



Transcript of Robert Allan Durham, Ph.D., Volume 2

Date: December 11, 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

VOLUME 2
Deposition of ROBERT ALLAN DURHAM, Ph.D.
Conducted Virtually
Thursday, December 11, 2025
10:14 a.m.

REPORTED BY:
BOBBIE ZELTMAN
Professional Realtime Court Reporter
and Notary for New York and Florida

Job Number 612758

December 11, 2025
10:14 a.m.

VOLUME 2

Videotaped deposition of ROBERT ALLAN
DURHAM, Ph.D. taken by Patent Owner, pursuant to
Notice, via Zoom before BARBARA R. ZELTMAN, a
Professional Realtime Court Reporter and Notary
Public within and for the State of New York.

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

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8 BY: MELISSA L. MUENKS, ESQ., and

9 CHAD C. WALTERS, ESQUIRE

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18 BY: RICK HENRY QUARLES, ESQUIRE

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21
22 ALSO PRESENT: Saul Gan, Remote Tech

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IT IS HEREBY STIPULATED AND AGREED
by and between the attorneys for the respective
parties herein that filing and sealing be and
the same are hereby waived.

IT IS FURTHER STIPULATED AND AGREED
that all objections, except as to the form of
the question, shall be reserved to the time
of trial.

IT IS FURTHER STIPULATED AND AGREED
that the within deposition may be signed and
sworn to before any officer authorized to
administer an oath with the same force and
effect as if signed and sworn to before
the Court.

1 REMOTE TECH: Thank you
2 everyone for attending this
3 proceeding remotely which I
4 anticipate will run smoothly.

5 Please remember to speak slowly and
6 do your best not to talk over one
7 another.

8 Please be aware also we are
9 recording this proceeding for backup
10 purposes.

11 Any off-the-record discussions
12 should be had away from the computer.
13 Please remember to mute your mic for
14 those conversations.

15 Also, please have your video
16 enabled to help the reporter identify who
17 is speaking. If you are unable to
18 connect to video and are connecting
19 through the phone, please voice identify
20 yourself each time before speaking.

21 We will be providing a
22 complimentary unedited recording of this
23 deposition with a purchase of a
24 transcript. I apologize in advance for
25 any technical-related interruptions.

1 And I'll turn it over to our court
2 reporter, Bobbie.

3 ROBERT ALLAN DURHAM,
4 having been first duly sworn by
5 Barbara R. Zeltman, Notary Public, was
6 examined and testified as follows:

7 MR. WALTERS: Hi, Rick, I've
8 got one question. Is this being
9 video-recorded?

10 MR. QUARLES: No, not that I'm
11 aware of.

12 MR. WALTERS: Okay. An icon
13 popped up and I thought it might of
14 been.

15 MR. QUARLES: If that's wrong,
16 let me know, Saul.

17 But to my knowledge this is not
18 being video recorded.

19 REMOTE TECH: No, there is no
20 videographer here. It's just the
21 Zoom recording backup.

22 MR. QUARLES: Just the audio?

23 REMOTE TECH: And the video.

24 MR. WALTERS: We haven't agreed
25 to video. We are okay with the

1 audio.

2 REMOTE TECH: Mr. Quarles,
3 should I stop the recording?

4 MR. QUARLES: Yes, that's fine.

5 REMOTE TECH: Okay. There will
6 be an audio backup for this, though.

7 You can proceed, Counsel, if you
8 would like.

9 MR. QUARLES: Thank you.

10 EXAMINATION

11 BY MR. QUARLES:

12 Q Good morning, Dr. Durham.

13 A Good morning, Mr. Quarles.

14 (Liberty Exhibit 1052,
15 Declaration of Dr. Robert Durham in
16 Support of Petitioners' Opposition
17 to Patent Owners' Revised
18 Non-Contingent Motion to Amend,
19 Case No. IPR2024-01274, Patent
20 11,091,992, was previously marked
21 for Identification.)

22 BY MR. QUARLES:

23 Q I'll be asking you questions today
24 about your declarations, specifically your
25 third declaration IPR2024-01274, which has

1 been previously marked as Exhibit 1052, and
2 it is regarding U.S. Patent Number
3 11,091,992.

4 I'll be referring to the patent
5 today as the "'992 patent."

6 Will you please state your full
7 name for the record?

8 A Sure. Robert Allan, A-L-L-A-N,
9 Durham.

10 Q And where are you located today?

11 A Baker Botts office in Dallas,
12 Texas.

13 Q Have you ever been deposed before?

14 A Yes, sir.

15 Q How many times?

16 A A few. Over 120. Somewhere in
17 there.

18 Q If you need to take a break at any
19 time today, please let me know and I'll do
20 my best to take breaks shortly after you ask
21 for one. I will however ask that you answer
22 any pending questions.

23 Do you understand?

24 A Yes, sir.

25 Q If at any point you don't

1 understand my question, will you ask me to
2 restate it or repeat it so that we can
3 assume that if you've answered a question
4 you've understood it?

5 A Yes.

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

9 Do you have any documents in front
10 of you?

11 A I have a one-page errata sheet to
12 my third declaration.

13 Q Would you please read the contents
14 of your errata sheet in for the record?

15 A Yes. In Paragraph 90, there's a
16 parenthetical "(in the same volume)" that
17 should read "(in a lower volume)."

18 Paragraph 181, "[41o]," should read
19 "[411]."

20 And in Paragraph 515, Footnote 487,
21 the cite to Rusnak "Paragraph 87" should
22 read "Paragraph 80."

23 That's it.

24 Q Do you have any other documents in
25 front of you?

1 A No.

2 Q Is there a computer open in front
3 of you?

4 A Yes.

5 Q Is there anything open such as any
6 other applications besides the Zoom window
7 on that?

8 A No, there's not.

9 Q So no other applications are open?

10 A Correct.

11 Q Is there anything that would
12 prevent you from answering the questions
13 today honestly?

14 A No.

15 Q How many times have you offered
16 your expert opinion in a patent case?

17 A Probably 30 or 40 times.

18 Q What is your pay rate for this
19 case?

20 A 350 for analysis and 485 for
21 deposition.

22 Q Do you have any patents?

23 A No.

24 Q Have you ever applied to get a
25 patent?

1 A No.

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

4 A No, sir.

5 Q Did you submit a declaration in
6 connection with this IPR proceeding?

7 A Yes.

8 MR. QUARLES: Saul, would you
9 please bring up what's been marked as
10 Exhibit 1052.

11 MS. MUENKS: Mr. Quarles, can
12 you put the exhibit in the Chat,
13 please?

14 MR. QUARLES: I didn't quite
15 hear that. What was that?

16 MS. MUENKS: I asked if you
17 would be able to drop that in the
18 Chat as well, please.

19 REMOTE TECH: Counsel, I'm not
20 seeing Exhibit 1052.

21 MR. QUARLES: I just put it
22 into the Chat.

23 REMOTE TECH: Thank you. Give
24 me a second to mark it.

25 And this will be Durham 1, correct?

1 MR. QUARLES: This exhibit has
2 been previously marked 1052.

3 REMOTE TECH: It should be on
4 screen now, Counsel.

5 (Liberty Exhibit 1052,
6 Declaration of Dr. Robert Durham in
7 Support of Petitioners' Opposition
8 to Patent Owners' Revised
9 Non-Contingent Motion to Amend,
10 Case No. IPR2024-01274, Patent
11 11,091,992, was previously marked
12 for Identification.)

13 BY MR. QUARLES:

14 Q Is this your declaration,
15 Exhibit 1052?

16 A Yes, sir. It's my third
17 declaration in this IPR.

18 Q Is this your signature on Page 298?

19 A Yes, it is.

20 Q Other than the errata that you read
21 into the record, is there anything else that
22 you would like to change in your declaration
23 after your preparation for today's
24 deposition?

25 A Not that I know of.

1 Q Did you meet with anyone in
2 preparation for today's deposition?

3 A Yes, I met with Ms. Muenks
4 yesterday for about four hours.

5 Q Anyone else?

6 A No.

7 Q How many hours total did you spend
8 preparing for your deposition?

9 A Probably around 20.

10 Q In Section 4 of your declaration,
11 you list multiple materials that you
12 considered in drafting this declaration.

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

16 A I did not rely on any other
17 documents. I'm sure I've looked at other
18 ones.

19 Q You mentioned that this is your
20 third declaration, right?

21 A Yes, it is.

22 MR. QUARLES: Saul, would you
23 please bring up what's been marked as
24 Exhibit 1003.

25 REMOTE TECH: Counsel, I'm not

1 seeing that one either for some
2 reason.

3 MR. QUARLES: I just put it
4 into the Chat.

5 (Liberty Exhibit 1003,
6 Declaration of Dr. Robert Durham
7 Executed on September 4, 2024, Case
8 No. IPR2024-01274, Patent
9 11,091,992, was previously marked
10 for Identification.)

11 BY MR. QUARLES:

12 Q Dr. Durham, is this your first
13 deposition in this matter?

14 A No.

15 Q What's on the screen here, is this
16 your declaration?

17 A Exhibit 1003 is my first
18 declaration.

19 Q And is this your signature on
20 Page 185?

21 A Yes, it is.

22 Q Is there anything that you know of
23 that you would like to change about this
24 declaration?

25 A I believe -- I don't recall exactly

1 but I believe there's some errata that we
2 discussed during my first deposition
3 about -- that would affect 1003.

4 Q Other than that, is there anything
5 else that you would like to change about
6 this declaration?

7 A Nothing other than what we may have
8 discussed in the first deposition, no, sir.

9 Q Let's turn to Paragraph 116 of this
10 declaration.

11 A Of Exhibit 1003?

12 Q Yes.

13 A Okay. I'm there.

14 Q In Paragraph 116, you discuss Hunt,
15 which is U.S. Patent Publication
16 Number 2010/0038907, right?

17 A Yes.

18 Q I will refer to this publication as
19 "Hunt"; fair?

20 A Yes.

21 Q Let's look at Paragraph 288 of your
22 report.

23 A Okay.

24 Q In Paragraph 288, you include what
25 you mark as Exhibit 1008 "Hunt Figure 11

1 annotated."

2 Do you see that?

3 A Yes.

4 Q And here in Paragraph 288, you
5 discuss, "For example, in Figure 11, when
6 switchgear 1121A (annotated in green) is
7 tripped (opened), this terminates the
8 connection between generator 1115 (annotated
9 in red) and local load 1180 (pump, annotated
10 in blue) as well as utility bus 1165. This
11 would cut power from the generator."

12 Do you see that?

13 A Yes.

14 Q Let's look at Paragraph 289.

15 A Okay.

16 Q In Paragraph 289, you discuss that
17 "Similarly, in Figure 13, Hunt teaches that
18 when circuit breakers 1336 (annotated in
19 dark blue) and/or switchgear 1321 (annotated
20 in green) are opened and swap-over switch
21 1324 (annotated in orange) is switched to
22 apply local load 1380 (annotated in blue) is
23 switching to enable 'local load 1380 to be
24 connected directly to utility bus 1360
25 bypassing switchgear 1321' power from the

1 generator would be cut."

2 Right?

3 A Yes, you read that correctly.

4 Q So you are describing how when
5 circuit breakers and/or switchgears are
6 opened, power from the generator would be
7 cut, right?

8 A Right. Power from or to the
9 generator, right, in those scenarios, would
10 be cut.

11 Q And by "cut," you mean turned off,
12 right?

13 A Disconnected, yes.

14 Q Let's look at Paragraph 290.

15 A Okay.

16 Q In Paragraph 290, you discuss how
17 "Further, it is the nature of the electric
18 switchgear that tripping operations happen
19 in fractions of a second. For example, IEEE
20 Standard 141-1986 (Red Book) provides an
21 example of 'tripping time' curves for
22 switchgear (breakers). As a POSITA would
23 have understood for this figure, for a
24 'commanded' trip (such as receiving a trip
25 command from the central control system),

1 the breaker clearing time (time to
2 completely interrupt the electric power)
3 will be dictated by the 'instantaneous trip'
4 portion of the curve (area annotated in
5 blue). In this region the clearing time of
6 the switchgear would be between
7 approximately 0.06 seconds (minimum tripping
8 time, magenta line) and about 0.16 seconds
9 (maximum tripping time, red line)."

10 Do you see that?

11 A Yes, something close to that.

12 Q So here in Paragraph 290, you're
13 explaining that it is the nature of the
14 electric switchgear that tripping operations
15 happen in fractions of seconds, right?

16 MS. MUENKS: Objection to form.

17 A Correct. That's correct.

18 BY MR. QUARLES:

19 Q So tripping operations happen in an
20 amount of time that is greater than zero,
21 correct?

22 MS. MUENKS: Objection to form.

23 A It takes some -- yes, it takes some
24 non-zero time to complete the tripping
25 operation. The tripping operation begins

1 immediately at time zero, but there's some
2 non-zero time that it takes for
3 the mechanical action and the interrupting
4 action to take place.

5 Q In Paragraph 290, you discuss IEEE
6 standard 141-1986, right?

7 A Yes.

8 Q For purpose of our discussion, I'll
9 refer to this as "Red Book"; is that fair?

10 A Fair.

11 Q In Paragraph 290 you discuss how
12 Red Book provides an example of tripping
13 time curves for switchgear, right?

14 A Yes. As an example, each set of
15 switchgear has its own set of curves based
16 on how it would interrupt the circuit. And
17 those times vary, occurs varied for sure
18 based on settings.

19 Q You also include in Paragraph 290
20 Red Book's Figure 73 as an example of
21 tripping time curves for switchgear, right?

22 A Yes.

23 Q You also discuss how a POSITA would
24 have understood from this figure that for a
25 commanded trip, such as receiving a trip

1 command on a central control system, the
2 breaker clearing time would be dictated by
3 the instantaneous trip portion of the curve,
4 right?

5 A Yes.

6 Q What did you mean by in your report
7 by the term "dictated"?

8 A What I'm trying to express there as
9 for this example switchgear, that
10 instantaneous trip portion of the curve
11 defines the range of times that it would
12 take for a commanded trip to occur.

13 Q So in your example, a POSITA would
14 understand that an instantaneous trip time
15 would be determined by the instantaneous
16 trip curve, right?

17 A Yes, that is correct.
18 Instantaneous is what we call that section
19 of the curve.

20 Q And that time would be greater than
21 zero, right?

22 A Yes, it's greater than zero.

23 Q The breaker clearing time, you mean
24 the time to completely interrupt the
25 electric power, right?

1 A Yes, that's correct.

2 Q And you annotate the instantaneous
3 trip portion in blue, right?

4 A Yes, I kind of surround it with a
5 blue box.

6 Q You further explain that in this
7 blue region you identify the clearing time
8 of the switchgear would be between about
9 0.06 seconds minimum tripping time and about
10 0.16 seconds maximum tripping time, right?

11 A Yes, somewhere in there.

12 Q In fact, you annotate the minimum
13 tripping time of about 0.06 seconds with a
14 magenta line, right?

15 A Yes, sir.

16 Q You annotate the maximum tripping
17 time of about 0.16 seconds with a redline,
18 right?

19 A Yes.

20 Q So the tripping time could be 0.08
21 seconds for instance, right?

22 A Right. It depends on where in the
23 sign wave the instantaneous trip was
24 initiated. If it's in a peak of a sign wave
25 at the maximum voltage for example that

1 would take a longer time than if it was just
2 off zero. So it's a function of both the
3 mechanics of the breaker and switchgear and
4 where in the sign wave the trip command was
5 issued.

6 Q So a POSITA would understand
7 instantaneous tripping time would be
8 somewhere between 0.06 seconds and 0.16
9 seconds, right?

10 MS. MUENKS: Objection to form.

11 A The clearing time would be between
12 0.06 seconds and 0.16 seconds, not the trip
13 time. The trip would happen
14 instantaneously.

15 BY MR. QUARLES:

16 Q Let's look at the next paragraph,
17 Paragraph 291.

18 In Paragraph 291 you discuss how
19 such short periods of time as those
20 annotated in Red Book are faster than an
21 operator could notice them and then take
22 action, right?

23 A Generally speaking, yes.

24 It's not quite a quote of the
25 paragraph, but that's correct. "It's faster

1 than an operator could notice a problem and
2 take action."

3 Q And in Paragraph 291, you state in
4 your opinion that "Accordingly, such short
5 times are at least one example of what would
6 qualify as 'substantially immediately.'"

7 Right?

8 A Yes, that's a correct reading.

9 Q In Paragraph 292, you discuss
10 Hunt's teaching of a "shutdown condition"
11 where it's "MCM 205 unit terminates control
12 signal 227 to switchgear control relay 229
13 to trip switchgear 221 and disengaging
14 generator 215 from the utility power bus
15 260.

16 Right?

17 A Close to that, yes.

18 Q Later Paragraph 292, you discuss
19 how "this disclosure from Hunt is consistent
20 with the '992 patent."

21 Right?

22 A Yes.

23 Q You also discuss how the '992
24 patent "generally describes operating the
25 'Emergency Power Off functionality' to cut

1 power supplied to the site, thereby causing
2 generators to 'turn off.'"

3 Right?

4 A Yes.

5 Q In Paragraph 292, you also discuss
6 how "a POSITA would have known that
7 electrical relay operations (including
8 tripping) happen in less than one second,
9 for electrical safety."

10 Right?

11 A Right. I should have specified
12 instantaneous relay operations happen in
13 less than one second, clearly based on the
14 curves.

15 Depending on the conditions, that
16 can happen in multiple seconds.

17 Q So a POSITA would understand
18 cutting power to a generator for a tripping
19 for example would happen in less than one
20 second, correct?

21 MS. MUENKS: Objection to form.

22 A Without an added delay, yes.

23 Based on a commanded trip to a
24 switchgear, it would happen less than one
25 second.

1 BY MR. QUARLES:

2 Q Let's look at Paragraph 293.

3 In Paragraph 293, you discuss how
4 "Hunt discloses that a generator's power
5 'may be supplied to a utility grid,' for
6 example (when the generator produces excess
7 power). Accordingly, a POSITA would have
8 understood that 'tripping switchgear and
9 disengaging generator from utility power
10 bus' teaches that the generator would be
11 unable to provide power to the utility grid
12 such as (cut power from the generator)."

13 And you go on to say that it's your
14 opinion that "a POSITA would have understood
15 this disclosure to teach that the emergency
16 power off unit (switchgear) is configured to
17 substantially immediately (less than one
18 second) cut power from the generator when
19 activated."

20 Right?

21 A Yes, you read that paragraph
22 correctly.

23 Q You also discuss your opinion that
24 "a POSITA would have understood this
25 disclosure to teach that the emergency power

1 off unit (switchgear) is configured to
2 substantially immediately (less than one
3 second) cut power from the generator when
4 activated."

5 Right?

6 A Yes. Less than one second is an
7 example of "substantially immediately."

8 MR. QUARLES: Let's turn to the
9 exhibit list in your first report,
10 specifically Exhibit 1055.

11 THE WITNESS: I'm sorry, I
12 don't see Exhibit 1055 in the first
13 declaration. It only goes up to
14 1021.

15 MR. QUARLES: Saul, would you
16 please display what's been marked as
17 Exhibit 1052.

18 REMOTE TECH: Stand by counsel.

19 (Liberty Exhibit 1055, U.S.
20 Patent Number 7,909,585, Clancy,
21 filed March 28, 2007, published
22 November 22, 2007, was previously
23 marked for Identification.)

24 BY MR. QUARLES:

25 Q If you go to Page 8 which has the

1 exhibit list for your report, there is
2 Exhibit 1055.

3 Do you see that?

4 A Yes.

5 Q Exhibit 1055 as it's been
6 previously marked has U.S. Patent Number
7 7,909,585 Clancy filed March 28, 2007,
8 published November 22, 2007, right?

9 A Yes.

10 Q I'll refer to this as "Clancy";
11 fair?

12 A Yes, that's fair.

13 Q Let's turn to Paragraph 600 of your
14 report on Page 275.

15 A Okay.

16 Q Paragraph 600, you discuss how
17 "Clancy further discloses a 'hydraulic pump'
18 (111), which supplies pressure to run the
19 hydraulic motors and hydraulic pilot pump
20 (112), used to activate the valve
21 assembly...multiple filters (not shown) are
22 fitted in the tank on the discharge line,
23 return line and pilot pump, together with
24 high temperature shut downs (90), low level
25 shut downs (91) and a sight glass for level

1 indication (92)."

2 You go on to discuss your opinion
3 that "a POSITA would have been motivated to
4 incorporate Clancy's hydraulic system into
5 Coli's hydraulic fracturing system to obtain
6 power to drive the compressors and pumps
7 disclosed by Clancy."

8 Right?

9 A Yes.

10 Q And you state in your opinion that
11 "doing so would have merely involved
12 applying known techniques (hydraulic
13 systems) to known systems (hydraulic
14 fractioning systems) ready for improvement."

15 Right?

16 A Yes, that's correct. A hydraulic
17 system from Clancy to the hydraulic
18 fractioning system of Coli.

19 Q So at least in your example here in
20 Paragraph 600 the term "hydraulic system"
21 was known by a POSITA?

22 MS. MUENKS: Objection to form.

23 A As described by Clancy, yes.

24 BY MR. QUARLES:

25 Q And it's your opinion that Clancy

1 was known, right?

2 A Yeah. Clancy was published some
3 eight years before '992, so, yes, it would
4 have been known.

5 MR. QUARLES: Let's turn to
6 what's been previously marked as
7 Exhibit 1054. I'll put that in the
8 Chat.

9 THE WITNESS: Okay. I've got
10 Armstrong up.

11 (Liberty Exhibit 1054,
12 International Publication Number WO
13 2004/099587 A2, Armstrong,
14 International Publication Date, 18
15 November 2004 (18.11.2004), was
16 previously marked for
17 Identification.)

18 BY MR. QUARLES:

19 Q Let's turn to Page 9 of Armstrong.

20 A Okay. I'm on Page 9.

21 Q At the bottom on or about Line 24,
22 it says "At this point in the FCS 60, it is
23 possible that the fuel pressure is
24 below atmospheric pressure. A liquid drain
25 arrangement consisting of two solenoid

1 valves 11, 13" -- continuing on to Page 10
2 continues -- "and a liquid reservoir 12 can
3 be used to drain liquid from the
4 subatmospheric separator tank 10. During a
5 drain cycle, valve 11 would be opened to
6 permit liquid to fill the reservoir 12.
7 Value 11 then closes and value 13 opens to
8 drain the liquid out through a check valve
9 14 to the drain system, 15."

10 Right?

11 A Yes. That's correct.

12 Q So Armstrong is describing a liquid
13 drain arrangement using two solenoid valves
14 and a liquid reservoir, right?

15 A Yes, correct. Acts kind of like an
16 air lock to prevent air from being drawn
17 into tank 10.

18 Q Armstrong discusses draining liquid
19 from the subatmospheric separator tank,
20 correct?

21 A Correct. If it is, it's
22 subatmospheric, but there's a possibility it
23 is -- as Armstrong describes -- because of
24 the suction of the compressor, so this
25 prevents air from getting into the system.

1 Q Looking at the top of Page 10, to
2 drain the liquid, Armstrong discusses
3 "opening valve 11 to permit liquid to fill
4 the reservoir," right?

5 A Yes.

6 Q Up top later valve 11 closes,
7 right?

8 A Correct.

9 Q Could the closing of valve 11 be
10 implemented using a timer?

11 MS. MUENKS: Objection to form.

12 A Sure.

13 We would have to read what
14 Armstrong says about that.

15 BY MR. QUARLES:

16 Q So here in this discussion we've
17 just been reading about or this passage we
18 just been reading about, the liquid drain
19 arrangement, Armstrong does not explicitly
20 discuss monitoring valve 11 status, right?

21 MS. MUENKS: Objection to form.

22 A I disagree. I think it's contained
23 in the disclosure of Armstrong that you
24 would open valve 13 only after valve 11
25 closes, so that contains monitoring valve

1 11's status. Otherwise, the system doesn't
2 work.

3 BY MR. QUARLES:

4 Q Are you saying that it is your
5 opinion that Armstrong specifically mentions
6 monitoring valve 11?

7 MS. MUENKS: Objection to form.

8 A No. It doesn't explicitly use the
9 term "monitoring."

10 What I'm saying is the teaching of
11 Armstrong in this paragraph includes
12 monitoring valve 11 to ensure that it is
13 closed and before valve 13 opens, otherwise
14 you have a path for air to enter the system
15 if indeed tank 10 is subatmospheric
16 pressure.

17 Q How long would it generally take
18 for the reservoir to drain?

19 A Armstrong doesn't give us any time.

20 That depends on the amount of
21 liquid, depends on the size of the
22 reservoir, depends of size of the drain, the
23 pressure of the system.

24 So I don't know that Armstrong
25 defines how much time it would take.

1 Q Could a POSITA determine generally
2 the time that it would take for the
3 reservoir to drain?

4 A I don't think that you could do
5 that reliably. It's -- well, the reservoir,
6 maybe. Depends maybe on any given system at
7 any given time perhaps.

8 But as a POSITA would know the
9 amount of liquids that come from a
10 particular gas source may vary from time to
11 time depending on the content of the gas.
12 So I don't think you can really determine a
13 constant time it would take to drain
14 reservoir 12. Certainly not subatmospheric
15 separator tank 10, that would not be
16 reasonable.

17 Reservoir 12, maybe you can get
18 close but you couldn't define a particular
19 time reliably.

20 MS. MUENKS: I just wanted to
21 make sure that was recorded. Can you
22 hear me okay when I'm objecting?

23 THE REPORTER: You are a little
24 bit low. I can hear you, but I
25 didn't hear you object to this

1 question.

2 MS. MUENKS: I will try to be
3 louder.

4 THE REPORTER: I can hear you
5 better now though. Thank you.

6 THE WITNESS: If we can take
7 the time to take a break, I'm out of
8 water.

9 MR. QUARLES: Absolutely. I
10 think now is a good time. So 15
11 minutes?

12 THE WITNESS: Great. Thanks.

13 MR. QUARLES: Sure.

14 (A brief recess was
15 taken.)

16 BY MR. QUARLES:

17 Q Dr. Durham, before the break, we
18 were discussing Armstrong and specifically
19 discussing how Armstrong discusses draining
20 liquid from the subatmospheric separator
21 tank, right?

22 A Yes, generally speaking.

23 Q Armstrong discusses the
24 subatmospheric separator tank 10, right?

25 A Correct. And it points out that

1 it's possible that it's subatmospheric back
2 on Page 9.

3 Q Here in this paragraph it does
4 describe it as a "subatmospheric separator
5 tank 10," right?

6 A It uses that description at the
7 beginning of that paragraph, but it says
8 that it is possible that it's
9 subatmospheric, "fuel pressure is below
10 atmospheric pressure," so it's configured to
11 be either.

12 Q I realize the size could vary
13 somewhat, but generally speaking, how large
14 would the separator tank be?

15 MS. MUENKS: Objection to form.

16 A There's no teaching at Armstrong
17 that defines the size. It would vary
18 greatly depending on the amount of fuel
19 falling through the system.

20 BY MR. QUARLES:

21 Q And by "greatly," how much of a
22 swaying from minimum to maximum would a
23 POSITA understand would appear to be?

24 MS. MUENKS: Objection to form.

25 A I don't think there's anything in

1 Armstrong that tells us that.

2 BY MR. QUARLES:

3 Q Nothing in Armstrong. But just
4 generally speaking, given that knowledge of
5 a POSITA.

6 MS. MUENKS: Objection to form.

7 A I still don't think you can define
8 a minimum and maximum.

9 I've seen separators as small as
10 maybe one or two gallons. I've seen
11 separators as large as probably 30-some feet
12 tall with 200 barrels or more. So I don't
13 think there's any way at all to put limits
14 on Armstrong's teaching.

15 BY MR. QUARLES:

16 Q Have you seen reservoirs such as
17 the one that Armstrong is discussing?

18 A Yeah, an air lock, yes. A drain
19 air lock, yes, I have seen those.

20 Q How large were the reservoirs on
21 the ones that you saw?

22 MS. MUENKS: Objection to form.

23 A I don't know that I can put metes
24 and bounds on that.

25 Things like the ones I'm

1 visualizing maybe are in the 20- to
2 30-gallon range-ish.

3 But certainly there's no teaching
4 in Armstrong that limits that number.

5 BY MR. QUARLES:

6 Q Have you ever seen a hundred-gallon
7 reservoir?

8 A I don't know. I've seen an awful
9 lot.

10 Q For a given reservoir size and
11 given a particular fuel type, would it be
12 possible for a POSITA to calculate a drain
13 time for the reservoir?

14 MS. MUENKS: Objection to form.

15 A I think the same answer as I gave
16 earlier. You can get something that was
17 maybe kind of close, but, no, I don't think
18 you could calculate a consistent drain time
19 for the reservoir. It would depend an awful
20 lot on the pressure of the system, how its
21 operating, and the amount of liquid that
22 drops out into the separator tank.

23 MR. QUARLES: Let's turn to

24 Exhibit 1055, to Clancy.

25 I'll put in the Chat.

1 MS. MUENKS: Thank you.

2 THE WITNESS: Okay. I've got
3 Clancy open.

4 (Liberty Exhibit 1055, U.S.
5 Patent Number 7,909,585, Clancy,
6 filed March 28, 2007, published
7 November 22, 2007, was previously
8 marked for Identification.)

9 BY MR. QUARLES:

10 Q This is Clancy, what has been
11 previously marked as Exhibit 1055. For
12 purposes of our discussion, I'll reference
13 this as "Clancy."

14 Let's look at Paragraph 31.

15 A Okay. I've got 31 up. Let me read
16 it real quick.

17 Q Paragraph 31, Clancy discusses the
18 compressor skid.

19 Says "In the compressor skid of the
20 preferred embodiment of this invention, as
21 seen in Figure 1, natural gas and liquids
22 flows provided to skid via 3-inch 300 ansi
23 connection passing through a 3-inch ball
24 valve." And it references Figure 1.

25 Clancy discusses "the ball valve is

1 used to isolate the skid in the event of
2 maintenance or manual isolation is required.
3 A check valve is located next the pipeline
4 which is used to prevent any reversal of
5 flow backwards towards the source of the
6 suction. From the check valve the flow
7 passes through a second 3-inch valve, which
8 has an electric 120-volt actuator attached
9 to the valve stem." And that's not shown.

10 "This actuator used to open the
11 second 3-inch valve (6). For initial
12 startup and closes the second 3-inch valve
13 (6) in the event of an emergency shutdown
14 (ESD). The electric actuator is preferably
15 is class 1, division 1 compliant
16 and eliminates the need for using
17 pneumatically controlled actuators."

18 So here in Clancy, it discusses
19 closing the second 3-inch valve 6 in the
20 event of an emergency shutdown, right?

21 MS. MUENKS: Objection to form.

22 A Yes, it does.

23 BY MR. QUARLES:

24 Q Clancy does not explicitly discuss
25 monitoring the second 3-inch valve 6,

1 correct?

2 MS. MUENKS: Objection to form.

3 A I would say in this paragraph, it
4 doesn't explicitly disclose monitor at
5 least valve 6.

6 My opinions as I described in
7 Paragraphs 156 and 157 is the teachings of
8 Clancy make it obvious to monitor that
9 control valve for the various reasons I put
10 forth.

11 MR. QUARLES: Let's turn to
12 what's previously been marked as
13 Exhibit 1056.

14 And I will drop that into the Chat.

15 THE WITNESS: Okay. I've got
16 1056 open.

17 (Liberty Exhibit 1056,
18 International Publication Number WO
19 2016/044509 A1, was previously
20 marked for Identification.)

21 BY MR. QUARLES:

22 Q This has previously been marked as
23 Exhibit 1056 which I will refer to it as
24 "Trobaugh."

25 Let's turn to Paragraph 31.

1 A Okay. I've got 31 up.

2 Q In Paragraph 31, it says "In one
3 embodiment, natural gas fueling system 100
4 in Figure 1 also includes a filter bypass
5 assembly, which includes a bypass conduit or
6 line 106 and a bypass valve 108. The filter
7 bypass assembly is operably coupled to a
8 methane gas sensor 105 and a methane gas
9 pressure sensor 107 on conduit 104 and a
10 methane gas pressure sensor 109 on engine
11 150. Bypass valve 108 and sensors 105, 107,
12 109 may be operably coupled to a computer or
13 other device (not shown) for receiving
14 information from sensors 105, 107, 109. The
15 computer then outputs information to other
16 components of natural gas fueling system 100
17 and engine 150 based on the information from
18 sensors 105, 107, 109."

19 So Trobaugh discusses its computer
20 receiving information from sensors 105, 107
21 and 109, right?

22 A It does.

23 Q Trobaugh does not explicitly
24 discuss its computer receiving information
25 from bypass valve 108, right?

1 MS. MUENKS: Objection to form.

2 A Oh, it does. Because bypass valve
3 108 is connected to the computer, so the
4 computer would know the status of bypass
5 valve 108 and control bypass valve 108,
6 which is what a POSITA would understand from
7 reading this paragraph.

8 BY MR. QUARLES:

9 Q Trobaugh discusses bypass valve 108
10 and sensors 105, 107, 109 may be operably
11 coupled to the computer or other device for
12 receiving information from sensors 105, 107,
13 109 .

14 So Trobaugh explicitly discusses
15 receiving information from 105, 107 and 109,
16 right?

17 A Yes.

18 Q But Trobaugh does not explicitly
19 mention bypass valve 108 where it is
20 receiving information from sensors 105, 107
21 and 109, right?

22 MS. MUENKS: Objection to form.

23 A It does not disclose that, what you
24 just said, correct.

25 (Liberty Exhibit 1055, U.S.

1 Patent Number 7,909,585, Clancy,
2 filed March 28, 2007, published
3 November 22, 2007, was previously
4 marked for Identification.)

5 BY MR. QUARLES:

6 Q Let's turn back to Exhibit 1055,
7 Clancy.

8 A Okay.

9 Q Let's look at Paragraph 39.
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1 In Paragraph 39, Clancy discusses
2 how "as it can be seen in Figures 5A, 5B, 5C
3 and 5D, cooler fan (37) is powered by
4 hydraulic motor (38) attached to the fan
5 shaft (39) by way of a coupler 39A.
6 The after-cooler is designed to minimize the
7 effects of sound pollution."

8 And Clancy discusses "two
9 recycled louvers (40) and (41) are located
10 on the top and bottom of the ducting (125)
11 and an outlet louver (42) on the outlet of
12 the ducting (125). These louvers are linked
13 together by a linkage (43) which is
14 connected to an electric actuator (44),
15 which is controlled from the DCS. In the
16 event that the room temperature falls, the
17 electric actuator is sent to a signal to
18 open the two recycled louvers and as a
19 result the outlet louver begins to close as
20 the recycle and outlet louvers are
21 interconnected by the linkage. The system
22 is designed to maintain a set temperature as
23 input by the field operator and is monitored
24 via a fourth temperature sensor (45) located
25 on the base of the adjacent wall at the

1 opposite side of the ducting."

2 So Clancy discusses that it has a
3 cooler fan powered by hydraulic motor,
4 right?

5 A Correct.

6 Q And here in Paragraph 39, Clancy
7 does not explicitly discuss monitoring the
8 cooler fan, right?

9 MS. MUENKS: Objection to form.

10 A I agree with that.

11 In Paragraph 39, it does not
12 explicitly discuss monitoring the cooling
13 fan. I would say it's obvious for all the
14 reasons I set forth in my declaration
15 Paragraphs 216 and 217, is my opinion.

16 MR. QUARLES: Let's turn to
17 what's been previously marked as
18 Exhibit 1037. Thompson.

19 I'll drop that into the Chat.

20 THE WITNESS: Okay. I've got
21 Thompson open.

22 (Liberty Exhibit 1037, Patent
23 Application Publication, Thompson,
24 Pub. No.: US 2009/0181582 A1, was
25 previously marked for

1 Identification.)

2 BY MR. QUARLES:

3 Q Let's turn to Thompson Paragraph 2.

4 A Okay.

5 Q Thompson relates to "field
6 communication distribution equipment,"
7 right?

8 A Correct. As would be in place in a
9 communication system in a fractioning site,
10 for example.

11 Q Thompson does not expressly discuss
12 power distribution equipment, right?

13 MS. MUENKS: Objection to form.

14 A We had this discussion. I believe
15 it does.

16 BY MR. QUARLES:

17 Q Where?

18 A Yeah, I'm looking for this again.

19 As I recall from our previous
20 discussions about this, it does.

21 Yeah, it does talk about power
22 distribution some in Paragraph 14.

23 Certainly in Paragraph 48.

24 Yeah, I think those are the two
25 best locations. 48 being the best talking

1 about several different pieces of power
2 distribution equipment.

3 Q Thompson does not expressly discuss
4 oil fracking, right?

5 MS. MUENKS: Objection to form.

6 A Thompson does not explicitly
7 discuss fracturing oil and gas location, if
8 that's what your question was.

9 I'm not sure what "oil fracking"
10 is. Actually, I do know what oil fracking
11 is. That would be at a refinery. So, no,
12 it does not discuss refinery operations.

13 (Liberty Exhibit 1004, Patent
14 Application Publication Co., Coli,
15 et al., Pub. No.: US 2012/0255734
16 A1, was previously marked for
17 Identification.)

18 BY MR. QUARLES:

19 Q Turn to what's been previously
20 marked as 1004. Coli.

21 A Okay. I've got Coli open.

22 Q Let's turn to Coli Paragraph 71.

23 Coli Paragraph 71 discusses how "In
24 contrast, the present operation utilizes a
25 single point control that is not linked

1 solely to blender operations, in certain
2 illustrative embodiments. All operation
3 parameters can be input prior to beginning
4 fractioning. If a rate change is required,
5 the system will increase the rate of the
6 entire system with a single command. This
7 means that if pumps 22 are told to increase
8 rate, then blender module 40 along with the
9 chemical units and even ancillary equipment
10 like sand belts will increase rates to
11 compensate automatically."

12 So Coli discusses increasing the
13 rate of the overall system, right?

14 A Right. That's what this paragraph
15 is discussing --

16 Q What it does not explicitly discuss
17 in this paragraph monitoring the overall
18 rate of the system, right?

19 MS. MUENKS: Objection to form.

20 A I'm sorry, could you repeat that
21 question? I was still finishing my answer.
22 I missed the first front end of it.

23 BY MR. QUARLES:

24 Q Is there anything you would like to
25 add to your previous answer?

1 A If the court reporter can read back
2 my answer, I can finish it, yes.

3 (Requested portion of record read:

4 "A Right. That's what this
5 paragraph is discussing --")

6 (End of read-back.)

7 A I think I was going to add "as one
8 function of the control system of Coli."

9 BY MR. QUARLES:

10 Q Coli does not explicitly discuss
11 monitoring the rate of the overall system,
12 right?

13 MS. MUENKS: Objection to form.

14 A I think it doesn't use those words
15 but I think it's certainly contained in 71,
16 particularly in light of 72 that Coli system
17 monitored the rate of the entire system. It
18 would kind of be necessary to do that in
19 order to control the rate of the entire
20 system.

21 BY MR. QUARLES:

22 Q Is it your opinion that it would
23 not be possible to send out a command to the
24 overall system without simultaneously
25 monitoring the entire system?

1 MS. MUENKS: Objection to form.

2 A No. You can send a command, but in
3 light of 71 and 72 and the rest of Coli
4 taken together, you would be monitoring that
5 rate as well.

6 If we look at 72, "examples of
7 operations that can be controlled and
8 monitored remotely from control center 40
9 via communications link 41 can be the power
10 generation function in Area B., or the
11 delivery of treatment fluid from blender
12 module 40 to pumps 22 for delivery to the
13 wellbore."

14 So that's explicitly in
15 Paragraph 72; e.g., monitor the rate of the
16 fluid to the pumps delivered to the
17 wellbore, which is the rate of the entire
18 system.

19 So in order to control the rate --
20 you can send a command without monitoring,
21 but in order to control it -- as Coli
22 teaches -- you would need to monitor and
23 particularly in light of the explicit
24 teaching of the monitoring.

25 Q In Paragraph 71, it does not

1 explicitly mention monitoring the rate of
2 the overall system, right?

3 MS. MUENKS: Objection to form.

4 A If you take Paragraph 71 in
5 isolation, it does not use the term
6 "monitoring the rate of the entire system."

7 (Liberty Exhibit 1054,
8 International Publication Number WO
9 2004/099587 A2, Armstrong,
10 International Publication Date, 18
11 November 2004 (18.11.2004), was
12 previously marked for
13 Identification.)

14 BY MR. QUARLES:

15 Q Let's turn back to what's been
16 previously marked Exhibit 1054 to Armstrong.

17 A Okay. I've got Armstrong.

18 Q Armstrong does not explicitly
19 discuss oil fracking, right?

20 MS. MUENKS: Objection to form.

21 A No, it doesn't discuss
22 fractionating oil.

23 BY MR. QUARLES:

24 Q Can you repeat that? I didn't hear
25 you.

1 A It does not discuss fractioning --
2 fracking oil. It refers to a refinery
3 processing which includes that.

4 So it's contained within the
5 disclosure of Coli, but it doesn't use
6 the term -- I'm sorry, not Coli --
7 Armstrong, but it doesn't use the term "oil
8 fracking."

9 Q I believe what you are talking
10 about is where Armstrong says
11 "Hydrocarbon-based fuels are available from
12 a variety of sources including bio gas from
13 landfills, waste water treatment plants,
14 agricultural and other digesters like
15 hydrocarbon gases from oil and gas wells."

16 So Armstrong discusses hydrocarbon
17 fuels that may come from oil and gas wells,
18 right?

19 A It does. And from other locations
20 such as refinery processing, and refinery
21 processing would include oil fracking.

22 Q Other than that disclosure,
23 Armstrong does not explicitly discuss oil
24 fracking operations, right?

25 MS. MUENKS: Objection to form.

1 A Yes. As I said, it doesn't use
2 those words, but certainly a refinery
3 processing includes fractionating oil -- or
4 fracking oil.

5 BY MR. QUARLES:

6 Q And outside of that paragraph, it
7 does not mention anywhere else oil fracking,
8 right?

9 MS. MUENKS: Objection to form.

10 A It has a similar disclosure on
11 Page 9 on Lines 6 through, call it 8.

12 MR. QUARLES: It's at the top
13 of the hour. Let's take a 15-minute
14 break.

15 THE WITNESS: Okay.

16 (A brief recess was
17 taken.)

18 MR. QUARLES: Let's turn to the
19 '992 patent and let me know if you
20 need me to drop it into the Chat.

21 THE WITNESS: Yes, I do.

22 MR. QUARLES: I just dropped it
23 into the Chat.

24 BY MR. QUARLES:

25 Q Turn to Column 19 on or about

1 Line 15.

2 A Okay.

3 Q Going to the '992 patent, Column 19
4 on or about Line 15 in the '992 patent
5 discusses operating characteristics of the
6 turbine that can be also monitored and can
7 include for example external voltage
8 setpoint enabled, backup over speed, monitor
9 speed, backup over speed monitor, system
10 test speed delta, expected backup over speed
11 monitor trip setpoint, calculated backup
12 over speed monitor trip speed, control
13 system 24 VDC supply voltage, secondary
14 control system 24 VDC supply voltage,
15 turbine air inlet DP, turbine air
16 inlet filter DP as well as additional
17 parameters.

18 A POSITA would understand turbine
19 air inlet DP to mean turbine air inlet
20 differential pressure, right?

21 A Yes, I think so.

22 Q A POSITA would understand a turbine
23 air inlet filter DP to mean turbine air
24 inlet differential pressure, right?

25 A I think so. Those would be normal

1 things to monitor on turbine, on a gas
2 turbine like this.

3 Q Let's look at Column 14 on or about
4 Line 15.

5 A Okay.

6 Q On or about Line 15 in the '992
7 patent, it discusses that an embodiment, the
8 electrically-powered fracking fleet can
9 include a turbine. Operating
10 characteristics of a turbine that can be
11 monitored could include for example
12 calibration faults, no channel faults, no
13 communication faults; i.e, PE power fault,
14 internal power fault, program mode status,
15 module fault, module power fault, controller
16 battery voltage below, controller key switch
17 position alert, forces enabled, forces
18 installed, controller logic fault, backup
19 over speed monitor system test required,
20 backup over speed, monitored speed tracking
21 error, controller task overlap time
22 exceeded, turbine control channel fault, 120
23 VDC battery charger failure, turbine air
24 inlet duct transmitter failure, turbine air
25 inlet filter high, amongst some other items

1 below.

2 A POSITA would understand turbine
3 air filter high to potentially mean turbine
4 air inlet filter differential pressure
5 reading is high; is that right?

6 MS. MUENKS: Objection to form.

7 A No, I don't think you can get that
8 from that reading. It says what it says.
9 "Turbine air filter high." So it's
10 something about the air in the filter is
11 high. So we would have to look back at the
12 Quantum Premier documents to see exactly
13 what that maps.

14 BY MR. QUARLES:

15 Q What would a POSITA understand
16 based on knowledge of a POSITA what "turbine
17 air inlet high" means?

18 A Just exactly what I said. Some
19 parameter associated with a turbine air
20 inlet filter is high, above a threshold.

21 Q What might some of those parameters
22 be to your knowledge according to a POSITA?

23 A Temperature could be one pressure,
24 differential pressure, fouling level,
25 weight. Probably some other ones that I'm

1 missing, but it could include an awful lot
2 of things.

3 MR. QUARLES: That's all my
4 questions. I'll pass the witness.

5 MS. MUENKS: Let's take a
6 15-minute break.

7 (A brief recess was
8 taken.)

9 MS. MUENKS: I have no
10 questions for the witness.

11 MR. QUARLES: Okay. This
12 completes the deposition.

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14 (Continued on next page to fit the
15 Jurat.)
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THE REPORTER: Okay. Time is

3

12:38 p.m.

4

This is the end of the deposition

5

of Dr. Durham.

6

7

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(Whereupon, the deposition was

9

concluded at 12:38 p.m.)

10

11

ROBERT ALLAN DURHAM, Ph.D.

12

13

14 Subscribed and sworn

15 to before me this

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_____ day of _____, 2025

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Notary Public

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1 STATE OF FLORIDA) PAGE _____ of _____
2) ss:
3 COUNTY OF BROWARD)
4 I wish to make the following
5 changes, for the following reasons:
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1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

2 I, BARBARA (BOBBIE) ZELTMAN, a Professional
3 Realtime Court Reporter and Notary Public within and
4 for the State of Florida do hereby certify:

5 That ROBERT ALLAN DURHAM, Ph.D., the
6 witness whose deposition is hereinbefore set forth,
7 was duly sworn by me before the commencement of such
8 deposition and that such deposition was taken before
9 me and is a true record of the testimony given by such
10 witness.

11 I further certify that the adverse party,
12 LIBERTY ENERGY, INC., and LIBERTY OILFIELD SERVICE
13 LLC,, was represented by counsel at the
14 deposition.

15 I further certify that the deposition of
16 ROBERT ALLAN DURHAM, Ph.D., via Zoom, on December 11,
17 2025, commencing at 10:14 a.m. to 12:38 p.m.

18 I further certify that I am not related to
19 any of the parties to this action by blood or
20 marriage, I am not employed by or an attorney to any
21 of the parties to this action, and that I am in no way
22 interested, financially or otherwise, in the outcome
23 of this matter.

24
25

1

2 IN WITNESS WHEREOF, I have hereunto set my
3 hand this 16th day of December, 2025.

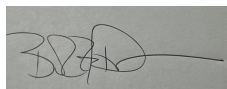
4 My commission expires:

5 August 9 2029

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10 Barbara R. Zeltman

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I N D E X

PAGE

Examination by Mr. Quarles

76

PREVIOUSLY MARKED EXHIBITS

(Indicated and listed here at mention)

LIBERTY #

DESCRIPTION

PAGE

Exhibit 1052

Declaration of Dr. Robert
Durham in Support of
Petitioners' Opposition to
Patent Owners' Revised
Non-Contingent Motion to
Amend, Case No.
IPR2024-01274, Patent
11,091,992

76

Exhibit 1052

Declaration of Dr. Robert
Durham in Support of
Petitioners' Opposition to
Patent Owners' Revised
Non-Contingent Motion to
Amend, Case No.
IPR2024-01274, Patent
11,091,992

81

Exhibit 1003

Declaration of Dr. Robert
Durham Executed on September
4, 2024, Case No.
IPR2024-01274, Patent
11,091,992

83

Exhibit 1055

U.S. Patent Number 7,909,585,
Clancy, filed March 28, 2007,
published November 22, 2007

95

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Page 63 of 85

1	PREVIOUSLY MARKED EXHIBITS		
2	(Indicated and listed here at mention)		
3	LIBERTY #	DESCRIPTION	PAGE
4	Exhibit 1054	International Publication	98
5		Number WO 2004/099587 A2,	
6		Armstrong, International	
7		Publication Date, 18 November	
8		2004 (18.11.2004)	
9	Exhibit 1055	U.S. Patent Number 7,909,585,	107
10		Clancy, filed March 28, 2007,	
11		published November 22, 2007	
12	Exhibit 1056	International Publication	109
13		Number WO 2016/044509 A1	
14	Exhibit 1055	U.S. Patent Number 7,909,585,	111
15		Clancy, filed March 28, 2007,	
16		published November 22, 2007	
17	Exhibit 1037	Patent Application	114
18		Publication, Thompson, Pub.	
19		No.: US 2009/0181582 A1	
20	Exhibit 1004	Patent Application	116
21		Publication Co., Coli, et	
22		al., Pub. No.: US	
23		2012/0255734 A1	
24	Exhibit 1054	International Publication	120
25		Number WO 2004/099587 A2,	
		Armstrong, International	
		Publication Date, 18 November	
		2004 (18.11.2004)	
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A			
a-l-l-a-n	actuators	114:13, 117:2, 126:3	anticipate
77:8	108:17		74:4
a1	add	allan	any
109:19, 132:16	117:25, 118:7	70:14, 71:6, 75:3, 77:8, 127:12, 129:5, 129:16	73:12, 74:11, 74:25, 77:18, 77:22, 77:25, 78:9, 78:24, 79:5, 79:22, 80:2, 82:13, 82:16, 101:19, 102:6, 102:7, 105:13, 108:4, 129:19, 129:20
a2	added		anyone
98:13, 120:9, 132:6, 132:29	93:22	along	82:1, 82:5
able	additional	117:8	anything
80:17	123:16	also	79:5, 79:11, 81:21, 83:22, 84:4, 104:25, 117:24
about	adjacent	72:22, 74:8, 74:15, 88:19, 88:23, 92:23, 93:5, 94:23, 110:4, 123:6	anywhere
76:24, 82:4, 83:23, 84:3, 84:5, 87:8, 90:8, 90:9, 90:13, 90:17, 98:21, 100:14, 100:17, 100:18, 115:20, 115:21, 116:1, 121:10, 122:25, 123:4, 124:3, 124:6, 125:10	113:25	amend	122:7
above	administer	76:18, 81:9, 131:14, 131:23	apologize
125:20	73:13	amongst	74:24
absolutely	advance	124:25	appeal
103:9	74:24	amount	70:2
according	adverse	87:20, 101:20, 102:9, 104:18, 106:21	appear
125:22	129:11	analysis	104:23
accordingly	affect	79:20	application
92:4, 94:7	84:3	ancillary	114:23, 116:14, 132:20, 132:23
action	after	117:9	applications
88:3, 88:4, 91:22, 92:2, 129:19, 129:21	77:20, 81:23, 100:24	annotate	79:6, 79:9
activate	after-cooler	90:2, 90:12, 90:16	applied
96:20	113:6	annotated	79:24
activated	again	85:1, 85:6, 85:8, 85:9, 85:18, 85:19, 85:21, 85:22, 87:4, 91:20	apply
94:19, 95:4	115:18	another	85:22
acts	agree	74:7	applying
99:15	114:10	ansi	97:12
actually	agreed	107:22	approximately
116:10	73:2, 73:6, 73:10, 75:24	answer	87:7
actuator	agricultural	77:21, 106:15, 117:21, 117:25, 118:2	area
108:8, 108:10, 108:14, 113:14, 113:17	121:14	answered	87:4, 119:10
	air	78:3	armstrong
	99:16, 99:25, 101:14, 105:18, 105:19, 123:15, 123:19, 123:23, 124:23, 124:24, 125:3, 125:4, 125:9, 125:10, 125:17, 125:19	answering	98:10, 98:13, 98:19, 99:12, 99:18, 99:23, 100:2, 100:14,
	al		
	114:24, 116:15, 116:16, 132:22, 132:25, 132:26		
	alert		
	124:17		
	all		
	73:7, 105:13,		

100:19, 100:23, 101:5, 101:11, 101:19, 101:24, 103:18, 103:19, 103:23, 104:16, 105:1, 105:3, 105:17, 106:4, 120:9, 120:16, 120:17, 120:18, 121:7, 121:10, 121:16, 121:23, 132:7, 132:30 armstrong's 105:14 around 82:9 arrangement 98:25, 99:13, 100:19 asked 80:16 asking 76:23 assembly 96:21, 110:5, 110:7 associated 125:19 assume 78:3 atmospheric 98:24, 104:10 attached 108:8, 113:4 attending 74:2 attorney 129:20 attorneys 72:4, 72:14, 73:3 audio 75:22, 76:1, 76:6 august 130:5 authorized 73:12	automatically 117:11 available 121:11 avenue 72:5 aware 74:8, 75:11 away 74:12 awful 106:8, 106:19, 126:1 B b2 70:9 back 104:1, 112:6, 118:1, 120:15, 125:11 backup 74:9, 75:21, 76:6, 123:8, 123:9, 123:10, 123:11, 124:18, 124:20 backwards 108:5 baker 72:3, 77:11 ball 107:23, 107:25 barbara 71:8, 75:5, 129:2, 130:10 barrels 105:12 base 113:25 based 88:15, 88:18, 93:13, 93:23, 110:17, 125:16 battery 124:16, 124:23 because 99:23, 111:2	been 75:4, 75:14, 77:1, 77:13, 80:9, 81:2, 82:23, 95:16, 96:5, 97:3, 98:4, 98:6, 100:17, 100:18, 107:10, 109:12, 109:22, 114:17, 116:19, 120:15 before 70:2, 71:8, 73:12, 73:14, 74:20, 77:13, 98:3, 101:13, 103:17, 127:17, 129:7, 129:8 beginning 104:7, 117:3 begins 87:25, 113:19 behalf 72:4, 72:14 being 75:8, 75:18, 99:16, 115:25 believe 83:25, 84:1, 115:14, 121:9 below 98:24, 104:9, 124:16, 125:1 belts 117:10 besides 79:6, 82:14 best 74:6, 77:20, 115:25 better 103:5 between 73:3, 85:8, 87:6, 90:8, 91:8, 91:11 bio 121:12	bit 102:24 blender 117:1, 117:8, 119:11 blood 129:19 blue 85:10, 85:19, 85:22, 87:5, 90:3, 90:5, 90:7 board 70:2 bobbie 70:21, 75:2, 129:2 book 86:20, 88:12, 91:20 book" 88:9 book's 88:20 both 91:2 bottom 98:21, 113:10 botts 72:3, 77:11 bounds 105:24 box 90:5 break 77:18, 103:7, 103:17, 122:14, 126:6 breaker 87:1, 89:2, 89:23, 91:3 breakers 85:18, 86:5, 86:22 breaks 77:20 brief 103:14, 122:16, 126:7
---	---	---	--

bring 80:9, 82:23 broward 128:3 bus 85:10, 85:24, 92:14, 94:10 bypass 110:4, 110:5, 110:6, 110:7, 110:11, 110:25, 111:2, 111:4, 111:5, 111:9, 111:19 bypassing 85:25	certificate 129:1 certify 129:4, 129:11, 129:15, 129:18 chad 72:9 change 81:22, 83:23, 84:5, 117:4, 128:7, 128:9, 128:11, 128:13, 128:15, 128:17, 128:19 changes 128:5 channel 124:12, 124:22 characteristics 123:5, 124:10 charger 124:23 charlotte 72:17 chat 80:12, 80:18, 80:22, 83:4, 98:8, 106:25, 109:14, 114:19, 122:20, 122:23 check 99:8, 108:3, 108:6 chemical 117:9 circuit 85:18, 86:5, 88:16 cite 78:21 clancy 95:20, 96:7, 96:17, 97:7, 97:17, 97:23, 97:25, 98:2, 106:24, 107:3, 107:5, 107:10, 107:13, 107:17,	107:25, 108:18, 108:24, 109:8, 112:1, 112:7, 113:1, 113:8, 114:2, 114:6, 131:32, 132:12, 132:18 clancy" 96:10 clancy's 97:4 class 108:15 clearing 87:1, 87:5, 89:2, 89:23, 90:7, 91:11 clearly 93:13 close 87:11, 92:17, 102:18, 106:17, 113:19 closed 101:13 closes 99:7, 100:6, 100:25, 108:12 closing 100:9, 108:19 coli 97:18, 116:14, 116:20, 116:21, 116:22, 116:23, 117:12, 118:8, 118:10, 118:16, 119:3, 119:21, 121:5, 121:6, 132:24 coli's 97:5 column 122:25, 123:3, 124:3 come 102:9, 121:17 command 86:25, 89:1,	91:4, 117:6, 118:23, 119:2, 119:20 commanded 86:24, 88:25, 89:12, 93:23 commencement 129:7 commencing 129:17 commission 130:4 communication 115:6, 115:9, 124:13 communications 119:9 compensate 117:11 complete 87:24 completely 87:2, 89:24 completes 126:12 compliant 108:15 complimentary 74:22 components 110:16 compressor 99:24, 107:18, 107:19 compressors 97:6 computer 74:12, 79:2, 110:12, 110:15, 110:19, 110:24, 111:3, 111:4, 111:11 concluded 127:9 condition 92:10 conditions 93:15
--	---	--	---

conducted 70:15 conduit 110:5, 110:9 configured 94:16, 95:1, 104:10 connect 74:18 connected 85:24, 111:3, 113:14 connecting 74:18 connection 80:6, 85:8, 107:23 consider 82:13 considered 82:12 consistent 92:19, 106:18 consisting 98:25 constant 102:13 contained 100:22, 118:15, 121:4 contains 100:25 content 102:11 contents 78:13 continued 126:14 continues 99:2 continuing 99:1 contrast 116:24 control 86:25, 89:1, 92:11, 92:12, 109:9, 111:5,	116:25, 118:8, 118:19, 119:8, 119:19, 119:21, 123:12, 123:14, 124:22 controlled 108:17, 113:15, 119:7 controller 124:15, 124:16, 124:18, 124:21 conversations 74:14 cooler 113:3, 114:3, 114:8 cooling 114:12 correct 79:10, 80:25, 87:17, 87:21, 89:17, 90:1, 91:25, 92:8, 93:20, 97:16, 99:11, 99:15, 99:20, 99:21, 100:8, 103:25, 109:1, 111:24, 114:5, 115:8 correctly 86:3, 94:22 could 90:20, 91:21, 92:1, 100:9, 102:1, 102:4, 104:12, 106:18, 117:20, 124:11, 125:23, 126:1 couldn't 102:18 counsel 76:7, 80:19, 81:4, 82:25, 95:18, 129:13 county 128:3 coupled 110:7, 110:12,	111:11 coupler 113:5 court 70:22, 71:9, 73:15, 75:1, 78:6, 118:1, 129:3 curve 87:4, 89:3, 89:10, 89:16, 89:19 curves 86:21, 88:13, 88:15, 88:21, 93:14 cut 85:11, 86:1, 86:7, 86:10, 86:11, 92:25, 94:12, 94:18, 95:3 cutting 93:18 cycle 99:5 D dallas 72:7, 77:11 dark 85:19 date 98:14, 120:10, 128:23, 132:8, 132:31 day 127:19, 130:3 dcs 113:15 december 70:16, 71:2, 129:16, 130:3 declaration 76:15, 76:25, 78:12, 80:5, 81:6, 81:14, 81:17, 81:22,	82:10, 82:12, 82:15, 82:20, 83:6, 83:16, 83:18, 83:24, 84:6, 84:10, 95:13, 114:14, 131:9, 131:18, 131:26 declarations 76:24 define 102:18, 105:7 defines 89:11, 101:25, 104:17 delay 93:22 delivered 119:16 delivery 119:11, 119:12 delta 123:10 depend 106:19 depending 93:15, 102:11, 104:18 depends 90:22, 101:20, 101:21, 101:22, 102:6 deposed 77:13 deposition 70:14, 71:6, 73:11, 74:23, 79:21, 81:24, 82:2, 82:8, 83:13, 84:2, 84:8, 126:12, 127:4, 127:8, 129:6, 129:8, 129:14, 129:15 describe 104:4 described 97:23, 109:6
--	--	---	--

describes 92:24, 99:23 describing 86:4, 99:12 description 104:6, 131:7, 132:3 designed 113:6, 113:22 determine 102:1, 102:12 determined 89:15 device 110:13, 111:11 dictated 87:3, 89:2, 89:7 different 116:1 differential 123:20, 123:24, 125:4, 125:24 digesters 121:14 directly 85:24 disagree 100:22 discharge 96:22 disclose 109:4, 111:23 disclosed 97:7 discloses 94:4, 96:17 disclosure 92:19, 94:15, 94:25, 100:23, 121:5, 121:22, 122:10 disconnected 86:13 discuss 84:14, 85:5, 85:16, 86:16, 88:5, 88:11,	88:23, 91:18, 92:9, 92:18, 92:23, 93:5, 94:3, 94:23, 96:16, 97:2, 100:20, 108:24, 110:24, 114:7, 114:12, 115:11, 116:3, 116:7, 116:12, 117:16, 118:10, 120:19, 120:21, 121:1, 121:23 discussed 84:2, 84:8 discusses 99:18, 100:2, 103:19, 103:23, 107:17, 107:25, 108:18, 110:19, 111:9, 111:14, 113:1, 113:8, 114:2, 116:23, 117:12, 121:16, 123:5, 124:7 discussing 103:18, 103:19, 105:17, 117:15, 118:5 discussion 88:8, 100:16, 107:12, 115:14 discussions 74:11, 115:20 disengaging 92:13, 94:9 display 95:16 distribution 115:6, 115:12, 115:22, 116:2 division 108:15 documents 78:9, 78:24, 82:14, 82:17, 125:12 doing 97:11	downs 96:24, 96:25 dp 123:15, 123:16, 123:19, 123:23 dr 76:12, 76:15, 81:6, 83:6, 83:12, 103:17, 127:5, 131:9, 131:18, 131:26 drafting 82:12 drain 98:24, 99:3, 99:5, 99:8, 99:9, 99:13, 100:2, 100:18, 101:18, 101:22, 102:3, 102:13, 105:18, 106:12, 106:18 draining 99:18, 103:19 drawn 99:16 drive 97:6 drop 80:17, 109:14, 114:19, 122:20 dropped 122:22 drops 106:22 duct 124:24 ducting 113:10, 113:12, 114:1 duly 75:4, 129:7 durham 70:14, 71:7, 75:3, 76:12, 76:15, 77:9, 80:25, 81:6, 83:6, 83:12,	103:17, 127:5, 127:12, 129:5, 129:16, 131:10, 131:19, 131:27 during 84:2, 99:4 E each 74:20, 78:8, 88:14 earlier 106:16 effect 73:14 effects 113:7 eight 98:3 either 83:1, 104:11 electric 86:17, 87:2, 87:14, 89:25, 108:8, 108:14, 113:14, 113:17 electrical 93:7, 93:9 electrically-pow- ered 124:8 eliminates 108:16 else 81:21, 82:5, 84:5, 122:7 embodiment 107:20, 110:3, 124:7 embodiments 117:2 emergency 92:25, 94:15, 94:25, 108:13, 108:20 employed 129:20 enable 85:23
--	--	---	--

enabled 74:16, 123:8, 124:17 end 117:22, 118:6, 127:4 energy 70:4, 129:12 engine 110:10, 110:17 ensure 101:12 enter 101:14 entire 117:6, 118:17, 118:19, 118:25, 119:17, 120:6 equipment 115:6, 115:12, 116:2, 117:9 errata 78:11, 78:14, 81:20, 84:1 error 124:21 esd 108:14 esq 72:8 esquire 72:9, 72:18 et 116:15, 132:24 even 117:9 event 108:1, 108:13, 108:20, 113:16 ever 77:13, 79:24, 106:6 everyone 74:2 exactly 83:25, 125:12, 125:18 examination 76:10, 131:3	examined 75:6 example 85:5, 86:19, 86:21, 88:12, 88:14, 88:20, 89:9, 89:13, 90:25, 92:5, 93:19, 94:6, 95:7, 97:19, 115:10, 123:7, 124:11 examples 119:6 exceeded 124:22 except 73:7 excess 94:6 executed 83:7, 131:27 exhibit 76:14, 77:1, 80:10, 80:12, 80:20, 81:1, 81:5, 81:15, 82:24, 83:5, 83:17, 84:11, 84:25, 95:9, 95:10, 95:12, 95:17, 95:19, 96:1, 96:2, 96:5, 98:7, 98:11, 106:24, 107:4, 107:11, 109:13, 109:17, 109:23, 111:25, 112:6, 114:18, 114:22, 116:13, 120:7, 120:16, 131:9, 131:18, 131:26, 131:31, 132:5, 132:11, 132:15, 132:17, 132:20, 132:23, 132:28 exhibits 131:5, 132:1	expected 123:10 expert 79:16 expires 130:4 explain 90:6 explaining 87:13 explicit 119:23 explicitly 100:19, 101:8, 108:24, 109:4, 110:23, 111:14, 111:18, 114:7, 114:12, 116:6, 117:16, 118:10, 119:14, 120:1, 120:18, 121:23 express 89:8 expressly 115:11, 116:3 external 123:7 extra 78:7 F fact 90:12 failure 124:23, 124:24 fair 84:19, 88:9, 88:10, 96:11, 96:12 falling 104:19 falls 113:16 fan 113:3, 113:4, 114:3, 114:8, 114:13 faster 91:20, 91:25	fault 124:13, 124:14, 124:15, 124:18, 124:22 faults 124:12, 124:13 fcs 98:22 feet 105:11 few 77:16 field 113:23, 115:5 figure 84:25, 85:5, 85:17, 86:23, 88:20, 88:24, 107:21, 107:24, 110:4 figures 113:2 filed 95:21, 96:7, 107:6, 112:2, 131:32, 132:12, 132:18 filing 73:4 fill 99:6, 100:3 filter 110:4, 110:6, 123:16, 123:23, 124:25, 125:3, 125:4, 125:9, 125:10, 125:20 filters 96:21 financial 80:2 financially 129:22 fine 76:4 finish 118:2 finishing 117:21
---	--	---	--

first 75:4, 83:12, 83:17, 84:2, 84:8, 95:9, 95:12, 117:22 fit 126:14 fitted 96:22 fleet 124:8 floor 72:16 florida 70:23, 128:1, 129:4 flow 108:5, 108:6 flows 107:22 fluid 119:11, 119:16 following 128:4, 128:5 follows 75:6 footnote 78:20 force 73:13 forces 124:17 form 73:7, 87:16, 87:22, 91:10, 93:21, 97:22, 100:11, 100:21, 101:7, 104:15, 104:24, 105:6, 105:22, 106:14, 108:21, 109:2, 111:1, 111:22, 114:9, 115:13, 116:5, 117:19, 118:13, 119:1, 120:3, 120:20, 121:25, 122:9, 125:6	forth 109:10, 114:14, 129:6 fouling 125:24 four 82:4 fourth 113:24 fracking 116:4, 116:9, 116:10, 120:19, 121:2, 121:8, 121:21, 121:24, 122:4, 122:7, 124:8 fractionating 120:22, 122:3 fractioning 97:14, 97:18, 115:9, 117:4, 121:1 fractions 86:19, 87:15 fracturing 97:5, 116:7 front 78:9, 78:25, 79:2, 117:22 fuel 98:23, 104:9, 104:18, 106:11 fueling 110:3, 110:16 fuels 121:11, 121:17 full 77:6 function 91:2, 118:8, 119:10 functionality 92:25 further 73:6, 73:10, 86:17, 90:6, 96:17, 129:11, 129:15, 129:18	G gallon 106:2 gallons 105:10 gan 72:22 gas 102:10, 102:11, 107:21, 110:3, 110:8, 110:10, 110:16, 116:7, 121:12, 121:15, 121:17, 124:1 gases 121:15 gave 106:15 generally 91:23, 92:24, 101:17, 102:1, 103:22, 104:13, 105:4 generation 119:10 generator 85:8, 85:11, 86:1, 86:6, 86:9, 92:14, 93:18, 94:6, 94:9, 94:10, 94:12, 94:18, 95:3 generator's 94:4 generators 93:2 getting 99:25 give 80:23, 101:19 given 102:6, 102:7, 105:4, 106:10, 106:11, 129:9 glass 96:25	go 94:13, 95:25, 97:2 goes 95:13 going 118:7, 123:3 good 76:12, 76:13, 103:10 great 103:12 greater 87:20, 89:20, 89:22 greatly 104:18, 104:21 green 85:6, 85:20 grid 94:5, 94:11 H hand 130:3 happen 86:18, 87:15, 87:19, 91:13, 93:8, 93:12, 93:16, 93:19, 93:24 hear 80:15, 102:22, 102:24, 102:25, 103:4, 120:24 help 74:16, 78:6 henry 72:18 here 75:20, 83:15, 85:4, 87:12, 97:19, 100:16, 104:3, 108:18, 114:6, 131:6, 132:2 hereby 73:2, 73:5,
--	--	---	---

129:4 herein 73:4 hereinbefore 129:6 hereunto 130:2 hi 75:7 high 96:24, 124:25, 125:3, 125:5, 125:9, 125:11, 125:17, 125:20 honestly 79:13 hour 122:13 hours 82:4, 82:7 however 77:21 hundred-gallon 106:6 hunt 84:14, 84:25, 85:17, 92:19, 94:4 hunt" 84:19 hunt's 92:10 hydraulic 96:17, 96:19, 97:4, 97:5, 97:12, 97:13, 97:16, 97:17, 97:20, 113:4, 114:3 hydrocarbon 121:15, 121:16 hydrocarbon-based 121:11	83:10, 95:23, 98:17, 107:8, 109:20, 112:4, 115:1, 116:17, 120:13 identify 74:16, 74:19, 90:7 ieee 86:19, 88:5 illustrative 117:2 immediately 88:1, 92:6, 94:17, 95:2, 95:7 implemented 100:10 improvement 97:14 inc 70:4, 129:12 include 84:24, 88:19, 121:21, 123:7, 124:9, 124:11, 126:1 includes 101:11, 110:4, 110:5, 121:3, 122:3 including 93:7, 121:12 incorporate 97:4 increase 117:5, 117:7, 117:10 increasing 117:12 indeed 101:15 indicated 131:6, 132:2 indication 97:1 information 110:14, 110:15,	110:17, 110:20, 110:24, 111:12, 111:15, 111:20 initial 108:11 initiated 90:24 inlet 123:15, 123:16, 123:19, 123:23, 123:24, 124:24, 124:25, 125:4, 125:17, 125:20 input 113:23, 117:3 installed 124:18 instance 90:21 instantaneous 87:3, 89:3, 89:10, 89:14, 89:15, 89:18, 90:2, 90:23, 91:7, 93:12 instantaneously 91:14 interconnected 113:21 interest 80:2 interested 129:22 internal 124:14 international 98:12, 98:14, 109:18, 120:8, 120:10, 132:5, 132:7, 132:15, 132:28, 132:30 interrupt 87:2, 88:16, 89:24 interrupting 88:3 interruptions 74:25	invention 107:20 involved 97:11 ipr 70:7, 76:19, 76:25, 80:3, 80:6, 81:10, 81:17, 83:8, 131:15, 131:24, 131:29 isolate 108:1 isolation 108:2, 120:5 issued 91:5 items 124:25 J job 70:26 jurat 126:15 K key 124:16 kind 90:4, 99:15, 106:17, 118:18 know 75:16, 77:19, 81:25, 83:22, 101:24, 102:8, 105:23, 106:8, 111:4, 116:10, 122:19 knowledge 75:17, 105:4, 125:16, 125:22 known 93:6, 97:12, 97:13, 97:21, 98:1, 98:4 L landfills 121:13
---	---	--	---

large 104:13, 105:11, 105:20 later 92:18, 100:6 least 92:5, 97:19, 109:5 less 93:8, 93:13, 93:19, 93:24, 94:17, 95:2, 95:6 let's 84:9, 84:21, 85:14, 86:14, 91:16, 94:2, 95:8, 96:13, 98:5, 98:19, 106:23, 107:14, 109:11, 109:25, 112:6, 112:9, 114:16, 115:3, 116:22, 120:15, 122:13, 122:18, 124:3, 126:5 level 96:24, 96:25, 125:24 liberty 70:4, 70:5, 76:14, 80:3, 81:5, 83:5, 95:19, 98:11, 107:4, 109:17, 111:25, 114:22, 116:13, 120:7, 129:12, 131:7, 132:3 light 118:16, 119:3, 119:23 limits 105:13, 106:4 line 87:8, 87:9, 90:14, 96:22, 96:23, 98:21,	110:6, 123:1, 123:4, 124:4, 124:6, 128:6 lines 122:11 link 119:9 linkage 113:13, 113:21 linked 113:12, 116:25 liquid 98:24, 99:2, 99:3, 99:6, 99:8, 99:12, 99:14, 99:18, 100:2, 100:3, 100:18, 101:21, 103:20, 106:21 liquids 102:9, 107:21 list 82:11, 95:9, 96:1 listed 82:14, 131:6, 132:2 little 102:23 llc 70:6, 70:9, 129:13 llp 72:3, 72:13 load 85:9, 85:22, 85:23 local 85:9, 85:22, 85:23 located 77:10, 108:3, 113:9, 113:24 location 116:7 locations 115:25, 121:19 lock 99:16, 105:18,	105:19 logic 124:18 long 101:17 longer 91:1 look 84:21, 85:14, 86:14, 91:16, 94:2, 107:14, 112:9, 119:6, 124:3, 125:11 looked 82:17 looking 100:1, 115:18 lot 106:9, 106:20, 126:1 louder 103:3 louver 113:11, 113:19 louvers 113:9, 113:12, 113:18, 113:20 low 96:24, 102:24 lower 78:17 M magenta 87:8, 90:14 maintain 113:22 maintenance 108:2 make 102:21, 109:8, 128:4 manual 108:2 many 77:15, 79:15, 82:7 maps 125:13	march 95:21, 96:7, 107:6, 112:2, 131:32, 132:12, 132:18 mark 80:24, 84:25 marked 76:20, 77:1, 80:9, 81:2, 81:11, 82:23, 83:9, 95:16, 95:23, 96:6, 98:6, 98:16, 107:8, 107:11, 109:12, 109:20, 109:22, 112:4, 114:17, 114:25, 116:16, 116:20, 120:12, 120:16, 131:5, 132:1 marriage 129:20 materials 82:11 matter 83:13, 129:23 maximum 87:9, 90:10, 90:16, 90:25, 104:22, 105:8 maybe 102:6, 102:17, 105:10, 106:1, 106:17 mcm 92:11 mean 86:11, 89:6, 89:23, 123:19, 123:23, 125:3 means 117:7, 125:17 mechanical 88:3 mechanics 91:3 meet 82:1
---	---	--	---

melissa 72:8 mention 111:19, 120:1, 122:7, 131:6, 132:2 mentioned 82:19 mentions 101:5 merely 97:11 met 82:3 metes 105:23 methane 110:8, 110:10 mic 74:13 might 75:13, 125:21 minimize 113:6 minimum 87:7, 90:9, 90:12, 104:22, 105:8 minute 122:13, 126:6 minutes 103:11 missed 117:22 missing 126:1 mode 124:14 module 117:8, 119:12, 124:15 monitor 109:4, 109:8, 119:15, 119:22, 123:8, 123:9, 123:11, 123:12, 124:1, 124:19 monitored 113:23, 118:17,	119:8, 123:6, 124:11, 124:20 monitoring 100:20, 100:25, 101:6, 101:9, 101:12, 108:25, 114:7, 114:12, 117:17, 118:11, 118:25, 119:4, 119:20, 119:24, 120:1, 120:6 more 105:12 morning 76:12, 76:13 motion 76:18, 81:9, 131:13, 131:22 motivated 97:3 motor 113:4, 114:3 motors 96:19 much 101:25, 104:21 muenks 72:8, 80:11, 80:16, 82:3, 87:16, 87:22, 91:10, 93:21, 97:22, 100:11, 100:21, 101:7, 102:20, 103:2, 104:15, 104:24, 105:6, 105:22, 106:14, 107:1, 108:21, 109:2, 111:1, 111:22, 114:9, 115:13, 116:5, 117:19, 118:13, 119:1, 120:3, 120:20, 121:25, 122:9, 125:6, 126:5, 126:9 multiple 82:11, 93:16,	96:21 mute 74:13 N name 77:7 natural 107:21, 110:3, 110:16 nature 86:17, 87:13 necessary 118:18 need 77:18, 108:16, 119:22, 122:20 new 70:23, 71:10 next 91:16, 108:3, 126:14 non-contingent 76:18, 81:9, 131:13, 131:22 non-zero 87:24, 88:2 normal 123:25 north 72:17 notary 70:23, 71:9, 75:5, 127:24, 129:1, 129:3 nothing 84:7, 105:3 notice 71:8, 91:21, 92:1 november 95:22, 96:8, 98:15, 107:7, 112:3, 120:11, 131:33, 132:8, 132:13, 132:19, 132:31 number 70:26, 77:2,	84:16, 95:20, 96:6, 98:12, 106:4, 107:5, 109:18, 112:1, 120:8, 131:31, 132:6, 132:11, 132:16, 132:17, 132:29 O oath 73:13 object 102:25 objecting 102:22 objection 87:16, 87:22, 91:10, 93:21, 97:22, 100:11, 100:21, 101:7, 104:15, 104:24, 105:6, 105:22, 106:14, 108:21, 109:2, 111:1, 111:22, 114:9, 115:13, 116:5, 117:19, 118:13, 119:1, 120:3, 120:20, 121:25, 122:9, 125:6 objections 73:7 obtain 97:5 obvious 109:8, 114:13 occur 89:12 occurs 88:17 off-the-record 74:11 offered 79:15 office 70:1, 77:11 officer 73:12
--	--	---	--

oh 111:2 oil 116:4, 116:7, 116:9, 116:10, 120:19, 120:22, 121:2, 121:7, 121:15, 121:17, 121:21, 121:23, 122:3, 122:4, 122:7 oilfield 70:5, 129:12 okay 75:12, 75:25, 76:5, 84:13, 84:23, 85:15, 86:15, 96:15, 98:9, 98:20, 102:22, 107:2, 107:15, 109:15, 110:1, 112:8, 114:20, 115:4, 116:21, 120:17, 122:15, 123:2, 124:5, 126:11, 127:2 one 74:6, 75:8, 77:21, 83:1, 92:5, 93:8, 93:13, 93:19, 93:24, 94:17, 95:2, 95:6, 105:10, 105:17, 110:2, 118:7, 125:23 one-page 78:11 ones 82:18, 105:21, 105:25, 125:25 only 95:13, 100:24 open 79:2, 79:5, 79:9, 100:24, 107:3, 108:10,	109:16, 113:18, 114:21, 116:21 opened 85:7, 85:20, 86:6, 99:5 opening 100:3 opens 99:7, 101:13 operably 110:7, 110:12, 111:10 operating 92:24, 106:21, 123:5, 124:9 operation 87:25, 116:24, 117:2 operations 86:18, 87:14, 87:19, 93:7, 93:12, 116:12, 117:1, 119:7, 121:24 operator 91:21, 92:1, 113:23 opinion 79:16, 92:4, 94:14, 94:23, 97:2, 97:10, 97:25, 101:5, 114:15, 118:22 opinions 109:6 opposite 114:1 opposition 76:16, 81:7, 131:11, 131:20 orange 85:21 order 118:19, 119:19, 119:21 other 78:8, 78:24, 79:6, 79:9,	81:20, 82:13, 82:16, 82:17, 84:4, 84:7, 110:13, 110:15, 111:11, 121:14, 121:19, 121:22, 124:25, 125:25 otherwise 101:1, 101:13, 129:22 out 99:8, 103:7, 103:25, 106:22, 118:23 outcome 80:3, 129:22 outlet 113:11, 113:19, 113:20 outputs 110:15 outside 122:6 over 74:6, 75:1, 77:16, 78:8, 123:8, 123:9, 123:10, 123:12, 124:19, 124:20 overall 117:13, 117:17, 118:11, 118:24, 120:2 overlap 124:21 own 88:15 owner 70:10, 71:7, 72:14 owners 76:17, 81:8, 131:12, 131:21 P page 81:18, 83:20, 95:25, 96:14,	98:19, 98:20, 99:1, 100:1, 104:2, 122:11, 126:14, 128:1, 128:6, 131:2, 131:7, 132:3 paragraph 78:15, 78:18, 78:20, 78:21, 78:22, 84:9, 84:14, 84:21, 84:24, 85:4, 85:14, 85:16, 86:14, 86:16, 87:12, 88:5, 88:11, 88:19, 91:16, 91:17, 91:18, 91:25, 92:3, 92:9, 92:18, 93:5, 94:2, 94:3, 94:21, 96:13, 96:16, 97:20, 101:11, 104:3, 104:7, 107:14, 107:17, 109:3, 109:25, 110:2, 111:7, 112:9, 113:1, 114:6, 114:11, 115:3, 115:22, 115:23, 116:22, 116:23, 117:14, 117:17, 118:5, 119:15, 119:25, 120:4, 122:6 paragraphs 109:7, 114:15 parameter 125:19 parameters 117:3, 123:17, 125:21 parenthetical 78:16 particular 102:10, 102:18, 106:11
--	---	--	---

particularly 118:16, 119:23 parties 73:4, 129:19, 129:21 party 129:11 pass 126:4 passage 100:17 passes 108:7 passing 107:23 patent 70:1, 70:2, 70:8, 70:10, 71:7, 72:14, 76:17, 76:19, 77:2, 77:4, 77:5, 79:16, 79:25, 81:8, 81:10, 83:8, 84:15, 92:20, 92:24, 95:20, 96:6, 107:5, 112:1, 114:22, 116:13, 122:19, 123:3, 123:4, 124:7, 131:12, 131:15, 131:21, 131:24, 131:29, 131:31, 132:11, 132:17, 132:20, 132:23 patents 79:22 path 101:14 pay 79:18 pe 124:13 peak 90:24 pending 77:22	perhaps 102:7 periods 91:19 permit 99:6, 100:3 petitioners 70:7, 72:4, 76:16, 81:7, 131:11, 131:20 ph 70:14, 71:7, 127:12, 129:5, 129:16 phone 74:19 pieces 116:1 pilot 96:19, 96:23 pipeline 108:3 place 88:4, 115:8 plants 121:13 please 74:5, 74:8, 74:13, 74:15, 74:19, 77:6, 77:19, 78:13, 80:9, 80:13, 80:18, 82:23, 95:16 pneumatically 108:17 point 77:25, 98:22, 116:25 points 103:25 pollution 113:7 popped 75:13 portion 87:4, 89:3, 89:10, 90:3,	118:3 posita 86:22, 88:23, 89:13, 91:6, 93:6, 93:17, 94:7, 94:14, 94:24, 97:3, 97:21, 102:1, 102:8, 104:23, 105:5, 106:12, 111:6, 123:18, 123:22, 125:2, 125:15, 125:16, 125:22 position 124:17 possibility 99:22 possible 98:23, 104:1, 104:8, 106:12, 118:23 potentially 125:3 power 85:11, 85:25, 86:6, 86:8, 87:2, 89:25, 92:14, 92:25, 93:1, 93:18, 94:4, 94:7, 94:9, 94:11, 94:12, 94:16, 94:18, 94:25, 95:3, 97:6, 115:12, 115:21, 116:1, 119:9, 124:13, 124:14, 124:15 powered 113:3, 114:3 preferably 108:14 preferred 107:20 premier 125:12 preparation 81:23, 82:2	preparing 82:8 present 72:22, 116:24 pressure 96:18, 98:23, 98:24, 101:16, 101:23, 104:9, 104:10, 106:20, 110:9, 110:10, 123:20, 123:24, 125:4, 125:23, 125:24 prevent 79:12, 99:16, 108:4 prevents 99:25 previous 115:19, 117:25 previously 76:20, 77:1, 81:2, 81:11, 83:9, 95:22, 96:6, 98:6, 98:16, 107:7, 107:11, 109:12, 109:19, 109:22, 112:3, 114:17, 114:25, 116:16, 116:19, 120:12, 120:16, 131:5, 132:1 prior 117:3 probably 79:17, 82:9, 105:11, 125:25 problem 92:1 proceed 76:7 proceeding 74:3, 74:9, 80:6 processing 121:3, 121:20, 121:21, 122:3
--	--	---	---

produces 94:6 professional 70:22, 71:9, 129:2 program 124:14 provide 94:11 provided 107:22 provides 86:20, 88:12 providing 74:21 pub 114:24, 116:15, 132:21, 132:25 public 71:10, 75:5, 127:24, 129:1, 129:3 publication 84:15, 84:18, 98:12, 98:14, 109:18, 114:23, 116:14, 120:8, 120:10, 132:5, 132:8, 132:15, 132:21, 132:24, 132:28, 132:31 published 95:21, 96:8, 98:2, 107:6, 112:2, 131:33, 132:13, 132:19 pump 85:9, 96:17, 96:19, 96:23 pumps 97:6, 117:7, 119:12, 119:16 purchase 74:23 purpose 88:8 purposes 74:10, 107:12	pursuant 71:7 put 80:12, 80:21, 83:3, 98:7, 105:13, 105:23, 106:25, 109:9 Q qualify 92:6 quantum 125:12 quarles 72:18, 75:10, 75:15, 75:22, 76:2, 76:4, 76:9, 76:11, 76:13, 76:22, 80:8, 80:11, 80:14, 80:21, 81:1, 81:13, 82:22, 83:3, 83:11, 87:18, 91:15, 94:1, 95:8, 95:15, 95:24, 97:24, 98:5, 98:18, 100:15, 101:3, 103:9, 103:13, 103:16, 104:20, 105:2, 105:15, 106:5, 106:23, 107:9, 108:23, 109:11, 109:21, 111:8, 112:5, 114:16, 115:2, 115:16, 116:18, 117:23, 118:9, 118:21, 120:14, 120:23, 122:5, 122:12, 122:18, 122:22, 122:24, 125:14, 126:3, 126:11, 131:3, 132:36 question 73:8, 75:8,	78:1, 78:3, 103:1, 116:8, 117:21 questions 76:23, 77:22, 79:12, 126:4, 126:10 quick 107:16 quite 80:14, 91:24 quote 91:24 R range 89:11 range-ish 106:2 rate 79:18, 117:4, 117:5, 117:8, 117:13, 117:18, 118:11, 118:17, 118:19, 119:5, 119:15, 119:17, 119:19, 120:1, 120:6 rates 117:10 read 78:13, 78:17, 78:18, 78:22, 81:20, 86:3, 94:21, 100:13, 107:15, 118:1, 118:3 read-back 118:6 reading 92:8, 100:17, 100:18, 111:7, 125:5, 125:8 ready 97:14 real 107:16 realize 104:12	really 102:12 realtime 70:22, 71:9, 129:3 reason 83:2, 128:8, 128:10, 128:12, 128:14, 128:16, 128:18, 128:20 reasonable 102:16 reasons 109:9, 114:14, 128:5 recall 83:25, 115:19 receiving 86:24, 88:25, 110:13, 110:20, 110:24, 111:12, 111:15, 111:20 recess 103:14, 122:16, 126:7 record 77:7, 78:14, 81:21, 118:3, 129:9 recorded 75:18, 102:21 recording 74:9, 74:22, 75:21, 76:3 recycle 113:20 recycled 113:9, 113:18 red 85:9, 86:20, 87:9, 88:9, 88:12, 88:20, 91:20 redline 90:17 refer 84:18, 88:9, 96:10, 109:23
--	--	---	--

reference 107:12	74:16, 75:2, 78:6, 102:23, 103:4, 118:1, 127:2, 129:1, 129:3	89:16, 89:21, 89:25, 90:3, 90:10, 90:14, 90:18, 90:21, 90:22, 91:9, 91:22, 92:7, 92:16, 92:21, 93:3, 93:10, 93:11, 94:20, 95:5, 96:8, 97:8, 97:15, 98:1, 99:10, 99:14, 100:4, 100:7, 100:20, 103:21, 103:24, 104:5, 108:20, 110:21, 110:25, 111:16, 111:21, 114:4, 114:8, 115:7, 115:12, 116:4, 117:13, 117:14, 117:18, 118:4, 118:12, 120:2, 120:19, 121:18, 121:24, 122:8, 123:20, 123:24, 125:5	said 111:24, 122:1, 125:18 same 73:5, 73:13, 78:16, 106:15 sand 117:10 saul 72:22, 75:16, 80:8, 82:22, 95:15 saw 105:21 say 94:13, 109:3, 114:13 saying 101:4, 101:10 says 98:22, 100:14, 104:7, 107:19, 110:2, 121:10, 125:8 scenarios 86:9 screen 81:4, 83:15 sealing 73:4 second 80:24, 86:19, 93:8, 93:13, 93:20, 93:25, 94:18, 95:3, 95:6, 108:7, 108:11, 108:12, 108:19, 108:25 secondary 123:13 seconds 87:7, 87:8, 87:15, 90:9, 90:10, 90:13, 90:17, 90:21, 91:8, 91:9, 91:12, 93:16 section 82:10, 82:14,
references 107:24	represented 129:13	robert 70:14, 71:6, 75:3, 76:15, 77:8, 81:6, 83:6, 127:12, 129:5, 129:16, 131:9, 131:18, 131:26	
referring 77:4	requested 118:3	room 113:16	
refers 121:2	required 108:2, 117:4, 124:19	ross 72:5	
refinery 116:11, 116:12, 121:2, 121:20, 122:2	reserved 73:8	run 74:4, 96:18	
regarding 77:2	reservoir 99:2, 99:6, 99:14, 100:4, 101:18, 101:22, 102:3, 102:5, 102:14, 102:17, 106:7, 106:10, 106:13, 106:19	rusnak 78:21	
region 87:5, 90:7	reservoirs 105:16, 105:20	S	
related 129:18	respective 73:3	s 72:1, 101:1	
relates 115:5	rest 119:3	safety 93:9	
relay 92:12, 93:7, 93:12	restate 78:2		
reliably 102:5, 102:19	result 113:19		
rely 82:16	return 96:23		
remember 74:5, 74:13	reversal 108:4		
remote 72:22, 74:1, 75:19, 75:23, 76:2, 76:5, 80:19, 80:23, 81:3, 82:25, 95:18	revised 76:17, 81:8, 131:12, 131:21		
remotely 74:3, 119:8	rick 72:18, 75:7		
repeat 78:2, 117:20, 120:24	right 82:20, 84:16, 86:2, 86:7, 86:8, 86:9, 86:12, 87:15, 88:6, 88:13, 88:21, 89:4,		
report 84:22, 89:6, 95:9, 96:1, 96:14			
reported 70:20			
reporter 70:22, 71:9,			

89:18 see 85:2, 85:12, 87:10, 95:12, 96:3, 125:12 seeing 80:20, 83:1 seen 105:9, 105:10, 105:16, 105:19, 106:6, 106:8, 107:21, 113:2 send 118:23, 119:2, 119:20 sensor 110:8, 110:9, 110:10, 113:24 sensors 110:11, 110:14, 110:18, 110:20, 111:10, 111:12, 111:20 sent 113:17 separator 99:4, 99:19, 102:15, 103:20, 103:24, 104:4, 104:14, 106:22 separators 105:9, 105:11 september 83:7, 131:27 service 129:12 services 70:6, 70:9 set 88:14, 88:15, 113:22, 114:14, 129:6, 130:2 setpoint 123:8, 123:11 settings 88:18 several 116:1	shaft 113:5 shall 73:8 sheet 78:11, 78:14 short 91:19, 92:4 shorthand 129:1 shortly 77:20 should 74:12, 76:3, 78:17, 78:18, 78:21, 81:3, 93:11 shown 96:21, 108:9, 110:13 shut 96:24, 96:25 shutdown 92:10, 108:13, 108:20 side 114:1 sight 96:25 sign 90:23, 90:24, 91:4 signal 92:12, 113:17 signature 81:18, 83:19, 128:23 signature-plkal 130:8 signed 73:11, 73:14 similar 122:10 similarly 85:17 simultaneously 118:24 single 116:25, 117:6	sir 77:14, 77:24, 80:4, 81:16, 84:8, 90:15 site 93:1, 115:9 size 101:21, 101:22, 104:12, 104:17, 106:10 skid 107:18, 107:19, 107:22, 108:1 slowly 74:5 small 105:9 smoothly 74:4 solanoid 99:13 solely 117:1 solenoid 98:25 some 83:1, 84:1, 87:23, 88:1, 98:2, 105:11, 115:22, 124:25, 125:18, 125:21, 125:25 something 87:11, 106:16, 125:10 somewhat 104:13 somewhere 77:16, 90:11, 91:8 sorry 95:11, 117:20, 121:6 sound 113:7 source 102:10, 108:5 sources 121:12	south 72:15 speak 74:5 speaking 74:17, 74:20, 91:23, 103:22, 104:13, 105:4 specifically 76:24, 95:10, 101:5, 103:18 specified 93:11 speed 123:8, 123:9, 123:10, 123:12, 124:19, 124:20 spend 82:7 ss 128:2 stand 95:18 standard 86:20, 88:6 startup 108:12 state 71:10, 77:6, 92:3, 97:10, 128:1, 129:4 states 70:1 status 100:20, 101:1, 111:4, 124:14 stem 108:9 still 105:7, 117:21 stipulated 73:2, 73:6, 73:10 stop 76:3 strawn 72:13 street 72:15
---	---	---	--

subatmospheric 99:4, 99:19, 99:22, 101:15, 102:14, 103:20, 103:24, 104:1, 104:4, 104:9 submit 80:5 subscribed 127:15 substantially 92:6, 94:17, 95:2, 95:7 suction 99:24, 108:6 suite 72:6 supplied 93:1, 94:5 supplies 96:18 supply 123:13, 123:14 support 76:16, 81:7, 131:10, 131:19 sure 77:8, 82:17, 88:17, 100:12, 102:21, 103:13, 116:9 surround 90:4 swap-over 85:20 swaying 104:22 switch 85:20, 124:16 switched 85:21 switchgear 85:6, 85:19, 85:25, 86:18, 86:22, 87:6, 87:14, 88:13, 88:15, 88:21, 89:9, 90:8,	91:3, 92:12, 92:13, 93:24, 94:8, 94:16, 95:1 switchgears 86:5 switching 85:23 sworn 73:12, 73:14, 75:4, 127:15, 129:7 system 86:25, 89:1, 97:4, 97:5, 97:17, 97:18, 97:20, 99:9, 99:25, 101:1, 101:14, 101:23, 102:6, 104:19, 106:20, 110:3, 110:16, 113:21, 115:9, 117:5, 117:6, 117:13, 117:18, 118:8, 118:11, 118:16, 118:17, 118:20, 118:24, 118:25, 119:18, 120:2, 120:6, 123:9, 123:13, 123:14, 124:19 systems 97:13, 97:14 T take 77:18, 77:20, 78:7, 88:4, 89:12, 91:1, 91:21, 92:2, 101:17, 101:25, 102:2, 102:13, 103:6, 103:7, 120:4, 122:13, 126:5 taken 71:7, 103:15,	119:4, 122:17, 126:8, 129:8 takes 87:23, 88:2 talk 74:6, 78:7, 115:21 talking 115:25, 121:9 tall 105:12 tank 96:22, 99:4, 99:17, 99:19, 101:15, 102:15, 103:21, 103:24, 104:5, 104:14, 106:22 task 124:21 teach 94:15, 94:25 teaches 85:17, 94:10, 119:22 teaching 92:10, 101:10, 104:16, 105:14, 106:3, 119:24 teachings 109:7 tech 72:22, 74:1, 75:19, 75:23, 76:2, 76:5, 80:19, 80:23, 81:3, 82:25, 95:18 technical-related 74:25 techniques 97:12 tells 105:1 temperature 96:24, 113:16, 113:22, 113:24, 125:23	term 89:7, 97:20, 101:9, 120:5, 121:6, 121:7 terminates 85:7, 92:11 test 123:10, 124:19 testified 75:6 testimony 129:9 texas 72:7, 77:12 th 72:16, 130:3 thank 74:1, 76:9, 80:23, 103:5, 107:1 thanks 103:12 thereby 93:1 things 105:25, 124:1, 126:2 think 100:22, 102:4, 102:12, 103:10, 104:25, 105:7, 105:13, 106:15, 106:17, 115:24, 118:7, 118:14, 118:15, 123:21, 123:25, 125:7 third 76:25, 78:12, 81:16, 82:20 thompson 114:18, 114:21, 114:23, 115:3, 115:5, 115:11, 116:3, 116:6, 132:21 thought 75:13 threshold 125:20
---	---	--	---

through 74:19, 99:8, 104:19, 107:23, 108:7, 122:11 thursday 70:16 time 73:8, 74:20, 77:19, 86:21, 87:1, 87:5, 87:8, 87:9, 87:20, 87:24, 88:1, 88:2, 88:13, 88:21, 89:2, 89:14, 89:20, 89:23, 89:24, 90:7, 90:9, 90:10, 90:13, 90:17, 90:20, 91:1, 91:7, 91:11, 91:13, 91:19, 101:19, 101:25, 102:2, 102:7, 102:10, 102:11, 102:13, 102:19, 103:7, 103:10, 106:13, 106:18, 124:21, 127:2 timekeeper 132:34 timer 100:10 times 77:15, 79:15, 79:17, 88:17, 89:11, 92:5 today 76:23, 77:5, 77:10, 77:19, 79:13 today's 81:23, 82:2 together 96:23, 113:13, 119:4 told 117:7	top 100:1, 100:6, 113:10, 122:12 total 82:7, 132:37 towards 108:5 tracking 124:20 trademark 70:1 transcript 74:24 transmitter 124:24 treatment 119:11, 121:13 trial 70:2, 73:9 trip 86:24, 87:3, 88:25, 89:3, 89:10, 89:12, 89:14, 89:16, 90:3, 90:23, 91:4, 91:12, 91:13, 92:13, 93:23, 123:11, 123:12 tripped 85:7 tripping 86:18, 86:21, 87:7, 87:9, 87:14, 87:19, 87:24, 87:25, 88:12, 88:21, 90:9, 90:10, 90:13, 90:16, 90:20, 91:7, 93:8, 93:18, 94:8 trobaugh 109:24, 110:19, 110:23, 111:9, 111:14, 111:18 true 129:9	try 103:2 trying 89:8 tryon 72:15 turbine 123:6, 123:15, 123:18, 123:19, 123:22, 123:23, 124:1, 124:2, 124:9, 124:10, 124:22, 124:23, 124:24, 125:2, 125:3, 125:9, 125:16, 125:19 turn 75:1, 84:9, 93:2, 95:8, 96:13, 98:5, 98:19, 106:23, 109:11, 109:25, 112:6, 114:16, 115:3, 116:19, 116:22, 120:15, 122:18, 122:25 turned 86:11 two 98:25, 99:13, 105:10, 113:8, 113:18, 115:24 type 106:11 U unable 74:17, 94:11 understand 77:23, 78:1, 89:14, 91:6, 93:17, 104:23, 111:6, 123:18, 123:22, 125:2, 125:15 understood 78:4, 86:23, 88:24, 94:8,	94:14, 94:24 unedited 74:22 unit 92:11, 94:16, 95:1 united 70:1 units 117:9 unknown 132:35 use 101:8, 118:14, 120:5, 121:5, 121:7, 122:1 uses 104:6 using 99:13, 100:10, 108:16 utility 85:10, 85:24, 92:14, 94:5, 94:9, 94:11 utilizes 116:24 V value 99:7 valve 96:20, 99:5, 99:8, 100:3, 100:6, 100:9, 100:20, 100:24, 100:25, 101:6, 101:12, 101:13, 107:24, 107:25, 108:3, 108:6, 108:7, 108:9, 108:11, 108:12, 108:19, 108:25, 109:5, 109:9, 110:6, 110:11, 110:25, 111:2, 111:5, 111:9, 111:19
--	---	---	---

valves 99:1, 99:13 varied 88:17 variety 121:12 various 109:9 vary 88:17, 102:10, 104:12, 104:17 vdc 123:13, 123:14, 124:23 via 71:8, 107:22, 113:24, 119:9, 129:16 video 74:15, 74:18, 75:18, 75:23, 75:25 video-recorded 75:9 videographer 75:20 videotaped 71:6 virtually 70:15 visualizing 106:1 voice 74:19 volt 108:8 voltage 90:25, 123:7, 123:13, 123:14, 124:16 volume 70:13, 71:5, 78:16, 78:17 W waived 73:5 wall 113:25	walters 72:9, 75:7, 75:12, 75:24 want 78:7 wanted 102:20 waste 121:13 water 103:8, 121:13 wave 90:23, 90:24, 91:4 way 105:13, 113:5, 129:21 we've 100:16 weight 125:25 wellbore 119:13, 119:17 wells 121:15, 121:17 whereof 130:2 whereupon 127:8 window 79:6 winston 72:13 wish 128:4 within 71:10, 73:11, 121:4, 129:3 without 93:22, 118:24, 119:20 witness 95:11, 98:9, 103:6, 103:12, 107:2, 109:15, 114:20, 122:15, 122:21, 126:4, 126:10, 129:6,	129:10, 130:2 witness's 128:23 wo 98:12, 109:18, 120:8, 132:6, 132:16, 132:29 words 118:14, 122:2 work 101:2 writing 82:15 wrong 75:15 Y yeah 98:2, 105:18, 115:18, 115:21, 115:24 years 98:3 yesterday 82:4 york 70:23, 71:10 yourself 74:20 Z zeltman 70:21, 71:8, 75:5, 129:2, 130:10 zero 87:20, 88:1, 89:21, 89:22, 91:2 zoom 71:8, 75:21, 79:6, 129:16 . .2004 98:15, 120:11, 132:9, 132:32 0 0.06 87:7, 90:9,	90:13, 91:8, 91:12 0.08 90:20 0.16 87:8, 90:10, 90:17, 91:8, 91:12 00 132:35 0038907 84:16 01 132:36, 132:37 01274 70:7, 76:19, 76:25, 81:10, 83:8, 131:15, 131:24, 131:29 0181582 114:24, 132:22 02 132:35 0255734 116:15, 132:26 044509 109:19, 132:16 09 132:35 099587 98:13, 120:9, 132:6, 132:29 1 10 70:17, 71:3, 99:1, 99:4, 99:17, 100:1, 101:15, 102:15, 103:24, 104:5, 129:17 100 110:3, 110:16 1003 82:24, 83:5, 83:17, 84:3, 84:11, 131:26 1004 116:13, 116:20,
---	---	--	---

Transcript of Robert Allan Durham, Ph.D., Volume 2
Conducted on December 11, 2025

151

132:23 1008 84:25 1021 95:14 1037 114:18, 114:22, 132:20 104 110:9 105 110:8, 110:11, 110:14, 110:18, 110:20, 111:10, 111:12, 111:15, 111:20 1052 76:14, 77:1, 80:10, 80:20, 81:2, 81:5, 81:15, 95:17, 131:9, 131:18 1054 98:7, 98:11, 120:7, 120:16, 132:5, 132:28 1055 95:10, 95:12, 95:19, 96:2, 96:5, 106:24, 107:4, 107:11, 111:25, 112:6, 131:31, 132:11, 132:17 1056 109:13, 109:16, 109:17, 109:23, 132:15 106 110:6 107 110:9, 110:11, 110:14, 110:18, 110:20, 111:10, 111:12, 111:15, 111:20, 132:11 108 110:6, 110:11,	110:25, 111:3, 111:5, 111:9, 111:19 109 110:10, 110:12, 110:14, 110:18, 110:21, 111:10, 111:13, 111:15, 111:21, 132:15 11 70:16, 71:2, 84:25, 85:5, 99:1, 99:5, 99:7, 100:3, 100:6, 100:9, 100:20, 100:24, 101:1, 101:6, 101:12, 129:16 11,091,992 70:9, 76:20, 77:3, 81:11, 83:9, 131:16, 131:25, 131:30 111 96:18, 132:17 1115 85:8 112 96:20 1121 85:6 114 132:20 116 84:9, 84:14, 132:23 1165 85:10 1180 85:9 12 99:2, 99:6, 102:14, 102:17, 127:3, 127:9, 129:17 120 77:16, 108:8, 124:22, 132:28	125 113:10, 113:12 13 85:17, 99:1, 99:7, 100:24, 101:13 1321 85:19, 85:25 1324 85:21 1336 85:18 1360 85:24 1380 85:22, 85:23 14 70:17, 71:3, 99:9, 115:22, 124:3, 129:17 141 86:20, 88:6 15 99:9, 103:10, 122:13, 123:1, 123:4, 124:4, 124:6, 126:6 150 110:11, 110:17 156 109:7 157 109:7 16 72:16, 130:3 18 98:14, 120:10, 132:8, 132:31 18.11 98:15, 120:11, 132:9, 132:32 181 78:18 185 83:20 19 122:25, 123:3 1986 86:20, 88:6	2 20 82:9, 106:1 200 105:12 2001 72:5 2004 98:13, 98:15, 120:9, 120:11, 132:6, 132:9, 132:29, 132:32 2007 95:21, 95:22, 96:7, 96:8, 107:6, 107:7, 112:2, 112:3, 131:32, 131:33, 132:12, 132:13, 132:18, 132:19 2009 114:24, 132:22 2010 84:16 2012 116:15, 132:26 2016 109:19, 132:16 2024 70:7, 76:19, 76:25, 81:10, 83:7, 83:8, 131:15, 131:24, 131:28, 131:29 2025 70:16, 71:2, 127:19, 129:17, 130:3 2029 130:5 205 92:11 215 92:14 216 114:15 217 114:15
--	--	---	---

Transcript of Robert Allan Durham, Ph.D., Volume 2
Conducted on December 11, 2025

152

22 95:22, 96:8, 107:7, 112:3, 117:7, 119:12, 131:33, 132:13, 132:19 221 92:13 227 92:12 229 92:12 24 98:21, 123:13, 123:14 260 92:15 275 96:14 28 95:21, 96:7, 107:6, 112:2, 131:32, 132:12, 132:18 28202 72:17 288 84:21, 84:24, 85:4 289 85:14, 85:16 290 86:14, 86:16, 87:12, 88:5, 88:11, 88:19 291 91:17, 91:18, 92:3 292 92:9, 92:18, 93:5 293 94:2, 94:3 298 81:18 3 3-inch 107:22, 107:23,	108:7, 108:11, 108:12, 108:19, 108:25 30 79:17, 105:11, 106:2 300 72:15, 107:22 31 107:14, 107:15, 107:17, 109:25, 110:1, 110:2, 132:36 350 79:20 37 113:3 38 113:4, 127:3, 127:9, 129:17 39 112:9, 113:1, 113:5, 114:6, 114:11 4 40 79:17, 113:9, 117:8, 119:8, 119:12, 132:37 41 78:18, 78:19, 113:9, 119:9 42 113:11 43 113:13, 132:36 44 113:14 45 113:24, 132:37 48 115:23, 115:25 485 79:20 487 78:20 5 515 78:20	5a 113:2 5b 113:2 5c 113:2 5d 113:3 6 6 108:11, 108:13 60 98:22 600 96:13, 96:16, 97:20 612758 70:26 7 7,909,585 95:20, 96:7, 107:5, 112:1, 131:31, 132:11, 132:17 71 116:22, 116:23, 118:15, 119:3, 119:25, 120:4 72 118:16, 119:3, 119:6, 119:15 73 88:20 75201 72:7 76 131:3, 131:9 8 80 78:22 81 131:18 83 131:26 87 78:21	9 90 78:15, 96:24 900 72:6 91 96:25 92 97:1 95 131:31 98 132:5 992 77:5, 92:20, 92:23, 98:3, 122:19, 123:3, 123:4, 124:6
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1 STATE OF FLORIDA) PAGE 1 of _____
2) ss:
3 COUNTY OF BROWARD)
4 I wish to make the following
5 changes, for the following reasons:
6 PAGE LINE
7 90 23 CHANGE: change "sign" to "sine"
8 REASON: correct word
9 91 4 CHANGE: change "sign" to "sine"
10 REASON: correct word
11 93 14 CHANGE: replace period with comma
12 REASON: correctness
13 93 14 CHANGE: replace comma after second with period
14 REASON: correctness
15 93 15 CHANGE: add "tripping operation" after "that
16 REASON: complete answer
17 97 18 CHANGE: change "fractioning" to "fracturing"
18 REASON: correct word
19 104 19 CHANGE: change falling to flowing
20 REASON: correct word

21 
22 Witness's signature 12-19-2025
23 Date
24
25