Q. Do you have experience in centralized control
14 of oil and gas equipment other than pumps?

15 A. Experience in terms of having participated in
16 project where this is done, yes.

17 Q. What projects were those?

18 A. One was in horizontal drilling. That was with
19 Noble Drilling early 2000s around 2001 -- 2002. My role
20 there was to help with control of the drilling
21 operation, the horizontal drilling part of the drilling
22 operation. I helped with various aspects of that,

1 mainly the orientation of the drill bit, the weighted
2 bit, and various other aspects.

3 In terms of also working with pumps, I worked
4 with electric submersible pumps, which have to be
5 controlled and monitored. So the monitoring part was
6 something that we have a few publications on through the
7 collaboration with industrial partners, and I believe we
8 have a patent on that as well. Those are a couple I can
9 immediately remember.

10 Q. In any of those projects where you have
11 experience in control of components of oil and gas
12 operation, did any of them involve control of electric
13 motors?

14 A. Control of electric motors, that was part,
15 yeah, of the operation, yes.

16 Q. Did any of them involve monitoring or control
17 of switchgear?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: Switchgear. Specifically on
20 switchgear, I cannot recall that specific item.

21 Q. (By Mr. Walters) Do you have any experience in
22 monitoring and control of switchgear in oil and gas

1 operations?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: Overall, yes, but as part of --
4 as an element, actually, of the drilling operation.

5 Q. (By Mr. Walters) Which project was that?

6 A. That was a project with Rotherslade, a small
7 company that was developing a technology for horizontal
8 drilling, trying some new ideas on how to ensure
9 drilling and sliding simultaneously and maintain bit
10 orientation.

11 Q. When did that project take place?

12 A. That was a consulting project a few years ago,
13 five or six years ago. In my resume, this engagement is
14 under Rotherslade. I believe that was eventually the
15 company's name.

16 Q. Do you have any experience in monitoring a
17 control of transformers in an oil and gas operation?

18 A. Transformers, no. No, it's a electrical
19 device. So we use transformers, but it wasn't my
20 responsibility to deal with the specifics of these.

21 Q. Okay. Do you have an experience in monitoring
22 and control of turbine generators in an oil and gas

1 operation?

2 THE COURT REPORTER: I'm sorry, was there an
3 objection?

4 MR. QUARLES: Yes, objection. Form.

5 THE COURT REPORTER: Thank you.

6 THE WITNESS: Turbine generators, I do have
7 experience with generators that are used to generate
8 power but in a different context. It was through
9 working a natural gas plant. And in that, we use the
10 turboexpanders, which were used to capture power in
11 natural gas under -- gas, rather, in high pressure so
12 that power could be used to generate electricity and use
13 it further down rather than waste it.

14 Q. (By Mr. Walters) And that experience involved
15 monitoring of control of the generators?

16 A. Well, monitoring control of the generator
17 itself was included in what the manufacturer offered
18 because these are very sensitive devices. So one relies
19 on the manufacturer on the specifics of how monitoring
20 and control is done.

21 My role in that project was how to control the
22 operation by essentially relying on the controls of the

1 particular turboexpander that was used in that plant.

2 Q. And when was that project?

3 A. Oh, that was early 90s at the Union Pacific
4 plant in Bryan, Texas.

5 Q. I'd like to reference the substitute
6 independent claims.

7 A. Yes.

8 Q. And when I refer to substitute claims, you
9 understand I am referring to the amended claims in the
10 motion to amend?

11 A. Yes, you are referring to that three column
12 table, and you are referring to the left column in that
13 table, correct?

14 Q. Which table are you referring to?

15 A. Let me open my declaration. It's a table that
16 starts on page 43 -- actually, it says page 44 of 102 at
17 the bottom. Substitute claim 21. And then there is the
18 previous version in 838 application.

19 Q. Sure. And I'll -- you can also refer to
20 paragraph 56 on exhibit page 32.

21 A. Paragraph 56 of my declaration?

22 Q. Yes.

1 A. Give me just one second, please. Yes. Starts
2 on page 31, right -- yeah 32 of 102. I'm sorry at the
3 very bottom, yes.

4 Q. And so that paragraph goes through exhibit
5 page 42. And when I refer to page numbers in your
6 declaration, I am going to try to refer to the exhibit
7 page, which is at the label at the bottom right.

8 A. Yeah. Understood. Agreed. Very good.

9 Q. So the substitute claims include three
10 independent claims; is that right?

11 A. Okay. Well, which ones are you referring to
12 as the three independent claims?

13 Q. 21, 28, and 37?

14 A. Very good, yes.

15 Q. Okay. And each of the substitute independent
16 claims includes two limitations. One is where in the
17 electric pump has a maximum continuous power output of
18 at least 1750 brake horsepower or more. And wherein,
19 the electric pump has a maximum continuous torque of at
20 least 11,488 pound feet or more; is that right?

21 A. Yeah, that is correct.

22 Q. Okay. Can you turn to your declaration at

1 paragraph 80, which is on exhibit page 91?

2 A. Yes, sir, I am there.

3 Q. Here you conclude that the Coli Birch and
4 Rusnack references do not disclose the limitation in the
5 substitute independent claims that the electric pump has
6 a maximum continuous power output of at least 1750 brake
7 horsepower or more; is that right?

8 A. Correct.

9 Q. Can you turn to page 95 -- or excuse me,
10 paragraph 95 of your declaration.

11 A. Yes, on page 98 of the declaration, paragraph
12 95.

13 Q. Yes. And here you conclude that the Coli
14 Birch and Rusnack references do not disclose the
15 limitation in the substitute independent claims that the
16 electric pump has a maximum continuous torque of at
17 least 11,488 pound feet or more; is that right?

18 A. Yes.

19 Q. Can you turn to paragraph 103 of your
20 declaration.

21 A. Paragraph 103, page 102.

22 Q. Yes. And in this paragraph you reference

1 additional references that were submitted by patent
2 owner in this proceeding?

3 A. Correct.

4 Q. And you reference in this paragraph the two
5 newly added features that we just discussed that are in
6 the substitute independent claims?

7 A. Yeah, the -- yeah, the features include one
8 and two in that paragraph 103, correct.

9 Q. And you concluded that none of the additional
10 references disclosed those two new added features?

11 A. Correct.

12 Q. And the additional references that are
13 submitted by patent owner that you reference in this
14 paragraph are listed in paragraph four of your
15 declaration?

16 A. Yes, let me go to paragraph four to confirm.
17 Yes, on page eight of the declaration and continuing
18 over to the following pages.

19 Q. They're actually on pages eight, nine, and ten
20 of your declaration, right?

21 A. That's correct.

22 Q. And you reviewed each of those references?

1 A. I did.

2 Q. About how long did that take?

3 A. We took definitely several hours. And there
4 were key elements that I was looking for in doing this.
5 So it was a whole bunch of these that had to be
6 reviewed, but yes, I reviewed all of them.

7 Q. What key elements were you looking for?

8 A. The specifics that you mentioned in one and
9 two, items one and two in the last page of my
10 declaration that you just referred to.

11 Q. Okay. And specifically, those limitations
12 related to maximum continuous power output and maximum
13 continuous torque limitations?

14 A. Correct.

15 Q. And you concluded that none of the references
16 listed in paragraph four of your declaration included
17 those limitations?

18 A. Correct.

19 Q. Okay. I'd like to go back to the substitute
20 independent claims, and in particular claim 21. So it
21 may be worthwhile to use that paragraph 56 of your
22 declaration as a reference since it includes all the

1 substitute claims.

2 A. Yes, I am on paragraph 56.

3 Q. Okay. So I'd like to focus on limitation 21F.

4 A. 21F, which is on page 33, correct?

5 Q. Yes. And that limitation is wherein the
6 electric pump has a maximum continuous power output of
7 at least 1750 brake horsepower or more, correct?

8 A. Correct.

9 Q. What is brake horsepower?

10 A. Brake horsepower is the horsepower measured
11 for a device when it is placed against the brake so that
12 you can -- the brake provides resistance. And this
13 process is done in a fairly standard way so that you can
14 tell what is the horsepower that can be delivered by
15 that device under these conditions.

16 Q. Is brake horsepower a characteristic that is
17 typically associated with a pump?

18 A. A pump can be associated with a brake
19 horsepower, but there are other devices for which one
20 can specify -- associate brake horsepower, like internal
21 combustion engines and such.

22 Q. How is a pump typically associated with brake

1 horsepower?

2 A. It associated with horsepower because it
3 delivered certain horsepower. And the motor actually
4 associated -- connected with the pump, turns the pump,
5 and there is a corresponding horsepower that this system
6 delivers.

7 Q. So is it typical for a pump to be associated
8 with a horsepower output?

9 A. Well, the horsepower that the pump delivers,
10 it can be associated, yeah, with that pump. And again,
11 the pump is driven by some sort of a motor, like an
12 electric motor or a diesel motor or any other motor
13 available, and that is the power that -- it is through
14 that mechanism that the pump delivers power.

15 Q. A pump delivers power?

16 A. The pump moves the fluid. The fluid, as it is
17 moved, requires a certain power to be moved. The pump
18 itself draws the power from an electric motor in this
19 case, and that's why 21F says the electric pump has a
20 maximum continuous power output of at least 1750 brake
21 horsepower.

22 Q. Is it fair to say that a pump is -- strike

1 that.

2 It fair to say that horsepower is more
3 commonly referred to as an input to the pump versus an
4 output of the pump?

5 MR. QUARLES: Object to the form.

6 THE WITNESS: It can be both.

7 Q. (By Mr. Walters) Have you ever seen
8 specifications of a pump that refer to a pump having
9 horsepower output?

10 MR. QUARLES: Objection. Form.

11 THE WITNESS: You can calculate the output --
12 the horsepower output of a pump by simple calculation.
13 It's volumetric flow rate times delta p, the pressure.

14 Q. (By Mr. Walters) So you are measuring the flow
15 of the fluid from the pump in order to determine the
16 pumps horsepower output?

17 MR. QUARLES: Objection. Form.

18 THE WITNESS: I'm not following what exactly
19 you are referring to now. Are referring to what the
20 patent claims or in general knowledge or...

21 Q. (By Mr. Walters) General knowledge.

22 A. General knowledge, I would prefer to leave an

1 answer that's it depends on the particular situation
2 that what one wants to accomplish with all this. But as
3 a general statement, I still maintain, as I mentioned a
4 moment ago, that if one is to associate horsepower
5 delivered from the pump to the fluid, that's very
6 simple. It's volumetric flow rate times delta p.

7 Q. And is that commonly referred to in terms of
8 brake horsepower?

9 A. Brake horsepower can refer to anything that
10 provides power that can be placed against the brake so
11 that one can see how much power is delivered from that
12 device against the brake.

13 Q. And you're familiar with specifications of
14 pumps that refer to the pump's power output in terms of
15 brake horsepower?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: How one delivers these
18 specifications depends on the manufacturer and what they
19 want to focus on. And typically, manufacturers would
20 give the hydraulic head. They would give efficiency of
21 a pump. They will give a number of things. It depends
22 on the particular pump, what kind of pump it is, a

1 centrifugal or reciprocal and so forth. So it depends
2 on the situation.

3 Q. (By Mr. Walters) Have you ever seen a pump
4 specification referred to its output in terms of brake
5 horsepower?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: Pumps -- I mean, the things that
8 one usually looks up for a pump is volumetric flow rate
9 or flow rate in general, can be mass or volumetric flow
10 rate and delta p. So I would have to look up specifics
11 depending on what -- it depends on the manufacturer.
12 Depending on what the manufacture wants to emphasize,
13 they can provide that information.

14 Q. (By Mr. Walters) So I'll ask my question
15 again. Have you ever seen a pump specification that
16 referred to its output in terms of brake horsepower?

17 MR. QUARLES: Objection. Form.

18 THE WITNESS: I cannot recall that detail, but
19 I can recall specifications that refer to, as I
20 mentioned, delta p and flow rate.

21 Q. (By Mr. Walters) What is a torque of a pump?

22 A. The torque of a pump?

1 Q. Yes.

2 A. Well, you can define torque for motor, which
3 is something that you measure easily. For a pump, I
4 don't know whether there is a standard that says the
5 torque provided by this pump is this much. Typically,
6 one looks up, like I said, the pressure drop and flow
7 rate.

8 Q. So is it fair to say that a pump is not
9 typically referred to as having a particular torque?

10 MR. QUARLES: Objection. Form.

11 THE WITNESS: One can mention that depending
12 on what one wants to focus on.

13 Q. (By Mr. Walters) Okay. What is a torque of a
14 pump?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: It's whatever one wants to
17 define as a torque of a pump. A torque is a general
18 concept. It's force times distance, and it's a vector.
19 If one wants to focus on something that is associated
20 with a torque, they can definitely refer to that.

21 Q. (By Mr. Walters) Okay. Is torque a
22 characteristic that is typically associated with a pump?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: Depends on what applications you
3 may consider.

4 Q. (By Mr. Walters) I am asking in terms of your
5 general knowledge. Is torque a characteristic that is
6 typically associated with a pump?

7 MR. QUARLES: Objection. Form.

8 THE WITNESS: Torque in a pump can definitely
9 be calculated. Whether one wants to focus on that or
10 not depends on the application.

11 Q. (By Mr. Walters) Do you commonly see torque
12 associated with a pump?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: In my applications, I have seen
15 typically delta p, the pressure drop -- pressure boost
16 rather in the pump and flow rate.

17 Q. (By Mr. Walters) But not torque?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: That was not of primary concern
20 in applications I have seen.

21 Q. (By Mr. Walters) What does it mean that a pump
22 has a maximum torque?

1 A. Now, you are referring to claim 21F, the
2 electric has a pump maximum continuous -- no, sorry
3 that's a power. 21E, I'm sorry. The electric pump has
4 a maximum continuous torque of at least this much,
5 correct?

6 Q. Yes.

7 A. Okay. So that refers to what the electric
8 motor can deliver in the pump.

9 Q. So it's the input from the motor to the pump?

10 A. The pump and motor are connected and the motor
11 provides a certain torque, and that's what this refers
12 to.

13 Q. Okay. And in 21F, referring to the maximum
14 continuous power output, that too is referring to the
15 output delivered from the motor to the pump?

16 A. This is -- yeah, this is the continuous power
17 output that is eventually obtained from this combination
18 of modern pump.

19 Q. But like torque, it's referring to the power
20 delivered from the motor to the pump?

21 A. Yes.

22 Q. Can we look at limitation 22A?

1 A. 22A. Yes, it's on page 33.

2 Q. Yes.

3 A. Uh-huh.

4 Q. This limitation requires that the generator be
5 powered by liquefied natural gas?

6 A. Correct.

7 Q. As of 2015, were there generators that were
8 powered by liquefied natural gas?

9 A. Yes.

10 Q. Why would a person of skill in the art want to
11 use liquefied natural gas to power a generator?

12 A. In this case, it would be availability of
13 liquefied natural gas and a solution that would make
14 sense both technically and economically.

15 Q. And why is that?

16 A. Why is what, that this would make sense?

17 Q. Yes.

18 A. Again, it would make sense technically and
19 economically.

20 Q. How would it make sense technically?

21 A. The normal gas would be there, and it would be
22 an efficient way to generate electricity so that one

1 could drive the electric pump.

2 Q. Is using liquefied natural gas more efficient
3 than using plain natural gas?

4 A. Well, what is meant there by liquefied natural
5 gas is gas that, as received, is in liquid form
6 containing certain hydrocarbons that bring the natural
7 gas to that liquefied form. And natural gas -- are you
8 referring to natural gas as used in common jargon or
9 natural gas in a pipeline or deliver at home; what
10 exactly are you referring to?

11 Q. I am referring to natural gas as it was used
12 before -- in this claim before the limitation liquefied
13 was added?

14 A. Yeah, the liquefied -- let me also mention
15 something specific here. Liquefied natural gas is also
16 a term used in the industry and also in common jargon to
17 indicate pure -- fairly pure natural gas, mostly
18 methane, which is cooled, frozen down to very low
19 temperature, minus 260 Fahrenheit or something in that
20 range, so it can turn to liquid and thus take much less
21 volume and be transported.

22 The LNG industry is a big industry. It's even

1 in the news. People know about that from the media, and
2 that's one use of the term LNG.

3 Now, here as use -- as the term is used from
4 my reading of the patent, it simple refers to
5 liquefied -- natural gas components that are such that
6 at the given pressure and temperatures are in liquid
7 form. In fact, before they are used in the actual
8 electricity generation, before they are used actually in
9 the turbine, they have to be turned to gases so they can
10 be burned as gases.

11 So this is what the term liquefied -- this is
12 what I understand the term liquefied to mean in that
13 context.

14 Q. What are the economic benefits of using
15 liquefied natural gas?

16 A. It's easily available. It's inexpensive, and
17 there is equipment that can very well use it.

18 Q. Can we turn to substitute claim 23?

19 A. 23, yes, sir. It's page 33 at the bottom and
20 in continues on.

21 Q. Right. And this claim 23 depends from claim
22 22, which depends from claim -- from independent claim

1 21. Do you see that?

2 A. Correct. Yeah, it starts the system of claim
3 22, yes, which further says the system of claim 21,
4 correct.

5 Q. Okay. And so referring to claim 23, it
6 requires a centralized control unit that's configured to
7 monitor operating characteristics and control the
8 turbine generator. See that in 23B?

9 A. 23B wherein the centralized control unit is
10 further configured to monitor operating characteristics
11 and control the turbine generator, yes, sir.

12 Q. And one of the operating characteristics is
13 fuel system air supply pressure transmitter failure.
14 See that?

15 A. Yes, further down in 23C.

16 Q. What is fuel system air supply pressure
17 transmitter failure?

18 A. So it's a failure of the transmitter that
19 transmits the pressure of the air supply in the fuel
20 system. In other words, that system needs -- in
21 addition to fuel, the system needs air to function
22 properly. Air is provided there to the system, and the

1 pressure of the air supply has to be maintained. It is
2 monitored by the transmitter, and that transmitter may
3 fail.

4 Q. Okay. Why would a person of skill in the art
5 want to monitor for failure of a fuel system air supply
6 pressure transmitter?

7 A. Because if that transmitter is not working
8 well and the air supply system does not provide enough
9 pressure for enough flow rate of air, the burning of the
10 fuel is not going to proceed well because burning needs
11 both fuel and air, oxygen from the air that is. So
12 burning is not going to be done well if you have this
13 kind of failure.

14 Q. Sure. At the time of the 992 patent
15 application in 2015, was it known to monitor failure of
16 a turbine generator's fuel system air supply pressure
17 transmitter?

18 A. Are you asking whether that technology was
19 known at the time?

20 Q. Yes.

21 A. Yes, it was.

22 Q. Okay. Limitation 23C also includes as an

1 operating characteristic thermocouple input module
2 thermistor failure. Do you see that?

3 A. Uh-huh.

4 Q. What is thermocouple input module thermistor
5 failure?

6 A. Yeah, so again, it's a failure of the
7 thermocouple input module thermistor, which is for
8 temperature monitoring and control. So if that doesn't
9 work well, you may have issues with temperature
10 deviations that are unacceptable, for example,
11 overheating.

12 Q. And why would a person of skill in the art
13 want to monitor thermocouple input module thermistor
14 failure?

15 A. Because they would want to be on the safe side
16 and make sure that they have that information to avoid
17 temperature, unacceptable temperature deviations, which
18 might potentially damage the equipment or create other
19 hazards.

20 Q. At the time of the 992 patent application in
21 2015, was it known to monitor failure of a turbine
22 generator's thermocouple input module thermistor?

1 A. Again, I understand your question to be was
2 that technology available -- known at the time. The
3 technology was, in general, known at the time, yes.

4 Q. Okay. Staying in limitation 23C, the next
5 operating characteristic is start VFD configuration
6 failure. Do you see that?

7 A. Yes.

8 Q. What is start VFD configuration failure?

9 A. VFD is the variable frequency drive. That's
10 the electric drive that provides the power needed. And
11 the failure of that system would create, again,
12 operational problems because you wouldn't have the whole
13 system working as intended. So the actual
14 configuration, that starting the VFD system, should be
15 as desired. Failure of that would create operational
16 problems.

17 Q. Why would a person of skill in the art want to
18 monitor for failure of the start VFD configuration?

19 A. Again, to prevent the operation from not
20 proceeding as intended and potentially create hazards
21 and risks, safety risks.

22 Q. As of 2015, at the time of the 992 patent

1 application, was it known to monitor for failure of a
2 turbine generator's start VFD configuration?

3 A. The technology was available at the time,
4 correct.

5 Q. The technology to monitor for that failure was
6 known?

7 A. Yes, that's what is stated there, right.

8 Q. The next operating characteristic in 23C is
9 turbine air inlet filter transmitter failure?

10 A. Yes, sir.

11 Q. What is turbine air inlet filter transmitter
12 failure?

13 A. Yes, sir. So the turbine, as we mentioned,
14 uses air to mix it with the fuel and have the burning.
15 The air goes through a filter at the inlet, as it
16 enters, to make sure that no outside impurities, like
17 particles and other stuff, may enter the system. There
18 has to be monitoring that the system works well. If
19 there is a transmitter failure, again, you'll have
20 operational problems. The whole system is not going to
21 work as intended because, again, combustion requires
22 both the fuel and the air that should enter the system

1 unimpeded at the desired rate.

2 Q. Why would a person of skill in the art want to
3 monitor for failure of a turbine air inlet filter
4 transmitter?

5 A. For economical and safe operation.

6 Q. What do you mean by that?

7 A. That if not enough air is provided there, you
8 have a system that is not providing enough -- generating
9 enough power. And there could also be -- in all of
10 these operations, there could be potential hazards and
11 risks for damage of the equipment or even potential
12 accident in extreme cases.

13 Q. As of the time of the 992 patent application
14 in 2015, was it known to monitor for failure of a
15 turbine generator's air inlet filter transmitter?

16 A. The technology of doing this, yes, it was
17 available.

18 Q. Staying with 23C, the next limitation for
19 operating characteristic is generator circuit breaker
20 failure to open. Do you see that?

21 A. Yeah.

22 Q. What is generator circuit breaker failure to

1 open?

2 A. So this is a safety feature, and that breaker
3 should be able to open if needed. If not, you're
4 running risks of the damaging the equipment or having
5 other adverse effects in terms of safety. So that has
6 to be monitored and make sure that indeed the circuit
7 breaker, the generator circuit breaker work as intended.

8 Q. Why would a person of skill in the art want to
9 monitor for failure to open of a generator circuit
10 breaker?

11 A. Again, for operational and safety issues. You
12 might have a damage of the equipment involved if there
13 was this failure, and there might even be potential
14 safety risks.

15 Q. As of the time of the 992 patent application
16 in 2015, was it known to monitor for failure of a
17 turbine generator circuit breaker to open?

18 MR. QUARLES: Objection to form.

19 THE WITNESS: The technology for monitoring
20 this was available.

21 Q. (By Mr. Walters) And known?

22 A. Known as meaning how to do it? Yes, it was

1 known how to do it.

2 Q. Okay. The next operating condition in
3 limitation 23C -- excuse me, the next operating
4 characteristic in limitation 23C is gas fuel supply
5 pressure transmitter failure. Do you see that?

6 A. Yes, sir.

7 Q. What is gas fuel supply pressure transmitter
8 failure?

9 A. This is the counterpart of the air supply
10 system transmitter failure. So the burning requires
11 both fuel and air. This is about fuel. So the fuel
12 supply system has to maintain enough, high enough
13 pressure to provide enough fuel, and this is monitored
14 so if the transmitter fails, you don't know what is
15 happening and the system itself doesn't know exactly
16 what is happening, so there are potential risks of, A,
17 not delivering the intended performance and, B, possibly
18 safety hazards.

19 Q. And why would is person of skill in the art
20 want to monitor for failure of a gas fuel supply
21 pressure transmitter?

22 A. For economic and safety reasons, again, to

1 make sure that indeed you get the performance you want
2 from your system and that you are not putting anything
3 at risk, at safety risk.

4 Q. As of the time of the 992 patent application
5 in 2015, was it known to monitor for failure of a
6 turbine generator's gas fuel supply transmitter?

7 MR. QUARLES: Objection. Form.

8 THE WITNESS: The technology of doing this was
9 known.

10 Q. (By Mr. Walters) The next operating
11 characteristic in 23C is gas fuel control pressure
12 transmitter failure. Do you see that?

13 A. Yes.

14 Q. What is gas fuel control pressure transmitter
15 failure?

16 A. This is for fuel control. So as the fuel is
17 maintained -- the supply is maintained at a certain
18 pressure. And then how exactly the fuel is delivered to
19 the system is a matter of control to make sure that
20 combustion proceeds in a way close to optimal. So the
21 fuel control pressure transmitter provides an indication
22 that indeed that system, the fuel control pressure

1 system, works as intended. And if there is a failure of
2 that, again, there are issues with the whole system
3 operating as intended, which would be undesirable if the
4 system doesn't work as intended.

5 Q. Why would a person of skill in the art want to
6 monitor for failure of a gas fuel control pressure
7 transmitter?

8 A. Again, to make sure that the overall process
9 proceeds it operates as intended.

10 Q. As of the time of the 992 patent application
11 in 2015, was it known to monitor for failure of a gas
12 fuel control pressure transmitter?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: The technology for how to
15 monitor this was available at the time.

16 Q. (By Mr. Walters) What is utility circuit
17 breaker closed referred to as an operating
18 characteristic in 23C?

19 A. It's the circuit breaker associated with
20 utility power, and you need to make sure that this is
21 indeed closed. And this is something that you need to
22 monitor; otherwise, you have an operation that doesn't

1 work as intended.

2 Q. Why would a person of skill in the art want to
3 monitor for a closed status of a utility circuit
4 breaker?

5 A. To make sure that the operation is indeed as
6 intended.

7 Q. What do you mean by that?

8 A. That the operation proceeds with generation of
9 power that will drive the system as intended.

10 Q. What operation are you referring to?

11 A. The power generation so that the motor can
12 drive the pump and the pumping can proceed.

13 Q. Okay. As of the time of the 992 patent
14 application in 2015, was it known to monitor for a
15 closed status of a turbine generator's utility circuit
16 breaker?

17 MR. QUARLES: Objection. Form.

18 THE WITNESS: The technology was available at
19 the time.

20 Q. (By Mr. Walters) What is generator frequency?

21 A. This is the -- well, you see the term VFD
22 above, and there is a generator frequency. So this is

1 the frequency at which the electric generator works --
2 the electricity generator works rather.

3 Q. Why would a person of skill in the art want to
4 monitor a turbine generator's frequency?

5 A. To make sure that it is within acceptable
6 limits and there are no patterns that might indicate
7 that failure or any other hazard might be impending or
8 at play.

9 Q. What do you mean by acceptable limits?

10 A. Not too high not too low.

11 Q. According to who?

12 A. According to the manufacturer.

13 Q. What happens if you get too high or too low
14 outside of an acceptable limit?

15 A. Well, you might damage the equipment. And
16 there may even be safety risks.

17 Q. As of the time of the 992 patent application
18 in 2015, was it known to monitor a turbine generator's
19 frequency?

20 A. The technology was available at the time.

21 Q. So it was known to do that?

22 MR. QUARLES: Object to form.

1 THE WITNESS: The technology for how to do
2 generator frequency monitoring was available at the
3 time; it was known.

4 Q. (By Mr. Walters) The next operating
5 characteristic in 23C is engine serial number. Do you
6 see that?

7 A. Yes.

8 Q. What is engine serial number?

9 A. Well, basically this is a check to make sure
10 that indeed the right engine is the one actually
11 operating. So it's one characteristic that you want to
12 monitor and make sure that whoever is actually
13 interacting with the system, they look at the right
14 component, and there is no confusion as to what is
15 working and what is not.

16 Q. What do you mean by the right engine?

17 A. The one intended to be in operation. There
18 might be multiple pumps and multiple generators, so you
19 want to make sure the one referring to that specific
20 serial number is the one that you are looking at, and
21 there are no issues with mis-monitoring something or
22 making other mistakes.

1 Q. Is an engine -- strike that.

2 Is an engine serial number an operating
3 characteristic of a turbine generator?

4 A. Well, it's a characteristic that is important
5 just to make sure that you identify the correct engine,
6 so you are looking at the right thing -- the right --
7 you are looking at the right engine, and you are not
8 mistaking it for something else.

9 This is something that the human uses by
10 looking at the computer screen, so they may not have
11 direct inspection of that engine. And they go by serial
12 number, so one wants to make sure that indeed that
13 serial number is the one that the human really wants to
14 deal with and monitor along with the automated
15 monitoring system.

16 Q. Would you characterize the serial number as an
17 operating characteristic?

18 A. It's a characteristic associated with the
19 operation of the system to the extent that it refers to
20 a system which you believe is in operation or not.

21 Q. Why would a person of skill in the art want to
22 monitor a turbine generator's engine serial number?

1 A. To make sure they are looking at the correct
2 engine.

3 Q. As of the time of the 992 patent application
4 in 2015, was it known to monitor a turbine generator's
5 engine serial number?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: The technology for how to do
8 that was known, yes.

9 MR. QUARLES: Counsel, we've been going for a
10 little over an hour. I suggest a break before too long.

11 MR. WALTERS: Can you give me just one second.
12 I just want to make sure I close the loop on any
13 questions about that last line of questioning. I agree
14 we can take a break in just a second.

15 MR. QUARLES: Sure.

16 Q. (By Mr. Walters) When I ask you what engine
17 serial number was and you answered that it is a check to
18 make sure that the right engine is actually operating,
19 do you remember that?

20 A. That the right -- that the engine looked at is
21 indeed the engine that the system or a human believes
22 they are looking at, yes.

1 Q. And is that concept that you are confirming,
2 the engine you are looking at is the correct one that
3 you are supposed to be looking at, is that concept
4 described in the 992 patent application?

5 MR. QUARLES: Objection. Form.

6 THE WITNESS: What do you mean? What the
7 engine serial number means, whether this concept is
8 expounded on in the patent?

9 Q. (By Mr. Walters) Correct.

10 A. I don't remember, but I can look it up really
11 quickly, if that particular term is expounded on in the
12 patent.

13 Q. And I can refer you to column 19 lines 57 to
14 58 of the patent.

15 A. Give me just one second to go there. So go
16 one more time please.

17 Q. Column 19 lines 57 to 58.

18 A. Yes. Indeed, yes, engine serial number.

19 Q. So the patent states engine serial number, but
20 the patent does not describe that that is referring to
21 confirming that the engine one is monitoring is the
22 correct one; is that fair?

1 A. I am not sure I am following the question.

2 Can you rephrase.

3 Q. Sure. Is the concept that you described with
4 respect to engine serial number, namely that it means
5 you are confirming that the engine you are -- one is
6 looking at is the correct one, is that concept described
7 in the 992 patent application?

8 A. So are you referring -- are you asking whether
9 there is a procedure mentioned about how to look at the
10 engine serial number, or are you asking how the engine
11 serial number is used, whether that is discussed in the
12 patent?

13 Q. Either of those questions.

14 A. Either of those. Okay. So I don't believe --
15 let me do a quick check. I am just looking at that
16 document, just browsing the document Exhibit 1001, the
17 992 patent. So the serial number is just mentioned
18 there as one characteristic so that any ambiguity or
19 confusion that might result from not monitoring the
20 correct engine, it could be prevented. That's my
21 understanding, and that's what the amended claim refers
22 to.

1 Q. Okay. In the patent, does not specifically
2 describe resolving such an ambiguity or confusion,
3 correct?

4 A. It's just one characteristic that is mentioned
5 there. It doesn't say how this would be used, but it's
6 essentially a characteristic that says, you know, the ID
7 for that engine is to be monitored.

8 MR. WALTERS: It's a good time for us for a
9 break.

10 (Brief recess.)

11 Q. (By Mr. Walters) Welcome back, Dr. Nikolaou.

12 A. Thank you.

13 Q. You understand you've been deposed in IPRs
14 before and you understand that the PTAB rules prohibit
15 discussions with counsel during breaks of the
16 cross-examination?

17 A. That is correct, yes, I understand that.

18 Q. Okay. And you haven't discussed your
19 testimony with counsel during that break, correct?

20 A. No.

21 Q. Okay. I'd like to turn to limitation -- or
22 excuse me, substitute claim 24?

1 A. Yes, sir.

2 Q. And specifically limitation 24D.

3 A. Wherein operating characteristics include at
4 least the status of a fire alarm?

5 Q. Yes.

6 A. Yeah, very good, I am there.

7 Q. What is the status of the a fire alarm?

8 A. Whether it is on or off.

9 Q. And why would a person of skill in the art
10 want to monitor the status of a fire alarm associated
11 with a switchgear?

12 A. So the fire alarm is, obviously, a safety
13 device. A, I want to make sure the fire alarm is
14 operating correctly; and B, if the fire alarm goes off,
15 you want to make sure that you respond to that.

16 Q. As of the time of the 992 patent application
17 in 2015, was it known to monitor the status of a fire
18 alarm associated with a switchgear?

19 MR. QUARLES: Objection. Form.

20 THE WITNESS: The technology of monitoring the
21 status of a fire alarm was known at the time.

22 Q. (By Mr. Walters) And it was known to monitor

1 status of fire alarm of switchgear at the time?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: It was known for any application
4 that would require that for which the fire alarm would
5 be relevant.

6 Q. (By Mr. Walters) Okay. I'd like to move to
7 substitute claim 25.

8 A. Claim 25, page 34, yes, sir.

9 Q. And substitute claim 25 requires that the
10 system is configured to monitor operating
11 characteristics of the hydraulic system?

12 A. The system further comprising -- are you
13 reading on page 34 at the bottom?

14 Q. No, I am reading limitation 25C.

15 A. I am sorry, 25C. The system is configured to
16 monitor operating characteristics of the hydraulic
17 system, yes, sir.

18 Q. And 25D identifies some operating
19 characteristics. Do you see that?

20 A. Yes, sir.

21 Q. Okay. The first one identified is system
22 pressure?

1 A. Correct.

2 Q. What is system pressure?

3 A. The pressure at which the system operates.

4 You want to make sure it's at the right level to deliver
5 the performance you want.

6 Q. And what system are you referring to?

7 A. This is the -- let's see. We are still on
8 23 -- give me just one second. I lost my page. I am
9 sorry, I lost the page we are looking at. What was the
10 page we are looking at again.

11 Q. Exhibit page 35, 34 and 35.

12 A. 34 and 35. Yeah, forgive me for asking the
13 question -- for asking for repetition of the question,
14 but what was the question eventually that you asked
15 about this?

16 Q. So we talked about .

17 A. Yes.

18 Q. The first two operating characteristics. 25C
19 and 25D refer to operating characteristics, and
20 specifically 25D refers to system pressure?

21 A. Yes.

22 Q. What system does the system pressure refer to

1 there?

2 A. It's the pump system, the system that is
3 delivering the pressure so that it can move the fluids.

4 Q. The pump system?

5 A. Yes.

6 Q. It's not the hydraulic system?

7 A. Well, hydraulic system -- I am sorry. So you
8 are referring to the hydraulic system of 25B, right?

9 Q. I am referring to limitation 25D that states,
10 "Wherein the operating characteristics include at least
11 system pressure". So my question is: You had said that
12 system pressure is the pressure at which the system
13 operates, and I am asking what system you referring to?

14 A. It's what is referring 25D, the system further
15 comprising a hydraulic system.

16 Q. Okay. Which system?

17 MR. QUARLES: Object to form.

18 THE WITNESS: The system of claim 24.

19 Q. (By Mr. Walters) Okay. So --

20 A. That is mentioned in claim 25A to which 25B
21 refers.

22 Q. So you are not referring to the hydraulic

1 system, which is at the end of limitation 25B?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: I think I lost you there again.

4 So 25B says the system further comprising a
5 hydraulic system. That system in 25B at the beginning
6 of 25B comes from 25A that says the system of claim 24.

7 And the system of claim 24 is the system of
8 claim 21, and then we go back to claim 21.

9 Q. (By Mr. Walters) 25B states, "The system
10 further comprising a hydraulic system".

11 A. Correct.

12 Q. Okay. So there is two systems identified
13 there, correct?

14 A. There were -- yeah, the word system is used
15 twice.

16 Q. So system pressure in 25D which system in 25B
17 does system pressure refer to?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: So 25D as in David, that's what
20 you are asking, wherein the operating characteristics at
21 least -- is that what you mentioned?

22 Q. (By Mr. Walters) Yes.

1 A. So it's the -- it's the hydraulic system. The
2 word system is for the hydraulic system mentioned in 25B
3 as in Bravo.

4 Q. Okay. So it's not for the system that is
5 introduced in claim 21?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: Well, it's the -- it's the
8 sequence, again, as i mentioned a moment ago. So let me
9 try one more time. So 25D, as in delta, refers to
10 character -- operating characteristics like system
11 pressure, et cetera. This is going back to 25 Bravo,
12 the system further comprising hydraulic system. And the
13 further comes from 25A, which starts the system of claim
14 24. And 24 is right above, which is drawing from claim
15 21.

16 Q. (By Mr. Walters) Okay. So if I am going to
17 measure the system pressure that is identified in 25D,
18 where would I measure that?

19 A. The hydraulic system.

20 Q. Okay. And why would a person of skill in the
21 art want to monitor the pressure system of a hydraulic
22 system?

1 A. Because the very operation of a hydraulic
2 system depends on maintaining pressure as specified, as
3 designed; otherwise, there may be leaks or indications
4 of other problems. And if you know that the pressure is
5 maintained, that's a good indicator that such problems
6 may not be there.

7 Q. Okay. As of the time of the 992 patent
8 application in 2015, was it known to monitor the system
9 pressure of a hydraulic system?

10 MR. QUARLES: Objection. Form.

11 THE WITNESS: The technology or monitoring the
12 pressure of a hydraulic system was known at the time,
13 yes.

14 Q. (By Mr. Walters) Staying with limitation 25D,
15 the next operating characteristic is charged pressure.
16 Do you see that?

17 A. Yes.

18 Q. What is charged pressure?

19 A. It's the pressure of the entry of the system.
20 So it is what the system senses or experiences at its
21 input basically.

22 Q. Why would a person of skill in the art want to

1 monitor the charge pressure of a hydraulic system?

2 A. Same thing as before. Namely, you want to
3 know that this pressure is within acceptable bounds;
4 otherwise, there may be operational problems.

5 Q. As of the time of the 992 patent application
6 in 2015, was it known to monitor the charge pressure of
7 a hydraulic system?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: The technology for monitoring
10 charge pressure in a hydraulic system was known at the
11 time, yes.

12 Q. (By Mr. Walters) 25D, the next operating
13 characteristic, refers to temperature. Do you see that.

14 A. Yes, sir.

15 Q. What is the temperature of a hydraulic system?

16 A. The temperature at which the hydraulic system
17 operates.

18 Q. Why would a person of skill in the art want to
19 monitor the temperature of a hydraulic system?

20 A. To make sure it is within acceptable bounds.

21 Q. As of the time of the 992 patent application
22 in 2015, was it known to monitor the temperature of a

1 hydraulic system?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: The technology for doing this
4 was available at the time.

5 Q. (By Mr. Walters) And it was known to do that?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: It was known how to monitor the
8 temperature of a hydraulic system.

9 Q. (By Mr. Walters) And those in the industry
10 were monitoring temperatures of a hydraulic system at
11 the time?

12 MR. QUARLES: Objection. Form.

13 THE WITNESS: Overall, people in various
14 industries, yeah, were monitoring temperatures of
15 hydraulic systems, yes.

16 Q. (By Mr. Walters) What is the hydraulic oil
17 level of a hydraulic system?

18 A. There needs to be enough oil in that system;
19 otherwise, it won't deliver the performance intended, so
20 you want to make sure that you stay above a minimum
21 level so the system has enough oil to operate.

22 Q. Okay. Why would a person of skill in the art

1 want to monitor the hydraulic oil level of a hydraulic
2 system?

3 A. To make sure that that level doesn't fall
4 below a threshold, and by doing that, to maintain the
5 ability of the system.

6 Q. As of the time of the 992 patent application
7 in 2015, was it known to monitor the hydraulic oil level
8 of a hydraulic system?

9 MR. QUARLES: Objection. Form.

10 THE WITNESS: The technology for measuring
11 hydraulic oil level was known at the time.

12 Q. (By Mr. Walters) What is the filter status of
13 a hydraulic system?

14 A. It's whether the filter is clean enough to
15 make sure that, as the system operates, you don't have
16 any impurities sneaking into the system.

17 Q. Why would a person of skill in the art want to
18 monitor the filter status of a hydraulic system?

19 A. To ensure that the system is not impeded and
20 at risk of a malfunction or damage by impurities that
21 may have entered the system.

22 Q. As of the time of the 992 patent application

1 in 2015, was it known to monitor the filter status of
2 hydraulic systems?

3 MR. QUARLES: Objection. Form.

4 THE WITNESS: The technology for doing this
5 was known at the time.

6 Q. (By Mr. Walters) And it was known to actually
7 do this?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: To actually do what? To monitor
10 the filter status?

11 Q. (By Mr. Walters) Yes.

12 A. There was technology that was used -- that was
13 known and could be used to monitor filter status, yes.

14 Q. Okay. I'd like to move to substitute claim
15 26.

16 A. Yes, sir.

17 Q. Claim 26 recites an emergency power-off unit
18 configured to substantially immediately cut power from a
19 generator when activated. Do you see that?

20 A. Yes.

21 Q. And it says wherein the emergency power-off
22 unit is operated by a switch that sounds an audible

1 alarm?

2 A. Yes.

3 Q. What is an emergency power-off unit operated
4 by a switch that sounds an audible alarm?

5 A. It's a unit that can be used to power off a
6 system, to switch it off in case of an emergency, and it
7 is operated by a switch and with that switch an audible
8 alarm sounds.

9 Q. Why would a person of skill in the art
10 implement an emergency power-off unit operated by a
11 switch that sounds an audible alarm in a hydraulic
12 fracturing system?

13 A. Because that capability should be there should
14 an emergency arise for safe quick and safe powering off
15 of the unit to avoid both damage to the equipment and
16 worse, injuries or even loss of life, humans. A switch
17 would be used, along with an audible alarm, to alert
18 everybody around that the emergency power off has been
19 activated.

20 Q. As of the time of the 992 patent application
21 in 2015, was it known to implement an emergency
22 power-off unit for cutting power to a generator in a

1 hydraulic fracturing system where the switch sounds on
2 audible alarm?

3 MR. QUARLES: Objection. Form.

4 THE WITNESS: The overall technology -- each
5 one of the pieces that you mentioned may have been
6 there, but whether this particular configuration with
7 the emergency power off and switch and an audible alarm,
8 I'll have to check. Excuse me one second. Let me turn
9 this up. Okay. I apologize for a second. Let me turn
10 off this audio. Sorry about that. Okay. I am back.

11 Q. (By Mr. Walters) Okay. Can you hear me okay?

12 A. Yeah, it was nothing too important.

13 Q. Okay. I am not sure that you were done
14 answering the question, so I'll just ask the question
15 again.

16 A. Please.

17 Q. Okay. As of the time of the 992 patent
18 application in 2015, was it known to implement an
19 emergency power-off unit for cutting power to a
20 generator in a hydraulic fracturing system where the
21 switch sounds an audible alarm?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: In the references I looked at, I
2 didn't find that particular configuration with a switch
3 that sounds an audible alarm in case of an emergency
4 power off.

5 Q. (By Mr. Walters) Were switches that sound
6 audible alarms in the event of emergency power off known
7 at the time in 2015?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: Overall was that technology --
10 I'll have to check to see what exactly was the status of
11 this at the time.

12 Q. (By Mr. Walters) Okay. Were emergency
13 power-off units known at the time in 2015 in hydraulic
14 fracturing systems?

15 A. Emergency power off, yes.

16 Q. Okay. And so what is it that you are not sure
17 of that was known at the time?

18 A. The particular combination shown in 26C that
19 says emergency power off operated by switch that sounds
20 an audible alarm.

21 Q. Okay. Emergency power-off units were known at
22 the time in hydraulic fracturing systems, correct?

1 A. Yes.

2 Q. Okay. And those emergency power-off units
3 were operated by switches at the time, correct?

4 A. Yes.

5 Q. Okay. But you don't know if those switches
6 also sounded an audible alarm?

7 A. That combination, I'll have to check and see
8 that it was available.

9 Q. Where would you check?

10 A. Literature.

11 Q. What literature?

12 A. Well, all the engineering literature that
13 describes the technology at the time.

14 Q. Okay. In the non-hydraulic fracturing
15 context, were switches -- was it known to have switches
16 that operated an emergency power-off unit where the
17 switch also sounded an audible alarm in 2015?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: I'm have to check that to be a
20 hundred percent sure.

21 Q. (By Mr. Walters) Okay. So you don't know if
22 there were switches that operated emergency power-off

1 units where the switch sounded an audible alarm in 2015?

2 A. I didn't find that in the specific references
3 that I looked at in preparing this declaration, in this
4 specific combination, a switch that sounds an audible
5 alarm in case of an emergency power off.

6 Q. Okay. And why would a person of skill in the
7 art want to implement a switch in this scenario in a
8 hydraulic fracturing system where the switch sounded an
9 audible alarm?

10 A. To alert everybody around them that an
11 emergency power off has been activated and have
12 everybody act accordingly.

13 Q. And that motivation to implement such a switch
14 would have existed in 2015 at the time of the 992 patent
15 application, correct?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: Motivation, you mean whether it
18 would be considered beneficial to add that?

19 Q. (By Mr. Walters) Yes.

20 A. That feature?

21 Q. Yes?

22 A. Well, the very reason why this is included in

1 26C is because it would be considered beneficial.

2 Q. Okay. And it would have been beneficial in
3 2015, correct?

4 A. It would have been beneficial then as well,
5 yes.

6 Q. Would it have been easy in 2015 to implement
7 such a switch with an audible alarm?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: Easy as in would there be, say,
10 hardware technology that would allow implementation of
11 this?

12 Q. (By Mr. Walters) Would you deem it something
13 that's easy or complex to implement?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: It's a matter of whether one
16 would make the decision to proceed with implementing
17 such a system, so it would take the, you know, the usual
18 due diligence to figure out the merits of doing this.

19 Q. (By Mr. Walters) If one decided to implement
20 such a switch, would it be a complex process or would
21 you deem it an easy process?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: Again, it depends on the
2 particular situation and what would be the level of
3 integration with the overall system. And again, one
4 would have to do due diligence to come up with a
5 credible answer to this.

6 Q. (By Mr. Walters) Okay. So you can't tell me
7 whether it would be easy to implement a switch that
8 operates an emergency power-off unit where the switch
9 has an audible alarm?

10 A. Well, again, it depends on the particular
11 context and what kind of specifics are at play there to
12 offer a credible answer.

13 Q. Would you say that one could implement that
14 switch with an audible alarm without undue
15 experimentation?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: I am not sure what that is
18 asking. Without undue experimentation, meaning whether
19 to buy it off of a shelf, for example?

20 Q. (By Mr. Walters) Can you turn to your
21 declaration at paragraph 30?

22 A. Paragraph 30?

1 Q. Yes. The last two sentences in that paragraph
2 state, "I also understand that for a reference to be
3 anticipatory, it must contain an enabling disclosure.
4 It is further my understanding that merely naming or
5 describing the subject matter is insufficient if it
6 cannot be produced without undue experimentation".

7 A. Yes.

8 Q. Do you understand undue experimentation to be
9 a term used in the enablement standard in patent law?

10 A. Yes, okay.

11 Q. So that's the context in which I am using that
12 term.

13 A. Oh, I see. Okay.

14 Q. And so my question was: Would you say that
15 one could implement a switch of limitation 26C with an
16 audible alarm without undue experimentation?

17 MR. QUARLES: Objection. Form.

18 Q. (By Mr. Walters) In 2015.

19 A. There would have to be due diligence to
20 determine how to implement such a thing.

21 Q. Would you call that due diligence undue
22 experimentation?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: That would be due
3 experimentation, yeah. One would have to consider that
4 to make sure that they are putting this together
5 properly.

6 Q. (By Mr. Walters) You're referring to that as
7 due experimentation and not undue experimentation,
8 correct?

9 A. Yes, because it says the statement was
10 without -- not without undue experimentation, right?

11 Q. Yes.

12 A. So one wouldn't implement this without that
13 experimentation.

14 Q. One would implement without undue
15 experimentation or would not implement without undue
16 experimentation?

17 MR. QUARLES: Objection to form.

18 THE WITNESS: Would not.

19 Q. (By Mr. Walters) Would not. So implementing
20 the audible alarm on such a switch would require undue
21 experimentation in your opinion?

22 A. No, due experimentation. So let me make sure

1 I am using the words correctly. So one would not
2 automatically implement such a thing without due
3 experimentation.

4 Q. Okay. So there is a lot of negatives there.

5 A. Yeah, let me check the -- what was the
6 paragraph to make sure I am understand I am using the
7 same words consistently?

8 Q. Paragraph 30.

9 A. Paragraph 30. So let's see how we are using
10 this. So describing the subject matter -- I am reading
11 from paragraph 30 on page 20. So is insufficient if it
12 cannot be produced without -- should be due
13 experimentation I think. There is an inadvertent
14 negative there.

15 Q. There is not.

16 A. There is not?

17 Q. You correctly cited the standard.

18 A. Let me.

19 Q. Let me ask it another way. In order for one
20 of skill in the art at the time of the 992 patent
21 application in 2015 to implement the switch of
22 substitute claim 26 with an audible alarm, would it

1 require due experimentation or undue experimentation?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: So to implement, it would
4 require due experimentation.

5 Q. (By Mr. Walters) Let's move to claim 27.
6 Claim 27 requires that a signal be transmitted over
7 armored shielded Cat 5e cabling. Do you see that?

8 A. What page are we again?

9 Q. Exhibit page 35.

10 A. Okay. I am on page 35.

11 Q. You see claim 27 there?

12 A. 27, yes, sir.

13 Q. Okay. And this requires that a signal be
14 transmitted over armored shielded Cat 5e cabling?

15 A. Yes, sir, at the bottom.

16 Q. What is armored shielded Cat 5e cabling?

17 A. It's a particular standard for signal
18 transmission using a particular kind of cable.

19 Q. Okay. And the signal in this claim is to open
20 a breaker to substantially immediately cut power to the
21 generator. Do you see that?

22 A. Right above.

1 Q. Yes.

2 A. Yes.

3 Q. Why would a person of skill in the art want to
4 transmit signals to open a breaker over armored shielded
5 Cat 5e cabling in a hydraulic fracturing system?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: It's the particular choice made
8 here to transmit the signal that would trigger that
9 control unit to open the breaker.

10 Q. (By Mr. Walters) So why would one of skill in
11 the art want to transmit such a signal over armored
12 shielded Cat 5e cabling?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: Are you asking why would they
15 want to transmit a signal, or given they would want to
16 transmit a signal, why would they make that choice of
17 cabling?

18 Q. (By Mr. Walters) Why would they make that
19 choice of cabling?

20 A. They found it to be a good solution for the
21 problem. They looked at for how to transmit that
22 signal.

1 Q. What is the benefit to one of skill in the art
2 to transmit such a signal over armored shielded Cat 5e
3 cabling?

4 MR. QUARLES: Objection form.

5 THE WITNESS: They found it to be a good
6 choice based on their analysis.

7 Q. (By Mr. Walters) Okay. Why is armored
8 shielded Cat 5e cabling a good choice?

9 MR. QUARLES: Objection. Form.

10 THE WITNESS: That's what they determined to
11 be suitable for the environment they work in and the
12 specific conditions.

13 Q. (By Mr. Walters) Who is they?

14 A. The writers of the patent.

15 Q. Okay. I am not referring to the writers of
16 the patent, okay. I am referring to one of skill in the
17 art in 2015 that's implementing a fracturing system.
18 What would be benefits for transmitting a signal like
19 this over armored shielded Cat 5e cabling?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: There are various choices for
22 transmitting that signal, and that's the one that,

1 according to the statement, would be the choice that has
2 benefits for this particular operation.

3 Q. (By Mr. Walters) What are those benefits?

4 A. Technical and economic.

5 Q. Can you elaborate?

6 A. Well, not in detail because this is subject
7 for a more detailed analysis. According to this
8 statement here, this has been found to be a good choice
9 according to the -- to this statement.

10 Q. What are the technical benefits of
11 implementing such a signal over armored shielded Cat 5e
12 cabling?

13 A. That it does the job reliably. It has the
14 capacity needed, the strength needed, durability, and so
15 forth.

16 Q. What are the economic benefits of transmitting
17 such a signal over armored shielded Cat 5e cabling?

18 A. That the cost benefit analysis for this
19 operation turns out a result that says this is a good
20 choice, and that's what they found to do the job at a
21 reasonable cost without jeopardizing the operation.

22 Q. Okay. What operation are you referring to?

1 A. The signal transmission as described in 27B
2 says, "Responsive to a signal from the centralized
3 control unit".

4 Q. Is using armored shielded Cat 5e
5 cabling -- strike that.

6 Does using armored shielded Cat 5e cabling
7 cost less than using other cabling?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: I don't know that, and there is
10 no claim of that that I can see here.

11 Q. (By Mr. Walters) Okay. Does using armored
12 shielded Cat 5e cabling provide technical benefits
13 versus using other types of cabling?

14 A. It does the job according to this choice
15 stated in 27C.

16 Q. So I am not talking in terms of this claim,
17 okay. I am talking in terms of implementing a
18 fracturing system where one of skill in the art needs to
19 send a signal to open a breaker to substantially
20 immediately cut power, okay, in a fracturing system in
21 2015. And I am wondering what technical benefits one of
22 skill in the art would realize by using armored shielded

1 Cat 5e cabling?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: The specific benefits are
4 subject to analysis, which is what the people who came
5 up with the idea have done, so that they can come up
6 with this particular alternative among others.

7 Q. (By Mr. Walters) Okay. So what -- were you
8 familiar with armored shielded Cat 5e cabling in 2015?

9 A. 2015 armored shielded cabling definitely. I
10 don't remember if that standard was there because there
11 are various Cat standards. I'll have to look up the
12 specific one, but the armored shielded cabling, yes.

13 Q. What benefits did -- would you have
14 encountered using armored shielded cabling in 2015?

15 A. That the signal from the centralized control
16 unit to open a breaker to cut power would be done
17 reliably with that system at a reasonable cost.

18 Q. Okay. As of the time of the 992 patent
19 application in 2015, was it known to transmit signals to
20 open a breaker over armored shielded Cat 5e cabling in a
21 hydraulic fracturing system?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: So again, I'll have to check the
2 specifics of the 5e standard here, but the technology
3 for transmitting signals from one centralized control
4 unit to a device, it had many options that were
5 available at the time from wire to wireless to other
6 options. This is the one the particular choice selected
7 for this particular application.

8 Q. (By Mr. Walters) Okay. But the technology --
9 you are not sure of whether the Cat 5e standard was in
10 place in 2015, correct?

11 A. To be honest with you, I'll have to check to
12 see if that, you know, there are various Cat 6 and
13 various numbers there. I'll have to check the specifics
14 to see when exactly each one of those was made available
15 at what time. But there are a number of technologies
16 that were available for doing this kind of signal
17 transmission, and that's the one selected here.

18 Q. And one of them was armored shielded cabling,
19 correct?

20 A. Armor shielded cable, yes. Yeah.

21 Q. It was not new in 2015 to use armored shielded
22 cabling to transmit such a signal, correct?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: Armored shielded cabling was
3 available at the time, and it was used in a number of
4 applications to my knowledge.

5 Q. (By Mr. Walters) Okay. I'd like to move to
6 substitute claim -- excuse me, substitute claim 33.

7 This claim in 33B recites monitoring operating
8 characteristics of the turbine generator. Do you see
9 that?

10 A. Yes, sir.

11 Q. And one of those operating characteristics is
12 gas fuel main valve discharge pressure transmitter
13 failure. Do you see that?

14 A. In 33C yes, sir.

15 Q. What is gas fuel main valve discharge pressure
16 transmitter failure?

17 A. So the -- the generator has -- let me see
18 where I can start because there are many terms in line
19 here. So there is a discharge pressure, which is
20 associated with the main valve, and that pressure is
21 monitored, and there is a transmitter that transmits
22 that pressure. Failure of that transmitter would with

1 create problems in the characteristics -- this
2 particular characteristics is monitored to make sure
3 that the system operates the turbine operates well.

4 Q. So why would a person of skill in the art want
5 to monitor for failure of a gas fuel main valve
6 discharge pressure transmitter?

7 A. Maybe because if that transmitter fails, there
8 may be operational problems or even safety issues.

9 Q. Okay. As of the time of the 992 patent
10 application in 2015, was it known to monitor for failure
11 of a turbine generator's gas fuel main valve discharge
12 pressure transmitter?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: The technology for doing that
15 was available at the time, that is correct.

16 Q. (By Mr. Walters) What is backup system relay
17 failure?

18 A. Yes, in case the main system fails then you
19 have a backup system that is supposed to take over, and
20 there is a relay that would activate that, and that
21 relay must be operational. So if there is a failure,
22 you need to know this, and that is what is monitored

1 here.

2 Q. Why would a person of skill in the art want to
3 monitor for failure of a turbine generator's backup
4 system relay?

5 A. For operational and safety reasons. Again, if
6 that doesn't work then you may have issues with -- you
7 won't be able to start the backup system correctly.

8 Q. What are the safety reasons?

9 A. Safety you might be left without power
10 basically.

11 Q. As of the time of the 992 patent application
12 in 2015, was it known to monitor for failure of a
13 turbine generator's backup system relay?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: The technology for doing this
16 was available at the time, yes.

17 Q. (By Mr. Walters) And it was known to do this?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: The technology for how to do
20 this was known.

21 Q. (By Mr. Walters) Can we move to substitute
22 claim 34?

1 A. Yes, sir.

2 Q. This claim in 34B requires the method further
3 comprising monitoring operating characteristics of the
4 variable frequency drive. Do you see that?

5 A. Yes, at the very bottom.

6 Q. And in 34C it states, "Where the monitored
7 operating characteristics include motor winding
8 temperatures". Do you see that?

9 A. Yes, sir, at the top of page 39.

10 Q. What are motor winding temperatures?

11 A. Yeah, the motor has wire winding internally,
12 which may overheat, and that's why it's a good idea to
13 monitor the temperature of that winding.

14 Q. So why would a person of skill in the art want
15 to monitor a VFD's motor winding temperature?

16 A. To make sure that you get good operation and
17 prevent the damage to the equipment in case of
18 overheating.

19 Q. As at the time of the 992 patent application
20 in 2015, was it known to monitor a VFD's motor winding
21 temperature?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: The technology for doing that
2 was available at the time.

3 Q. (By Mr. Walters) And it was known to do that?

4 MR. QUARLES: Objection. Form.

5 THE WITNESS: It was known how to do this kind
6 of temperature monitoring.

7 Q. (By Mr. Walters) What is motor RPM?

8 A. The revolutions per minute at which the motor
9 rotates.

10 Q. Why would a person of skill in the art want to
11 monitor a VFD's motor RPM?

12 A. To make sure that the number is as desired and
13 certainly within acceptable limits.

14 Q. What if it's not within acceptable limits?

15 A. You do not get good performance and you even
16 run the risk of damaging the equipment.

17 Q. As of the time of the 992 patent application
18 in 2015, was it known to monitor a VFDs motor RPM?

19 A. The technology for doing this was known. It's
20 a classic measurement actually.

21 Q. What is a VFD's voltage?

22 A. The voltage at which the variable frequency

1 drive operates.

2 Q. Why would a person of skill in the art want to
3 monitor a VFD's voltage?

4 A. Same thing for -- to ensure good operation and
5 prevent potential damage if the voltage goes out of
6 bounds.

7 Q. As of the time of the 992 patent application
8 in 2015, was it known to monitor a VFD's voltage?

9 MR. QUARLES: Objection. Form.

10 THE WITNESS: The technology for measuring
11 voltage on a VFD was known at the time, yes.

12 Q. (By Mr. Walters) What is a VFD's torque?

13 A. It is the torque delivered by a variable
14 frequency drive. It's a drive, so it delivers rotation.
15 So the torque delivered is the torque of the VFD.

16 Q. Why would a person of skill in the art want to
17 monitor a VFD's torque?

18 A. A similar reason. To ensure good operation
19 and prevent potential damage to the equipment if things
20 go out of bounds, if torque goes out of bounds.

21 Q. As of the time of the 992 patent application
22 in 2015, was it known to monitor a VFD's torque?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: The technology for doing this
3 was available at the time.

4 Q. (By Mr. Walters) What is a VFD's current or
5 amperage?

6 A. It's the electric current drawn by the VFD
7 when it operates.

8 Q. Why would a person of skill in the art want to
9 monitor a VFD's current?

10 A. To ensure good operation and prevent potential
11 damage if amperage goes out of bounds.

12 Q. As of the time of the 992 patent application
13 in 2015, was it known to monitor a VFD's current?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: The technology for doing this
16 was available at the time.

17 Q. (By Mr. Walters) And it was known to do this?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: It was known how to do this.

20 Q. (By Mr. Walters) And were those skilled in the
21 art monitoring VFD's current in 2015?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: If they would need to do that,
2 they would have technology available for doing this.

3 Q. (By Mr. Walters) Were they doing that in 2015?

4 MR. QUARLES: Objection. Form.

5 THE WITNESS: I have no particular experience
6 to be honest with you.

7 Q. (By Mr. Walters) You don't know whether
8 before -- 2015 or before those skilled in the art were
9 monitoring the current of a VFD?

10 MR. QUARLES: Objection.

11 THE WITNESS: I would have to guess, so I'd
12 rather not answer that and just leave it at the
13 technology would be there.

14 Q. (By Mr. Walters) What would be your guess, yes
15 or no?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: I cannot speculate for something
18 I don't know.

19 Q. (By Mr. Walters) Yeah, I'm -- you said you'd
20 have to guess, so I am just asking you to guess.

21 A. I would refrain from guessing.

22 Q. Okay. So you don't know whether at the time

1 of the patent application in 2015 those skilled in the
2 art, of which you qualify, were monitoring current of a
3 VFD?

4 MR. QUARLES: Objection. Form.

5 THE WITNESS: I would have to look it up to be
6 a hundred percent sure. I know for a fact that the
7 technology was there to do this.

8 Q. (By Mr. Walters) You think the technology was
9 there, but it may not be -- it may have not have been
10 used at the time?

11 A. No, for this particular application that we
12 have here. VFD's are used in many applications, so this
13 is one -- I presume you refer to this particular
14 application.

15 Q. I am referring to any application.

16 A. To any application, then the obvious answer
17 is: If this was available, why would it not be used.
18 So it's fair to infer that it was available; therefore,
19 somebody somewhere used it.

20 Q. Okay. And when you are referring to your lack
21 of knowledge of use in a particular application, what
22 are application are you referring to?

1 A. The particular application here for a
2 fracturing operations where you use the VFD in
3 conjunction with the pump, and the pumping operation,
4 and all that.

5 Q. Okay. So it's your understanding that in
6 2015, at the time of the 992 patent application, the
7 current of VFD's was being monitored in various
8 industries, but you don't know whether the current of
9 VFD's used in fracturing operations was being monitored;
10 is that fair?

11 MR. QUARLES: Objection. Form.

12 THE WITNESS: Again, by inference, I can say
13 that, yes, as you mentioned, in general, in overall
14 applications of VFD's, the current would be monitored.
15 Whether people did it in this particular context in the
16 fracturing operations, I would have to check, and it
17 would be a quick check, an easy check, actually, to find
18 out.

19 Q. (By Mr. Walters) What would you check?

20 A. I would check the technical literature to see
21 what people were doing at the time.

22 Q. Okay. The benefits that you described earlier

1 to monitor the current of a VFD, those benefits would
2 apply when you were monitoring a VFD in a fracturing
3 operation as well, correct?

4 A. That is correct, yes. Benefits namely deliver
5 a good performance and make sure you don't damage the
6 equipment if things go out of balance.

7 Q. Okay. This is a good time for a break if
8 you'd like to take another break.

9 A. Sure. Ten minutes?

10 Q. That's okay with me.

11 MR. QUARLES: That's fine with me.

12 (Brief recess.)

13 Q. (By Mr. Walters) Welcome back, Dr. Nikolaou.

14 A. Thank you, again.

15 Q. I'd like to turn to the patent Exhibit 1001.

16 A. Yes, sir.

17 Q. Specifically at column 12, line 14.

18 A. Column 12, line 14, yes, sir.

19 Q. That paragraph states that the fracking fleet
20 can include a switchgear and then identifies a number of
21 operating characteristics of the switchgear that can be
22 monitored. Do you see that?

1 A. I see that, yes.

2 Q. Focusing on those operating characteristics
3 that are identified there, my question is: Were those
4 operating characteristics of the switchgear known in
5 2015 at the time of the 992 patent application?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: You mean known as in what?
8 Known to be operating characteristics of the switchgear?

9 Q. (By Mr. Walters) Of a switchgear, yes, at the
10 time.

11 A. So it was known that, for example, the breaker
12 status is an operating characteristic of the switchgear.
13 Voltage or the current is an operating characteristic of
14 the switchgear. Are you asking the question in that
15 context whether these specific operating characteristics
16 were known indeed to be operating characteristics of a
17 switchgear?

18 Q. Yes.

19 A. Yes, those -- it would make sense to say these
20 were operating characteristics of switchgear.

21 Q. That were known at the time?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: To be operating characteristics
2 of a switchgear. I mean, this is something fundamental
3 in the sense that this simply refers to what a
4 switchgear is and what may be associated with its
5 operation. So I would look at each one of them one by
6 one. For example, the voltage is a classic operating
7 characteristic of switchgear. I would say people would
8 characterize this, indeed, as an operating
9 characteristic of switchgear.

10 Q. (By Mr. Walters) Was it known to monitor these
11 switchgear operating characteristics in 2015 at the time
12 of the 992 patent application?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: Well, monitoring here is -- I
15 mean, the pattern talks about monitoring in the specific
16 setting and context of using that switchgear in the
17 overall fracturing operation as power is transmitted.
18 So it is in this context that monitoring is proposed
19 rather than a general idea of monitoring something in a
20 generic form.

21 Q. (By Mr. Walters) Okay. So my question is:
22 Was it known in 2015 to monitor the switchgear operating

1 characteristics that are identified in that paragraph?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: So what was known was that
4 monitoring can be done for equipment for which a number
5 of characteristics are of interest to make sure proper
6 and safe operation. For that particular context, what
7 is proposed here is monitoring of this specific
8 equipment that specific operation.

9 Q. (By Mr. Walters) Yeah, I understand what you
10 are saying, but my question is: Was it known to monitor
11 these switchgear characteristics -- excuse me, was it
12 known to monitor these switchgear operating
13 characteristics In 2015?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: Again, when you are saying "it
16 was known to monitor", are you asking whether it was
17 known that people were monitoring these characteristics?

18 Q. (By Mr. Walters) Yes.

19 A. Well, I would have to look at evidence about
20 this happening in the way it is presented here, and the
21 sources I looked at do not have this complete list of
22 these items monitored in this particular embodiment

1 mentioned in this pattern.

2 Q. Okay. Was it known to monitor these
3 switchgear operating characteristics in 2015 in other
4 embodiments?

5 MR. QUARLES: Objection. Form.

6 THE WITNESS: Again, it -- I would look at the
7 entirety of these characteristics including the
8 emergency power of status, the breaker status, the
9 voltage, the current, the kilowatts, the breaker
10 temperatures, the closure temperature, the status of the
11 fire alarm, and the ground fault. So I haven't seen a
12 reference that lists this set as mentioned here.

13 Q. (By Mr. Walters) Okay. Was it known to
14 monitor these switchgear operating characteristics in
15 2015 in a non-fracking context?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: Again, I haven't seen a
18 reference that lists all of them as reference -- as
19 mentioned here in this document Exhibit 1001, column 12.

20 Q. (By Mr. Walters) So you don't know whether in
21 2015 it was known to monitor the emergency power off
22 status of a switchgear?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: Just this particular one? Are
3 you asking whether the -- just this one particular
4 operating aspect was monitored?

5 Q. (By Mr. Walters) Yeah, my question is: You
6 don't know whether in 2015 it was known to monitor the
7 emergency power off status of switchgear?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: That one I cannot answer
10 because, again, I looked for a monitoring mode that
11 would include all of these quantities mentioned in
12 column 12 here.

13 Q. (By Mr. Walters) So I am talking about just
14 your general knowledge as one of skill in the art in
15 control systems, including control in monitoring of
16 switchgear that you referenced earlier in the
17 deposition. Based on that general knowledge, you don't
18 know whether it was known in 2015 to monitor an
19 emergency power off status of switchgear?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: Well, that's not what I focused
22 on because, again, was at issue here is was the complete

1 set of all of these variables being monitored here.

2 Q. (By Mr. Walters) I understand that. And
3 irrespective of the work you did to prepare for this
4 deposition, I am asking about your general knowledge as
5 one of skill in the art in this space. And my question
6 is you: Don't know whether it was known in 2015 to
7 monitor the emergency power off status of switchgear?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: So I would have to search for
10 that item specifically and do some additional work to
11 offer a well-informed opinion on this particular item
12 alone.

13 Q. (By Mr. Walters) Okay. And you don't know
14 whether in 2015 it was known to monitor the breaker
15 status of a switchgear?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: Again, for a well-informed
18 opinion, I would have to look for that particular item
19 alone to offer a well-substantiated opinion on that.

20 Q. (By Mr. Walters) Okay. And you don't know
21 whether in 2015 it was known to monitor the voltage of a
22 switchgear?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: Are you asking whether the
3 technology for monitoring the voltage of switchgear was
4 available at the time?

5 Q. (By Mr. Walters) I am asking whether those of
6 skill in the art were monitoring voltages of switchgear
7 at the time?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: Again, for that thing in
10 isolation, I would have to check the specifics to see
11 exactly how this monitoring may or may not have been
12 done.

13 Q. (By Mr. Walters) You don't know whether it was
14 done or not, correct?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: I would have to make sure I look
17 at the -- at some references to have an informed opinion
18 rather than speculate.

19 Q. (By Mr. Walters) Okay. And as one of skill in
20 the art, you don't know whether in 2015 it was known to
21 monitor the current of a switchgear, correct?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: If you are asking about the
2 technology being there to monitor the current of a
3 switchgear, the technology was available. Now, how
4 people were using it, I would have to look it up.

5 Q. (By Mr. Walters) Okay. Was the technology
6 available to monitor each of these operating
7 characteristics of switchgear in 2015?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: So technology for monitoring
10 each one of these characteristics individually was
11 available at the time. What I would have to check is
12 how the technology was used, in what context, and even
13 more so in what way was -- were those individual
14 technologies combined for the entire list of variables
15 shown here in column 12.

16 Q. (By Mr. Walters) Okay. So is it fair to say
17 that the technology was available and people were
18 monitoring individual operating characteristics of
19 switchgear identified in column 12, paragraph 14, but
20 you don't know whether they were monitoring all of them?

21 MR. QUARLES: Objection. Form.

22 THE WITNESS: Technology was indeed available

1 for each of these to monitor each one of these. Then, I
2 haven't found evidence that monitoring of all of these
3 in the context of fracturing operations was considered
4 at the time.

5 Q. (By Mr. Walters) Was -- Strike that?

6 I'd like to turn back to your declaration at
7 exhibit page 34.

8 A. Exhibit page 34, yes, sir.

9 Q. And specifically limitation 25B, B as in boy.

10 A. 25B at the bottom, yes, sir.

11 Q. That limitation states the system further
12 comprising a hydraulic system. Do you see that?

13 A. Yes.

14 Q. What is the hydraulic system of the 992
15 patent?

16 A. You mean, how is it constructed or how does it
17 function or can you help me with this?

18 Q. What is included as part of the hydraulic
19 system?

20 A. Let me refresh my memory on specifics of this.
21 Okay. So what was your question again? What is
22 included in the hydraulic system?

1 Q. Yes.

2 A. So there is hydraulic fracturing here. So
3 there is a system that includes all the elements needed
4 so that you can have the right operation by monitoring
5 variables, such as, the pressure, the charged pressure,
6 temperature, the hydraulic oil level, and the filter
7 status.

8 Q. Let me ask a different question. Does the 992
9 patent describe the parts or components of the hydraulic
10 system that's claimed in limitation 25B?

11 A. It basically leaves it as such as a hydraulic
12 system.

13 Q. How does the 992 patent describe what the
14 hydraulic system is? Feel free to reference the patent
15 and point me to the portions.

16 A. Yeah, let me -- let me check again because
17 there is no way I can remember off the top of my head.
18 So let me look it up. Give me a couple of minutes, if
19 you would.

20 Q. Sure.

21 A. So I can go over the patent again.

22 So I am not finding a detailed description for

1 the hydraulic motor in 992. I am only finding general
2 description, for example, in column nine, that the
3 electrically powered fracking fleet can include the
4 hydraulic motor. And for monitoring of that, you can
5 include the self-starter, the motor winding temperature,
6 et cetera

7 Q. So my question was about the hydraulic system.
8 Are you saying that the hydraulic motor is part of the
9 hydraulic system that's claimed?

10 A. So you wanted the hydraulic system. Okay. So
11 there is no detailed description of the hydraulic
12 system. It's -- you're -- again, we were looking at
13 25B, as Bravo, the system further comprising hydraulic
14 system. That was the question, correct?

15 Q. Yes.

16 A. Yeah. So i don't see a detailed description
17 in the patent for that. So this is one embodiment --
18 it's an element of one embodiment according to the
19 patent. It can include that part.

20 Q. Okay. Can we turn to column 9, line 15?

21 A. Nine, line 15, yes, sir.

22 Q. Actually, let's move to column eight, line 63?

1 A. Yes, sir. And right there it reads -- yeah,
2 so --

3 Q. Starting at line 67.

4 A. 67 at the very bottom of column eight?

5 Q. Yes.

6 A. Yes, sir.

7 Q. It says, "Control of the discharge motor can
8 include changing the motor RPM, the VFD algorithm, the
9 voltage set setpoint, and the discharge pump speed, also
10 controls the discharge pressure".

11 A. Yes, sir.

12 Q. Was it known to control those aspects of a
13 discharge motor in 2015?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: So, again, motor control has
16 been known for a long time including in 2015. In fact,
17 if you have a motor, usually the manufacturer provides
18 the controls so that the user can use whatever controls
19 they see appropriate. So was it known how to control
20 motor RPM, for example, which is at the top of column
21 nine? It was known how to control motor RPM. Now, was
22 it known where to set motor RPM, and this is indeed

1 something that you need to set and let the motor deliver
2 that in this particular operation? Well, that's the
3 contribution that is made here, that you -- that the
4 fracking operation may require changing the motor RPM
5 using the capabilities of the motor.

6 Q. (By Mr. Walters) Okay. Was it known to change
7 motor RPM, VFD algorithm, voltage set point, and
8 discharge pump speed when controlling a discharge motor?

9 MR. QUARLES: Objection. Form.

10 THE WITNESS: The capability existed, the
11 technology for enabling the user to do that existed at
12 the time. What the contribution of this proposition
13 here is that those are things that one has to focus on
14 during the fracturing operation.

15 Q. (By Mr. Walters) So it was novel in 2015 to
16 change the motor RPM, the VFD algorithm, the voltage set
17 point, and the discharge pump speed of a discharge motor
18 in a fracking operation?

19 A. The combined use of these is what is the
20 novelty here.

21 Q. Okay. So the novelty -- strike that.

22 It was known to control those individual

1 characteristics of a discharge motor in a fracking
2 operation in 2015, but it was not known to control all
3 of them?

4 A. The combination of these for the purpose of
5 the fracturing operation is what this adds to the
6 discussion, yes.

7 Q. So is "yes" the answer to my question?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: The question, again, is whether
10 the combination was known or not?

11 Q. (By Mr. Walters) Correct.

12 A. The combination is the new thing, yes.

13 Q. Okay. But control of the individual elements
14 of a discharge motor in a fracking operation was known?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: Each individual element, let's
17 take a look at one. Changing the motor RPM, yes, it was
18 available. It's typically available from the motors'
19 manufacturing -- manufacturer, have you changed the
20 motor RPM. The VFD algorithm, that's -- that is also
21 something. It's a capability that comes with the VFD.
22 The voltage set point says -- specifying the set point

1 is typically available. At what value you specify is
2 something else. And the discharge pump speed, same
3 thing. The capability was there. So combining all of
4 these would be the novelty so that you can accomplish
5 the fracturing operation.

6 Q. (By Mr. Walters) Can we turn to column 14 of
7 the patent?

8 A. Column ten, yes, sir.

9 Q. Okay. Specifically at line 15.

10 A. Line 15, yes, sir.

11 Q. That portion begins with a paragraph that
12 states that the fracking fleet can include a turbine --

13 A. Column 14, you said?

14 Q. Yes.

15 A. Line 15?

16 Q. Yes.

17 A. It says in an embodiment, blah, blah, blah.

18 Is that this one?

19 Q. Yes.

20 A. Very good. Go ahead, please, yeah.

21 Q. So it says that the fracking fleet can include
22 a turbine, and then it identifies a number of operating

1 characteristics of the turbine that could be monitored
2 in that paragraph. Do you see that?

3 A. Yes, sir, I do.

4 Q. Were those -- were all of these turbine
5 operating characteristics identified in that paragraph
6 known in 2015 at the time of the 992 patent application?

7 MR. QUARLES: Objection. Form.

8 THE WITNESS: I would have to look up, again,
9 each and every one of them in its own right to see what
10 exactly was the state of the art at the time, but I
11 certainly have not seen the combination of these.

12 Q. (By Mr. Walters) Was it known to monitor
13 individually each of those turbine operating
14 characteristics in 2015 at the time of the 992
15 application?

16 MR. QUARLES: Objection. Form.

17 THE WITNESS: Well, this is a lengthy list.
18 So to make sure I answer without speculating, I'd have
19 to do a check on each and every one of those. It goes
20 down to line 43, so there is -- there are several of
21 those. So I would look at each and every one of them,
22 one-by-one, to see what exactly the state of the art at

1 the time was.

2 Q. (By Mr. Walters) Okay. I am going to direct
3 you to column 14 line 15.

4 A. Line 15, yes, sir.

5 Q. It's where you are -- it's where you're
6 looking now.

7 A. Yes, sir.

8 Q. All the way to column 21 line 20.

9 A. Okay.

10 Q. So that portion that I've identified includes
11 a number of paragraphs that identify operating
12 characteristics of a turbine.

13 A. Yes, that is correct.

14 Q. Okay. So my question -- my ultimate question
15 was: Was it known to monitor each individual of those
16 operating characteristics listed in those columns in
17 2015?

18 MR. QUARLES: Objection. Form.

19 THE WITNESS: Well, not having done a thorough
20 search on each of every one of them myself, I would
21 leave it -- I would leave it at what the patent states.

22 So each of those paragraphs starting on

1 paragraph -- in column 14 and going all the way down,
2 starts with operating characteristics can also be
3 monitored, that can also be monitored; it can include.
4 And there is a whole bunch of characteristics. So there
5 are several paragraphs that start like this, operating
6 characteristics of turbine that can be also monitored,
7 can include -- and there is a description of those
8 characteristics.

9 Clearly the patent states that those are
10 relevant for this operation and how the monitoring would
11 be done and everything else. The everything was meaning
12 the hardware, the actual operation, the connections,
13 design, and all that. There are no specific details
14 given at this point, but there is a list of these
15 variables that are to be monitored for proper operation.

16 So -- and with my understanding that the
17 contribution is in collecting these for due -- to ensure
18 proper operation of the fracturing operation, I didn't
19 check each and every one of those to see what the state
20 of the art was at the time or what -- is there
21 contribution by the pattern itself suggested that
22 something is developed internally or are they taking

1 existing technology off the shelf and combining it in
2 this operation, one would have -- I would have to do a
3 detailed study to assert that, indeed, each of every one
4 of those was available at the time.

5 But again, my focus was that the contribution
6 isn't collecting these in suggesting these can be
7 monitored for proper operation of the fracturing
8 process.

9 Q. (By Mr. Walters) Can you rephrase that again
10 at the end? What is your understanding of the
11 contribution?

12 A. Yeah, that collecting these as relevant, in
13 fact, important for the fracturing operation is a
14 contribution of the patent in the sense that monitoring
15 these would help ensure the right -- the proper
16 operation of the fracturing process.

17 Q. Okay. I'd like you to spend some time looking
18 at the columns we've identified so columns 14, 15, 16,
19 17, 18, through 21, and I'd like you to identify for me
20 any of the turbine operating characteristics that -- for
21 which monitoring might have been novel in 2015.

22 A. Again, to do that, I would have to take the

1 time and check each and every one of them and see
2 whether indeed that would be novel or not. And given
3 that I did not focus on that, I focused on the actual
4 combination of these, I am afraid that this would take
5 an inordinate amount of time or it could be carried
6 offline.

7 Q. And you have time right now to read through
8 these, correct?

9 A. I do have time to read through these, but I
10 have to check for appropriate references, each and every
11 one of them, to see what the state of the art was in
12 2015.

13 Q. Okay. Let's go to column 19 line 47.

14 A. Yes.

15 Q. That paragraph ends with generator total real
16 power. Do you see that?

17 A. Generator -- end or generator total real
18 power, yes sir.

19 Q. Was it known to monitor generator total real
20 power in 2015?

21 MR. QUARLES: Objection. Form.

22 THE WITNESS: The technology for monitoring

1 generator total real power was available at the time,
2 yes.

3 Q. (By Mr. Walters) Were those of skill in the
4 art monitoring the total real power of turbine
5 generators before 2015?

6 A. Yes.

7 Q. So it doesn't sound like monitoring total real
8 power of a generator was novel in 2015, correct?

9 A. In isolation, no. That's an honest statement,
10 yes, sir.

11 Q. So we answered the question with that
12 characteristic without you having to refer to any other
13 sources. So I'd like you to read those columns and
14 identify any other characteristics for which you don't
15 know whether or not they were novel in 2015.

16 A. Okay. Now, do I have a few minutes at least?

17 Q. You have as much time as you need.

18 A. Thank you. We are starting, again, column
19 14 -- what line, 15 you said?

20 Q. Yes.

21 A. Okay. So I think we can come back to this.

22 So the entire list contains terms that are sensible and

1 they are all reasonable, and they appear related to the
2 operation of a turbine. If anything, I would say on
3 column 15, line seven, for example, what do they mean
4 exactly by flameout switch appears failed to open. Is
5 this something that is a clean measurement or are they
6 talking about technology there developing so that they
7 can actually tell whether failed open happened or
8 whether it's just an appearance.

9 Same thing in column 16, line 45. The
10 external watchdog fault, I don't know whether this is a
11 standard term. I haven't seen it in conjunction with
12 everything else anywhere, but it could be something that
13 indeed was there or they are developing themselves.

14 But overall, I would say, you know, they --
15 what I read makes sense, but I would need to do a
16 detailed thorough search to make sure that each and
17 every one of these was indeed available at the time.

18 Q. In isolation, was monitoring any of those
19 turbine operating characteristics novel in 2015?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: Again, that's what I am saying.
22 They all look sensible, but whether they refer to

1 something that they are proposing as part of this or it
2 was something that was already very well known, I'd have
3 to do a check one by one.

4 Q. (By Mr. Walters) Okay. And you just checked
5 one by one, correct?

6 A. Well, I did a reading as you suggested within
7 the few minutes that we had available. So I identified
8 a couple that on which I would start my search. For
9 example, as I mentioned, column 15, line seven switch
10 appears failed open. Is there any particular reference
11 to using AI for the term appears or is this something
12 specific, I haven't seen that in this context. In
13 column six, line 45, the external watchdog fault, I
14 would check that again to be on the safe side.

15 Q. Okay. So you identified flameout switch
16 appears failed to open and external watchdog fault?

17 A. Yeah, for a check for at first pass.

18 Q. For -- right. But is it fair to say that it
19 does not strike you as novel to monitor any of the other
20 operating characteristics of the turbine in 2015?

21 MR. QUARLES: Objection. Form.

22 THE WITNESS: Sure. I would say that they all

1 look relevant, definitely relevant, and beyond that, I
2 would check to see what exactly was the status of the
3 time.

4 Q. (By Mr. Walters) Okay. Was it novel in 2015
5 to monitor back up lube oil pump test failure?

6 A. I'd have to check that again.

7 Q. Okay. Is it fair to say that outside of
8 flameout switch appears failed open and external
9 watchdog fault, all of the other characteristics were
10 known operating characteristics of a turbine generator
11 in 2015?

12 MR. QUARLES: Object to form.

13 THE WITNESS: I would say that I would start
14 my search for individual characteristics in using these
15 two. And for the rest, you know, just go one by one.

16 Q. (By Mr. Walters) Why would you start with
17 those two?

18 A. Because they seem the most interesting to me
19 at this time to see what might be novel perhaps
20 suggested in this patent.

21 Q. Okay. Does the patent describe -- for these
22 turbine operating characteristics in column 14 to line

1 21, does the patent describe monitoring any of them as
2 novel?

3 MR. QUARLES: Objection. Form.

4 THE WITNESS: There is no description of these
5 as to any details about how the specific monitoring
6 would be done.

7 Q. (By Mr. Walters) Do you think that one of
8 skill in the art could monitor each of these operating
9 characteristics of a turbine without undue
10 experimentation in 2015?

11 MR. QUARLES: Objection. Form.

12 THE WITNESS: Well, for that, again, comes
13 back to were all of these available, were technologies
14 for these all available at the time or could it be that
15 there would be novel ideas in some of them. Again, I
16 would have to check each and every one to have an
17 informed opinion as, again, my focus was whether
18 something proposing the combination of these was in
19 existence or not.

20 Q. (By Mr. Walters) If there is no description in
21 the patent or details about how specific monitoring
22 would be done for any of these characteristics then how

1 would one of skill in the art be able to implement a
2 system to be able to monitor these characteristics
3 without undue experimentation?

4 MR. QUARLES: Objection. Form.

5 THE WITNESS: Well, that's what the patent
6 writers considered to be suitable for putting together
7 their patent, so they have their limitations, and they
8 leave it at that. That's my understanding.

9 Q. (By Mr. Walters) Okay. Do you think that the
10 patent writers did not include any additional details
11 about how to monitor the turbine characteristics in
12 columns 14 to 21 because the patent writers thought that
13 the novelty in the patent was the centralized monitoring
14 of these characteristics?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: Well, the novelty of the patent
17 was the entire system, and that's why the claims start a
18 system and a method. So it's the system as they
19 describe it.

20 Q. (By Mr. Walters) Okay. So I'll ask my
21 question again because -- just to make sure you
22 understand it because I don't think you answered it.

1 So my question is: Do you think that the
2 patent writers did not include any additional details
3 about how to monitor the turbine characteristics in
4 columns 14 to 21 because the patent writers thought that
5 the novelty was the centralized monitoring of these
6 characteristics?

7 MR. QUARLES: Objection. Form.

8 THE WITNESS: I cannot speculate on what they
9 were thinking, but what they state is clearly a system
10 and a method. So that's what they are putting as their
11 main limitations in their claims.

12 MR. WALTERS: Okay. I think it's a good time
13 for a break, and we can break for lunch, if you'd like.

14 THE WITNESS: That would be perfect for me. I
15 don't know about the rest of the group.

16 MR. QUARLES: Works for me.

17 MR. WALTERS: It's up to you guys. And just
18 let me know how long you'd like the break.

19 THE WITNESS: Make a suggestion, 45 minutes,
20 30.

21 MR. QUARLES: 45 minutes sounds good.

22 MR. WALTERS: Okay. So like 1:20 Central

1 Time.

2 THE WITNESS: That would be perfect.

3 MR. QUARLES: Sounds good.

4 MR. WALTERS: Thanks.

5 (The lunch break was taken.)

6 Q. (By Mr. Walters) Welcome back, Dr. Nikolaou.

7 A. Thank you, again.

8 Q. I'd like to turn to the substitute claims
9 specifically starting at claim 23 -- limitation 23C
10 which is on page 34 of your declaration.

11 A. Page 34, claim 23C, yes, sir.

12 Q. So 23B states that the centralized control
13 unit is further configured to monitor operating
14 characteristics. And then 23C states, "Wherein the
15 operating characteristics include at least," and then
16 identifies a number of them, right?

17 A. Correct.

18 Q. Okay. To satisfy limitation 23B, does a
19 centralized control unit need to be configured to
20 monitor each of the characteristics listed in 23C?

21 MR. QUARLES: Objection. Form.

22 THE WITNESS: So 23C says that the operating

1 characteristics include at least the following and there
2 is a list there.

3 Q. (By Mr. Walters) Yeah. So my question is: To
4 satisfy these limitations, 23B and 23C, does the
5 centralized control unit need to be able need to be
6 configured to be able to monitor all of the operating
7 characteristics in 23C or just any one of them?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: So as it's stated, the
10 centralized control unit is configured to monitor the
11 operating characteristics, which include at least those
12 indicated in 23C, so it includes all of these.

13 Q. (By Mr. Walters) So if a centralized control
14 unit, for example, was configured to monitor fuel system
15 air supply pressure transmitter failure but was not
16 configured to monitor thermocouple input module
17 thermistor failure then that centralized control unit
18 would not read on those limitations; is that fair?

19 A. Well, as stated, the limitation includes both
20 of these items that you mentioned, so both should be
21 included.

22 Q. So what's the answer to my question?

1 A. So you mentioned two items, whether those
2 should be included in the operated -- operating
3 characteristics monitored by the centralized control
4 unit, the answer is yes.

5 Q. So in order to read on limitations 23B and
6 23C, the centralized control unit must be configured to
7 monitor all of the characteristics identified in 23C,
8 right?

9 A. That's how this is stated, yes.

10 Q. Okay. I'd like to look at substitute claim
11 25?

12 A. 25. Same page further down, yes.

13 Q. And really on the next page.

14 A. Yeah.

15 Q. Okay. So limitation 25C states, "Wherein the
16 system is configured to monitor operating
17 characteristics of the hydraulic system". 25D states,
18 "Wherein the operating characteristics include at
19 least," and then a number of characteristics. Do you
20 see that?

21 A. Yes.

22 Q. Okay. To satisfy these limitations 25C and

1 25D, does the system need to be configured to monitor
2 all of the operating characteristics identified in 25D?

3 A. Yes, that's how it is stated. The system is
4 configured to monitor operating characteristics of the
5 hydraulic system wherein the operating characteristics
6 include, and there is a list.

7 Q. Moving to claim 31.

8 A. Page 37?

9 Q. Yes. Limitation 31C states, "The method
10 further comprising monitoring operating characteristics
11 of a hydraulic system." 31D states, "Wherein the
12 operating characteristics include a number of
13 characteristics." Do you see that?

14 A. Yes.

15 Q. In order to read on limitations 31C and 31D,
16 does the method need to monitor all of the operating
17 characteristics identified in 31D?

18 A. At least these, yes.

19 Q. And moving to claim 32.

20 A. Page 37?

21 Q. Yes. Limitation 32B states, "Monitoring
22 operating characteristics of the turbine generator"?

1 A. Yes.

2 Q. And 32C states, "Wherein the monitored
3 operating characteristics include," and then identifies
4 a number of characteristics. Do you see that?

5 A. Yes.

6 Q. Okay. To read on limitations 32B and 32C,
7 does the method need to monitor each and all of the
8 operating characteristics identified in 32C?

9 A. Yes, 32C starts wherein the monitored
10 operating characteristics include at least, and there is
11 a bunch of characteristics listed.

12 Q. Okay. Moving to claim 33. 33B states,
13 "Monitoring operating characteristics of the turbine
14 generator". And 33C states, "Wherein the monitored
15 operating characteristics include," and then identifying
16 a few operating characteristics. Do you see that?

17 A. Yes.

18 Q. So to read on limitations 33B and 33C, does
19 the method need to be monitoring all of the operating
20 characteristics identified in 33C?

21 A. At least those, yes. At least all of those,
22 yes.

1 Q. Okay. And in claim 34B and 34C, in order to
2 read on those claims, does the method need to be able
3 to -- excuse me -- does the method need to monitor all
4 the operating characteristics identified in 34C?

5 A. Yes, same story here. Those characteristics
6 of the VFD include and then there is a list.

7 Q. Okay. Moving to claim 39.

8 A. Page 41.

9 Q. Read on claim 39, "Does the centralized
10 control unit need to be configured to monitor and
11 control all of the characteristics identified there
12 starting with compression of natural gas?"

13 A. Yes.

14 Q. Can we turn to paragraph 81 of your
15 declaration.

16 A. 81 page, 92. Yes.

17 Q. Okay. This portion of your declaration is
18 discussing limitation 21F of the substitute claims
19 wherein the electric pump has a maximum continuous power
20 output of at least 1750 brake horsepower or more; is
21 that right?

22 A. Yes.

1 Q. And in your declaration, you summarize
2 Dr. Durham's deposition testimony regarding differences
3 between maximum horsepower and maximum continuous
4 horsepower specifically at paragraph 81 to 88.

5 A. Yes.

6 Q. And you agree with Dr. Durham that there is a
7 difference between and maximum horsepower and maximum
8 continuous horsepower?

9 A. I agree.

10 Q. What is the difference between maximum
11 horsepower and maximum continuous horsepower?

12 A. Okay. So maximum horsepower is a horsepower
13 that you can achieve -- that a device can achieve
14 momentarily for a very short period of time.
15 Continued -- maximum continuous horsepower is the
16 maximum level of horsepower that device can deliver in a
17 sustained fashion or period of time.

18 Q. What period of time?

19 A. Say during an operation over which that device
20 will be used to deliver horsepower.

21 Q. What operation?

22 A. In this context, it's the hydraulic fracturing

1 operation.

2 Q. Okay. How long does that take?

3 A. It may take -- well, it depends. It can take
4 minutes, hours. It varies.

5 Q. What does --

6 A. Yeah, it varies based on the design, how many
7 segments you want to fracture, how many fractures, what
8 is the depth, what is the length of the fractures.
9 There is a whole procedure. In theory, design theory of
10 how to design the a hydraulic fracturing operation.

11 Q. How long does the power output have to exceed
12 1750 brake horsepower for it to be considered
13 continuous?

14 A. For the duration of an operation over which
15 this horsepower is used.

16 Q. Would it be one minute?

17 A. It will likely be more for a fracturing
18 operation.

19 Q. Could it be ten minutes?

20 A. Well, again, it depends on the design. The
21 fracturing operation proceeds in a pattern that is
22 fairly well established. As the pump provides power,

1 the pressure inside the well increases, and then the
2 fracturing starts. You deliver the fluid that is
3 somewhat constant pressure. And then you release the
4 pressure; you essentially shut off the pump, and the
5 pressure starts dropping. That completes that stage of
6 the operation. So the pump is supposed to provide power
7 in a sustained fashion for as long as you are
8 pressurizing the water that goes into the well and is
9 opening up the fractures.

10 Q. Could it be one hour?

11 A. It depends on the operation, yes.

12 Q. Could it be three hours?

13 A. I have to look up specifics. It depends on
14 the kind of well, the stresses that the fracturing
15 operation may have to overcome, the orientation of the
16 fractures, the length of the section in the well, and on
17 and on and on. It's a fairly well-understood process
18 that petroleum engineers implement in fracturing
19 operations.

20 Q. Could it be one day?

21 A. For a single segment, that's unlikely I would
22 say.

1 Q. Possible?

2 A. I would say not in my experience, but again,
3 those numbers are ballpark figures. As I said, there is
4 no fixed value. I am sorry go ahead.

5 Q. Could it be three days?

6 A. For a single section, no, I would doubt it.

7 Q. You said there is no fixed value for how long
8 the power output of the pump needs to exceed 1750 brake
9 horsepower for it to be considered continuous?

10 A. There is, rather, a fixed pattern, and the
11 pattern is as I mentioned, so let me summarize it once
12 more.

13 The pump has to develop -- to deliver a
14 certain horsepower for a sustained period of time.
15 During that period of time, the pressure of the water --
16 injected water inside the well starting increasing until
17 it reaches a point where the stress, the strength of the
18 rock is exceeded and the rock starts fracturing. So you
19 continue pumping, you continue providing sustained power
20 until you have reached the point where the fracture is
21 long enough, it has roughly the dimensions that you
22 want. At which point, you turn off the pump, and you

1 start the reverse process to lower the pressure and
2 continue the operation. The pump has to deliver
3 sustained horsepower over the period of time when you
4 have this water injected into the well pressurized.
5 That's a continuous operation. However long that lasts.

6 Q. So in order -- so the answer to the question
7 of how long the power output of the pump needs to exceed
8 1750 brake horsepower for it to be considered continuous
9 depends on the particular operation for which you using
10 the pump?

11 A. The specific number is going to be
12 commensurate with the length of the operation, the
13 fracturing operation.

14 Q. And the length of the fracturing operation can
15 vary in different applications?

16 A. It can vary somewhat, yes.

17 Q. Is there anything in the patent specification
18 of the 992 patent that would inform someone of the
19 amount of time a particular power output of the electric
20 pump needed to be maintained for it to be considered
21 continuous?

22 A. Well, there is reference to the hydraulic

1 fracturing process, and it's without understanding that
2 continuous refers to delivering, continuously, the power
3 needed for the hydraulic fracturing process.

4 Q. Does the 992 patent tell you how long -- what
5 it means in terms of duration by the term continuous?

6 MR. QUARLES: Objection. Form.

7 THE WITNESS: Let me see the specifics to see
8 what exactly the language is, but there is ample
9 reference to hydraulic fracturing. So you are looking
10 for what again? You are looking for a specific number,
11 like, so many hours or something of that nature?

12 Q. (By Mr. Walters) I am looking for any portion
13 of the specification, the patent specification, that
14 would inform someone of the amount of time a particular
15 power output of the electric pump needed to be
16 maintained for it to be considered continuous?

17 MR. QUARLES: Objection. Form.

18 THE WITNESS: Okay. Do we have a couple of
19 minutes to read through the patent again? Because it's
20 a detail that I'll have -- I cannot remember this off
21 the top of my head. I have to check it out.

22 Q. (By Mr. Walters) Sure. Take as long as much

1 time as you need.

2 A. Thank you. Appreciate it. So all reference
3 to how the pump would be used in the fracturing
4 operation essentially is described in the introduction,
5 the background of the invention with the understanding
6 that the fracturing processes are well-known process,
7 and the pump will deliver the fluid that will be
8 injected to the well so that the corresponding fractures
9 can be propped up and remain open after the pressure is
10 released and the water is removed, and they leave it at
11 that. So a continuous horsepower would refer to this
12 operation which is described in column one, background
13 of the invention.

14 Q. So the background of the invention section in
15 column one is the only portion of the 992 patent
16 specification that would inform someone of the amount of
17 time a particular power output of an electric pump
18 needed to be maintained for it to be considered
19 continuous?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: It informs what would be a
22 reasonable amount of time over which a pump delivering

1 continuous horsepower at a certain level would be
2 required to actually deliver that horsepower in a
3 fracturing operation. How one actually measures and
4 specifies a continuous horsepower is a matter of
5 standards and how one agrees to these standards.

6 Q. (By Mr. Walters) Okay. Is there an industry
7 standard as to how long a particular power output of an
8 electric pump needed to be maintained for it to be
9 considered continuous?

10 MR. QUARLES: Objection. Form.

11 THE WITNESS: I don't remember specific
12 details. I know for this for automotive applications
13 where there are standards about continuous power as
14 opposed to peak power. Same thing for applications in
15 electronics and so forth. I'll have to look it up to
16 see what standards exist for measuring continuous
17 horsepower specifically according to standards using --
18 for pumps with electric motors or motors in general.
19 But here, these are pumps to be used for the fracturing
20 operation. So the context is that continuous power has
21 to be delivered for continuous operation in the context
22 of fracturing.

1 Q. (By Mr. Walters) Are you aware of any industry
2 standard related to fracturing that would state how long
3 a particular power output of an electric pump needed to
4 be maintained for it to be considered continuous?

5 MR. QUARLES: Objection. Form.

6 THE WITNESS: Well, this is a pump feature,
7 first of all, pump and water characteristics, so it's
8 not -- it doesn't have to be associated to fracturing;
9 it's a generic feature. So I'd have to look it up to
10 see what specific standards may exist. I don't remember
11 off the top of my head what specific standards may exist
12 out there.

13 Q. (By Mr. Walters) Let's say we have a pump that
14 can achieve a maximum power output of 750 brake
15 horsepower for four hours, okay? It cannot achieve it
16 for longer than four hours.

17 A. Yes.

18 Q. Okay. If the pump were used in a fracturing
19 operation that required it to run for three hours then
20 the pump would satisfy the limitation for that
21 fracturing operation; is that fair?

22 MR. QUARLES: Objection. Form.

1 THE WITNESS: That's fair if. It was rated
2 for that continuous power for four hours and it is used
3 for three hours, yeah.

4 Q. (By Mr. Walters) If the pump was used in a
5 fracturing operation that required it to run for five
6 hours then the pump would not meet that limitation for
7 the five-hour fracturing operation; is that fair?

8 MR. QUARLES: Objection. Form.

9 THE WITNESS: Well, if the pump was rated
10 safely for four hours then it might have problems if run
11 for five hours, okay. That's fair to say.

12 Q. (By Mr. Walters) So does the -- you refer to
13 the pump's rating. Who sets the pump's rating?

14 A. This comes from the manufacturer basically.
15 The manufacturer will tell you this pump can run like
16 this for so long.

17 Q. Okay. Is there an industry standard that
18 manufacturers use to determine whether their pumps can
19 output a particular amount of power long enough to be
20 considered continuous power output?

21 MR. QUARLES: Objection. Form.

22 THE WITNESS: Again, I would have to look this

1 up to see. This is a mechanical issue, so I would have
2 to look it up for the latest in the field as to what are
3 the specific standards on this today.

4 Q. (By Mr. Walters) Okay. I'd like to move to
5 limitation 21E, in particular, your declaration at
6 paragraphs 89 to 96.

7 A. So paragraphs 89 to 96 you said?

8 Q. Yes.

9 A. In my declaration, right?

10 Q. Yes.

11 A. Very good. 89 page 96. Yes, sir.

12 Q. Okay. In these paragraphs 89 to 96, discuss
13 the limitation wherein the electric pump has a maximum
14 continuous torque of at least 11,488 pound feet or more
15 correct?

16 A. Yes.

17 Q. And in your declaration, you summarize
18 Dr. Durham's deposition testimony regarding differences
19 between maximum torque and maximum continuous torque?

20 A. Correct.

21 Q. And in paragraph 93, you agree with Dr. Durham
22 that there is a difference between maximum torque and

1 maximum continuous torque?

2 A. Correct.

3 Q. What is the difference between maximum torque
4 and maximum continuous torque?

5 A. Maximum continuous torque refers to torque
6 that can be delivered over a sustained period of time.
7 Maximum torque can be instant. It's -- for example, if
8 I may use an example from every day life. Your car
9 engine's RPM can temporarily go to, say, 7000
10 revolutions per minute, but this is only a temporary and
11 instantaneous excursion. That can be okay, but it
12 cannot be sustained continuously. And actually, there
13 are safety mechanisms that prevent you from using that
14 RPM continuously for safety reasons to avoid damage to
15 the engine. It's in this setting that maximum
16 continuous torque refers to sustained torque using
17 whatever standard is appropriate to characterize
18 continuous torque as continuous and just maximum a peak.
19 It can be raised instantaneously, and then it may drop.

20 Q. Does the 992 patent identify any standards
21 that would be appropriate to determine how long of a
22 time would be continuous for maximum continuous torque

1 or maximum continuous power?

2 MR. QUARLES: Objection. Form.

3 THE WITNESS: It leaves it at the level, but
4 it shouldn't be instantaneous. It should be
5 continuous -- sustained by whatever standards would be
6 appropriate.

7 Q. (By Mr. Walters) Does the patent identify any
8 of those standards?

9 A. Not specifically.

10 Q. Okay. You said the maximum continuous torque
11 refers to torque that can be delivered over a sustained
12 period of time, right?

13 A. Correct, yes.

14 Q. How long of a period of time?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: Again, for -- as a practical
17 measure, it would have to be over the duration or the
18 entire duration of a fracturing operation. And for
19 communication between the vendor and the buyer, there
20 would be specifications from the vendor as to what they
21 refer to when they say continuous, but continuous would
22 definitely mean not instantaneous.

1 Q. (By Mr. Walters) Is there an industry standard
2 that manufacturers use to determine whether their pumps
3 can maintain a particular torque long enough to be
4 considered continuous?

5 A. I would have to look it up because this is a
6 mechanical issue, so I haven't focused on that to see
7 what the latest standards may be.

8 Q. You are not aware of any such standards?

9 A. Off the top of my head, I cannot remember
10 these. Like I said, I mention examples from say the
11 automotive industry, the red line in your RPM -- in the
12 RPM in your car or the audio high fidelity audio
13 industry where you may have a root mean square power and
14 peak power for amplifiers and loudspeakers and so forth.
15 This is a universal issue. A device that provides power
16 can instantaneously, at an instant, provide peak power,
17 but it cannot provide the same power over a sustained
18 period of time.

19 Q. And for the maximum continuous torque, you
20 said that it would have to be over the duration or the
21 entire duration of a fracturing operation to be
22 considered continuous, right?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: The patent says continues and
3 leaves it at that in the sense that it cannot be
4 considered an instantaneous value. It has to be
5 continuous by whatever form that continuous can be
6 certified by the vendor in agreement with the buyer.

7 Q. (By Mr. Walters) And different fracturing
8 operations can require different durations; is that
9 fair?

10 A. That is fair, yes.

11 Q. Okay. Is there anything in the 992 patent
12 specification that would inform someone of the amount of
13 time a particular torque of an electric pump needed to
14 be maintained for it to be considered continuous?

15 MR. QUARLES: Objection. Form.

16 THE WITNESS: There is no specific number.
17 Rather, the term continuous is used to alert potential
18 users that they have -- the user and the vendor of the
19 pump -- pumping system have to be in agreement as to how
20 much torque the system can deliver not instantaneously
21 but continuously. And what continuously means in the
22 particular context can be something that both the vendor

1 and the buyer can -- the user can agree upon to make
2 sure that the pump fits -- is fit for the purpose.

3 Q. (By Mr. Walters) Okay. Might different
4 manufacturers use different lengths of time in order to
5 rate their pumps as having a maximum continuous torque
6 or maximum continuous power?

7 MR. QUARLES: Objection. Form.

8 THE WITNESS: I would have to check the
9 specifics on this. It's a detail that I have to look it
10 up.

11 Q. (By Mr. Walters) Would it surprise you if
12 manufacturers used different lengths of time?

13 MR. QUARLES: Objection. Form.

14 THE WITNESS: Surprise me? Why would it
15 surprise me?

16 Q. (By Mr. Walters) It would not surprise you if
17 manufacturers used different lengths of time in order to
18 determine the continuous rating?

19 MR. QUARLES: Objection. Form.

20 THE WITNESS: I would have the fairly neutral
21 position that it's something that serves -- I mean, the
22 length of time over which continuous maximum torque will

1 be delivered is something that plays the role that I
2 explained. Maybe it has to be delivered throughout the
3 duration of the operation. And beyond that it's for the
4 vendor and the buyer to see whether the vendor offers
5 what the buyer needs.

6 Q. (By Mr. Walters) And some operations might
7 take three hours while others might take eight hours,
8 correct?

9 A. In fracturing, they might take different
10 lengths of time; that is correct.

11 Q. I'd like to turn to the face of the 992 patent
12 and Exhibit 1001.

13 A. Yes, sir. Cover page you said?

14 Q. Yes.

15 A. Very good.

16 Q. Do you see the related US application data
17 section?

18 A. Related US application data, first column,
19 left column towards the bottom?

20 Q. Yes.

21 A. Yes, sir, I see that.

22 Q. Okay. The 992 patent claims priority as a

1 continuation to what I'll refer to as the 363

2 application. Do you see that?

3 A. Yes, I see that. It's 14/884,363.

4 Q. And then that 363 application claims priority
5 to a 689 application, and you have to flip to the next
6 page to see that.

7 A. Go to the next page. Continuation part of
8 application number, blah, blah, 689. Yes, sir, I see
9 that.

10 Q. And that 689 application is US patent number
11 9,410,410?

12 A. Yes, it's in the line below.

13 Q. Okay. And that patent number is Exhibit 1010
14 in this proceeding.

15 A. Very good. Do you want me to open that?

16 Q. That would be great. Thank you.

17 A. Give me just one second, please, to find my
18 files. It's Exhibit 1010 you said, right? Yes.

19 Q. Yes.

20 A. Okay. Let's see if I have it open on my
21 screen.

22 Q. I'll refer to that as the 410 patent; is that

1 okay?

2 A. 410, yes, sir.

3 Q. Okay. And Exhibit 1010 the 410 patent is one
4 of the exhibits you reviewed in preparation for your
5 declaration?

6 A. Yes, it is.

7 Q. I'd like to turn to column three, line 43 of
8 the 410 patent.

9 A. Three, line 43, yes.

10 Q. In that portion there states, specifically,
11 "Some pumps ten can have a maximum continuous power
12 output of about 1500 bhp 1750 bhp or more". Do you see
13 that?

14 A. Yes, sir.

15 Q. Okay. So here this 410 patent, to which the
16 992 patent claims priority, is it fair to say it
17 discloses substitute limitation 21F, namely that an
18 electric pump having a maximum continuous power output
19 of at least 1750 brake horsepower or more?

20 A. Let me understand the question once more. So
21 the 410 patent gives these two specifications, 1500
22 brake horsepower and -- or 1750 or more, and then the

1 maximum continuous torque and all that. And 992 has
2 1750 only. And then your question what was again?

3 Q. 992 has 1750 brake horsepower or more,
4 correct?

5 A. Let me check. 1750 or more, right. Yes, it's
6 in column three of 992. Okay. And the question now, if
7 you could repeat it, please?

8 Q. Yeah. When we refer to the 992, I am actually
9 referring to substitute claim limitation 21F. Okay?

10 A. In my declaration?

11 Q. Yes.

12 A. 21F. Yes, bottom of page 45 of the exhibit.

13 Q. Okay. So my question was: The disclosure at
14 column three, lines 44 to 46 of the 410, that discloses
15 limitation 21F, correct?

16 A. So in 410, there is 1500 or 1750 or more. In
17 the updated 992, it's just 1750 or more.

18 Q. You are saying that 410 does not disclose
19 limitation 21F?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: Well, I don't want to get into
22 the legal use of the term discloses or whatever would be

1 appropriate here, but clearly column three of 410 has
2 maximum continuous power output of about 1500, 1750, or
3 more. In 992, the proposed amendment has 1750 or more.

4 Q. (By Mr. Walters) Okay. The next line of the
5 410 states, "Maximum continuous torque of about 8,750
6 pound feet or more".

7 A. Yes, I see that.

8 Q. Okay. And limitation 21E states, "The
9 electric pump has a maximum continuous torque of at
10 least 11,488 pound feet or more," correct?

11 A. That is correct, yeah. That's in page 45 of
12 the exhibit with my declaration, yes.

13 Q. The range disclosed in the 410 is from 8,750
14 pound feet and above?

15 A. Maximum continuous torque of about 8,750 or
16 more yes, sir.

17 Q. And so that would necessarily include a pump
18 having a maximum continuous torque of 11,488 pound feet
19 or more, correct?

20 MR. QUARLES: Objection. Form.

21 THE WITNESS: So the 992 amendment sets the
22 maximum continuous torque to be at least 11,000

1 something -- 11,488, so it sets -- again, it sets that
2 number as at least the maximum continuous torque. So
3 the maximum torque should be at least 11,488 or more.

4 Q. (By Mr. Walters) And the 410 discloses pumps
5 having a maximum continuous torque of 8,750 or anything
6 more than 8,750, correct?

7 A. Yes.

8 Q. And the pump required in 21E has a maximum
9 continuous torque of 11,488 pound feet, correct?

10 A. At least that, yes.

11 Q. So 21E -- the pump required in 21E would fall
12 within the range of the pump described in the 410,
13 correct?

14 MR. QUARLES: Objection. Form.

15 THE WITNESS: So 410 includes maximum
16 continuous torques such as, for example, 9,000 or
17 10,000. Says, "Maximum continuous torque of this or
18 more." Okay. So it may include 9,000, 10,000, or
19 11,000. 992, the amendment, this does not include
20 9,000, 10,000, 11,000, for example.

21 Q. (By Mr. Walters) So is it fair that the 410 is
22 broader, has a broader range than that described in 21E?

1 MR. QUARLES: Objection. Form.

2 THE WITNESS: So 410 includes the range from
3 8,750 to 11,488, which is in the "or more" range of the
4 continuous -- the maximum continuous torque which is not
5 included in the 992.

6 Q. (By Mr. Walters) And the 410 also includes the
7 range of an electric pump having a maximum torque of
8 11,488 or more, correct?

9 A. This is in the "or more" range.

10 Q. Is the answer to my question yes?

11 MR. QUARLES: Object to form.

12 THE WITNESS: Let me make it clear also. So
13 410, column three, line 46, is a maximum continuous
14 torque of 8,750 pound feet or more. So the "or more"
15 does include the 11,488.

16 MR. WALTERS: I think I am done. I don't
17 think I have any further questions, but if we could just
18 break for five minutes?

19 MR. QUARLES: Yeah, that works.

20 THE WITNESS: Okay. Should I come back in
21 five minutes?

22 MR. WALTERS: Yeah, okay. Great. Thank you.

1 (Brief recess.)

2 MR. WALTERS: I don't have any further
3 questions, so I'll pass the witness.

4 MR. QUARLES: Maybe just need a few minutes to
5 check back over my notes. So I'd say maybe come back in
6 maybe 15 minutes.

7 MR. WALTERS: Okay.

8 MR. QUARLES: Thanks.

9 (Brief recess.)

10

11 E X A M I N A T I O N

12 BY MR. QUARLES:

13 Q. Dr. Nikolaou, you discussed previously how you
14 were asked about your experience in control systems for
15 oil fracking, right?

16 A. Yes.

17 Q. And you mentioned in your report that you
18 testified in IPR 2023 dash 00558, right?

19 A. Yes.

20 Q. And specifically in paragraph 81, you
21 mentioned that this involved the 870 patent; is that
22 correct?

1 A. Let me -- I have no doubt, but let me just
2 make sure that I am where you specify all this. So open
3 my declaration. And go to what paragraph, one more
4 time, please?

5 Q. Paragraph 81.

6 A. Yes, sir. Claim 15 of US patent, et cetera.

7 Q. And did the 870 patent pertain to the
8 hydraulic fracking industry?

9 A. Yes.

10 Q. And did it involve controlling -- more
11 specifically, did it relate to controlling the speed of
12 a motor using a variable frequency drive?

13 A. Yes.

14 Q. So did the eight -- is it fair to say that the
15 870 patent relates to control systems in the hydraulic
16 fracking industry?

17 A. Yes.

18 Q. Switching gears just a little bit. You
19 reviewed the prior art asserted in the petition; is that
20 right?

21 A. That's correct.

22 Q. And so that involved the references known as

1 Coli Dykstra Birch Hunt and Rusnack; is that right?

2 A. That is correct.

3 Q. Okay. And we'll refer to these as the
4 asserted patents; is that fair?

5 A. Sure.

6 Q. Okay. You also reviewed, I don't know, a
7 little over 80 references Exhibits 2008 through 2090,
8 right?

9 A. That's correct, yes.

10 Q. So let's refer to the asserted prior art and
11 the additional 827 references as the references of
12 record. Is that fair?

13 A. Good.

14 Q. So let's look at in your report claim element
15 23C on page 34.

16 A. Page 34. There we go. Which element on page
17 34?

18 Q. 23C.

19 A. 23C, yes, sir.

20 Q. So there are operating characteristics listed
21 there, right?

22 A. Correct.

1 Q. We'll refer to these as the operating
2 characteristics collectively as the limitation 23C
3 operating characteristics; is that fair?

4 A. Fair enough.

5 Q. Did any of the references of record explicitly
6 disclose that the limitation 23C limitation operating
7 characteristics?

8 A. I didn't find the entire collection of these
9 characteristics in a single reference. Is that what you
10 ask about?

11 Q. Yes.

12 A. Okay.

13 Q. Did any of the references of record explicitly
14 disclose that the 23C operating characteristics were
15 known?

16 A. Not as a set, known to be in use as a set. I
17 didn't find that.

18 Q. And I should clarify. That's what we mean is
19 as a set, collectively as a group. And did any of the
20 references of record explicitly disclose monitoring the
21 limitation 23C limitation operating characteristics?

22 A. Again, not as a group, not monitoring these

1 combined as a group for fracturing operations.

2 Q. Did any of these references of record discuss
3 in their background sections that it was known to
4 monitor these operating characteristics?

5 A. No, I didn't see any such statement for,
6 again, for the entire group.

7 Q. So get a little further down on limitation
8 24D. We'll refer to these as the limitation 24D
9 operating characteristics, fair?

10 A. Very good.

11 Q. Did any of the references of record explicitly
12 disclose all these limitations that were known?

13 A. 24D you said or further down in 25?

14 Q. Yeah, so specifically in 24D, did any of the
15 references of record explicitly disclose all of the
16 operating characteristics listed in 24D that they were
17 known?

18 A. So the status of a fire alarm, I mean, I don't
19 recall seeing that for the status of the fire alarm.
20 And I am sorry, go ahead.

21 Q. Go ahead.

22 A. I just wanted to say, I may have seen -- but

1 I'll let you ask the next question.

2 Q. Moving to limitation 25D on page 35 of your
3 declaration.

4 A. Yes, I see that.

5 Q. We'll refer to these as the operating
6 characteristics collectively as the 25D limitation
7 operating characteristics, fair?

8 A. Yes.

9 Q. Did any of the references of record explicitly
10 disclose the operating characteristics, all of the
11 operating characteristics of 25D that they were known?

12 A. I didn't find that explicitly included for the
13 entire set.

14 Q. Did any of the references of record explicitly
15 disclosed monitoring all of the limitation 26C operating
16 characteristics?

17 A. 26C is the emergency power off operated by a
18 switch that sounds an audible alarm?

19 Q. Yes.

20 A. Or go back to 25D?

21 Q. That's right. Did any of the references
22 explicitly disclose monitoring that?

1 A. For 26C, I didn't see this with a specific
2 audible alarm with the operation of a switch for the
3 emergency power off.

4 Q. One moment. Moving onto 27C on page 35 of
5 your declaration.

6 A. Yes, at the bottom.

7 Q. Did any of the references of record explicitly
8 disclose using Cat 5e cabling?

9 A. Couldn't see that. It's interesting,
10 actually, that communication for signal transmission was
11 mentioned but not in terms of this specific solution,
12 the Cat 5e, that is, a specific solution.

13 Q. Right. Thank you. Did any of the references
14 of record explicitly disclosed that Cat 5e was commonly
15 in use?

16 A. I don't recall seeing that.

17 Q. Moving to 31D, page 37.

18 A. 31D.

19 Q. Did any of the -- and we'll refer to these
20 operating characteristics as the limitation 31D
21 operating characteristics. Did any of the references of
22 record explicitly disclose all the -- monitoring all of

1 the limitations in limitation 31D?

2 A. No, I didn't see that.

3 Q. Did any of the references of record explicitly
4 disclose that it was known in the art to monitor all of
5 these limitation 31D operating characteristics?

6 A. Again, for the entire set, I didn't see that.

7 Q. Moving to 32C. It's on page 38.

8 A. Yes, top of page 38.

9 Q. We'll refer to these as the limitation 32C
10 operating characteristics, fair?

11 A. Yes.

12 Q. Did any of the references of record explicitly
13 disclose monitoring the all of the limitation 32C
14 operating characteristics?

15 A. I didn't see the whole set in these
16 references.

17 Q. Did any of the references of record explicitly
18 discuss in the background sections that it was known to
19 monitor all of the limitation 32C operating
20 characteristics?

21 A. I didn't see that there either.

22 Q. Moving to 33C, we'll refer to these as the

1 upper -- as the limitation 33C operating
2 characteristics, fair?

3 A. Yeah.

4 Q. Did any of the references of record explicitly
5 disclose monitoring all of the 33C operating
6 characteristics?

7 A. No, I didn't find that in these references.

8 Q. Did any of the references of record
9 disclose -- discuss in their background sections that it
10 was known to monitor all of the limitation 33C operating
11 characteristics?

12 A. I didn't see that there either.

13 Q. Moving to 34C. That's on page 39.

14 A. Yes, top of 39.

15 Q. We'll refer to these as the limitation 34C
16 operating characteristics.

17 A. Yes.

18 Q. Did any of the references of record explicitly
19 disclose monitoring all of the operating characteristics
20 in limitation 34C?

21 A. I didn't find that in these references.

22 Q. Did any of the references of record discuss in

1 their background sections that it was known to monitor
2 all of the limitation 34C operating characteristics?

3 A. I didn't find that there either.

4 Q. Moving to claim 39 on bottom of page 40,
5 starts the bottom of page 40 and top of page -- or
6 bottom of page 41 and top of page 42.

7 A. Yes.

8 Q. We'll refer to these as the claim 39 operating
9 characteristics, fair?

10 A. Yes.

11 Q. Did any of the references of record explicitly
12 disclose monitoring all of the claim 39 operating
13 characteristics?

14 A. I didn't find that for the entire group.

15 Q. Did any of the references of record discuss in
16 the background sections that it was known to monitor all
17 of the claim 39 operating characteristics?

18 A. I didn't find that there either.

19 MR. QUARLES: No further questions.

20 MR. WALTERS: I don't have any additional
21 questions. I think this should end the deposition.

22 THE COURT REPORTER: Mr. Walters, I have you

1 down for a rough draft. Is that still the case?

2 MR. WALTERS: Yes.

3 THE COURT REPORTER: Mr. Quarles, would you
4 like a rough draft as well?

5 MR. QUARLES: When is the -- when will we
6 expect to receive the transcript?

7 (Discussion off the record.)

8 MR. QUARLES: We'll take a rough draft as
9 well.

10 MR. WALTERS: Well, yeah, I mean, we may need
11 it sooner.

12 I assume he's going to want to sign it, Rick?

13 MR. QUARLES: That's right.

14 MR. WALTERS: How much time will he need -- I
15 mean, if we get it on the 5th, could he turn it around
16 by the 8th or 9th?

17 MR. QUARLES: Let's see.

18 THE WITNESS: The 5th is...

19 MR. WALTERS: September. It's a Friday.

20 THE WITNESS: A week from tomorrow, a week
21 from Friday and turn it back on the following Monday or
22 Tuesday?

1 MR. WALTERS: Yes.

2 MR. QUARLES: So basically that would be
3 reviewing, you know, reviewing it all and then signing
4 it, of course.

5 THE WITNESS: Yeah, I can do my best.

6 MR. WALTERS: Okay. Could we -- Brigid, could
7 we have it on the 5th.

8 THE COURT REPORTER: Sure.

9 MR. WALTERS: Let's do that.

10 MR. QUARLES: We'll have ours on the 5th as
11 well.

12 (The deposition concluded at 12:57 p.m. PST.)

13 (Signature is reserved.)

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C E R T I F I C A T E

I, Brigid M. Donovan, RPR, a Certified
Stenographic Reporter, do hereby certify:

That MICHAEL NIKOLAOU, PH.D., the witness whose
deposition is hereinbefore set forth, was duly sworn
by me before the commencement of such deposition and
that such deposition was taken before me and is a true
record of the testimony given by such witness.

I further certify that the adverse party,
U.S. WELL SERVICES, LLC, was represented by counsel
at the deposition.

I further certify that the deposition of
MICHAEL NIKOLAOU, PH.D., occurred virtually via Zoom
on Thursday, August 28, 2025, commencing at 7:00 a.m.
to 12:57 p.m.

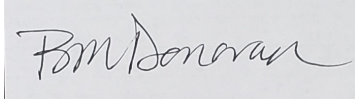
I further certify that I am not related to
any of the parties to this action by blood or
marriage, I am not employed by or an attorney to any
of the parties to this action, and that I am in no way
interested, financially or otherwise, in the outcome
of this matter.

1 IN WITNESS WHEREOF, I have hereunto set my
2 hand this 5th day of September, 2025.

3 My commission expires:

4

5



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7 WA CCR NO.: 2070, AZ CCR NO.: 50902

8 OR CSR NO.: 21-0023 (exp. 12/27)

9 CA CSR NO.: 14520

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Re: Deposition of **Michael Nikolaou, Ph.D.**

Date: 8/28/2025

Case: Liberty Energy, Inc., et al. -v- U.S. Well Services, LLC (PTAB)

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Page	Line	Correction/Change and Reason
8	14	Let me of confirm <-- Let me confirm
10	17	mentions <-- mention
15	1	weighted <-- weight on
16	6	Rotherslade <-- RotoSlide
16	14	Rotherslade <-- RotoSlide
16	18	a electrical <-- an electrical
16	19	use <-- used
17	9	working a <-- working in a
17	9	use the <-- used
17	11	in high pressure <-- at high pressure
24	2	It associated <-- It is associated
24	3	delivered <-- delivers
25	19	Are referring <-- Are you referring
26	1	that's <-- that
26	2	that what <-- what
30	18	modern <-- motor and
31	21	normal <-- natural
33	3	as use <-- as used
57	12	comprising hydraulic <-- comprising a hydraulic
63	16	humans <-- for humans
69	19	off of a shelf <-- off the shelf

9/8/2025

(Date)



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80	22	would with <-- would
93	5	make sure <-- ensure
108	11	was <-- else
109	3	of <-- and
109	6	isn't <-- is in
112	6	there <-- they were
125	9	procedure. In <-- procedure and
129	1	without <-- with the
132	7	water <-- motor
135	18	and just maximum a peak <-- and not just maximum at a peak
138	2	continues <-- continuous
143	2	was again <-- was it again

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ACKNOWLEDGMENT OF DEPONENT

I, Michael Nikolaou, Ph.D., do hereby
acknowledge that I have read and examined the
foregoing testimony, and the same is a true, correct
and complete transcription of the testimony given by
me and any corrections appear on the attached Errata
sheet signed by me.

9/8/2025

(Date)



(Signature)