

UNITED STATES PATENT TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

**HALLIBURTON ENERGY SERVICES, INC.,
Petitioner,**

v.

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

**IPR2023-00558
U.S. Patent No. 11,136,870 B2**

**DEPOSITION VIA ZOOM VIDEOCONFERENCE OF
DR. ROBERT DURHAM**

TAKEN NOVEMBER 14, 2023 BY CARA NASI-PINARDI, RPR



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1 THE DEPOSITION OF DR. ROBERT DURHAM IS TAKEN ON THIS
2 14TH DAY OF NOVEMBER, 2023, VIA ZOOM
3 VIDEOCONFERENCE, COMMENCING AT 9:32 A.M.

4

5 TRIAL TECH: We are now on the record.
6 My name is Ben Merten. I'm a trial technician
7 representing Twin West Reporting. Today's date is
8 Tuesday, November 14th, 2023, and the time is
9 9:32 a.m. Central Time.

10 This is the deposition of Dr. Robert
11 Durham in the matter of Halliburton Energy Services,
12 Incorporated versus U.S. Well Services, LLC, Case
13 Number IPR2023-00558 before the Patent Trial and
14 Appeal Board.

15 By participating in this deposition, all
16 parties have agreed to our court reporter
17 administering the oath and transcribing testimony
18 remotely.

19 Will counsel please identify themselves
20 and who they represent for the record, after which
21 our reporter will administer the oath.

22 MR. HOPKINS: Matthew Hopkins from



1 Winston & Strawn. I'm counsel for Patent Owner,
2 U.S. Well Services.

3 MS. FLANNERY: Liz Flannery with Baker
4 Botts representing Halliburton, Petitioner. Also
5 with me is Lori Ding, also for Baker Botts.

6 (WHEREUPON, DR. ROBERT DURHAM WAS DULY SWORN.)

7 EXAMINATION

8 BY MR. HOPKINS:

9 Q Good morning, Dr. Durham.

10 A Good morning.

11 Q I'll be asking you questions today about your
12 declaration in IPR2023-00558 regarding U.S. Patent
13 No. 11,136,870. I'll be referring to this patent
14 today as the '870 Patent.

15 Can you state your name for the record?

16 A Dr. Robert Allan, A-L-L-A-N, Durham.

17 Q And where are you today?

18 A In Baker Botts' office in Houston.

19 Q And do you have any documents in front of you?

20 A Other than the declaration that you just uploaded,
21 no.

22 Q And I notice that you have a laptop and a computer



1 in front of you. Is there anything open, any other
2 applications open besides a Zoom window on that?

3 A The PDF of the declaration you just sent me, but
4 that's it.

5 Q Okay. So no other applications are open?

6 A Correct.

7 Q And have you ever been deposed before?

8 A Yes, sir.

9 Q So to help the court reporter today, I just want to
10 take extra care that we don't talk over each other.
11 You know, if you need a break at any time, please
12 let me know. I'll do my best to take breaks shortly
13 after you ask for one. I will, however, ask that
14 you answer any pending question.

15 Do you understand?

16 A Yes.

17 Q Now, I've uploaded your declaration that is in front
18 of you. Can you please review that Exhibit 1002 and
19 let me know if that is your declaration.

20 A Yes, sir. From quick review, it appears to be
21 complete.

22 Q Can you turn to page 135 of that PDF. Let me know



1 when you're there.

2 A Okay.

3 Q Can you confirm that that's your signature on page
4 135?

5 A It is.

6 Q Thank you, sir. Now can we turn to paragraph 56.
7 This is on PDF page 34.

8 A Okay. I'm there.

9 Q In this paragraph you mention that you use ASD and
10 VFD interchangeably throughout your declaration. I
11 plan to use VFD and ASD interchangeably in today's
12 deposition as well and have them mean the same
13 thing.

14 Do you have any issue with me doing that?

15 A No, sir.

16 Q May we turn to paragraph 70 now of your declaration.
17 It's also on the share screen as well.

18 In this paragraph you mention that you both
19 design and oversee installation of increasingly
20 small ASDs for various applications including power
21 generation, petrochemical, and commercial
22 environments.

1 What are some ASDs that you designed or oversaw
2 installation for for power generation?

3 A For power generation, I have installed, jeez, horse
4 draft fans, induced draft fans, boiler feed pumps,
5 all the way down to chemical pumps, and those
6 smaller 10 horsepower, 20 horsepower motors feeding
7 various liquids and chemicals into boilers or into
8 turbines.

9 Q Okay. Can we start with some of the larger ones
10 that you worked on? What was the largest ASD that
11 you can think of in the power generation
12 environment?

13 A I would say probably the induced draft fans at
14 Northeastern 3 and 4 Coal Station. My recollection
15 is those were 6500 horsepower. Those would probably
16 be the biggest.

17 Q And was the 6500 horsepower the power of the ASD?

18 A Yes, each one was 6500. There were four.

19 Q And about how large was that ASD in size?

20 A Each pair of drives have an entire building
21 100-by-20, something along that size.

22 Q What kind of functionality did that ASD have?

1 MS. FLANNERY: Object to form.

2 A That's a broad question. Could you narrow that down
3 a little bit?

4 BY MR. HOPKINS:

5 Q What did this ASD do?

6 A Changed the frequency to the -- controlled the
7 frequency of the power to the motors.

8 Q And what did the motors do?

9 A They drove induced draft fans.

10 Q So these were electric motors that drove fans for --
11 I guess, strike that.

12 Can you kind of explain at a high level what
13 the ASD and electric motor did for the fans?

14 A Well, at a high level, it drove the fans, changed
15 the speed of the fans by varying the frequency.

16 Q And were the fans used for cooling?

17 A No. They were induced draft fans, induced draft
18 combustion fans for the coal fired boiler. So they
19 would draw combustion air through the boiler.

20 Q Okay. What about the smallest VFD that you've used
21 or that you've designed and oversaw installation?

22 A Probably 3 horsepower on a liquid transfer pump at

1 one of our leases.

2 Q I'm sorry. You said one of your leases?

3 A At least that's the -- I'm sorry. Could you repeat?

4 Q You had mentioned on one of your leases. What is
5 that?

6 A Oil and gas lease.

7 Q Okay. Can you explain what that is a little bit
8 more?

9 A I'm sorry. Could you rephrase that?

10 Q What is an oil and gas lease?

11 A Well, an oil and gas lease is a location of where
12 you're producing oil and gas.

13 Q And did I hear you correctly that you said it was a
14 3 horsepower variable frequency?

15 A Yes, yes. And I would clarify that that's the
16 smallest one that I've done where it was an
17 individual ASD. You almost can't buy an appliance
18 anymore without a direct drive variable frequency
19 drive on it.

20 Q What kind of appliances have ASDs and variable
21 frequency drives?

22 A Washers, dryers, refrigerators, freezers, air

1 conditioners, pool pumps. You can go down the list.
2 Almost all appliances now that have motors have at
3 least as an option a direct drive pulse-width
4 modulated variable frequency drive.

5 Q Do they all use the same type of electric motors?

6 A If you mean by AC electric motors, yes, they all use
7 AC electric motors, and they're all very similar in
8 design.

9 Q Are there more than one type of electric motors?

10 MS. FLANNERY: Object to form.

11 A Yes, sir.

12 BY MR. HOPKINS:

13 Q What are the types of electric motors?

14 A You have DC, you have AC induction, AC synchronous,
15 and permanent magnet motors.

16 Q What are some uses of an AC permanent magnet motor?

17 A An AC permanent magnet motor is used in the same
18 applications as an induction motor would be used.
19 It trades off some efficiency for some complexity.
20 It's a little bit more complex to construct, a
21 little more expensive to construct, but the
22 advantage is it's a little more efficient in

1 operation. So any application used in an induction
2 motor, you could use a permanent magnet motor in.

3 Q And you previously said that there were four
4 different types of electric motors. Is that
5 correct?

6 A Yes.

7 Q Do all of them use a VFD or an ASD?

8 A Well, not a DC motor, no. DC motor is not AC.

9 Q Okay. So three different -- there are three
10 different types of electrical motors that use an
11 ASD. Is that correct?

12 A Yes, sir.

13 Q And how big is a VFD for an electric motor for a
14 pool pump?

15 MS. FLANNERY: Object to form.

16 A What size pool pump?

17 BY MR. HOPKINS:

18 Q Olympic size pool.

19 A Probably hold it in your hand, at least two hands.
20 So, you know, 12-by-24, somewhere in that range
21 maybe.

22 Q How many horsepower -- or, sorry. Strike that.

1 How much horsepower would that pool pump
2 generate?

3 MS. FLANNERY: Object to form.

4 A I answered your question on the assumption it would
5 be around 10 horsepower for an Olympic size pool.

6 BY MR. HOPKINS:

7 Q Would the VFD for a pool pump have any type of
8 graphical user interface for a user to interact
9 with?

10 MS. FLANNERY: Object to form.

11 A I think that would depend on the particular VFD.

12 BY MR. HOPKINS:

13 Q Are there certain VFDs that do not have a graphical
14 user interface for a user to interact with?

15 A Yes, sir.

16 Q Do those tend to be smaller VFDs?

17 A I don't know that you can characterize it. It's a
18 graphical user interface. It's available sometimes.
19 Sometimes you just don't need it.

20 Q Are there any VFDs that do not have ways for a user
21 to interact with it?

22 MS. FLANNERY: Object to form.

1 A Yes, sir.

2 BY MR. HOPKINS:

3 Q And so what would those VFDs be?

4 A Those would be VFDs incorporated in the body of a
5 standalone appliance or other prebuilt kind of
6 installation where it's all preprogrammed from the
7 factory.

8 Q And those VFDs will work completely fine by just
9 plugging them in and having them run?

10 MS. FLANNERY: Object to form.

11 A Well, no, there's an awful lot that goes into a
12 prebuilt appliance or a scatter installation. So,
13 you know, you just don't just plug it in.
14 Obviously, they have to be programmed and set up at
15 the factory.

16 BY MR. HOPKINS:

17 Q After one of those VFDs that we're speaking about
18 leaves the factory, is there any need for a customer
19 to set anything with the VFD to use it?

20 MS. FLANNERY: Object to form.

21 A You're asking some really broad questions, but in
22 the hypothetical we've been operating under, no, not

1 usually. If something goes wrong, you call a
2 technician.

3 BY MR. HOPKINS:

4 Q Going back to paragraph 70, you also mentioned that
5 ASDs are used for HVAC blowers -- or to control HVAC
6 blowers.

7 Can you give me an example of how an ASD is
8 used to do that?

9 A I'm not sure really how to answer that question. It
10 controls the HVAC blower, varies the speed of the
11 blower.

12 Q And is this an HVAC blower one that you would find
13 at a house, a normal person's residence?

14 A They are available for residential use, yes.

15 Q All right. I would like to turn now to
16 Exhibit 1006.

17 TRIAL TECH: Introducing Exhibit 1006.

18 BY MR. HOPKINS:

19 Q This is the Toshiba G7 Adjustable Speed Drive. I'm
20 going to put this exhibit in the chat so you have it
21 open.

22 MR. HOPKINS: Has the witness confirmed

1 that they've received this exhibit?

2 A Okay. I've got it.

3 BY MR. HOPKINS:

4 Q Dr. Durham, do you know what this VFD would be
5 typically used for?

6 A A G7, Toshiba G7, any application of the horsepower
7 range that it's designed for.

8 Q Does the horsepower range matter for its
9 application?

10 A Broadly speaking, yes. You have a certain
11 horsepower need, and so you select a VFD that can
12 supply that horsepower.

13 Q And when you speak of a VFD -- I'm sorry.

14 When you speak of a need, are you referring to
15 the need of an electric motor?

16 A Well, the need of the process or what you're trying
17 to drive determines what size electric motor you
18 have, and the size of the electric motor determines
19 what size VFD you would select.

20 Q Is it fair to say that the electric motor and VFD
21 need to have a matching horsepower range?

22 MS. FLANNERY: Object to form.

1 A No.

2 BY MR. HOPKINS:

3 Q No. I would like to go back to the need that we
4 were talking about that you mentioned, the Toshiba
5 G7 has a particular operating range to fit that
6 need.

7 What is that need that you're talking about?

8 MS. FLANNERY: Object to form.

9 A Can you break that down, please?

10 BY MR. HOPKINS:

11 Q When I asked you -- and please correct me if I'm
12 misstating your testimony. But when I asked you
13 about what the Toshiba G7 is typically used for, you
14 said it is used for any operating use for a
15 particular need. Is that --

16 A That's not what I said.

17 Q Okay. I'm going to ask you the question again for
18 clarity of the record.

19 So what is a Toshiba G7 typically used for?

20 A To drive a motor.

21 Q To drive any motor?

22 A To drive any motor that is operating within the



1 horsepower range of the G7 drive.

2 Q So I would like to talk about the horsepower range.
3 So this is -- the Toshiba G7 has a particular
4 horsepower range. Is that correct?

5 A It does.

6 Q Okay. And the electric motor must fall within that
7 horsepower range in order to be operated by the
8 Toshiba G7. Is that correct?

9 A No, sir.

10 Q Okay. How is that incorrect?

11 A The motor can be any size. It's the -- you're
12 asking very specific questions, and the answer to
13 the question is, no, the motor can be larger or
14 smaller than what the G7 range is. What has to
15 match is what is driving, the output of the drive
16 versus what load is required on the motor.

17 Q Can we turn to page 24 of Exhibit 1006.

18 A PDF 24 or 24 in the document?

19 Q PDF page 24.

20 A Okay.

21 Q There's a sentence there that's after the third
22 paragraph, "Do not use an ASD with a motor that has

1 a power rating that is higher than the rated output
2 of the ASD."

3 A Yes.

4 Q Is this consistent with what you were telling me?

5 A Yes.

6 Q Okay. Can you explain --

7 A It's a different question.

8 Q Okay.

9 A Sure. If we look, for example -- let me see. If we
10 look, for example, on page 20, we understand the
11 explanation for that statement. So "A motor with a
12 rated capacity that exceeds the motor capacity
13 recommended for the ASD may result in instable
14 operations."

15 But your question is, do they have to match?

16 And the answer is, no, they don't have to match.

17 You can choose to use it and take the efficiency and
18 the stability hit, but, no, they don't have to
19 match.

20 Q The sentence that is shown on the screen on page 24
21 of Exhibit 1006 is explaining that you should not
22 use a motor that has a power rating that is higher

1 than the rated output of the ASD. Is that fair?

2 MS. FLANNERY: Object to form.

3 A That's the manufacturer's recommendation, yes, and,
4 of course, that's also -- you have to take into
5 account whether you're operating VFDs in parallel as
6 well, which these G7s are set up to be operated in
7 parallel. So that changes the size of the motor as
8 well.

9 BY MR. HOPKINS:

10 Q Do you think a POSITA reading this would consider
11 this to be a warning of something that they
12 shouldn't do?

13 MS. FLANNERY: Object to form.

14 A Yes.

15 BY MR. HOPKINS:

16 Q Do you know what the rated output of the Toshiba G7
17 ASD is?

18 A The range, depending on which one you select,
19 between 30 horsepower and 350 horsepower according
20 to this document.

21 Q So I want to go back to a few examples we talked
22 about earlier about the one at the coal power plant.

1 Would you be able to use the Toshiba G7 VFD to
2 substitute that out for the VFD used at the one you
3 spoke of earlier, the largest one that you worked
4 on?

5 A I don't know that I can answer that question without
6 consulting with Toshiba. This G7 is set up to be
7 operated in parallel, and so I would really want to
8 consult with Toshiba to see if you could operate
9 that in parallel.

10 Q What if it was only one, just a single Toshiba G7
11 VFD, could you use just a single one to power the
12 largest --

13 A No.

14 Q And could you also use the Toshiba G7 VFD to power
15 the electric motor in any of the home appliances we
16 talked about that also used VFD?

17 MS. FLANNERY: Object to form.

18 A Yes.

19 BY MR. HOPKINS:

20 Q Could you use the Toshiba G7 VFD to power the pool
21 pump that you mentioned was 10 horsepower?

22 A Yes.

1 Q Is it a fair statement to say that VFDs are not
2 interchangeable if they do not meet the power
3 requirements required for the electric motor?

4 MS. FLANNERY: Object to form.

5 A Can you reask that question, please?

6 BY MR. HOPKINS:

7 Q Is it fair to say that VFDs are not interchangeable
8 if they do not meet the power requirements of the
9 electric motor?

10 MS. FLANNERY: Object to form.

11 A I would say you would not use a VFD that's too small
12 for the application. You could not do that if it
13 does not provide the power. Like we started this
14 whole conversation 30 minutes ago, it has to supply
15 the power necessary for the load in some
16 configuration.

17 BY MR. HOPKINS:

18 Q I would like to turn to Exhibit 1005. This is the
19 Coli reference. I'll share this. In particular, I
20 would like to turn your attention to paragraphs 65
21 and 66.

22 A Okay. I've got that. Hold on a second. I'll get

1 those paragraphs. Okay.

2 Q So in paragraphs 65 and 66, Coli describes a VFD and
3 electric motor as separate components. Is that
4 correct?

5 MS. FLANNERY: Object to form.

6 A I don't know that Coli describes it that way. They
7 are separate structures. An electric motor is a
8 separate structure than a VFD for sure.

9 BY MR. HOPKINS:

10 Q Okay. So generally that's true that a VFD and
11 electric motors are separate structures?

12 A Generally that's true. You'll occasionally have a
13 VFD mounted on an electric motor for a specific
14 application, but generally they are separate
15 structures.

16 Q With respect to the prior art, which would include
17 Coli, Toshiba, any reference used in -- well, strike
18 that.

19 With respect to the VFDs used in your
20 declaration, are those all separate structures from
21 the electric motor?

22 MS. FLANNERY: Object to form.

1 A I don't think you can say that specifically with
2 respect to all the references. Certainly, the base
3 reference is Coli, and that's what my declaration is
4 built off of, but I don't think you can make that
5 determination from the other references whether
6 they're separate structure or not. More likely than
7 not, but I don't think you can say absolutely.

8 BY MR. HOPKINS:

9 Q Okay. Could we just march through each one? So
10 Coli you said it would be a separate structure. Is
11 that correct?

12 A Yes, we see those as separate structures in the
13 figures.

14 Q Okay. The Toshiba G7 Manual, is that considered a
15 separate structure?

16 A Yes, sir.

17 Q Okay. The Loucks reference, I can --

18 A Agnostic. Loucks doesn't say either way. If I say
19 Loucks (pronounced differently), then you'll know
20 I'm referring to the same reference.

21 Q Yeah, I'll try to use Loucks moving forward.
22 Horikoshi reference?

1 A Again, Horikoshi is agnostic as to whether it's a
2 separate structure or a combined structure.

3 Q So both Horikoshi and Loucks could be the same
4 device of both --

5 A The same structure. It's still not the same device,
6 but structurally they're mounted together. A motor
7 and a variable frequency drive are different pieces
8 of equipment. Structurally sometimes they're built
9 together.

10 Q Okay. So is it fair to say that the base references
11 all have different pieces of equipment, one being a
12 VFD and one being an electric motor?

13 MS. FLANNERY: Object to form.

14 A Yes.

15 BY MR. HOPKINS:

16 Q I'd like to turn to paragraph 116 of your
17 declaration.

18 A Okay.

19 Q Is this an annotated drawing from the Toshiba G7
20 referenced, Exhibit 1006?

21 A Well, there's two figures in paragraph 116. Which
22 one are you referring to?

1 Q The one on the shared screen. I believe it's
2 probably the top one.

3 A Oh, okay. Yes, that is an annotated figure
4 extracted from the G7 Manual.

5 Q And in the bright blue box at the top right, that is
6 depicting the electric motor. Is that correct?

7 A Yes, sir. That's correct.

8 Q And then if we zoom out the general box that
9 includes both the red box and the green box is the
10 Toshiba G7 VFD. Is that correct?

11 A Generally speaking, yes. I would put a couple
12 things outside that box. The DC reactor and the
13 external potentiometer are also part of the G7 but
14 mounted outside the enclosure.

15 Q Are those depicted in this picture?

16 A Yes.

17 Q Where are those?

18 A Which one?

19 Q The two that you said would be considered inside the
20 Toshiba G7.

21 MS. FLANNERY: Object to form.

22 A No, that's not what I said. I'm sorry.

1 BY MR. HOPKINS:

2 Q All right. There's an external potentiometer
3 mentioned at the bottom.

4 A Yes, sir.

5 Q Was that part of what you would consider to be
6 included in the Toshiba G7 ASD?

7 A Yes, sir.

8 Q Was there anything else you considered to be in the
9 Toshiba G7 ASD?

10 A Yes, sir. The DC reactor at the top of the page,
11 that would be part of the G7 as well if it was
12 installed, but it would be outside the enclosure.

13 Q Okay. And the electric motor in the top right in
14 the bright blue box would be outside of that
15 enclosure. Is that correct?

16 A Yes.

17 Q And the bright green box, is that a VFD fault
18 indicator display?

19 A That's part of its functionality. That's the
20 electronic operator interface or EOI.

21 Q Okay. Is that where it displays the VFD faults?

22 A Yes, sir. That's part of it.

1 Q I would like to turn now to the '870 Patent.

2 TRIAL TECH: Introducing Exhibit 1001.

3 BY MR. HOPKINS:

4 Q And in particular, if we could turn to Column 5,
5 lines 42 through 47.

6 A Okay.

7 Q There's a sentence there that reads "Other pump
8 control and data monitoring equipment can include
9 pump throttles, a pump VFD fault indicator with a
10 reset, a general fault indicator with a reset, a
11 main estop, a programmable logic controller for
12 local control, and a graphics panel."

13 Do you see that sentence?

14 A Yes, sir.

15 Q Is that the same VFD fault indicator in the green
16 box in paragraph 116 of your declaration?

17 MS. FLANNERY: Object to form.

18 A I think as a general statement, you can map the EOI
19 and the VFD fault -- the pump VFD fault indicator
20 with a reset together. They generally map to each
21 other.

22 BY MR. HOPKINS:



1 Q Okay. So to be clear, the VFD fault indicator and
2 the green box would generally map together, map to
3 each other. Is that fair?

4 MS. FLANNERY: Object to form.

5 A Can you rephrase that question, please?

6 BY MR. HOPKINS:

7 Q Is it fair that the VFD fault indicator in the green
8 box in paragraph 116 of your declaration from the
9 Toshiba G7 would map to the VFD fault indicator in
10 the '870 Patent in that sentence that's highlighted?

11 MS. FLANNERY: Object to form.

12 A Very broadly and very generally, I think that's
13 probably fair. This pump VFD fault indicator is not
14 part of any of the claims that I recall, so I don't
15 know that I went into a detailed analysis about what
16 this particular statement in the specification is
17 physically referring to. But I'd say a very broad
18 mapping, yeah, they probably map together broadly.

19 BY MR. HOPKINS:

20 Q Okay. So the VFD fault indicator wasn't included in
21 any of the claims that you analyzed?

22 A That's correct. It's not in any of the claim

1 language.

2 Q The '870 Patent does mention VFD faults, right?

3 MS. FLANNERY: Object to form.

4 A I would be glad to look at that if you could point
5 me to that direction.

6 BY MR. HOPKINS:

7 Q Turn to the highlighted sentence, "pump VFD fault
8 indicator" is indicative that the '870 Patent
9 contemplates VFD faults. Is that correct?

10 MS. FLANNERY: Object to form.

11 A I don't know that you can say that off that
12 sentence, not directly and not exclusively for sure.

13 BY MR. HOPKINS:

14 Q What do you think a VFD fault indicator displays?

15 A Well, based on the Toshiba reference, if we map
16 those together and call them the same thing, the
17 fault indicator indicates problems with the incoming
18 power, with the motor, with the VFD itself, with
19 potentially mechanical equipment that's connected to
20 the motor, the external brakes. There's a lot of
21 things it indicates.

22 Q But with respect to the '870 Patent, it would be

1 fair to say that a pump VFD fault indicator would
2 indicate VFD faults. Is that correct?

3 MS. FLANNERY: Object to form.

4 A Same answer as above. If you have a particular
5 location where you think that's delineated in the
6 '870 -- I don't recall that -- then I would be glad
7 to look at it.

8 BY MR. HOPKINS:

9 Q Let's turn now to the '870 Patent Column 4, lines 16
10 through 25. In particular, let's turn -- I would
11 like to turn your attention to the last sentence
12 that reads, "The electric motor diagnostics can be
13 disabled, if desired, when using, for example, a low
14 impedance or high-speed electric motor."

15 A Okay.

16 Q Would a POSITA understand this sentence to mean that
17 all electric motor diagnostics can be disabled?

18 MS. FLANNERY: Object to form.

19 A No, I don't believe so.

20 BY MR. HOPKINS:

21 Q Can all VFD faults in the Toshiba reference be
22 disabled?

1 A Can you rephrase that question, please? I'm not
2 sure I understand what you're trying to get at.

3 Q Can the VFD faults mentioned in the Toshiba G7
4 reference be disabled?

5 A Some certainly can. I haven't looked to see if
6 every one could.

7 Q Do you think some cannot?

8 MS. FLANNERY: Object to form.

9 A I know that some can. I haven't looked to see if
10 all of them can.

11 BY MR. HOPKINS:

12 Q Is it fair to say that the inventors of the '870
13 Patent described both a VFD fault indicator and
14 electric motor diagnostics?

15 MS. FLANNERY: Object to form.

16 A Those phrases are both in the specification, yes.
17 They're not specified that they're separate
18 structures, but those phrases are both in there.

19 BY MR. HOPKINS:

20 Q Is there anywhere in the '870 -- actually, would you
21 be surprised to find out that in the '870 Patent
22 there is nowhere that describes VFD fault indicator

1 and electric motor diagnostics to be the same thing?

2 MS. FLANNERY: Object to form.

3 A I think there is only one reference to VFD fault
4 indicator, and that's the reference -- I believe it
5 was Column 5 that we just looked at. As I recall,
6 that's the only location of the VFD fault indicators
7 used in the entire document, and there's certainly
8 no description about its functionality here. So,
9 no, I wouldn't be surprised.

10 BY MR. HOPKINS:

11 Q So the inventors didn't mention that VFD faults and
12 electric motor diagnostics can be the same thing.
13 Is that correct?

14 MS. FLANNERY: Object to form.

15 A They didn't say either way, didn't give any
16 description at all of what a VFD fault indicator is.

17 BY MR. HOPKINS:

18 Q And the claims recite only electric motor
19 diagnostic -- sorry, strike that.

20 The claims recite only -- strike that.

21 Independent Claims 1 and 4 recite electric
22 motor diagnostics. Is that correct?

1 A Yes, sir. They do.

2 Q Did the claims mention variable frequency drive
3 faults?

4 MS. FLANNERY: Object to form.

5 A No, sir. I don't see VFD faults in the claim
6 language of any of the claims.

7 BY MR. HOPKINS:

8 Q And do the claimed diagnostics in independent Claims
9 1 and 4 pertain only to the electric motor?

10 MS. FLANNERY: Object to form.

11 A No, sir.

12 BY MR. HOPKINS:

13 Q How so?

14 A Well, they certainly pertain to the variable
15 frequency drive because the variable frequency drive
16 is what is performing the electric motor
17 diagnostics.

18 Q Okay. But the diagnostics themselves, are they
19 only -- strike that.

20 Do the claim diagnostics -- strike that.

21 Would the claims be satisfied -- strike that.

22 Would the electric motor diagnostics be

1 satisfied by diagnostics for the VFD?

2 MS. FLANNERY: Object to form.

3 A Can you explain what you mean by "for the VFD"?

4 BY MR. HOPKINS:

5 Q Any diagnostic that is only determined using sensors
6 inside the VFD.

7 A Yes. The claim language would be satisfied by
8 sensors -- by diagnostics using sensors inside the
9 VFD, yes, sir.

10 Q The terms electric motor in front of diagnostic,
11 what do you think -- how does that limit the claim?

12 A It limits by saying the variables frequency drive
13 has to perform a diagnostics or analysis on the
14 electric motor detecting a problem with the electric
15 motor at least.

16 Q So would diagnostics unrelated to the electric motor
17 satisfy this claim?

18 MS. FLANNERY: Object to form.

19 A It doesn't -- the claim does not exclude those.
20 Certainly, if you're doing diagnostics on the
21 electric motor and doing something else, yes, that
22 would be satisfied.

1 BY MR. HOPKINS:

2 Q I'm going to try a hypothetical for you. Would a
3 diagnostics pertaining to the VFD about whether it
4 was at the proper temperature based solely on
5 sensors inside the VFD satisfy electric motor
6 diagnostics?

7 MS. FLANNERY: Object to form.

8 A I want to make sure I'm answering the question
9 you're asking. Could I ask the reporter to read
10 that question back?

11 (Question read back as follows: I'm
12 going to try a hypothetical for you. Would a
13 diagnostics pertaining to the VFD about whether it
14 was at the proper temperature based solely on
15 sensors inside the VFD satisfy electric motor
16 diagnostics?)

17 A Okay. By its temperature, do you mean the VFD
18 temperature or do you mean some other temperature?

19 Q I mean the VFD's temperature.

20 A So that in a standalone hypothetical, if I'm
21 understanding the breadth of your hypothetical,
22 would not in and of itself be electric motor

1 diagnostics.

2 MR. HOPKINS: I think this might be a
3 good time for a break if that works for everyone.

4 TRIAL TECH: Off the record at
5 10:28 a.m.

6 (Off the record.)

7 (Back on the record.)

8 TRIAL TECH: Back on the record at
9 10:44 a.m.

10 BY MR. HOPKINS:

11 Q If we could please turn to paragraph 117 of your
12 declaration which is Exhibit 1002.

13 A Okay.

14 Q If we can also look at the last sentence in
15 paragraph 117, in that sentence you provide a few
16 examples of motor diagnostics used to protect a
17 connected motor. Is that correct?

18 A No, sir, not in the last sentence of the paragraph.

19 Q Oh, I'm sorry. The last sentence on page 70 of your
20 declaration.

21 A Okay. Yeah, I start listing some examples.

22 Q Okay. I would like to walk through the evidence

1 that you cite for these examples and each example.
2 We'll start with overload protection. This is
3 Exhibit 1006 at page 19.

4 A Okay. That's PDF page 19, by the way.

5 Q Yes, that's PDF page 19, yeah. So the first
6 sentence reads, "The G7 ASD software monitors the
7 output current of the system and determines when an
8 overload condition occurs."

9 The system in that sentence is the ASD. Is
10 that correct?

11 A Yes. That's the output current of the ASD, which is
12 the same as the input current to the motor.

13 Q But what is monitored is the output current of the
14 ASD. Is that correct?

15 A Yes. The output current of the ASD, which is the
16 same as the input current to the motor in this
17 paragraph.

18 Q Would the sensors that monitor the output current be
19 located inside the ASD?

20 A Yes. We can go through the Toshiba Manual, but,
21 yes, those sensors are inside the ASD enclosure.

22 Q So they are measuring current inside the ASD. Is

1 that correct?

2 MS. FLANNERY: Object to form.

3 A The sensors are located inside the ASD. The current
4 is not limited to inside the ASD. The current
5 leaves the ASD enclosure and goes to the motor. The
6 current is the same all the way through that entire
7 phase.

8 BY MR. HOPKINS:

9 Q The next sentence reads, "The overload current level
10 is a percentage of the rating of the motor."

11 Do you see that?

12 A Yes, sir.

13 Q What is a rating of a motor?

14 A Each motor has a full load rating and full load amps
15 and horsepower or kilowatts depending on if you have
16 European markings.

17 Q I'm sorry. You said full load rating. Is that
18 correct?

19 A Full load amps, horsepower and/or kilowatts is how
20 the rating of the motor is specified.

21 Q Does it provide all three or just one of those?

22 A It'll provide two of those depending on whether

1 you're doing North American Electric Manufacturers
2 Association or IEC markings. It'll always have full
3 load amps, and it will have either horsepower or kW
4 or both maybe depending on the markings.

5 Q I would like to turn now to page 182 of
6 Exhibit 1006.

7 A Okay.

8 Q And the first item in the fault screen display
9 refers to ASD overload. Do you see that?

10 A Yes.

11 Q Is this fault ASD overload also related to the
12 overload protection that we were just speaking
13 about?

14 A No, sir.

15 Q This is a different one?

16 A Yes, sir.

17 Q Okay. Are there any fault codes that pertain to
18 overload protection adjustment listed in pages 182
19 through 186 of Exhibit 1006?

20 A Yes, sir.

21 Q What would those be?

22 A Well, at the very least, at the top of page 184 is

1 motor overload.

2 Q I would like to turn now to page 22 of the PDF in
3 Exhibit 1006 -- actually, before we do that -- yes,
4 let's turn to page 22 of the PDF in Exhibit 1006.
5 In particular, let's look at the over-current
6 protection.

7 Was this the evidence you were referring to in
8 paragraph 117 of your declaration?

9 A Yes, sir. I call that over-current protection in
10 reference to this section.

11 Q If we could read the first two sentences of that, it
12 says, "Each G7 ASD model was designed for a
13 specified operating power range."

14 A Yes, sir.

15 Q That paragraph continues, "The ASD will incur a trip
16 if the design specifications are exceeded."

17 This is referring to the ASD having an
18 operating power range -- sorry, strike that.

19 Is the first two sentences here referring to
20 when the ASD exceeds its specified operating power
21 range?

22 A Yes.

1 Q And sensors for detecting that are located inside
2 the ASD. Is that correct?

3 A Yes.

4 Q I would like to turn to the -- or draw your
5 attention to the next paragraph. It says, "However,
6 the ASD may be operated at 110 percent of the
7 specified output-current range continuously or at
8 150 percent for a limited amount of time as
9 indicated."

10 Is there a difference between running the ASD
11 continuously at a certain amount versus what appears
12 to be its maximum at 150 percent for a limited
13 amount of time?

14 A Well, yes.

15 MS. FLANNERY: Object to form.

16 BY MR. HOPKINS:

17 Q Does an ASD have a maximum current range that's
18 different for continuous operation versus a maximum
19 current range generally?

20 MS. FLANNERY: Object to form.

21 A There are, just like motors, this particular ASD has
22 different current ranges for different amount of

1 times. Current ratings are not -- really current
2 ratings are really heat ratings, and you generate
3 heat continuously at a certain current level, but
4 you can generate heat that is not damaging at a
5 higher current level for a shorter period of time.
6 That's kind of a standard of electric protection
7 coordination.

8 BY MR. HOPKINS:

9 Q And do motors have the same requirement?

10 A It's not the same, but it's a similar concept. It's
11 an i^2t , current squared times time relationship.

12 Q What is that relationship? I guess, what is
13 similar? What do motors have that's similar for
14 those maximum --

15 A An i^2t relationship. We can look in -- for example,
16 in here there's a motor 150 percent time
17 specification as well setting. So that's similar to
18 the 150 percent specification for the ASD. Again,
19 it's i^2t , current squared times time. If you have a
20 higher current, you can only run that higher current
21 for a shorter period of time. It's really an energy
22 relationship.

1 Q Okay. Does that energy relationship compare to
2 horsepower -- I'm sorry. Strike that.

3 Is that energy relationship representative of
4 horsepower?

5 A No. Horsepower is power, not energy.

6 Q Can you explain the difference between horsepower
7 and energy?

8 MS. FLANNERY: Object to form.

9 A Power is -- your horsepower is your instantaneous
10 power that's being used or delivered. Energy is the
11 amount of energy you use over time. They relate to
12 each other by time. Kilowatt is a power. Kilowatt
13 hour is an energy unit.

14 BY MR. HOPKINS:

15 Q So would motors have similar limits on how much they
16 could run continuously versus how much they could
17 run as a maximum?

18 A Yes.

19 Q And would those limits have different horsepowers?

20 A No.

21 Q Would those limits have different torques?

22 A No, current. i2t, that's the relationship. What

1 I'm talking about is the damage curve on any piece
2 of electrical equipment is an i^2t relationship.

3 Q So if you were to run an electric motor at the
4 maximum for continuous as limited by current, would
5 it have a different horsepower than running the same
6 motor using its maximum current?

7 A Can you explain to me what you mean by maximum
8 current, please?

9 Q Well, in this second sentence here we have, "The ASD
10 may be operated at 110 percent of output-current
11 range continuously" versus 150 percent for a limited
12 amount of time, which I assume is a shorter amount
13 of time.

14 So you mentioned electric motors kind of have a
15 similar limitation.

16 A Correct.

17 Q And I'm asking if you were running the electric
18 motor let's say at the first output limit -- or,
19 sorry, the first current limit for continuous, would
20 that have a different horsepower than the maximum
21 limit?

22 A It's the word maximum I'm having a problem with.

1 There is no maximum current. It's an i^2t
2 relationship. It's a nonlinear relationship. This
3 particular paragraph and this protection scheme
4 picked two points. It picked 110 percent and 150
5 percent, but there's a continuum on that -- that's a
6 continuous curve. So there is not a maximum number.
7 So that's the problem I'm having with it.

8 Q Does an electric motor have a limit on its input
9 current for continuous operation that is different
10 than a limit for a instantaneous or short time
11 period operation?

12 A Yes, sir, it does.

13 Q Okay. So using those different limits applied to
14 the same electric motor, would there be a difference
15 in horsepower at the continuous limit and the limit
16 for a shorter period of time?

17 A All else being equal, those are likely to be
18 different horsepower. It would really depend on
19 the particular motor design and the protection
20 scheme in place.

21 Q Would they also have different torques?

22 A Depends on how it's being operated.

1 Q Would you suspect that they'd have different
2 torques?

3 MS. FLANNERY: Object to form.

4 A It depends on how it's being operated. At a
5 constant speed, an increase in horsepower changes
6 the available torque, but it's that constant speed
7 that's kind of a kicker.

8 BY MR. HOPKINS:

9 Q Assuming a constant speed for both?

10 A Assuming a constant speed and all else being equal,
11 yes, the torque would increase as current increase.

12 Q And those are the limits on the electric motor?

13 A Electric motor has a damage curve, yes, like we've
14 been talking about, correct, like any piece of
15 electrical equipment.

16 Q I would like to turn now to page 160 of
17 Exhibit 1006, in particular, the Electronic Thermal
18 Protection located at the top.

19 MS. FLANNERY: Counsel, did you say
20 page -- which page is that?

21 MR. HOPKINS: This is page 160 of the
22 PDF in Exhibit 1006.

1 MS. FLANNERY: Got it. Thank you.

2 BY MR. HOPKINS:

3 Q Dr. Durham, this is the same electronic thermal
4 protection evidence that you cite in paragraph 117
5 of your declaration. Is that correct?

6 A Well, this is the setting that goes with that
7 diagnostics that we've been talking about. You set
8 your motor full load amps here, and then the
9 software uses that in various forms to detect
10 different fault conditions. So I don't think I
11 directly referenced 160 in paragraph 117. Oh, yeah,
12 I did. Okay. So, yes, the answer to your question
13 is yes. I apologize.

14 Q Just a quick question on this one. Can you disable
15 this fault?

16 A Sure.

17 Q Yes?

18 A Yes. Let me back up and answer your question. The
19 answer to your question is, this is not a fault. I
20 should have been more careful with my answer. This
21 is a setting.

22 Q What's the difference between a setting and a fault?

1 A Well, the setting is something you tell the -- in
2 this case, ASD, this is the full load amps rating of
3 the motor. Otherwise it doesn't know. And then it
4 uses that in various configurations to determine if
5 there is a fault in the motor. So this is an input
6 to the system, and you would compare this, for
7 example, in an overload condition to the full load
8 current delivered to the motor to determine if there
9 is an overload of the motor.

10 Q So this setting that we're talking about on page 160
11 does not show any faults. Is that correct?

12 MS. FLANNERY: Object to form.

13 A The setting is an input to determine whether or not
14 there is a fault in the motor.

15 Q But that itself is not a fault. Is that correct?

16 MS. FLANNERY: Object to form.

17 A The full load amps of the motor, is that what you're
18 asking?

19 BY MR. HOPKINS:

20 Q The Electronic Thermal Protection #1 on page 160, is
21 that a fault?

22 MS. FLANNERY: Object to form.

1 A No, that's a setting. It's used to determine
2 whether there's a fault in the motor.

3 BY MR. HOPKINS:

4 Q Let's turn to page 162. This is also Exhibit 1006.
5 I would like to draw your attention to the Short
6 Circuit Test and Short Circuit Test Duration.

7 Are these both settings?

8 A These are settings to indicate how the short circuit
9 test is run and how long the short circuit test is
10 run.

11 Q Okay. But these are not faults. Is that correct?

12 MS. FLANNERY: Object to form.

13 A These are not what?

14 BY MR. HOPKINS:

15 Q Faults.

16 A These are inputs to tell the ASD how long you run
17 the short circuit test. The short circuit test
18 determines whether or not there is a fault in the
19 motor prior to energizing the motor at full power.

20 Q There is a difference between a test and a fault,
21 correct?

22 MS. FLANNERY: Object to form.

1 A Could you repeat that, please?

2 BY MR. HOPKINS:

3 Q Is there a difference between a test and a fault?

4 MS. FLANNERY: Same objection.

5 A A fault is an output of a test or a potential output
6 of a test. So you test for diagnostics of the motor
7 and generate a fault signal in the case of the ASD.

8 BY MR. HOPKINS:

9 Q Can these tests be disabled for the short circuit
10 test?

11 A I don't know the answer to that. Not in these
12 settings. But as I recall, yes, you would disable
13 this in case you're running a low impedance motor
14 because a low impedance motor would give a faulty
15 indication of a short circuit test. I think that's
16 in a different location.

17 Q Are you referring to the '870 Patent that we talked
18 about earlier?

19 A No, I'm talking about the Toshiba Manual.

20 Q If I gave you -- how long do you think it would take
21 you to find that disclosure in the Toshiba Manual?

22 MS. FLANNERY: Object to form.

1 A There is no way -- it's a 200 page document. I
2 don't know the answer to that. I haven't performed
3 that analysis to date.

4 BY MR. HOPKINS:

5 Q Would you mind if I gave you a maximum of like five
6 minutes to try and look for that, if you can?

7 A It's your show. Sure.

8 Q If you could try and find that, please.

9 A Okay. (Reviewing).

10 MR. HOPKINS: Can I just check with the
11 court reporter about when I asked -- or how long ago
12 I asked the previous question, how long it has been?

13 THE COURT REPORTER: It was 11:10.

14 MR. HOPKINS: Okay. So we're about just
15 over five minutes in.

16 BY MR. HOPKINS:

17 Q Dr. Durham, were you able to find anything about
18 that?

19 A It's hard to say. There is a motor overload
20 disable, which likely is related to that, but in
21 that short period of time, no, I can't perform
22 enough analysis to answer your question.

1 Q Thank you. I would like to turn now to
2 Exhibit 1001, which is the '870 Patent. In
3 particular, I would like to turn to Claim 13. Claim
4 13 recites, "wherein a truck having at least five
5 axles."

6 Claim 13 does not recite a trailer, does it,
7 Dr. Durham?

8 A I disagree.

9 Q Okay. Can we turn to Claim 1 in the exhibit I've
10 got up. Claim 1 recites, "a trailer for attachment
11 to a truck."

12 Is that correct?

13 A Correct.

14 Q That specific -- strike that.

15 Claim 1 specifically recites a trailer. Is
16 that correct?

17 A Correct.

18 Q Okay. Let's turn to Claim 13.

19 A Okay.

20 Q Does Claim 13 recite a trailer?

21 MS. FLANNERY: Object to form.

22 A I think it -- yes, you could read a trailer into the

1 word truck. Claim 13 it not dependent in Claim 1.

2 It depends from Claim 7.

3 BY MR. HOPKINS:

4 Q So is your analysis based on the truck being both a
5 trailer and a truck? Is that correct?

6 MS. FLANNERY: Object to form.

7 A No.

8 BY MR. HOPKINS:

9 Q What do you mean by a trailer can be part of a truck
10 in Claim 13?

11 A A tractor trailer is referred to as a truck, and
12 there's nothing that I recall in the '870 Patent
13 that excludes that. In addition, my analysis, as I
14 recall -- well, I'm not even going to speak to that.
15 I'll go back and read it when you ask me a question.

16 Q Sure. Just to help direct you, it would be
17 paragraph 199, I guess, 198 through, I think, 200 of
18 your declaration in Exhibit 1002.

19 A Yeah. So a truck, we talk about a semi truck, which
20 includes a tractor trailer. A trailer without a
21 tractor is not a -- it's not useful for porting from
22 one location to another.

1 So Coli specifically discloses a vehicle with
2 five axles, a tractor trailer or a truck. And then
3 additionally here as I said in 199, a unitary truck
4 would have been obvious in view of the disclosure of
5 Coli. In the case that Claim 13 can be read to mean
6 a unitary truck, it was an obvious configuration.

7 Q Can we go back to the claims now or claim. Let's go
8 to Claim 13.

9 A Uh-huh.

10 Q So Claim 13 specifically recites, "A vehicle is a
11 truck having at least five axles."

12 Is that correct?

13 A Yes.

14 Q And if we look to Claim 1, it recites, "a trailer
15 attachment to a truck."

16 Is that correct?

17 A Correct, yes.

18 Q Does truck mean something different in Claim 1 than
19 truck means in Claim 13?

20 MS. FLANNERY: Object to form.

21 A I think it can, yes.

22 BY MR. HOPKINS:

1 Q So a claim term can have different meanings in
2 different claims?

3 MS. FLANNERY: Object to form.

4 A Yes.

5 BY MR. HOPKINS:

6 A Yes. It can have different meanings in different
7 claims, not in the same dependence line, but in
8 different claims, yes.

9 Q So your understanding that the truck in Claim 13
10 encompasses both a truck and a trailer. Is that
11 correct?

12 MS. FLANNERY: Object to form.

13 A A tractor trailer referred to as a truck would be
14 part of Claim 13 as would be a unitary truck as I
15 discuss in paragraph 199. Either configuration
16 would be a truck.

17 BY MR. HOPKINS:

18 Q Just to be a little bit more clear, looking at
19 paragraph 198 of your declaration, you rely on a
20 disclosure from Coli that says "Each trailer is
21 attached to a truck"?

22 A Correct.



1 Q So is it your position that Claim 13 encompasses
2 both truck 6 and trailer 5 described in Coli?

3 A Yeah, the plain and ordinary meaning of the word
4 truck to a POSITA at the time of the '870 Patent
5 would include both the tractor or truck 6 and the
6 trailer or a unitary truck as I talk about in
7 paragraph 199. A POSITA reading the word truck
8 would immediately think of either configuration.

9 Q What do you mean by unitary truck in paragraph 199?

10 A A single body vehicle as opposed to a tractor
11 trailer.

12 Q To put this simply, would that be equivalent to an
13 RV versus a camper trailer that's pulled behind a
14 truck? You're referring to a unitary truck as an
15 RV?

16 MS. FLANNERY: Object to form.

17 A No. I'm referring to a unitary truck as a five axle
18 single body truck, single unit truck, where the
19 tractor, if you will, is permanently attached to the
20 bed as opposed to a tractor trailer or a semi, what
21 we commonly call a semi truck going down the
22 highway. I don't see a reference to RV anywhere in

1 that paragraph.

2 BY MR. HOPKINS:

3 Q Do you rely on the same disclosure from Coli that
4 each trailer 5 is attached to a truck to satisfy
5 Claim 1's requirement for a trailer for attachment
6 to a truck?

7 A Can you read that question back, please?

8 (Question read back as follows: Do you
9 rely on the same disclosure from Coli that each
10 trailer 5 is attached to a truck to satisfy Claim
11 1's requirement for a trailer for attachment to a
12 truck?)

13 A Yes.

14 BY MR. HOPKINS:

15 Q So for your position for Claim 1, Coli's trailer is
16 a trailer and Coli's truck is a truck. Is that
17 correct?

18 MS. FLANNERY: Object to form.

19 A Coli's trailer is a trailer and Coli's truck is a
20 tractor.

21 MR. HOPKINS: I think now might be a
22 good time for a break.

1 TRIAL TECH: Off the record at

2 11:25 a.m.

3 (Off the record.)

4 (Back on the record.)

5 TRIAL TECH: Back on the record at

6 11:32 a.m.

7 BY MR. HOPKINS:

8 Q I've just uploaded the Loucks's reference,
9 Exhibit 1009. Can you let me know when you've
10 received that and can open that one?

11 A Okay. I've got Loucks.

12 Q I would like to turn your attention to Figure 2.
13 Figure 2 illustrates Loucks' cooling efficiency
14 monitoring technique. Is that correct?

15 A Yes, but the software side, not the physical side.

16 Q And can we turn to paragraphs 48 and 49 of Loucks,
17 which is the corresponding description of Figure 2.

18 A Yes, I'm there.

19 Q I'll give you some time to read those paragraphs,
20 and then I want to walk through Loucks' Figure 2.

21 A Okay.

22 Q So the first step in Loucks is establishing a

1 baseline of cooling efficiency. That's step 200.

2 Is that correct?

3 A In this example, yes.

4 Q Is there another example that you're thinking of?

5 A Well, there's lots of embodiments of Loucks all the
6 way through it.

7 Q When you were referring to Loucks' cooling
8 efficiency monitoring technique, were you referring
9 to this technique?

10 A Broadly, yes, the technique described in the
11 specification all the way through, not these two
12 paragraphs in particular.

13 Q Okay. So in performing all the steps in Figure 2,
14 Loucks then compares an operating cooling efficiency
15 with a baseline cooling efficiency at step 250. Is
16 that correct?

17 A Yes, this embodiment, yes.

18 Q And if the difference between this cooling
19 efficiency exceeds a threshold, then there's a
20 notification. Is that correct?

21 A Correct.

22 Q Now, that notification 260 is described in paragraph

1 49, correct?

2 A Yes, generally speaking.

3 Q So in Figure 2, Loucks' cooling efficiency
4 monitoring technique determines only whether a
5 system is operating outside its optimum range. Is
6 that correct?

7 A No.

8 Q So there's a comparison at step 260 -- I'll turn
9 your attention to paragraph 49 -- that the
10 notification happens when there is a difference
11 between cooling efficiencies, and the one is an
12 operating cooling efficiency and the baseline
13 cooling efficiency. Is that correct?

14 A Correct.

15 Q Okay. And the operating cooling efficiency is what
16 the system is currently operating at. Is that
17 correct?

18 A Yes.

19 Q And is the baseline cooling efficiency, what is
20 established in step 210, an ideal operating
21 efficiency? Is that correct?

22 A No.

1 Q What is a baseline cooling efficiency?

2 A That limit of the baseline cooling efficiency is
3 whatever the operator decides it to be. Maybe it's
4 an ideal. We have further examples throughout the
5 specification that it's a damage limit. So it's --
6 that baseline cooling efficiency is chosen or at
7 least the threshold that's compared with in step 250
8 is chosen for various reasons. It can be a variety
9 of things.

10 Q Is the baseline cooling efficiency -- strike that.

11 A baseline cooling efficiency is not the same
12 as an alarm limit. Is that correct?

13 MS. FLANNERY: Object to form.

14 A Well, the comparison in 250 adds a threshold for the
15 difference. So the baseline cooling efficiency plus
16 a threshold would be the alarm limit, if you will,
17 in step 250 or the notification limit.

18 BY MR. HOPKINS:

19 Q Is the notification limit the same as the alarm
20 limit?

21 A I think they are equivalent, yes, but your cooling
22 efficiency alarm limit would be the notification

1 limit, yes.

2 Q Okay. If I could turn your attention to paragraph
3 18.

4 A Uh-huh, I'm there.

5 Q And I believe this is a paragraph you cited in your
6 declaration. It mentions that "it is desirable to
7 detect problems before temperatures reach alarm
8 limits."

9 A Right.

10 Q So is this the difference between your notification
11 limit and your alarm limit?

12 A No, there is not a difference between a notification
13 limit and alarm limit. There is a difference
14 between a temperature alarm limit and a cooling
15 efficiency alarm limit.

16 Q Okay. Can you explain that a little bit?

17 A Well, a cooling efficiency is not the same thing as
18 a temperature. Cooling efficiency is kilowatt hours
19 per degree or some other analogous units. If your
20 cooling efficiency is poor, then you're eventually
21 going to get a high temperature. Again, it's the
22 difference between power, if you will, and energy.

1 Q Turning to paragraph 18, it mentions -- there is a
2 sentence that reads, "Unfortunately, for a variably
3 loaded system, simply waiting for a high temperature
4 limit to be reached may result in equipment damage
5 that occurs in the time it takes to resolve the
6 cooling problem."

7 Is the high temperature limit the same as the
8 threshold?

9 A No.

10 Q Is the high temperature limit higher than the
11 threshold?

12 A They are non-analogous units.

13 Q So high temperature limit is not shown in Figure 2
14 of Loucks?

15 A That is correct. It's a different method of
16 determining that there is a problem than just
17 relying on temperature limits.

18 Q And now alarm limits, is that the same as the
19 threshold described in Figure 2 of Loucks?

20 MS. FLANNERY: Object to form.

21 A Which alarm limits? Are you specifically referring
22 to the one that says "reach alarm limit" in

1 paragraph 18?

2 Q That's correct.

3 A Then, yes, they're completely different.

4 Q Okay. So the alarm limits and a high temperature
5 limit described in paragraph 18 are not the same
6 limits or are even disclosed in Figure 2 of Loucks.
7 Is that correct?

8 MS. FLANNERY: Object to form.

9 A They're completely different. They're completely
10 different units. You can't compare temperature
11 alarm limits to the baseline minus operating greater
12 than threshold in Figure 2. They're just different.

13 BY MR. HOPKINS:

14 Q And when you say they're different, is it because
15 the units that they measure are temperature units
16 and degrees of Celsius or Fahrenheit? Is that
17 correct?

18 A Temperature limits would be more likely than not a
19 degree measurement. Nothing in Figure 2 is in units
20 of degrees.

21 Q So the threshold is also not in units of degrees as
22 well?

1 A No.

2 Q Okay. So the notification sent at the end of
3 Loucks' cooling efficiency monitoring technique is
4 not related to any alarm using degrees of
5 temperature?

6 MS. FLANNERY: Object to form.

7 A That's incorrect.

8 BY MR. HOPKINS:

9 Q How so?

10 A Well, your threshold is in kilowatt hours per
11 degree, so it's using degrees. You can see step
12 230, determine the delta T. That would be in
13 degrees, but that's not the end of the equation.
14 That's an input.

15 Q So the notification -- and it's step 250. If we
16 could turn back to paragraphs 48 and 49. Would the
17 notification at 260 that should have exceeded this
18 threshold indicate that there was excessive heat in
19 the system?

20 A Excessive heat, yes. Excessive temperature, no.
21 Some people want to equate heat and temperature, but
22 they're not equivalent.

1 Q How are they different?

2 MS. FLANNERY: Object to form.

3 A Well, temperature is a measure of the entropy in the
4 system. Heat is the amount of energy going into the
5 system. So temperature is the -- if your heat
6 increases, then you're expecting to have a higher
7 temperature eventually, but they're not equivalent.
8 Temperature is simply a number. To calculate heat,
9 you have to know things like mass and density and
10 things like that of the devices at that temperature.
11 Again, heat is energy. Temperature is a
12 measurement.

13 BY MR. HOPKINS:

14 Q Do thermal sensors measure temperature?

15 A Yes, broadly speaking, they do, yes.

16 Q So thermal sensors do not measure heat as you just
17 described?

18 MS. FLANNERY: Object to form.

19 A Correct. They don't measure the heat. A thermal
20 sensor doesn't measure heat. It measures the
21 temperature. You have to do something else with
22 that temperature measurement to determine what the

1 heat is.

2 BY MR. HOPKINS:

3 Q So does Loucks' cooling efficiency monitoring
4 technique monitor -- strike that.

5 Would a POSITA have known that thermal sensors
6 can be placed in multiple places throughout an
7 electronic system?

8 MS. FLANNERY: Object to form.

9 A With reference to what? Are you talking about with
10 reference to Loucks?

11 BY MR. HOPKINS:

12 Q That's correct.

13 A Yes. Loucks teaches thermal sensors in multiple
14 locations.

15 Q And those thermal sensors can monitor the internal
16 temperature of the electronic component monitored in
17 Loucks?

18 MS. FLANNERY: Object to form.

19 A No, you cannot measure the internal temperature of
20 the electronic component. That's why we rely on the
21 temperature of the heatsink.

22 BY MR. HOPKINS:

1 Q In paragraph 48, it explains what the baseline
2 cooling efficiency is and how it's established. Can
3 you explain -- strike that.

4 Where is the ambient temperature measured at
5 step 230 in Loucks?

6 A Apologize, counsel. My PDF reader just locked up.
7 Give me a moment.

8 Q Okay.

9 A Okay. It's proximate to monitored electrical
10 device.

11 Q And if we're talking about the electronic device in
12 Figure 1, where would we be monitoring the ambient
13 temperature?

14 A Figure 1 is an electrical device. So it would be
15 proximate the device in Figure 1.

16 Q And when you say "proximate," do you mean outside of
17 the device?

18 A No, not necessarily.

19 Q So it could be proximate inside the device as well?

20 A If it was inside, it would definitely be proximate,
21 yes.

22 Q Turning back to the notification in Figure 2, this

1 notification as you mentioned was different than
2 both the high temperature limits and the alarm
3 limits in paragraph 18. Sorry, strike that.

4 The notification is set as a result of the
5 differences exceeding the threshold in step 250, and
6 that threshold is different than both the alarm
7 limits and high temperature limit described in 18.
8 Is that correct?

9 MS. FLANNERY: Object to form.

10 A Yes, both of the limits described in 18 are
11 temperature limits, a high temperature limit and a
12 temperature alarm limit. That's different than
13 Figure 2 from the 250.

14 BY MR. HOPKINS:

15 Q So the notification in Figure 2 is not a result of
16 any temperature limit. Is that correct?

17 MS. FLANNERY: Object to form.

18 A It's a result of a temperature measurement and
19 calculation based on that temperature but not a
20 temperature alarm limit as referred to in 18 -- I'm
21 sorry, not Figure 18, paragraph 18. The whole point
22 of Loucks is you're going to get the notification in

1 Figure 2 before you reach a high temperature limit.
2 That's the whole purpose of Loucks.

3 BY MR. HOPKINS:

4 Q And that high temperature limit is when there would
5 be damage caused by excessive heat. Is that
6 correct?

7 MS. FLANNERY: Object to form.

8 A Heat in excess of the high temperature limit may
9 result in equipment damage according to Loucks. We
10 see that in paragraph 18.

11 BY MR. HOPKINS:

12 Q So Loucks' cooling technique -- sorry. Loucks'
13 cooling monitoring technique notifies a user before
14 it hits that high alarm technique that causes damage
15 by excessive heat. Is that correct?

16 A I got lost in the middle. I'm sorry. Could you
17 repeat that?

18 Q Loucks' monitoring technique shown in Figure 2
19 provides a notification before any of the alarm
20 limits that would cause damage by excessive heat.
21 Is that correct?

22 MS. FLANNERY: Object to form.

1 A No. Before the temperature alarm limits as he
2 describes in 18, yes, but not before any alarm
3 limits.

4 MR. HOPKINS: I think this might be
5 where we're going to take a break.

6 TRIAL TECH: Off the record at
7 11:57 a.m.

8 (Off the record.)

9 (Back on the record.)

10 TRIAL TECH: Back on the record at
11 12:46 p.m.

12 BY MR. HOPKINS:

13 Q If we could turn to paragraph 49 and 52 of
14 Exhibit 1005 of Coli.

15 A Did you say 49 and 52?

16 Q That's correct.

17 A Okay. All right. I'm at 49.

18 Q I'll give you some time to familiarize yourself with
19 paragraphs 49 and 52.

20 A Sure. Okay. I've read those.

21 Q Okay. These paragraphs 49 and 52 describe some
22 certain requirements for the electric motor used in

1 Coli's fracking operation. Is that correct?

2 A Well, it describes one embodiment, one illustrative
3 embodiment of the electric motors of Coli.

4 Q Okay. It provides requirements for that one
5 embodiment. Is that correct?

6 A Maybe I'm not understanding the word requirement.
7 It describes this embodiment, yes.

8 Q It describes that -- paragraphs 49 and 52 describes
9 that the electric motors used in Coli can have a
10 true 2500 horsepower directly provided to each pump
11 as well as an electric motor that should be capable
12 of operating up to 1500 RPMs with a torque of 20,000
13 foot-pounds, I think it is. Is that correct?

14 A Correct, with the caveat that as I say in my
15 declaration, the 20,000 foot per pounds is obviously
16 a typo. The proper units as you said were
17 foot-pounds.

18 Q And then let's also look at paragraph 46 as well.

19 A Okay.

20 Q The last sentence of 46, which I believe you also
21 identify in your declaration, it explains -- the
22 last sentence is, "A suitable pump is" -- is one

1 sold by Gardner Denver, and this is the SWGS-2500
2 Well Service Pump. Is that correct?

3 A Yes.

4 Q Okay. And is this the same Gardner Denver pump that
5 is described in Exhibit 1011? I will provide that
6 now in the chat box.

7 A Yes, again with the proviso as I stated in my
8 declaration, it's actually an SGWS fluid end on the
9 GD-2500Q pump.

10 Q And this Gardner Denver pump from Exhibit 1011 meets
11 the requirements described in paragraphs 49 and 52
12 of the Coli reference. Is that right?

13 MS. FLANNERY: Object to form.

14 A No, sir. 49 and 52 are talking about the electric
15 motor, not really the pump.

16 BY MR. HOPKINS:

17 Q Okay. So paragraph 49 describes that the pumps
18 would -- sorry. Give me a second.

19 So in Coli's system, it explains that the
20 present system can deliver 2500 horsepower to each
21 pump. Is that correct?

22 A Yes.

1 Q And this pump would be the pump in Exhibit 1011. Is
2 that right?

3 A Exhibit 1011 describes the pump specifically
4 referenced in paragraph 46, and certainly this pump
5 would demand up to 2500 horsepower from the motors
6 under certain fluid conditions. I hope that answers
7 your question.

8 Q And would all pumps in Coli's fracturing operation
9 have the same requirements as the Gardner Denver
10 pump in Exhibit 1011?

11 MS. FLANNERY: Object to form.

12 A No, sir.

13 BY MR. HOPKINS:

14 Q Do you think they need to have a similar horsepower
15 requirement?

16 A No, sir. I don't see that in the claims at all.

17 Q I wasn't asking about the claims. I was asking
18 about whether the pumps described in Coli's
19 fracturing operations would have a similar
20 horsepower requirement as the Gardner Denver pump in
21 Exhibit 1011.

22 A I don't think you can draw that conclusion

1 necessarily.

2 Q Turn to Claim 14 of Exhibit 1001.

3 A Okay.

4 Q Claim 14 specifies the hydraulic horsepower for a
5 pump. Is that correct?

6 A Yes, at about 2250 hydraulic horsepower or more.

7 Q Exhibit 1011, the pump, it's your position that the
8 pump in Exhibit 1011 meets this hydraulic horsepower
9 requirement. Is that correct?

10 A Yes, it is.

11 Q Okay. So is it fair to say that Exhibit 1011 would
12 have similar input horsepower requirements as those
13 required by a pump satisfying Claim 14?

14 MS. FLANNERY: Object to form.

15 A Could you repeat that, please?

16 BY MR. HOPKINS:

17 Q Is it fair to say that a pump such as the one
18 described in -- I'm sorry. Strike that.

19 Is it fair to say that the claimed pump from
20 Claim 14 would have the same input requirements for
21 horsepower as the well servicing pump in
22 Exhibit 1011?

1 A Yes, about 25- -- let me see the claim again. Yes,
2 about 2250 hydraulic horsepower or more. The pump
3 described in Exhibit 1011 meets that claim
4 limitation.

5 Q Now, the 2250 hydraulic horsepower, is that input
6 horsepower or is that output horsepower?

7 A Output, output of the pump.

8 Q Okay. Have you ever worked on any VFD used in a
9 fracking operation?

10 A I have worked to provide power to VFDs in fracturing
11 operations. Have I physically been the technician
12 programming it? No.

13 Q So you've never had to select a VFD for a fracking
14 operation. Is that correct?

15 A Correct. That's correct.

16 Q Do you know if anyone has ever used a Toshiba GX7
17 described in Exhibit 1006 in a fracking operation?

18 MS. FLANNERY: Object to form.

19 A Yes, I do.

20 BY MR. HOPKINS:

21 Q Do you know if anyone has ever used a Toshiba GX7
22 VFD in a fracking operation with a well servicing

1 pump used in Exhibit 1011?

2 A I understand that to be true, yes.

3 Q How do you understand that to be true?

4 A I've read quote specifications and other patents for
5 fracturing operations that reference to GX7, and I
6 understand the same company uses the Gardner Denver
7 2500Q with an SGWS power end fluid in them.

8 Q And are any of those patents or references included
9 or cited in your declaration?

10 A No.

11 Q I would like to turn now to Exhibit 1047. I'm
12 uploading that now.

13 A Okay.

14 Q In particular -- well, first question. This Exhibit
15 1047 is representative of a spec sheet or the
16 specifications for a GX7 Toshiba VFD. Is that
17 correct?

18 A Yes, sir.

19 Q There is a line here for maximum horsepower. Now,
20 there's a range here between 500 and 800 horsepower.
21 Is that the maximum horsepower output that the VFD
22 can have?

1 A That's the maximum horsepower output for continuous
2 operation of this particular specified VFD can have
3 as a standalone unit.

4 Q Now, can the electric motor make this horsepower --
5 I'm sorry. Strike that.

6 Can the electric motor increase this
7 horsepower?

8 MS. FLANNERY: Object to form.

9 A I really don't understand your question.

10 BY MR. HOPKINS:

11 Q This is the maximum horsepower provided by a Toshiba
12 ASD that is fed into an electric motor. Is that
13 correct?

14 MS. FLANNERY: Object to form.

15 A This particular specified Toshiba ASD, yes, that's
16 the maximum horsepower this particular specified ASD
17 has.

18 BY MR. HOPKINS:

19 Q And the electric motor can generate no additional
20 horsepower on top of the maximum horsepower
21 described in this document. Is that correct?

22 A Could you rephrase that question?

1 Q Can the electric motor --

2 A I don't think that's the question you wanted to ask.

3 Q Can the electric motor that operates with this
4 Toshiba GX7 have a horsepower -- have an input
5 horsepower -- sorry. Strike that.

6 Can the electric motor that operates with a
7 Toshiba GX7 have an output horsepower higher than
8 800 horsepower described on this document?

9 A Yes.

10 Q So can an electric motor powered by only a single
11 Toshiba GX7 have an output power higher than 800
12 horsepower?

13 A No, not if you limit it to a single GX7 as specified
14 on this sheet. Then it's limited to 800 horsepower.

15 Q So I would like to turn now to paragraph 142 of your
16 declaration.

17 A Okay.

18 Q I just have a clarifying question before I get
19 there. You mentioned that you had read or have seen
20 a patent involving a Toshiba GX7 used in a fracking
21 operation. Was that used to power an electric motor
22 used to power a pump?

1 A Yes, a fracturing pump in particular.

2 Q All right. Let's turn to paragraph 142. You were
3 providing evidence from Exhibit 1011, and it's a
4 table. This is the same Gardner Denver Well
5 Servicing Pump. Is that correct?

6 A Yes.

7 Q The bottom of this table mentions input power, base
8 horsepower.

9 A No.

10 Q No? I'm sorry. The bottom line in this table, it
11 says, "Input Power, Base Horsepower." Is that
12 correct?

13 A No, I disagree. That's incorrect.

14 Q What does it say?

15 A It says, "Input Power, Brake Horsepower," as I
16 describe in paragraph 142.

17 Q So in paragraph 142, the bottom line of this table
18 taken from Exhibit 1011 specifies the input brake
19 horsepower for this pump. Is that correct?

20 A Yes, sir. That's correct.

21 Q And the minimum input brake horsepower listed on
22 this table was 2200 horsepower. Is that correct?

1 A That is correct for those fluid conditions
2 specified.

3 Q And that is larger than the maximum output of a
4 single Toshiba GX7 VFD. Is that correct?

5 A I don't know that you could make that determination,
6 no. It's larger than the output of the single VFD
7 described in Exhibit 1047. I can agree to that.

8 Q As you testified before, a single Toshiba GX7 VFD
9 and an electric motor can produce no more horsepower
10 than the 800 horsepower listed on that specification
11 form. Is that correct?

12 A I disagree with your characterization of my
13 testimony. I did not testify to that.

14 Q If you were to use a single Toshiba GX7 VFD and an
15 electric motor, that would not -- strike that.

16 Using a single Toshiba GX7 VFD and an electric
17 motor would not satisfy the input power requirements
18 shown in the table in your declaration on paragraph
19 142. Is that correct?

20 A No, I don't think you can make that determination.
21 We just simply don't have enough data to answer that
22 question.

1 Q What kind of data would you need to determine
2 whether you could use a single Toshiba GX7 VFD to
3 power this pump?

4 A We would need to know the entire range of
5 horsepower, maximum horsepowers for all GX7s, and we
6 don't know that.

7 Q What about the Toshiba GX7 described in Exhibit 1047
8 and 1011 -- I'm sorry, Exhibit 1006 and
9 Exhibit 1047?

10 A Was there a question?

11 Q You said that the information that you would need to
12 know is you would need to know the operating power
13 of all Toshiba GX7s. I'm asking specifically for
14 the one described in Exhibit 1006 and 1047.

15 A Specifically what about those two specs?

16 Q Using the Toshiba GX7 described in both of those
17 documents and just a single one, would you not be
18 able to meet the power requirements of the Gardner
19 pump?

20 A Correct.

21 Q So using the Toshiba GX7 described in Exhibit 1006
22 and 1011, you would not be able to combine it

1 with -- you would not be able to replace the VFD in
2 Coli that uses the Gardner pump. Is that correct?

3 MS. FLANNERY: Object to form.

4 A Incorrect.

5 BY MR. HOPKINS:

6 Q Coli's system explains that it can deliver 2500
7 horsepower directly to each pump. Would you be able
8 to use the Toshiba GX7 described in Exhibit 1006 and
9 1047 to power a pump described in Coli?

10 MS. FLANNERY: Object to form.

11 A Yes.

12 BY MR. HOPKINS:

13 Q Given Coli's requirement of supplying 2500
14 horsepower directly to each pump, would you be able
15 to use a single VFD described in Exhibit 1006 and
16 1047 to power an electric motor to power those
17 pumps?

18 A I disagree with your question.

19 Q What part of my question did you disagree with?

20 A That there's a requirement in Coli that the pump
21 deliver true 2500 horsepower. That's only one
22 embodiment, not the invention as a whole.

1 Q Okay. Let's turn to paragraph 49 of Coli. There's
2 a sentence that reads, "In contrast, the present
3 system can deliver a true 2500 horsepower to each
4 pump because pump 22 is coupled to electric motor."

5 Do you see that sentence?

6 A I do.

7 Q Does that sentence refer to an exemplary embodiment?

8 A Yes. See illustrative embodiment of Figure 3.

9 Q Now, I agree the first sentence says that, but then
10 it does go on to describe conventional systems and
11 the problem, namely, "In this particular
12 configuration, each single trailer provides more
13 pumping capacity than four of the traditional diesel
14 powered fracturing trailers of Figure 5 as parasitic
15 losses are minimal in the electric fracturing system
16 compared to the parasitic losses typical of diesel
17 fueled systems."

18 Does that indicate -- or does that describe the
19 problem of past systems in Coli?

20 MS. FLANNERY: Object to form.

21 A One of the problems in this embodiment.

22 BY MR. HOPKINS:

1 Q And then the next sentence also describes
2 conventional features. It says, "For example, a
3 conventional diesel powered fluid pump is rated for
4 2250 horsepower."

5 Does that again talk about conventional
6 systems?

7 A One particular conventional system. Certainly not
8 all conventional diesel powered fluid pumps are
9 rated for 2250 horsepower. That's kind of silly.
10 That's just one example.

11 Q And then the next sentence is again talking about
12 problems with the conventional system. "However,
13 due to parasitic losses in the transmission, the
14 torque converter and cooling system, diesel fueled
15 systems typically only provide 1800 horsepower to
16 pumps."

17 That again, is that talking about conventional
18 systems?

19 A Yes, that example of a 2250 horsepower pump would
20 only get about 1800 horsepower.

21 Q Okay. Then in contrast to those conventional
22 systems, the present system can deliver 2500

1 horsepower directly to each pump because the pump 22
2 is directly coupled to an electric motor 21. Now
3 we're talking about the present invention of Coli.
4 Is that correct?

5 MS. FLANNERY: Object to form.

6 A One embodiment of the present invention, yes, but
7 the embodiment that replaces the 2250 horsepower
8 diesel powered fluid pump, yes. That's only one
9 example.

10 BY MR. HOPKINS:

11 Q Okay. Are you familiar with other pumps used in
12 fracking?

13 A Yes.

14 Q Okay. Are you familiar with the horsepower
15 requirements of other pumps used in fracking?

16 A Yes.

17 Q Okay. So the conventional system has 1800
18 horsepower. Is that correct?

19 MS. FLANNERY: Object to form.

20 A In this example.

21 BY MR. HOPKINS:

22 Q So is it fair to say that most pumps have a

1 horsepower requirement between 1800 and 2500 that
2 are used in fracking operations?

3 A No.

4 Q Is it fair to say that using a single Toshiba GX7
5 described in Exhibits 1006 and 1047 would not power
6 a pump rated higher than 1,000 base horsepower?

7 A I think we need more information. I think that's
8 not a fair statement the way you asked the question.

9 Q What's not a fair statement about it?

10 A Your limit of a thousand. We know, for example, in
11 the GX7 that an 800 horsepower GX7 can power a 1200
12 horsepower pump at least for a period of time.

13 Q Can it power that pump continuously?

14 A No.

15 Q I believe the GX7 mentioned a period of time for
16 about 120 seconds on Exhibit 1047. This is
17 referring to the overload rating. Is that the
18 period of time you were talking about?

19 A Yes, that would be for this particular
20 specification, 130 percent for 120 seconds, so that
21 would be 1040 horsepower.

22 Q So it could only reach 1040 horsepower for 120

1 seconds. Is that correct?

2 A The drives specified on these specification sheets,
3 yes, that's correct.

4 Q So in the sentence in Coli that says, "In contrast,
5 the present system can deliver a true 2500
6 horsepower to each pump 22 because pump 22 is
7 directly coupled to electric motor," the Toshiba GX7
8 described in Exhibits 1006 and 1047 could not power
9 that pump in that embodiment?

10 MS. FLANNERY: Object to form.

11 A Incorrect.

12 BY MR. HOPKINS:

13 Q So the example provided in Coli that requires the
14 present system to deliver a true 2500 horsepower
15 directly to each pump could not be used with a
16 single Toshiba GX7 described in Exhibit 1006 and
17 1047. Is that correct?

18 A Yes, that specific embodiment and limited the GX7 to
19 a single one as specified in 1047 and 1006, they
20 would not work.

21 Q Let's go to paragraph 155 of your declaration. With
22 respect to that embodiment described in Coli, is it

1 incorrect that a POSITA would have been motivated to
2 simply be able to substitute the VFD in Coli for the
3 VFD described in the Toshiba Manual?

4 A No, that is not incorrect. That's still a valid
5 statement.

6 Q Would the statement be valid if it was a POSITA
7 would have been motivated to simply substitute the
8 VFD of Coli described in paragraph 49 with a single
9 VFD of the Toshiba Manual without affecting the
10 functionalities of Coli?

11 MS. FLANNERY: Object to form.

12 A Well, sir, I may be missing it, but I don't see a
13 VFD described in paragraph 49. If you can point
14 that to me, I would be glad to answer your question.

15 BY MR. HOPKINS:

16 Q The sentence, "In contrast, the present system can
17 deliver a true 2500 horsepower directly to each
18 pump," part of that present system would include a
19 VFD. Is that correct?

20 A I think you can make that -- yes, you can say that.

21 Q So the VFD in the present system would be what I
22 would be referring to in the VFD in Coli for this

1 part of the specification.

2 A Okay.

3 Q So my question is, would the following statement be
4 true: A POSITA would have been motivated to simply
5 substitute the VFD of Coli described in paragraph 49
6 in part of the present system for the VFD described
7 in the Toshiba Manual without affecting the other
8 functionalities of Coli?

9 MS. FLANNERY: Object to form.

10 A Yes, that sentence would still be accurate.

11 BY MR. HOPKINS:

12 Q Would it be accurate --

13 A That's not what I wrote. You're kind of writing
14 your own declaration, I guess, but...

15 Q We agreed before -- well, sorry.

16 Is it fair to say that if a VFD is
17 underpowered, it cannot power a motor requiring a
18 higher input power?

19 A The answer to your question is, no, that's not
20 correct.

21 Q Is it fair to say that a single VFD with certain
22 power output requirements cannot power a motor that

1 has higher power output requirements?

2 A No, that's not correct.

3 Q Is there any passage in Coli that -- strike that.

4 I would like to turn to Exhibit 1007 at page
5 24. Sorry, it's 1006 at page 24.

6 A Okay.

7 Q The sentence that reads, "Do not use an ASD with a
8 motor that has a power rating that is higher than
9 the rated output of the ASD."

10 To deliver 2400 true horsepower to a pump as
11 mentioned in paragraph 49 of Coli, would you need a
12 motor that has a power rating higher than the rated
13 output of the Toshiba GX7 ASD described in
14 Exhibit 1006?

15 MS. FLANNERY: Object to form.

16 A No, I don't believe so. That's something I would
17 want to talk to Toshiba about.

18 BY MR. HOPKINS:

19 Q So you could use a motor providing 2400 true
20 horsepower with a Toshiba GX7, with a single GX7
21 ASD. Is that correct?

22 MS. FLANNERY: Object to form.

1 A We don't have enough data to answer your question
2 the way you asked it.

3 BY MR. HOPKINS:

4 Q Let's turn back to paragraph 155. Do you have
5 enough data to determine whether a POSITA would have
6 been motivated to simply substitute the VFD in Coli
7 for a single VFD of Toshiba in the Toshiba Manual?

8 A No.

9 Q Okay.

10 A That's not what I wrote.

11 Q Let's turn to Horikoshi, Exhibit 1008.

12 A If you're moving in a different direction, would
13 this be a good time to take a break? We've been
14 going about 45 minutes.

15 MR. HOPKINS: Yeah.

16 MS. FLANNERY: Let's go off the record.

17 TRIAL TECH: Off the record at 1:31 p.m.

18 (Off the record.)

19 (Back on the record.)

20 TRIAL TECH: Back on the record at

21 1:39 p.m.

22 BY MR. HOPKINS:



1 Q So I would like to turn to paragraph 218 of
2 Exhibit 1002.

3 A Okay. I'm there.

4 Q And in this paragraph it is your position that
5 substituting the VFD for Coli and the VFD for
6 Horikoshi that has the diagnostic functionality to
7 detect a ground fault or a phase-to-phase short
8 circuit, this would render Claim 1 and 4 obvious.
9 Is that correct?

10 A What I'm talking about here is why a POSITA would
11 have been motivated to combine the two references,
12 Coli and Horikoshi.

13 Q Okay. But specifically with what you're combining
14 is the VFD of Horikoshi with the diagnostic
15 functionality to detect a ground fault and a
16 phase-to-phase short circuit. Is that correct?

17 A Correct, either as a replacement or as an
18 enhancement.

19 Q All right. I would like to talk a little bit about
20 this diagnostic functionality to detect a ground
21 fault or phase-to-phase short circuit in Horikoshi.
22 So if we could turn to Exhibit 1008 which I've

1 uploaded.

2 A Okay. I've got it.

3 Q Specifically, I guess paragraph 11, let's turn
4 your -- I'd like to turn your attention to that
5 paragraph.

6 A Okay.

7 Q Is this the diagnostic function that you were
8 talking about in your previous motivation to
9 combine?

10 A That's part of the description that I referred to.
11 Let me see here. That may be incorrect. Hold on a
12 second. I was looking at the wrong exhibit. No, I
13 don't think I ever referred to paragraph 11 of
14 Horikoshi. So the answer to your question is not
15 really.

16 Q Can I turn your attention to your declaration at
17 paragraphs 212 and 213.

18 A Okay.

19 Q In these paragraphs it appears that you're
20 describing the diagnostics and motor protection from
21 Horikoshi that would include the functions described
22 in paragraphs eight, 10 and 11. Is that correct?

1 A Well, 11 is describing the objective of Horikoshi.
2 So, yes, to the extent that that objective loosely
3 describes the invention, I refer to it here in the
4 summary of the overview. I don't refer to paragraph
5 11 in the sections where I'm showing the disclosure
6 of the limitation in Claim 1 or 4. That's all I was
7 trying to say.

8 Q I understand. Let's go to paragraph 225 of your
9 declaration. This is the diagnostic function that
10 you were mapping to Claims 1 and 4 for electric
11 motor diagnostics. Is that correct?

12 A Yes.

13 Q Okay. Does Horikoshi disclose that this diagnostic
14 function can be disabled?

15 A I don't see -- just a quick search of the word
16 disabled, I don't see the word disabled in the spec.
17 To answer the question more specifically since I
18 haven't done that analysis, I would need to read the
19 whole thing. That's as far as I can go. It doesn't
20 contain the word disabled in the specification.

21 Q Does Horikoshi provide any horsepower requirements
22 for its motor driving apparatus?

1 A No, it's agnostic. It's about the size of the
2 drive.

3 Q Without knowing the horsepower requirements of the
4 motor driving apparatus, is there any way to
5 conclusively tell whether you could substitute
6 Horikoshi's driving apparatus in Coli's VFD?

7 A Yes. A POSITA that understands the operation of the
8 VFD and a -- or an ASD would understand that this
9 diagnostic would, in fact, be agnostic. It could be
10 applied to any size motor, any size drive. The
11 operation of a drive does not change based on its
12 horsepower rating. It's simply the physical size
13 and the current carrying capability of its equipment
14 that changes. How it operates doesn't change.

15 Q If we can go to paragraph 218 of your declaration.

16 MR. HOPKINS: We're going to need both
17 pages. Thank you.

18 BY MR. HOPKINS:

19 Q In paragraph 218 you contend that a POSITA would
20 have been motivated to simply substitute the VFD of
21 Coli for the VFD of Horikoshi that has the
22 diagnostic functionality. Without knowing the power

1 requirements of Horikoshi's motor driving apparatus,
2 is there any way to tell, conclusively tell that you
3 could make such a substitution?

4 A Yes. The apparatus in Horikoshi is horsepower
5 agnostic. It would work in any drive at any
6 horsepower running any type of motor. So, yes, we
7 can conclusively say it would work.

8 Q So the VFD in Horikoshi would work in a washing
9 machine?

10 A Yes, it's size agnostic. The specifics of Horikoshi
11 would work very well in a washing machine or
12 fracturing pump or an induced draft fan.

13 Q I would like to turn to paragraph 128.

14 A Of my declaration?

15 Q That's correct.

16 A Okay.

17 Q Would you be surprised to learn that the word pumps
18 never appears in Horikoshi?

19 MS. FLANNERY: Object to form.

20 A No, that wouldn't surprise me because as I just
21 said, Horikoshi is application agnostic, the driving
22 work on fans, pumps, blowers, any motor with a

1 drive.

2 BY MR. HOPKINS:

3 Q Okay. So you agree --

4 A Or a drive connected to a motor, I should say.

5 Q So you agree that Horikoshi does not describe
6 electric motor driven pumps. Is that correct?

7 A Correct. Horikoshi is talking about the drive, not
8 the motor or the pump.

9 Q Is that your statement that --

10 A The paragraph says -- I'm sorry. Go ahead.

11 Q So your statement that Horikoshi describes the use
12 of variable frequency drives to control electric
13 motor driven pumps is not accurate. Is that
14 correct?

15 A I disagree with your question. That's not what the
16 paragraph says.

17 Q The paragraph in pertinent part says, "Horikoshi
18 describes the use of variable frequency drives to
19 control electric motor driven pumps."

20 Is that not accurate?

21 MS. FLANNERY: Object to form.

22 A That's an incorrect reading of my paragraph.

1 MR. HOPKINS: Counsel, at this time, I
2 would like to pass the witness.

3 MS. FLANNERY: Okay. I have just a
4 couple of questions. Actually, I think let's leave
5 that same exhibit up on the screen. Can we go to
6 paragraph 155, please.

7 EXAMINATION

8 BY MS. FLANNERY:

9 Q Dr. Durham, counsel for Patent Owner asked you some
10 questions about this paragraph and statements
11 therein. Do you recall those?

12 A To some extent, yes.

13 Q Okay. I believe counsel for Patent Owner asked you
14 if the statement there that a POSITA would have been
15 motivated to simply substitute the VFD of Coli for
16 the VFD of Toshiba Manual, et cetera, and I believe
17 he asked you if that would still be true if you
18 amended your statement to say the VFD of Coli as
19 described in paragraph 49.

20 Do you recall that?

21 A Yes.

22 Q I believe -- what was your testimony as to whether

1 that would still be a valid statement?

2 A Well, my testimony was there's not a VFD described
3 in paragraph 49, but the statement as a whole is
4 still accurate.

5 Q Okay. And why is that?

6 A Well, it's because the Toshiba Manual VFDs for one
7 reason can be paralleled. You can run multiple
8 VFDs to control a single motor, and that would
9 increase the capability of the VFD system above the,
10 for example, 800 horsepower in Exhibit 1047.

11 Q And would a person of skill in the art in the
12 2010/2012 time period, would they have understood
13 how to arrange multiple VFDs from the Toshiba Manual
14 that way?

15 A Yes, it would.

16 MR. HOPKINS: Objection, form.

17 BY MS. FLANNERY:

18 Q And how much output horsepower could VFDs arranged
19 in that way put out?

20 A Well, I'm not sure we know the answer to that
21 question. I'm sorry?

22 MR. HOPKINS: Objection, form.

1 A I'm not sure we know the answer to that question. I
2 recall some of that discussion, and I said I would
3 want to talk to Toshiba about that and see how many
4 it would be practical to arrange put in parallel.
5 So it would be dependent on how many that could be.
6 Two or three or four makes sense.

7 BY MS. FLANNERY:

8 Q Okay. And if you have, let's say, two, three or
9 four of the VFDs arranged in parallel based on the
10 output specifications that you went through with
11 counsel, what's the range of output horsepower that
12 you would be looking at?

13 MR. HOPKINS: Objection, form.

14 A Again, under the hypothetical limited to the ones
15 described in 1047, which is not the entire family of
16 GX7s, four would be 3200 horsepower.

17 BY MS. FLANNERY:

18 Q I believe there was also a discussion about
19 paragraph 49 --

20 MS. FLANNERY: Actually, let's bring up
21 Coli which is Exhibit 1005 and go to paragraph 49,
22 please.

1 BY MS. FLANNERY:

2 Q And do you recall the testimony that you gave about
3 this section when counsel for Patent Owner was
4 asking you some questions?

5 A I recall discussing this. I don't recall many
6 details at this point.

7 Q Okay. In that paragraph, the sentence that begins,
8 "In contrast, the present system can deliver a true
9 2500 horsepower directly to each pump," do you see
10 that?

11 A Yes.

12 Q Is that a requirement for all fracturing pumps that
13 could be used under Coli?

14 A No.

15 Q In your experience, can fracturing pumps perform
16 fracturing operations using less than that amount of
17 horsepower?

18 A Absolutely.

19 Q No further questions.

20 MS. FLANNERY: Pass the witness.

21 MR. HOPKINS: Can we bring up

22 Exhibit 1005 again, what was just up. I believe it

1 was paragraph 49. Actually, no further questions.

2 MS. FLANNERY: Okay.

3 MR. HOPKINS: Thank you, Doctor.

4 TRIAL TECH: Is there anything else to
5 put on the record before we close for the day?

6 MS. FLANNERY: I don't think so. We'll
7 read and sign.

8 TRIAL TECH: Thank you. We are off the
9 record at 1:57 p.m.

10 (The deposition concluded at 1:57 p.m.)

11 *END OF RECORD*

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