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Transcript of Robert Allan Durham, Ph.D.

Date: October 8, 2025

Case: Liberty Energy, Inc., et al. -v- U.S. Well Services, LLC (PTAB)

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

- - - - - x
LIBERTY ENERGY, INC., :
AND LIBERTY OILFIELD :
SERVICES LLC, :
Petitioners, : Case No. IPR2024-01274
v. : U.S. Patent No.
U.S. WELL SERVICES, LLC, : 11,091,992 B2
Patent Owner. :
- - - - - X

Deposition of ROBERT ALLAN DURHAM, Ph.D.
Conducted Virtually
Wednesday, October 8, 2025
10:31 a.m. EDT

Job No.: 603756
Pages 1 - 69
Reported by: Debra A. Whitehead

1 Deposition of ROBERT ALLAN DURHAM, Ph.D.,
2 conducted virtually.

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5 Pursuant to notice, before Debra Ann Whitehead,
6 E-Notary Public in and for the Commonwealth of
7 Virginia.

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1 A P P E A R A N C E S

2 ON BEHALF OF PETITIONER:

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19 ALSO PRESENT:

20 HAROLD RODRIGUEZ, A/V Technician

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C O N T E N T S

EXAMINATION OF ROBERT ALLAN DURHAM, Ph.D.	PAGE
By Mr. Quarles	6

EXHIBITS MARKED IN TODAY'S SESSION

(Attached to the Transcript)

EXHIBIT	PAGE
Exhibit 2105 AmeriMex Motor & Controls, Inc.,	30
5000HP 400V 45Hz Speed/Torque	
Curves, Bates LIBERTY_00033439	
Exhibit 2106 UL 61800-5-1, Standard for	31
Safety	

EXHIBITS MARKED IN PRIOR SESSIONS

(Not Attached)

EXHIBIT	PAGE
Exhibit 1004	51
Exhibit 1005	35
Exhibit 1007	39
Exhibit 1022	9
Exhibit 1026	16
Exhibit 1027	20

1	EXHIBITS MARKED IN PRIOR SESSIONS - CONTINUED	
2	EXHIBIT	PAGE
3	Exhibit 1037	57
4	Exhibit 1040	53
5	Exhibit 2004	23
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P R O C E E D I N G S

ROBERT ALLAN DURHAM, Ph.D.,

having been duly sworn, testified as follows:

EXAMINATION BY COUNSEL FOR PATENT OWNER

BY MR. QUARLES:

Q Good morning, Dr. Durham.

A Good morning, Mr. Quarles.

Q I'll be asking you questions today about
your second declaration in IPR2024-01274, which
has previously been marked as Exhibit 1022 and is
regarding U.S. Patent Number 11,091,992. I will
be referring to this patent today as the '992
patent.

Would you please state your full name,
for the record.

A Sure. Dr. Robert Allan Durham.

Q And where are you today?

A In the Baker Botts office in Dallas,
Texas.

Q Have you ever been deposed before?

A Yes, sir.

Q How many times?

1 A Somewhere north of 120.

2 Q If you need to take a break at any time
3 today, please let me know. I'll do my best to
4 take breaks shortly after you ask for one. I
5 will, however, ask that you answer any pending
6 questions.

7 Do you understand?

8 A Yes, sir.

9 Q If at any point you don't understand my
10 question, will you ask me to restate it or repeat
11 it so that we can assume that if you answered a
12 question you've understood it?

13 A Yes, sir.

14 Q To help the court reporter, I just want
15 to take extra care that we don't talk over each
16 other.

17 Do you have any documents in front of
18 you?

19 A I have the Zoom instructions and one page
20 of errata.

21 Q Would you care to read the errata in, for
22 the record.

1 A Sure. First on the cover sheet, I picked
2 up an old document for a skeleton so it should
3 read Liberty entities, not Halliburton, as the
4 petitioner. Paragraph 105 I state "monitoring
5 generator frequency was known," and that should
6 read "monitoring engine serial number was known."

7 And finally, Paragraph 179, McIver is
8 U.S. Patent Application not 2013/0142601. It
9 should read, McIver is U.S. Patent Application
10 Publication Number 2013/0142601.

11 Q Anything else?

12 A No, sir.

13 Q Other than the papers that you've
14 mentioned, do you have any other papers in front
15 of you?

16 A No.

17 Q And you have a computer in front of you?

18 A Yes, sir.

19 Q Is there anything open, any other
20 applications open besides a Zoom window on that?

21 A No, sir. That's all.

22 Q How many times have you offered expert

1 opinions in a patent case?

2 A It's likely around 40 or so. It's been a
3 while since I've counted.

4 Q What is your pay rate for this case?

5 A 350 for analysis and 485 for deposition
6 and testimony. Well, for deposition testimony,
7 yes.

8 Q Do you have any patents?

9 A No, sir.

10 Q Have you ever applied to get a patent?

11 A No.

12 Q Do you have any financial interest in
13 Liberty or the outcome of this IPR?

14 A No, sir, I don't.

15 Q Did you submit a declaration in
16 connection with this IPR proceeding?

17 A I did.

18 MR. QUARLES: Harold, would you please
19 bring up file name EX-1022, Durham Second '992
20 Declaration.PDF, which has been marked as Exhibit
21 1022.

22 (Exhibit 1022, previously marked, not

1 attached.)

2 MR. WALTERS: And if you could drop that
3 in the Chat window as well, Harold, I would
4 appreciate it.

5 Q Dr. Durham, let me know when you have
6 access.

7 A Sure.

8 Okay. It's up now.

9 Q Is this your second declaration?

10 A Yes, sir, it appears to be.

11 Q Let's turn to Page 104.

12 A Okay.

13 Q Is this your signature on Page 104?

14 A Yes, sir, it is.

15 Q Other than the errata that you mentioned
16 earlier, is there anything that you would like to
17 change in your declaration after your preparation
18 for today's deposition?

19 A No, sir.

20 Q Did you meet with anyone to prepare for
21 today's deposition?

22 A Yes, sir, I did.

1 Q Is that the counsel that appears on this
2 call?

3 A Yes, sir, it is.

4 Q Anyone else?

5 A No.

6 Q How long did you meet?

7 A About -- I don't know, about four hours,
8 probably.

9 Q How many hours total did you spend
10 preparing for your deposition?

11 A Probably 25 to 30.

12 Q In Section 4 of your declaration you list
13 multiple materials that you considered in drafting
14 this declaration.

15 Did you consider any other documents
16 besides those listed in Section 4 in writing your
17 declaration?

18 A These are the documents I relied on,
19 those listed in Section 4.

20 Q And no others?

21 A No, no others I relied on. No.

22 MR. QUARLES: Harold, please bring up

1 file name IPR2024-01274, Paper 13, Patent Owner's
2 Motion to Amend.PDF.

3 Q Dr. Durham, if you'd let me know when you
4 can access that, that would be great.

5 A Sure.

6 Okay, I've got it up.

7 Q Let's turn to Appendix Page A-1.

8 A Okay.

9 Q Claim 21, Limitation E, specifies,
10 "Wherein the electric pump has a maximum
11 continuous torque of at least 11,488 lb-ft or
12 more."

13 Right?

14 A Yes, sir.

15 Q Claim 21, Limitation F, specifies,
16 "Wherein the electric pump has a maximum
17 continuous power output of at least 1750 brake
18 horsepower or more."

19 Right?

20 A Yes, sir.

21 Q Turning to Appendix Page A-5. Claim 28,
22 Limitation F, specifies, "Wherein the electric

1 pump has a maximum continuous torque of at least
2 11,488 lb-ft or more."

3 Right?

4 A At 28F, yes.

5 Q Claim 28, Limitation G, specifies,
6 "Wherein the electric pump has a maximum
7 continuous power output of at least 1750 brake
8 horsepower or more."

9 Right?

10 A Yes, sir.

11 Q Turning to Appendix Page A-9. Claim 37,
12 Limitation F, specifies, "Wherein each electric
13 pump has a maximum continuous torque of at least
14 11,488 lb-ft or more."

15 Right?

16 A Yes, it does.

17 Q Claim 37, Limitation G, specifies,
18 "Wherein each electric pump has a maximum
19 continuous power output of at least 1750 brake
20 horsepower or more."

21 Right?

22 A Yes, sir.

1 Q A POSITA would understand that an
2 electric pump in the context of Claims 21, 28, and
3 37 refers to a hydraulic fracturing pump driven by
4 electric motors. Right?

5 MR. WALTERS: Objection. Form.

6 A I'm not sure, to be honest, the POSITA
7 would understand the term "electric pump."
8 That -- that term really doesn't have any meaning
9 to me. But I understand, as it's used in the '992
10 patent, it's described as an electric motor
11 driving a pump.

12 Q The pump is comprised of the fluid end
13 and power end itself is not electric, but rather
14 is driven by prime mover powered by electricity.
15 Right?

16 MR. WALTERS: Objection. Form.

17 A I'm not sure. I don't recall whether the
18 '992 describes fluid end and the power end the way
19 you described it or not.

20 Q How would a POSITA understand it in
21 reading the '992 patent?

22 MR. WALTERS: Objection. Form.

1 A Well, I -- I don't have the '992 patent
2 up in front of me right now. But generally as I
3 described, it's a pump driven by an electric
4 motor, as I said earlier.

5 Q So wouldn't a POSITA understand that
6 Claim 21 refers to an electric frack pump that has
7 a plunger pump that's driven by a prime mover,
8 with the maximum continuous torque of at least
9 11,488 lb-ft or more and a brake horsepower of at
10 least 1750 or more?

11 MR. WALTERS: Objection. Form.

12 A I don't recall whether the '992 patent
13 describes it as a plunger pump or not.

14 Q How would a POSITA understand it in
15 reading the '992 patent?

16 MR. WALTERS: Objection. Form.

17 A A pump driven by an electric motor.

18 Q So if this Claim 21 E language were to
19 instead read, "Wherein the total output of the one
20 or more electric motors driving the pump has a
21 maximum continuous torque of at least 11,488 lb-ft
22 or more," would that have a reasonably certain

1 claim scope?

2 MR. WALTERS: Objection. Form.

3 A No, sir, I don't believe it would.

4 Q Why not?

5 A Because the use of the term "continuous"
6 in the '992 patent does not -- is not defined, it
7 doesn't have a meaning.

8 MR. QUARLES: Harold, would you please
9 bring up file name EX-1026, Kohlenberger.PDF.

10 (Exhibit 1026, previously marked, not
11 attached.)

12 Q Let's turn to what's been previously
13 marked as Exhibit 1026, which I'll refer to as
14 Kohlenberger.

15 A Okay.

16 Q Let's turn to Column 5, Line 65 through
17 Column 6, Line 6.

18 A Okay, I'm there.

19 Q Column 5, Line 65 through Column 6, Line
20 6 reads, "A motor turbine control center 46
21 controls the ignition and feed of the combustion
22 fuel entering the gas turbine 42 as well as the

1 electricity required to operate the electrical
2 compressor drives (not shown) to lower the
3 temperature of the cooling coils 12, 14, 16. This
4 motor turbine control center 46 has sensors (not
5 shown) within the air inlet to insure that the air
6 entering the turbine cabinet 48 is a constant
7 temperature and pressure to optimize the
8 performance of the gas turbine 42."

9 Kohlenberger discusses sensors within the
10 air inlet. Right?

11 A Yes, sir, it does.

12 Q Kohlenberger does not expressly discuss
13 monitoring for a failure of air inlet sensors.

14 Right?

15 MR. WALTERS: Objection. Form.

16 A I agree with that.

17 Q Kohlenberger discusses that sensors
18 within the air inlet insure that the air entering
19 the turbine cabinet is a constant temperature and
20 pressure. Right?

21 A Yes, in this paragraph.

22 Q A POSITA would understand that one way of

1 implementing a system to ensure that the air
2 entering the turbine cabinet is a constant
3 temperature and pressure would be for the sensors
4 to provide signals to indicate an overpressure or
5 underpressure, as opposed to providing actual
6 pressure values. Right?

7 MR. WALTERS: Objection. Form.

8 A I think I would have to think about that
9 question in terms of Kohlenberger. That's not the
10 way I read Kohlenberger, so I think I would have
11 to spend some time with this reference to answer
12 that question.

13 Q Would you like a few minutes to reflect
14 on Kohlenberger?

15 A I think it would take probably more than
16 a few minutes. That's kind of a whole different
17 way of looking at things.

18 Q So sitting here today, you don't know
19 whether or not a POSITA would understand that one
20 way of implementing a system to ensure that the
21 air entering the turbine cabinet is of constant
22 temperature and pressure would be for the sensors

1 to provide signals to indicate an overpressure or
2 underpressure.

3 Is that right?

4 MR. WALTERS: Objection. Form.

5 A In terms of Kohlenberger, that's correct.

6 Q Kohlenberger does not expressly discuss
7 pressure sensors providing specific pressure
8 values. Right?

9 MR. WALTERS: Objection. Form.

10 A I think that's the same question, same --
11 a different way to ask the same question. So I
12 think I would have to spend some time with the
13 reference in thinking about that to see if that's
14 true.

15 Q To be clear, you did review Kohlenberger.
16 Correct?

17 A Absolutely.

18 Q And you reviewed it in the context of the
19 '992 patent?

20 A Yes, sir.

21 Q And in your review, do you recall
22 Kohlenberger expressly discussing pressure sensors

1 providing specific pressure values?

2 A I don't recall.

3 Q Just to be clear, you're -- if I
4 understand correctly, you're saying that you don't
5 recall Kohlenberger expressly discussing pressure
6 sensors providing specific pressure values.

7 Right?

8 MR. WALTERS: Objection. Form.

9 A I don't recall whether it does or not.

10 Q Would you like to take a few minutes to
11 review Kohlenberger to see?

12 A Sure. I can answer that question in a
13 few minutes.

14 Specific pressure is defined in the
15 specification.

16 Q Okay.

17 MR. QUARLES: Harold, please bring up
18 file name starting with EX-1027.

19 (Exhibit 1027, previously marked, not
20 attached.)

21 Q Let's turn to what has previously been
22 marked as Exhibit 1027, which I will refer to as

1 Ekanayake. Let's turn to Column 1, Lines 24
2 through 27, which says, "To provide a safe and
3 efficient operation, air entering the gas" --

4 A Hold on a second. Hold on a second, I'm
5 not quite there.

6 Q Sure.

7 A Okay. Yep, I'm there now.

8 Q Column 1, Lines 24 through 27, it says,
9 "To provide a safe and efficient operation, air
10 entering a gas turbine for power generation
11 applications is filtered. The gas turbine air
12 inlet system may include an inlet filter house and
13 associated ducting."

14 So Ekanayake discusses that air entering
15 a gas turbine for power generation applications is
16 filtered. Right?

17 A Yes, sir.

18 Q Let's turn to Column 2, Lines 19 through
19 35. You can let me know when you get there.

20 A Okay, I'm there.

21 Q At Column 2, Lines 19 through 35 it says,
22 "In another embodiment, a method for servicing a

1 filter system having a plurality of filter
2 assemblies, including measuring the degree of
3 fouling in at least one of the plurality of filter
4 assemblies, wirelessly communicating the degree of
5 fouling, and servicing the filter system when the
6 degree of fouling exceeds a predetermined level."

7 Ekanayake discusses an embodiment that
8 includes filter assemblies. Right?

9 MR. WALTERS: Objection. Form.

10 A It does.

11 Q Ekanayake discusses filter assemblies
12 that include measuring the degree of fouling and
13 wirelessly communicating the degree of fouling.

14 Right?

15 A Yes, sir.

16 Q Ekanayake does not expressly discuss
17 monitoring for a transmitter failure. Right?

18 MR. WALTERS: Objection. Form.

19 A I agree with that.

20 Q Ekanayake does not expressly discuss
21 monitoring for failures. Right?

22 A It does not use the term "failure," no.

1 Ekanayake does not.

2 MR. QUARLES: Harold, please bring up
3 file name starting with EX-2004.

4 (Exhibit 2004, previously marked, not
5 attached.)

6 Q Dr. Durham, if you'd let me know when you
7 have that document, it would be great.

8 A Okay, I've got that. 2004 from the '870
9 IPR.

10 Q Do you recognize this document?

11 A Yes, sir, I do.

12 Q What is it?

13 A This is my declaration in the '870 IPR.
14 IPR2023-00558.

15 Q Let's turn to Page 1.

16 A Okay.

17 Q This declaration involved U.S. Patent
18 Number 11,136,870. Right?

19 A Yes, sir.

20 Q For purposes of our discussion, I will
21 refer to this as the '870 patent.

22 Let's turn to Page 12.

1 A Okay.

2 Q On Page 12 you provide a list of
3 exhibits. Right?

4 A Yes, sir, it starts on Page 12 and goes
5 for a couple of pages.

6 Q One of those exhibits is Exhibit 1005,
7 which is U.S. Patent Publication Number
8 2012/0255734, to Coli. Right?

9 A Yes, sir.

10 Q So the Exhibit 1005 to Coli listed here
11 is the same Coli reference that is Exhibit 1004 in
12 this IPR2024-01274 proceeding. Right?

13 A Yes, sir, it is.

14 Q Let's turn to Paragraph 203 of your
15 declaration.

16 A Okay.

17 Q In Paragraph 203 you opine regarding
18 Claim 15 of the '870 patent. Right?

19 A Claim 15, yes, sir.

20 Q Specifically Claim 15 of the '870 patent
21 specifies, "The system of Claim 7 wherein the
22 electric motor has a maximum continuous power

1 output of about 1750 brake horsepower or more."

2 Right?

3 A Yes, sir.

4 Q In Paragraph 203, you opine that Coli
5 discloses that the motor can deliver a true 2500
6 horsepower directly to each pump 22 because pump
7 22 is directly coupled to electric motor 21,
8 citing Exhibit 1005, Paragraph 49.

9 You go on to opine that, "Accordingly, a
10 POSITA at the time of the '870 patent was filed
11 would have recognized that Coli discloses the
12 electric motor has a maximum continuous power
13 output of about 1750 horsepower or more."

14 Is that right?

15 A Yes.

16 Q You did not opine that the limitation,
17 Wherein the electric motor has a maximum
18 continuous power output of about 1750 brake
19 horsepower or more is not well known to a person
20 of ordinary skill.

21 Right?

22 MR. WALTERS: Objection. Form.

1 A I did not opine that.

2 Q More specifically, you did not opine that
3 the term "maximum continuous power" is not
4 well-known to a person of ordinary skill. Right?

5 MR. WALTERS: Objection. Form.

6 A I did not opine that.

7 Q Let's look at Paragraph 204.

8 A Okay.

9 Q In Paragraph 204 you opine regarding
10 Claim 16 of the '870 patent. Right?

11 A Yes, sir, that's correct.

12 Q Specifically Claim 16 of the '870 patent
13 specifies that the system of Claim 7, wherein the
14 electric motor has a maximum continuous torque of
15 about 8750 lb-ft or more. Right?

16 A Yes, sir, that is Claim 16.

17 Q In Paragraph 204 you opine that Coli
18 discloses that the electric motor can be capable
19 of operation in the range of up to 1500 RPMs and
20 up to 20,000 ft-lbs of torque, citing Exhibit
21 1005, Paragraph 11.

22 You go on to opine that, "Accordingly, a

1 POSITA at the time the '875 patent was filed would
2 have recognized that Coli discloses an electric
3 motor has a maximum continuous torque of about
4 8750 ft-lb or more."

5 Is that right?

6 A Yes.

7 Q You did not opine that the limitation,
8 Wherein the electric motor has a maximum
9 continuous torque of about 8750 lb-ft or more is
10 not well known to a person of ordinary skill.

11 Right?

12 MR. WALTERS: Objection. Form.

13 A I did not opine that.

14 Q More specifically, you did not opine that
15 the term "maximum continuous torque" is not
16 well-known to a person of ordinary skill. Right?

17 MR. WALTERS: Objection. Form.

18 A I did not opine that.

19 Q Let's turn to Page 82.

20 A Okay. Page 82?

21 Q Yes.

22 A Of the '870 declaration?

1 Q Yes.

2 A Okay.

3 Q On Page 82 you provide an overview of the
4 disclosure of Gardner. Right?

5 A Yes, sir. Starts on Page 82.

6 Q Let's look at Paragraph 144 under that
7 overview section.

8 A Okay.

9 Q In Paragraph 144 you opine that "A POSITA
10 would have known that the output hydraulic
11 horsepower rating of a pump corresponds to the
12 maximum power that the pump can output using any
13 given plunger diameter."

14 Right?

15 A Yes.

16 Q Let's look at Paragraph 145.

17 A Okay.

18 Q In Paragraph 145 you opine that, A POSITA
19 would have, therefore, understood that a pump that
20 has a brake horsepower rating of 2500 is a pump
21 rated at about 2250 (hydraulic) horsepower or
22 more, as recited in Claim 14."

1 Right?

2 A Yes, sir.

3 Q Let's turn to Paragraph 146.

4 A Okay, I'm there.

5 Q In Paragraph 146 you opine that, "In
6 addition, a POSITA would have understood that
7 Gardner discloses a plunger-type quintuplex pump
8 for fracturing operations that includes an 8-inch
9 stroke, 4.5-inch diameter plungers, and is rated
10 at about 2250 (hydraulic) horsepower or more.
11 Relatedly, a POSITA would have understood an
12 electric motor coupled to the Gardner pump would
13 be equipped to provide a maximum continuous power
14 output of more than 1750 horsepower."

15 Right?

16 A Yes, sir.

17 Q You did not opine that the term "maximum
18 continuous power output" is not well-known to a
19 person of ordinary skill. Right?

20 MR. WALTERS: Objection. Form.

21 A I did not opine that.

22 MR. QUARLES: Harold, please bring up the

1 file name starting with EX-2105. And let's mark
2 this as Exhibit 2105. 2105, for clarification.

3 (Exhibit 2105 marked for identification
4 and is attached to the transcript.)

5 Q We have here on the screen Exhibit 2105,
6 which is a document from AmeriMex Motor &
7 Controls, Inc., with Bates LIBERTY_00033439.

8 Have you heard of AmeriMex Motor &
9 Controls?

10 A Yes, sir, I have.

11 Q Do you have a general understanding of
12 what is shown here in Exhibit 2105?

13 A Yes, sir. It's a speed torque curve.

14 Q You have experience with motor torque and
15 RPM curves. Right?

16 A Yes, sir.

17 Q Do you agree that this shows intermittent
18 torque values at various motor RPM values?

19 A Yes.

20 Q Do you agree that this shows continuous
21 torque at various motor RPM values?

22 A Yes, sir.

1 MR. WALTERS: Objection. Form.

2 MR. QUARLES: Harold, please bring up
3 file name starting with EX-2106. And let's mark
4 it as Exhibit 2106.

5 (Exhibit 2106 marked for identification
6 and is attached to the transcript.)

7 Q We have here on the screen Exhibit 2106,
8 which is UL 61088-5-1, Standard For Safety,
9 regarding Adjustable Speed Electrical Power Drive
10 Systems. Let's turn to Section 4.14DV.1.1, which
11 is on Page 112.

12 A 112 of the documentation or 112 of the
13 PDF?

14 Q 112 of the document.

15 A Oh, okay. All right. Thanks.

16 Okay. I'm there at 4.14DV.1.

17 Q Section 4.14DV.1.1, it says, "A bus
18 capacitor shall be rated for the voltage and the
19 temperature of the circuit involved. This rating
20 shall be based on the continuous working voltage
21 rating and the overvoltage surge rating."

22 Do you have a general understanding of

1 the term "continuous working voltage" as used in
2 Section 4.14DV.1.1?

3 MR. WALTERS: Objection. Form.

4 A Not without studying this document I
5 don't, no, sir.

6 Q Would you like a few moments to look over
7 the document?

8 A Sir, it's a 330-page standard. It's
9 going to take a lot more than a few moments.

10 Q Let's turn to Paragraph 5.2.3.8DV.2.2,
11 which is on Page 165 of the document.

12 A Which paragraph again?

13 Q 5.2.3.8DV.2.2.

14 A DV.2.2. Okay.

15 Okay, I'm there.

16 Q This section says, "To determine whether
17 power conversion equipment complies with the
18 temperature test requirements, it is to be
19 operated at the voltage specified in 5.2DV.1 until
20 thermal stabilization occurs under normal
21 conditions as follows: A, for continuous
22 operation, according to the continuous ratings; B,

1 for intermittent operation, according to the rated
2 duty cycle; or, C, for short-time operation, for
3 the rated operating time."

4 Do you have a general understanding of
5 what this excerpt means by the term "continuous
6 operation"?

7 MR. WALTERS: Objection. Form.

8 A It ties that with the continuous rating
9 of the -- of the power conversion equipment.

10 Let's see if 5.2DV.1 helps.

11 Continuous rating of the conversion
12 equipment, it would take some study of the
13 document. 5.1DV.1 wasn't very helpful.

14 Q Do you have a general understanding of
15 what is meant by the term "intermittent
16 operation"?

17 MR. WALTERS: Objection. Form.

18 A Could you give me that paragraph again?
19 I'm sorry. There we go. I'm back.

20 Less than continuous, more than
21 short-time, based on this paragraph.

22 Q Do you have a general understanding of

1 what this excerpt means by the term "short-term
2 operation"?

3 MR. WALTERS: Objection to form.

4 A It's the amount of operating time that
5 the conversion equipment can be operated based on
6 its rating, based on the rated operating time.

7 Q Let's turn to Paragraph 5.2.3.8DV.3.2.2
8 on Page 167 of the document.

9 A Okay.

10 Q In Section 5.2.3.8DV.3.2.2, it says, "The
11 equipment shall then be subjected to two
12 consecutive sets of cycling of the current. Each
13 set shall consist of 42 complete cycles. During
14 each cycle the current shall be on for 2 hours and
15 off for 2 hours; or if, during the initial heating
16 mentioned in 5.2.3.8DV.3.2.2, average temperatures
17 on the spring-loaded bus bar joint at the end of 2
18 hours are more than 5 degrees C lower than the
19 average final temperatures during continuous
20 operation, the current shall remain on for 3 hours
21 in each cycle."

22 Do you have a general understanding of

1 what this excerpt means by "continuous operation"?

2 MR. WALTERS: Objection. Form.

3 A No, sir. It appears that it's something
4 having to do with 42 cycles. But, no, that would
5 take fairly substantial study of the document and
6 the tests described.

7 MR. QUARLES: Harold, would you please
8 bring up file name starting with EX-1005.

9 (Exhibit 1005, previously marked, not
10 attached.)

11 Q Let's turn to what has been previously
12 marked as Exhibit 1005, which I will refer to as
13 Birch. Let's turn to Birch, Column 3, Lines 4
14 through 12.

15 A Okay, I'm there.

16 Q Birch, Column 3, Lines 4 through 12 says,
17 "In the separator tank 13, there are provided a
18 level switch 19 for monitoring the oil level, a
19 pressure sensor 17 for monitoring the discharge
20 (gas) pressure, and a thermocouple 18 for
21 monitoring the discharge (gas) temperature. If an
22 oil leak occurs and the lower oil level is

1 detected by the level switch 19, or if the
2 increase of the discharge (gas) temperature is
3 detected by the thermocouple 18, these error
4 signals are sent to a controller 31 which shuts
5 down the system, thereby preventing the escape of
6 gas."

7 Birch discusses a thermocouple 18 for
8 monitoring the gas charge discharge. Right?

9 A Yes, sir, it does.

10 Q Birch does not expressly discuss a
11 thermistor. Right?

12 MR. WALTERS: Objection. Form.

13 A Correct. I agree -- well, let me check.
14 Hold on.

15 Correct, it does not.

16 Q Birch does not expressly discuss the
17 thermocouple input module thermistor. Right?

18 A Correct.

19 Q Birch does not expressly discuss a
20 thermocouple input module thermistor failure.

21 Right?

22 A I agree with that.

1 Q Birch does not expressly discuss
2 monitoring for a failure of the thermocouple input
3 module thermistor. Right?

4 A I agree with that.

5 Q Birch does not expressly discuss
6 monitoring for any failures of the thermocouple.
7 Right?

8 A I believe that is correct. I don't
9 recall any.

10 MR. QUARLES: At this point we've been
11 going for about an hour. So if you would like to
12 take a break, then now is probably a good time.

13 THE WITNESS: You beat me to it. Thank
14 you.

15 MR. QUARLES: Sure.

16 (A recess was taken.)

17 BY MR. QUARLES:

18 Q Let's turn to Birch, Column 2, Lines 30
19 through 39.

20 A Okay.

21 Q Birch Column 2, Lines 30 through 39 says,
22 "Referring first to Figure 1, hydrocarbon gas,

1 usually natural gas at low pressure, enters the
2 system from a mains supply 1. Items 2 to 7 are
3 required by British Gas in this embodiment and
4 protect the mains supply from being under- or
5 over-pressurized by a fault developing in the
6 compressor system. The gas passes through a plug
7 cock 2, a particulate filter 3, a solenoid
8 isolating valve 4, a flexible connection 5, under
9 and over pressure electronic sensors 6A and 6B,
10 and through an approved non-return valve 7."

11 Birch discusses under- and over-pressure
12 electronic sensors 6A and 6B. Right?

13 A Yes, sir.

14 Q Birch's under-pressure sensor senses
15 under pressure. Right?

16 A I think that's a fair representation.

17 Q Birch's over-pressure sensor senses over
18 pressure. Right?

19 A Yes, sir.

20 Q Birch does not expressly discuss
21 transmitting the actual gas fuel supply pressure
22 value. Right?

1 MR. WALTERS: Objection. Form.

2 A Could you repeat the question, make sure
3 I answer the correct question?

4 Q Sure. Birch does not expressly discuss
5 transmitting the actual gas fuel supply pressure
6 value. Right?

7 MR. WALTERS: Objection. Form.

8 A I disagree.

9 Q Where does it expressly discuss
10 transmitting the actual gas fuel supply pressure
11 value?

12 A At least in Column 3, Lines 5 through 8,
13 that sentence, that clause.

14 Q Birch does not expressly discuss
15 monitoring for a transmitter failure. Right?

16 MR. WALTERS: Objection. Form.

17 A As I recall, I can agree with that, yes.

18 MR. QUARLES: Harold, would you please
19 bring up file name starting with EX-1007.

20 (Exhibit 1007, previously marked, not
21 attached.)

22 Q Let's look at what's been previously

1 marked as Exhibit 1007, U.S. 2008/0288115 A1 to
2 Rusnak. Let's look at Paragraph 3.

3 A Okay, I'm at Paragraph 3.

4 Q Paragraph 3 it says, "In other prior art
5 pump control methods, relationships (curves) are
6 developed between TDH and Torque for minimum and
7 maximum allowable flow points over a variety of
8 speeds and used to identify the operating point of
9 the pump and determine if it is operating within
10 an allowable minimum and maximum flow range. Pump
11 performance curves, relationships between BHP,
12 flow, and TDH, and between BHP, torque and speed,
13 as well as the Affinity laws are used to develop
14 the TDH versus torque curves. Motor torque and
15 speed values from a VFD are supplied to a
16 processor where TDH, torque and speed
17 relationships are used in a processor to identify
18 the operating point of the pump and determine if
19 the pump is operating within the allowable minimum
20 and maximum allowable flow ranges. This method
21 has been deployed in a VFD."

22 So Rusnak discusses prior art control

1 methods in which motor, torque and speed values
2 from a VFD are supplied to a processor where the
3 torque and speed relationships are used by the
4 processor to identify the operating point of the
5 pump and determine if the pump is operating within
6 the allowable minimum and maximum allowable flow
7 ranges. Right?

8 MR. WALTERS: Objection. Form.

9 A Yes.

10 Q Let's look at Rusnak Paragraph 4. Rusnak
11 Paragraph 4 says, "Although the above prior art
12 methods are adequate for their intended purposes,
13 it would be useful to have a pump controller that
14 neither requires an external sensor, nor does it
15 require performance values calculated at multiple
16 speeds to be stored in memory. Also, it would be
17 useful to have a controller that does not require
18 generation of any unique performance curves, i.e.
19 TDH versus Torque. Such features would simplify
20 the set-up and operation of a VFD controller for a
21 centrifugal pump."

22 So Rusnak further teaches the advantages

1 over the prior art of having a pump controller
2 that does not require an external sensor, does not
3 require performance values calculated at multiple
4 speeds to be stored in memory, and does not
5 require generation of any unique performance
6 curves. Right?

7 MR. WALTERS: Objection. Form.

8 A Yes.

9 Q Rusnak teaches the advantage over the
10 prior art is to simplify the set-up and operation
11 of a VFD controller for a centrifugal pump.

12 Right?

13 MR. WALTERS: Objection. Form.

14 A It says that those features would be
15 useful. And the same as the previous question. I
16 tried to amend my answer. It describes it would
17 be useful. It doesn't describe the advantages,
18 necessarily. At least not in that paragraph.

19 Q Let's look at Rusnak Paragraph 5.

20 Paragraph 5 says, "A method of
21 controlling operation of a centrifugal pump in a
22 fluid pumping system having a variable frequency

1 drive powering an alternating current (AC) motor
2 which turns said centrifugal pump is disclosed.
3 The method comprises internally monitoring
4 automatically output current and voltage of the
5 VFD to the AC motor without the need for an
6 external sensor, calculating automatically output
7 power based on monitored values of said output
8 current and voltage; checking automatically
9 whether said calculated output power is either
10 above a predetermined high power limit or below a
11 predetermined low power limit for a desired
12 setpoint; and initiating automatically a
13 predetermined response action if said calculated
14 output power is either above said predetermined
15 high power limit or below said predetermined low
16 power limit."

17 So Rusnak teaches a method which
18 comprises internally monitoring automatically
19 output current and voltage of the VFD without the
20 need for an external sensor. Right?

21 MR. WALTERS: Objection. Form.

22 A It says the output current voltage of the

1 VFD to the AC motor without the need for an
2 external sensor. I think you left out "to the AC
3 motor" part.

4 Q Rusnak further describes calculating
5 automatically output power based on monitored
6 values of output current and voltage. Right?

7 MR. WALTERS: Objection. Form.

8 A Yes, sir.

9 Q Let's look at Rusnak Paragraph 37.
10 Rusnak Paragraph 37 says, "It is to be appreciated
11 that in process control mode the present invention
12 does not compare the actual operating point of the
13 centrifugal pump (based on motor torque and motor
14 speed) to minimum and maximum flow operating
15 ranges."

16 The method disclosed in Rusnak does not
17 compare the actual operating point of the
18 centrifugal pump which is based on motor and
19 torque -- motor torque and motor speed to minimum
20 and maximum flow operating ranges.

21 Right?

22 MR. WALTERS: Objection. Form.

1 A And that's true when it's operating in
2 process control mode. I don't know that that's
3 true in the rest of the document. I believe it's
4 not true.

5 Q Let's look at Rusnak Paragraph 46.
6 Rusnak Paragraph 46 on or about 12 lines down from
7 the right column on Page 5.

8 A Okay.

9 Q Says that "The present invention does not
10 require generation of any unique performance
11 curves, i.e. TDH versus Torque."

12 Rusnak does not expressly discuss using
13 torque as part of its calculation method. Right?

14 MR. WALTERS: Objection. Form.

15 A Rusnak describes prior art methods that
16 measure torque and use that in calculations. And
17 also describes in, for example Paragraph 54,
18 techniques for protection based on torque
19 measurement or estimation. So I disagree with
20 your statement.

21 Q Other than discussing prior art methods,
22 Rusnak does not expressly discuss using torque as

1 part of its calculation method. Right?

2 MR. WALTERS: Objection. Form.

3 A I disagree.

4 Q Where does Rusnak discuss expressly using
5 torque as part of its calculation method other
6 than as describing prior art methods?

7 MR. WALTERS: Objection. Form.

8 A In describing the -- hold on a second.

9 In describing the IPS monitors, and
10 specifically the pump power monitor 600. It --

11 Q What paragraph are you on?

12 A Well, it's a whole -- it's a whole length
13 of paragraphs between 44 through -- well, starting
14 at Paragraph 44 it describes the IPS monitors.
15 And it describes in Paragraph 46 power limits,
16 which are the torque and speed, can be selected
17 from the pump's standard performance curves or
18 specific values provided with the pump selection
19 or specification documents in order to protect the
20 pump.

21 But while it describes it does not
22 require generation of total dynamic head versus

1 torque, it uses the standard performance curves,
2 which are speed and torque curves, to protect the
3 pump.

4 Q And where specifically are you seeing
5 that it uses the word "torque" in saying how it is
6 performing? Not the prior art, but how the method
7 according to Rusnak.

8 MR. WALTERS: Objection. Form.

9 A It's -- the pump power monitor is used in
10 either -- this is Paragraph 46. The pump power
11 monitor, PPM, is used in either process or speed
12 control mode to detect pump operation at power
13 levels above or below predetermined normal levels.
14 Pump power levels are a product of speed and
15 torque. And then it goes on to describe it can
16 use standard performance curves versus TDH versus
17 torque curves, which were described in the prior
18 art.

19 Q You're in Paragraph 46?

20 A Yes.

21 Q The only usage of the word "torque" in
22 Paragraph 46 is where it says, "Accordingly, the

1 present invention does not require generation of
2 any unique performance curves, i.e., TDH versus
3 torque."

4 Is that right?

5 A Yes, that's the only time it uses the
6 word "torque."

7 But then goes on to describe standard
8 performance curves and Affinity laws in those
9 paragraphs surrounding it, which are -- themselves
10 contain torque; speed torque, Affinity laws,
11 torque versus speed formula, those kind of things.
12 So it's contained within the disclosure of Rusnak.

13 Q So to be clear, it does not use the word
14 "torque" other than in that paragraph where it
15 says, "Accordingly, the present invention does not
16 require generation of any unique performance
17 curves, i.e., TDH versus torque."

18 Right?

19 MR. WALTERS: Objection. Form.

20 A Yes, that's the only place the word
21 "torque" is used in the paragraph. Torque is
22 contained in the rest of the disclosure of that

1 paragraph and the ones surrounding it.

2 Q When you say "contained," it's not
3 specifically described as a -- it does not use the
4 word "torque." Correct?

5 MR. WALTERS: Objection. Form.

6 A Right. In describing the standard
7 performance curves or the Affinity laws, Rusnak
8 does not use the word "torque"; but torque is
9 contained in those standard performance curves and
10 Affinity laws.

11 Q Rusnak also discusses the desirability of
12 its method over the prior art that uses
13 performance curves involving torque. Right?

14 MR. WALTERS: Objection. Form.

15 A No. Rusnak still has performance curve
16 that contain torque. It just does not require it
17 total dynamic head versus torque curve, which is a
18 very specific curve.

19 Q Rusnak discusses that the present
20 invention does not require generation of any
21 unique performance curves. Right?

22 MR. WALTERS: Objection. Form.

1 A Specifically total dynamic head versus
2 torque, I agree. And total dynamic head versus
3 torque is system-specific, not pump-specific.

4 Q Let's turn to Paragraph 80 of Rusnak.

5 A Okay.

6 Q In Paragraph 80, on or about eight lines
7 down it says, "After the number of seconds in the
8 user-defined delay of the auto retry (Auto Rstrt
9 Delay) has elapsed, the controller 30 will
10 automatically reset the faulted condition."

11 Rusnak does not expressly discuss
12 monitoring for any configuration failures. Right?

13 MR. WALTERS: Objection. Form.

14 A It does not use the term "configuration
15 failure," I agree with that.

16 Q Rusnak does not expressly discuss
17 monitoring for a failure of the VFD to start.

18 Right?

19 A It does not use that term "failure to
20 start." It does talk about faults in the VFD, and
21 failure to start is a pretty basic fault. I
22 believe it's contained in the disclosure, but it

1 does not use the term "failure to start."

2 Well, I'm going to take back that answer.

3 No. I think in Paragraph 80 it is there, "When
4 the auto restart is enabled by the user setting a
5 value greater than zero for the number of restarts
6 of the auto entry (Auto Rstrt Tries), and an auto
7 reset fault occurs, the controller will stop and
8 remain in the fault condition."

9 So it is monitoring for a restart, which
10 would be a type of start and a failure of the
11 restart.

12 MR. QUARLES: Harold, would you please
13 bring up file name starting with EX-1004.

14 (Exhibit 1004, previously marked, not
15 attached.)

16 Q This has previously been marked as
17 Exhibit 1004 to Coli. Let's look at Coli,
18 Paragraph 72.

19 A Okay.

20 Q Coli Paragraph 72 says, "Suitable
21 controls and computer monitoring for the entire
22 fracturing operation can take place at a single

1 central location, which facilitates adherence to
2 pre-set safety parameters."

3 Coli does not expressly discuss its
4 control center 40 monitoring transformers. Right?

5 A It does. Right in that paragraph. Right
6 in that sentence you just read. Because
7 transformers are part of the system of Coli, and
8 it's monitoring the entire fracturing operation.

9 Q It does not use the term that it's
10 monitoring. It does not expressly use the term
11 that it's monitoring transformers. Right?

12 MR. WALTERS: Objection. Form.

13 A It does not expressly use the term
14 "monitoring transformers," I'd agree with that.

15 Q Coli does not expressly discuss and use
16 the term that it's monitoring for switch gear.

17 Right?

18 MR. WALTERS: Objection. Form.

19 A It does not use the term "monitoring for
20 switch gear," but it does discuss monitoring
21 switch gear, combining Paragraph 72 with the rest
22 of Coli and the other references.

1 Q Coli does not expressly discuss switch
2 gear anywhere in its -- inside of its disclosure.

3 Right?

4 MR. WALTERS: Objection. Form.

5 A Yes, I can agree with that.

6 MR. QUARLES: Harold, please bring up
7 file name starting with EX-1040.

8 (Exhibit 1040, previously marked, not
9 attached.)

10 Q Let's turn to what's previously been
11 marked as Exhibit 1040, which I'll refer to as
12 Omont. Let's turn to Paragraph 48.

13 Now, Paragraph 48, it says, "The additive
14 system 201 may comprise a container 240, such as
15 may be or comprise one or more of the containers
16 110, 112, 130, 140 shown in Figure 1. The
17 container 240 may be an implementation of the
18 monitored subsystem 202, and may thus comprise one
19 or more sensors 204, such as material quantity
20 sensors operable to generate information related
21 to level, volume, and/or mass of the material
22 within the container 240."

1 Omont Paragraph 48 discusses material
2 quantity sensors operable to generate information
3 related to level, volume, and/or mass of the
4 material within the container 240. Right?

5 MR. WALTERS: Objection. Form.

6 A It does.

7 Q Let's turn to Paragraph 99.

8 Paragraph 99 it says, "The automation
9 diagnostic tool 530" --

10 A Hold on. I'm not quite there. Sorry.

11 Q Sure.

12 A Okay.

13 Q In Paragraph 99 it says, "The automation
14 diagnostic tool 530 performs automation
15 diagnostics for monitoring automatic operations of
16 the additive system 200 without human operator
17 knowledge or participation. For example, during a
18 tub calibration procedure in cementing operations,
19 the automation diagnostics may monitor a rise in
20 tub level to complete the calibration process."

21 Omont Paragraph 99 discusses monitoring a
22 rise in tub level to complete the calibration

1 process. Right?

2 A Yes.

3 Q Let's turn to Paragraph 120.

4 On or about 11 lines down in Paragraph
5 120 it says, "Additional examples of log
6 parameters associated with the prime mover may
7 indicate dates of engine oil, transmission fluid,
8 and other fluid changes, as well as servicing of
9 filters, air systems, and other components,
10 including with respect to date, operating hours,
11 elapsed functional life, and/or other factors."

12 Omont Paragraph 120 discusses logging
13 dates of engine oil and transmission fluid.

14 Right?

15 A Among other things, yes, sir.

16 Q A POSITA may understand dates of engine
17 oil to be the date the engine oil was last
18 changed. Right?

19 MR. WALTERS: Objection. Form.

20 A He may understand that.

21 Q Omont does not expressly discuss
22 monitoring hydraulic oil level. Right?

1 MR. WALTERS: Objection. Form.

2 A Yes, I believe that's correct, from my
3 recollection.

4 Q What would a POSITA understand to be the
5 difference between engine oil and hydraulic oil?

6 A Generally, engine oil provides lubricant
7 for operation of an engine, and hydraulic oil
8 provides power transfer and lubrication for a
9 hydraulic engine.

10 Q What would a POSITA understand to be the
11 difference between the difference between
12 transmission fluid and hydraulic oil?

13 A They have very, very similar
14 characteristics. The transmission fluid is used
15 to, among other things, lubricate the transmission
16 system and provide energy transfer, torque
17 transfer between components of the transmission
18 system. Whereas hydraulic oil is used, again, to
19 lubricate and to provide power transfer in a
20 hydraulic engine.

21 MR. QUARLES: Harold, please bring up
22 file name starting with EX-1037.

1 (Exhibit 1037, previously marked, not
2 attached.)

3 Q Dr. Durham, if you could let me know when
4 you can see that, that would be great.

5 A Yeah, I've got Thompson.

6 Q Let's turn to what's previously been
7 marked as Exhibit 1037, which I will refer to as
8 Thompson. Let's turn to Thompson Paragraph 2.

9 Thompson Paragraph 2 says, "The present
10 invention relates to field communication
11 distribution equipment."

12 So Thompson relates to field
13 communication distribution equipment. Right?

14 A Yes. And more particularly to
15 improvements in cables for such equipment to
16 increase data throughput of such cables without
17 increasing cross-talk and other interference
18 between data communication channels between the
19 distribution equipment. And it goes on to
20 describe quite a bit else.

21 Q Thompson does not expressly discuss power
22 distribution equipment. Right?

1 MR. WALTERS: Objection. Form.

2 Q More specifically Thompson does not
3 expressly use the term "power distribution
4 equipment." Right?

5 A Well, it doesn't use that term. But it
6 certainly does discuss power distribution
7 equipment throughout the document.

8 Q Thompson does not expressly discuss oil
9 fracking. Right?

10 A No, I don't believe Thompson specifically
11 discusses fracturing for oil in gas operations. I
12 believe that would be encompassed in the term
13 "field," Paragraph 2.

14 Q Thompson does not expressly discuss
15 switch gear. Right?

16 A I don't think I can agree with that. I
17 think the fuses and switches discussed in
18 Thompson, for example in Paragraph 45 on the fuses
19 and switches throughout, would probably be
20 classified as switch gear. I think I would want
21 to spend some time with Thompson to think about
22 that, but I think that's true.

1 Q Thompson does not expressly use the term
2 "switch gear." Correct?

3 A Correct. It does not use the term
4 "switch gear," I agree with that.

5 Q Thompson does not expressly discuss
6 turbine generators. Right?

7 A Yeah -- yes, that's correct.

8 MR. QUARLES: Harold, would you please
9 bring up file name EX-1004.

10 Q Let's turn back to what's been previously
11 marked as Exhibit 1004, which we referred to as
12 Coli. Let's look at Coli Paragraph 72.

13 A Okay, I'm back to 72.

14 Q Coli Paragraph 72 says, "Suitable
15 controls and computer monitoring for the entire
16 fracturing operation can take place at a single
17 location which facilitates adherence to preset
18 safety parameters."

19 Let's talk about the term "computer
20 monitoring."

21 A POSITA would understand there may be
22 cost/benefit tradeoffs when designing a computer

1 monitoring structure for a fracturing operation.

2 Right?

3 MR. WALTERS: Objection. Form.

4 A I think that's true of any system design,
5 so I'll agree with that.

6 Q For any given parameter, a POSITA would
7 understand there would be cost to implementing
8 computer monitoring of that parameter. Right?

9 A Costs and benefits. You would have to
10 look at any particular parameter to see which one
11 outweighs the other. There might be cost savings.

12 In fact, there likely would be.

13 Q There may be hardware costs such as
14 sensors. Right?

15 A There may be, yes.

16 Q There may be software costs such as costs
17 of writing code to monitor the parameter. Right?

18 A Yes, sir.

19 Q There may be testing and integration
20 costs of adding a parameter to the list of
21 computer monitor parameters. Right?

22 A Yes.

1 Q There may be maintainability costs
2 associated with maintaining the hardware and
3 software to ensure reliable data readings. Right?

4 A Yes, there may be.

5 Q There may be risks associated with
6 relying on the accuracy of computer monitoring as
7 compared with, for example, a more hands-on
8 operator observation technique. Right?

9 MR. WALTERS: Objection. Form.

10 A No; I think you're reducing risk.

11 Q Is it your position that there would be
12 no risks associated with relying on the accuracy
13 of computer monitoring?

14 A No. It's my position that would reduce
15 overall risk.

16 Q And to be clear, there may be risks, not
17 necessarily overall risk, but there may be risks
18 associated with relying on the accuracy of a
19 computer monitor value being correct, as opposed
20 to a more direct observation without relying on a
21 computer?

22 MR. WALTERS: Objection. Form.

1 A It's been my experience computer
2 monitoring is more correct in most locations, in
3 most times, than it is relying on an observation
4 of a noncomputer meter or observation. So I
5 think, again, the risks are lower.

6 Q A POSITA would understand that the term
7 "computer monitoring" for the entire fracturing
8 fleet would necessarily include choosing to
9 implement computer monitoring -- strike that.

10 So a POSITA would understand that the
11 term "computer monitoring" for the entire
12 fracturing fleet would not necessarily include
13 choosing to implement computer monitoring of every
14 single possible parameter. Right?

15 MR. WALTERS: Objection. Form.

16 A Well, that's a complex question. Can you
17 repeat that, please?

18 Q Sure. So a POSITA would understand that
19 the term "computer monitoring" for the entire
20 fracturing fleet would not necessarily include
21 choosing to implement computer monitoring of every
22 single possible parameter. Right?

1 MR. WALTERS: Objection. Form.

2 A Correct, it would not necessarily include
3 that. It certainly would make monitoring of each
4 individual parameter obvious.

5 Q Coli does not expressly discuss
6 monitoring for transmitter failures. Right?

7 A It does not use the term "transmitter
8 failure."

9 MR. QUARLES: So probably a good time for
10 us to take a break. We've been going for about an
11 hour. So would you like ten minutes?

12 THE WITNESS: Ten minutes is great.

13 Thanks.

14 MR. QUARLES: Okay. Thanks.

15 (A recess was taken.)

16 BY MR. QUARLES:

17 Q Let's go back to what has been previously
18 marked as Exhibit 1007, Rusnak.

19 A Okay, I've got Rusnak open.

20 Q Specifically looking at Paragraph 44.

21 On or about six lines down in Paragraph
22 44 it says, "Such an embodiment eliminates the

1 need for external power measurement sensors and
2 external processing device."

3 Right?

4 A Yes.

5 Q In Paragraph 46, about ten lines down on
6 the right column on Page 5 it says, "The present
7 invention does not require an external sensor, nor
8 does it require performance values calculated at
9 multiple speeds to be stored. Accordingly, the
10 present invention does not require generation of
11 any unique performance curves, i.e. TDH versus
12 torque. In addition, the power limits can be
13 selected from the pump's standard performance
14 curves or specific values provided with pump
15 selection/specification documents in order to
16 protect the pump. Limits can also be selected by
17 the customer that not only protect the pump, but
18 may be required to protect the process."

19 So while Rusnak discusses selecting power
20 limits, in its embodiment it is not expressly
21 discussing measuring the torque value, as opposed
22 to setting power limits. Correct?

1 MR. WALTERS: Objection. Form.

2 A Correct. I can -- I can agree that
3 Rusnak's method does not require measuring the
4 torque value. It monitors it from the standard
5 performance curves and the Affinity relationships
6 based on speed.

7 Q A POSITA would understand that the
8 monitoring of parameters with a computer may run
9 the risk of the computer reporting the value
10 incorrectly. Right?

11 MR. WALTERS: Objection. Form.

12 A Yes, I think that -- that is there.
13 Whether that values come from the sensor's
14 communications or the computer itself.

15 MR. QUARLES: I believe that's all my
16 questions, so I will pass the witness.

17 MR. WALTERS: Can we take a 15-minute
18 break?

19 MR. QUARLES: Sure. No problem here.

20 (A recess was taken.)

21 MR. WALTERS: I don't have any questions,
22 so this should end the deposition.

1 (Off the record at 1:13 p.m. EDT.)

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ACKNOWLEDGMENT OF DEPONENT

I, ROBERT ALLAN DURHAM, 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.

2025-10-13

(DATE)


(SIGNATURE)

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C E R T I F I C A T E

I, Debra Ann Whitehead, E-Notary Public in and for
the Commonwealth of Virginia, do hereby certify:

That ROBERT ALLAN DURHAM, 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
virtually and is a true record of the testimony
given by such witness.

I further certify that the adverse
parties, LIBERTY ENERGY, INC., and LIBERTY OILFIELD
SERVICES LLC, were represented by counsel at the
deposition.

I further certify that the deposition of
ROBERT ALLAN DURHAM, Ph.D., occurred virtually, on
Wednesday, October 8, 2025, from 10:31 a.m. to 1:13
p.m. EDT.

1 I further certify that I am not related to
2 any of the parties to this action by blood or
3 marriage, I am not employed by or an attorney to any
4 of the parties to this action, and that I am in no
5 way interested, financially or otherwise, in the
6 outcome of this matter.

7

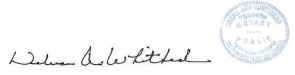
8 IN WITNESS WHEREOF, I have hereunto set my
9 hand this 12th day of October, 2025.

10

11 My commission expires:

12 October 31, 2027

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15 E-NOTARY PUBLIC IN AND FOR THE

16 COMMONWEALTH OF VIRGINIA

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