In the Matter Of:

HALLIBURTON ENERGY vs

U.S. WELL SERVICES

MICHAEL NIKOLAOU

January 30, 2024



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Case Nos. IPR2021-01066, Patent No. 10,020,711

IPR2021-01238, Patent No. 10,526,882

IPR2021-01315, Patent No. 9,893,500

HALLIBURTON ENERGY SERVICES, INC.,

Petitioner,

-vs-

U.S. WELL SERVICES, LLC,

Patent Owner.

REMOTE TESTIMONY OF DR. MICHAEL NIKOLAOU

JANUARY 30, 2024 - 9:12 A.M. CST

JOB NO. 2024-927157

JANUARY 30, 2024

9:12 A.M. CST

DEPOSITION of DR. MICHAEL NIKOLAOU, before S. Arielle Santos, Certified Court Reporter, Certified LiveNote Reporter and Notary Public.

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DR. MICHAEL NIKOLAOU, Affirmed, Testifies as follows:

THE WITNESS: I do.

EXAMINATION

BY ELIZABETH D. FLANNERY:

Q Good morning.

Could you please state your full name for the record?

A Good morning. My name is Michael Nikolaou.

Q And Mr. -- Dr. Nikolaou -- excuse me -- where are you located today?

A I am located in Houston, Texas.

Q Are you located in an office today?

A Yes, it is the Winston & Strawn offices in Houston, 24th floor of the Bank of America building.

Q Okay. Very good.

I am just down the street in Houston as well.

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Is there anyone in the room present there with you today?

A No. I am in the room by myself.

Q Okay.

Other than the computer that you are using for the deposition today, do you have any other computers, laptops with you?

A No.

Q Do you have any -- do you have a cell phone with you today?

A I do but it's in my briefcase which is next to me, but it's not on. And in that briefcase, there's a laptop, by the way, but it's not on either.

Q Okay. Very good.

I would just ask during today's deposition that those things stay where they are. If for some reason that changes during your deposition, you have your phone on or something like that, I would ask that you let me know.

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Is that acceptable to you?

A Absolutely.

Q Okay.

And do you have any copies of documents there in the room with you?

A Yes. I have a binder that contains my declaration, a copy of the patent in question, and a number of other documents that are cited in my declaration.

Q Are those clean copies of those documents or have you made notations on them?

A They are clean. They are entirely clean. They have no markings on them at all.

Q Okay. Very good.

Dr. Nikolaou, I understand you have been deposed before; is that correct?

A Yes, a few times.

Q Okay.

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Roughly how many times before have you been deposed?

A Four or five over the last decade or so.

Q How many depositions have you had within the last year?

A Definitely one within the last year.

Q How many cases involving patents have you worked on over your career?

A Cases involving patents. In addition to this one, another two cases that I can immediately recall.

Q Roughly how long ago were those cases?

A They were a few years ago and I have the details I believe in my declaration, in the introduction where I indicate my prior involvement in this.

So there was a case Eurecat -- involving Eurecat and Chem 32, that was about a decade ago, I believe.

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And then there was another case where the two litigants were Sunoco and Magellan, that was -- it lasted for a number of years, actually, but I believe it was five or six years ago.

And then there was a minor case with TDE versus Moblize, and vice-versa, that was about eight years ago I believe.

Q And that last one which one was that?

A TDE Petroleum Data Solutions. It's item --

(Reporter Clarification.)

THE WITNESS: It is Item (b) in paragraph 16 of my declaration.

BY ELIZABETH D. FLANNERY:

Q The TDE case that you mentioned, what generally was the subject matter of that case?

A The case was that one company claimed that another was infringing on a patent that they had, and I offered an

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opinion there. And that's how far I was involved in that. After a certain point I -- I couldn't honestly make certain claims, so I retracted myself.

Q What was the technology involved in that case, just a high level?

A The technology was -- if I recall, it was about data collection and presentation. One company claimed they could collect data from various sources in an oil or gas producing location and offer those to manager, let's say, every day along with some processing. So the two companies were claiming that this is known or this is not known, your patent is valid, your patent is not valid, blah blah. So that was the gist of the contest.

Q When you said you couldn't make certain claims in that case, was that relating to -- well, I guess at a high level, what were the reasons for that?

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Were those related to your expertise or something else?

A Yeah, exactly. Exactly. I was asked to offer my opinion based on technical matters, and my opinion -- I offered my honest opinion and that's how we left things. It didn't go very far.

Q And then the Sunoco Partners and Powder Springs matter you mentioned matter, item (d), what type of technology did that case involve?

A Yes, that was a case that lasted for at least a couple of years and it went all the way to trial eventually where I testified.

So the technology involved was about gasoline and butane blending; one company was doing it one way, the other was doing another way. And there was a dispute that this is proprietary, this is patented; no, this is not patentable; you infringed; no, we did not infringe. So

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those were the arguments.

Q Thank you for that.

So to just kind of just review at a high level, you have had depositions before but I just wanted to make sure that we are on all board with some ground rules.

As we have been doing, I will have questions today during the deposition and we will be having the court reporter transcribe. It's important that we not talk over each other so that the court reporter can get everything down.

I will do my best not to talk over your answers and I would just ask that you do the same, that you wait until I completed my question before you start your answer.

Is that acceptable?

A Very good. It's perfectly acceptable.

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Q Okay.

We will also go today in periods of approximately an hour and take breaks at around the hour. If you need a break sooner than that, please ask me. I am certainly happy to accommodate that.

The only time I won't be able to do that if there is a question pending, I will ask you answer the question pending before we -- before we take a break.

Is that acceptable for you?

A Yes.

Q And do you understand that during the deposition, at least during my period of questioning, the rules that govern us say that you are not allowed to speak with your counsel about the substance of your testimony until I have finished with my questions.

Do you understand that rule and are you willing to abide by it?

A I understand that, yes.

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Q Okay.

What did you do to prepare for today's deposition?

A I went over a number of documents and I had conversations with counsel here at Winston & Strawn.

Q You said you reviewed documents.

Were there any documents that you reviewed that were not listed in -- as exhibits in your declaration?

Did it go beyond that?

A No, no. It was only documents -- the main document, my declaration, and then documents cited in that declaration.

Q I think you said you had conversations with counsel.

Approximately how long did you meet with counsel?

A For about a day.

Q Okay.

That was yesterday?

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A Yes, that was yesterday.

Q Okay.

Was there anybody other than counsel for U.S. Well Services present there?

A No. In fact, it was -- I was in the offices, but we had the whole thing on Zoom. So it was -- same way we are doing it now, online.

ELIZABETH D. FLANNERY: I would like to pull up Exhibit 1001, which is the '870 patent. Pull that up on the screen.

(Previously Marked Exhibit 1001 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q And certainly, Dr. Nikolaou, we will go to certain portions. If it's easier for you to refer to the paper copy that you have there, that's fine as well. Just I would ask you confirm that

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whatever paper copy you look at is the same as what we are looking at on the screen.

A Yes, I can see that on the screen right now.

Q Okay. Very good.

I would like to go to Claim 1 of that patent which is towards the end, it should be on the very last page.

THE REPORTER: Am I marking these or have they been marked?

ELIZABETH D. FLANNERY: They have been marked in the proceeding. I don't know if it gets listed in your transcript. I think that's how the other deposition happened.

BY ELIZABETH D. FLANNERY:

Q All right. So can we zoom in a little, Claim 1 down at the bottom of the screen, bottom left column there.

There you go.

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And you see there that one of the elements of the system that's claimed there is a variable frequency drive connected to the electric motor?

Do you see that, sir?

A Yes, four lines from the bottom.

Q Yes.

As you understand, Claim 1 requires a variable frequency drive?

A Yes.

Q Is it okay with you during the deposition today if we refer to that as the VFD?

A Yes, that's perfectly acceptable.

Q Okay.

And Claim 1 further requires in that claim, just a little bit further down, that the variable frequency drive performs electric motor diagnostics to prevent damage to one or more electric motors.

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Do you see that?

A Yes.

Q Does the '870 patent describe how electric motor diagnostics are performed?

A It refers to motor diagnostics in general in this claim. And further up, there are instances where it says -- so this shouldn't happen to the electric motor or that shouldn't happen to the electric motor.

Q Okay.

ELIZABETH D. FLANNERY: Let's go a little further up, let's go to column 4, please. Should be -- not exactly sure which page, probably -- actually, I think two or three pages from where we are.

A little more. There you go.

BY ELIZABETH D. FLANNERY:

Q Column 4, if you could look with me, like the first full paragraph there

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that starts, "The VFD can be designed..."

Do you see that?

A Which part again?

Q I'm sorry, first full paragraph there on column 4.

A Column 4, yes.

Q Yes. Starts, "The VFD can be designed..."

Do you see that?

A Yes.

Q Okay.

It states, "The VFD can be designed to maximize the flexibility, robustness, serviceability, and reliability required by oilfield applications, such as hydraulic fracturing."

Do you see that?

A Correct, yes.

Q Okay.

Little bit further down in that paragraph, around line 16, you see where

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it starts, "Furthermore..." It's sort of in the middle of the paragraph.

Do you see that, sir?

A Yes, I do.

Q Okay.

It says, "Furthermore, with respect to control capabilities, the VFD can provide complete monitoring and protection of drive internal operations."

Do you see that?

A Yes.

Q And then the very next sentence, it gives a for example. It described -- it talks about motor diagnostics.

Do you see that in the next sentence?

A Yes.

Q Do you agree the electric motor diagnostics are an example of the complete monitoring and protection of drive internal operations that the VFD provides?

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A Well, it explains in that sentence, it says, "motor diagnostics can be performed frequently (to prevent damage to grounded or shorted electric motor)."

So it's focusing on the motor in that sentence.

Q Right.

And I am just asking, this states, for example, in the context of this, would you understand that to be part of what is referred to in the previous sentence, an example of the complete monitoring and protection of internal drive operations?

A Can you rephrase the sentence? I may have missed the whole sentence that you just said.

Q Maybe where we start is if you can start reading with the furthermore and --

(Simultaneous Crosstalk.)

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A Yes.

Q -- read to the end of that paragraph and let me know when you have finished.

A Yes. Furthermore --

Q I'm sorry, you don't need to read it out loud. Read it to yourself and just let me know when you are finished.

A Yes. (Reviewing.)

Yes.

Q Okay.

After having read that sentence, do you agree that when this paragraph is talking about motor diagnostics being performed, that is an example of the VFD providing complete monitoring and protection of drive internal operations?

A The two are related, yeah. It says with respect to control capabilities, the VFD can provide complete monitoring and protection of

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drive internal operations.

So complete monitoring and protection can be done in a number of ways. And one of them is as explained in the next sentence, for an example, motor diagnostics can be performed. So by performing the motor diagnostics, they can help the control capabilities to protect the VFD, the VFD internal operations.

Q Okay.

And so in that same sentence that we were looking at a second ago, that says Furthermore --

(Simultaneous Crosstalk.)

A Yes.

Q -- after it talks about complete and monitoring -- complete monitoring and protection of drive internal operations, it also says, "while communicating with an operator via one or more user interfaces."

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Do you see that?

A Yes.

Q Okay.

What would be communicated with the operator in connection with these activities?

A Drive internal operations, let's see, can provide -- while this is happening, there can be -- while the VFD is doing what is claimed there, there can be communication with an operator, so the operator can have an idea of what is happening there.

Q And when it talks about communicating with the operator via one or more user interfaces, what types of interfaces do you understand this to be talking about?

A This can be anything in general that allows a device to communicate with a human operator. So those can be -- that can be anything that would allow

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this kind of communication.

Q Could that include an equipment console?

A Yes.

Q What about a graphics panel, like a computer system graphics panel?

A It depends on the situation and what -- the particular emphasis or focus would be or what would be practical or feasible or not too expensive and all that.

But the idea is that somehow there should be a communication so that the operator can understand -- can keep track of what is happening in the system.

Q If we go to the next page of this patent, so column 5.

A Yeah.

ELIZABETH D. FLANNERY: If we could go to little bit further down the paragraph that starts, pump and control -- pump control

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and data monitoring equipment.

It's right there, about line 34,

on the left-hand side.

There you are. It's right by

the hand.

BY ELIZABETH D. FLANNERY:

Q Do you see that, sir?

A Yes, sir.

Q Okay. Great.

So in this paragraph -- tell you what, why don't you go ahead and read that paragraph to yourself and let me know when you are finished.

A For lines 34 through 48, right?

Q Correct. Yes. That complete paragraph.

Let me know when you finish reading.

A (Reviewing.) Okay.

Q Okay.

So the paragraph there is talking about pump control and data

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monitoring equipment 40.

Do you see that?

A Yes.

Q And it states that that can be mounted on a control vehicle 42.

Do you see that?

A Yes.

Q And then it can be connected to the pumps 10, the electric motors 14, the blenders 34, and other downhole sensors and tools.

Do you see that?

A Yes.

Q Would you agree that this is the type of equipment that can be used for that -- the complete monitoring and protection of the drive internal operations?

A Complete in what way? That there shouldn't be -- there isn't anything else stated here. So -- misunderstanding that.

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Q I am just talking about does this equipment relate to the functions that were discussed in column 4 that we just talked about, when it referred to complete monitoring and protection of drive internal operations?

A Yeah, this is -- well, let me explain.

So this states that this is about pump control and about data monitoring. So it's all mounted on a control vehicle, and there are things to which this is connected or things connected to this equipment. So things are listed there. So there are the pumps, there are the electric motors, there are the blenders. And it says other downhole sensors and tools not shown.

So I understand that there's other equipment, but it falls in that category. And it's about downhole

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sensors and tools. So that in line 38, it says allow the operator to control different parameters of the fracturing operation.

Q Okay.

Just to sort of unpack some of the things you said there.

The pump control and data monitoring equipment, you agree that's connected to the electric motor in the patent, right?

A Yes. It says specifically pump control and data monitoring equipment that can be mounted in a control vehicle and connected to the pumps 10, electric motors 14, blenders 34, et cetera, yes.

Q Okay.

And then in the next sentence, where it says, "For example, the pump control and data monitoring equipment 40 can include A/C console that controls the VFD."

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Do you see that?

A Yes.

Q Okay.

So would you agree, in light of that, that this pump control and data monitoring equipment 40 is part of the equipment, at least part of the equipment that provides the complete monitoring and protection of drive internal operations?

A Drive internal operations, you mean VFD drive, right? Yeah.

Q Correct.

A Yes.

Q Okay.

If we could go a little further down into that paragraph that you read, the sentence that begins, "Other pump control and data monitoring equipment..."

Do you see that?

A Yes.

Q Okay.

It lists a number of things.

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One of the things that's listed there is a graphic panel.

Do you see that?

A Graphics panel, yes.

Q Okay.

Is that one type of interface that could be used to communicate information about the drive operations with the operator?

A Yes.

Q And then the sentence that immediately follows that talks about the graphics panel can include, for example, a touchscreen interface.

Do you see that?

A Correct, yes.

Q Okay.

And again, is a touchscreen an example of a type of interface that might be used for an operator to communicate with the drive control system?

A Correct, yeah.

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Q Okay.

The various pieces of equipment that we have been talking about here that are listed here, where would those interfaces be located?

A According to this, in this line 35, it says mounted on a control vehicle.

Q Okay.

So the interfaces that are used to control the VFD, those would be -- those would be located in the control vehicle 42, according to the '870 patent?

A According to this paragraph, yes.

Q Okay.

Let's go back to the last page of this exhibit, 1001. So looking at the claims, let's go to Claim 7 which is on the right side there.

You see that, sir?

A Yes.

Q Okay.

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And I am going to skip down to the element that talks about the variable frequency drive, the VFD.

Do you see that element?

A Give me one second -- so it says -- blah blah blah -- you are referring to line 32, variable frequency drive connected to this?

Q That's right.

A Yes.

Q Okay.

And Claim 7 also states in that same limitation, that -- it says the variable frequency drive -- and I am omitting a little bit -- but it says "having one or more power semiconductor heat sinks having thermal sensors."

Do you see that?

A Yes.

Q In this claim -- well, generally speaking, what do you understand a heat sink to be?

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A A heat sink is an element that can be used to absorb heat. So that you remove it from one place, you dump that heat to the heat sink so you can keep that place -- can prevent it from overheating, for example, or to maintain a temperature.

Q Would a person of skill in the art at the time of this patent -- actually, let me take a step back, just to level set.

You understand that the '870 patent, the effective filing date of this patent is in 2012.

Do you understand that?

A Yes.

Q Okay.

So when I'm asking you questions about person of skill in the art, I am referring to a person of skill in the art as of that time, not sitting here today.

Do you understand that?

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A Correct. Yes.

Q Okay. Very good.

So would a person of skill in the art have understood before this patent existed, that a VFD would need to be cooled to operate properly, for example, if it was operating at a warm environment?

A Cooling requirements depend on the particular equipment, the particular operation, the conditions, on a number of things. But a POSITA, a person of skill in the art, would understand that if there is a possibility of overheating, something would have to be done to protect the equipment from overheating.

Q Claim 7 there also requires -- it says the "one or more power semiconductor heat sinks having thermal sensors."

Do you see that?

A I do.

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Q What would be the purpose of the thermal sensor there.

A To -- I'm sorry, was there an interruption or no?

Q No.

A Just noise. Okay.

So what the purpose of the thermal sensor, so the sentence, "having one or more power semiconductor heat sinks having thermal sensors." So the heat sink by absorbing heat, would have its temperature typically go up to protect the semiconductor, the equipment in general, and the thermal sensor would be there to detect what is the temperature of that heat sink.

Q Why would the temperature of the heat sink be important to know?

A It's a way by which one can infer what is really happening to the equipment being protected by having heat removed and dumped to the heat sink.

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So the idea here is the sentence states on power semiconductor operation, there may be a need for cooling and that's why it states there will be heat sinks, power semiconductor heat sinks, having thermal sensors to monitor what is happening to the sink.

And in fact, the monitoring, as the sentence continues, is done by a microprocessor, monitored by microprocessor to prevent damage caused by excessive heat.

So the particular configuration used here to make sure that there's no equipment damage is by looking at the heat sink itself and having a sensor to monitor the temperature of that heat sink, and then having the microprocessor do its thing, its operations, so it can prevent damage caused by excessive heat.

Q Okay.

The damage -- well, let me take

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a step back.

The equipment that you are trying to understand what is going on with when you're measuring the temperature with the thermal sensor, what equipment are you trying to understand the temperature of when you're making that measurement?

A Well, the sentence here that talks about the VFD connected to the electric monitor to control the speed of motor, and having -- the VFD, that is -- one or more power semiconductor heat sinks. So the power semiconductors need those heat sinks to prevent overheating.

Q Does -- do the thermal sensors tell you anything about the temperature at the VFD?

A The thermal sensors specifically give you a direct measurement -- direct sense of what is happening at the point of installation, which is here the heat

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sink.

From that, one can infer what action to take to prevent damage to the equipment of interest. And all that will be done by a microprocessor, as stated there in line 35.

Q Does the thermal sensor have to be located on the heat sink in order to provide that information that would be inferred?

A That particular configuration is what the claim the limitation suggests. It suggests that -- it's in a power semiconductor heat sink, and that's where the thermal sensor is. There could be other locations where one could put sensors, but that particular claim is about that specific location.

Q It would be possible to have a thermal sensor located somewhere other than on the heat sink, and it would still be able to give you information about the

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temperature of the VFD; is that correct?

SCOTT BORDER: Objection.

Form.

THE WITNESS: That I don't know. That's something I haven't particularly examined. It wasn't in the scope of what I was asked to opine on.

The specific -- the specific task that I was asked to offer an opinion on was what is this sentence saying, how are semiconductor heat sinks having thermal sensors.

So my understanding is, as I explained in my declaration, and as I summarized it a moment ago, namely, that by placing the thermal sensor on the heat sink, you monitor what happens to the heat sink and from that, the microprocessor takes over and does

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an -- and executes whatever action needs to be taken so you can to protect the equipment, the power semiconductor.

BY ELIZABETH D. FLANNERY:

Q Is it your understanding that the only way to understand the temperature of the VFD is to have a thermal sensor on the heat sink?

A Again, I haven't examined that. I have only examined that specific indication shown on claim -- on limitation of Claim 7.

Q Okay.

Is it your understanding that a thermal sensor that is located near the heat sink but not on it, is it your understanding that would not fall within the scope of Claim 7?

SCOTT BORDER: Objection. Form.

THE WITNESS: Well, Claim 7

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says heat sink having thermal sensors. So it is -- this specific option that is -- that it suggests as a limitation.

BY ELIZABETH D. FLANNERY:

Q Right. And so I am just trying to understand what you understand that limitation to mean.

Do you understand that limitation to mean that a heat sink -- I'm sorry -- that a thermal sensor located near the heat sink but not on it, would not meet this limitation of Claim 7?

SCOTT BORDER: Objection. Form.

THE WITNESS: I understand literally what it says, that the heat sink has a thermal sensor.

BY ELIZABETH D. FLANNERY:

Q And does that include thermal sensors that are located near the heat

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sink but not on it?

A If it's not -- if the heat -- if that configuration is such that you cannot say that heat sink has a thermal sensor, then, no, that's not in the limitation.

The limitation is clearly -- says that it should be such -- that the configuration should be such that one can claim the heat sink has a thermal sensor.

Q Are there instances where a heat sink might have a thermal sensor when that thermal sensor is not located on the heat sink?

SCOTT BORDER: Objection. Form.

THE WITNESS: I don't know about that and I haven't thought about that, to be honest with you, whether a distinction can exist.

Here, it says clearly, heat sinks having thermal sensors. So

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I would look for a heat sink that has a thermal sensor.

BY ELIZABETH D. FLANNERY:

Q And I'm asking to you, as a person of skill in the art, that language requires that the thermal sensor be located on the heat sink.

Are you able to tell me that one way or the other?

A I would leave it at the language used in the claim. The heat sink has a thermal sensor.

Q And is it your understanding that that is limited to thermal sensors located on the heat sink; yes or no?

A I haven't been preferred -- prepared for that because it doesn't have to be on, for example; it could be in, it could be around, it could be close.

I don't know, the sentence says heat sink that -- heat sinks, rather, having thermal sensors and that's how I

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understand it, literally, as it's stated.

Q Would a thermal sensor located near the heat sink, would it be able to measure the temperature of the heat sink?

A I haven't studied that. I haven't prepared for that.

Q You just don't know one way or the other?

A I would have to be given many more details so I can tell what is happening.

Q Would a sensor located near the heat sink be able to measure the temperature of the VFD?

A I would have to see specific configurations to offer an opinion. It's not something I can have an opinion on without given enough information.

Q The last part of this limitation in Claim 7 that we have been looking at, talks about the thermal sensors are monitored by a microprocessor to prevent

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damage caused by excessive heat.

Do you see that?

A Yes.

Q In the '870 patent, does it describe where that -- where that monitoring occurs, where the microprocessor is monitoring the thermal sensor from?

A I would have to read again to see whether there is a specific reference to where that microprocessor is, whether it is done remotely or whether there is something on the spot.

Do I specify this in my declaration?

Q So I am not sure. But let's go to column 5, maybe this is can refresh your memory a little, the page preceding this one, sir.

A Yeah.

Q All right. Let's go back down to the pump control and data monitoring

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equipment paragraph that we were looking at earlier, around line 34.

Do you see that?

A Yes, yes. I recall that.

Q Okay.

So the pump control and data monitoring equipment that can be mounted on a control vehicle 42, is that one example of equipment that might be -- that might include a microprocessor that could be used to monitor the temperature sensor?

A That could be an option, just by looking at it now.

Q Going back to the control vehicle 42, what kind of vehicle would you understand that to include?

Could you give me an example of that that you would understand?

A I would go with what is sketched in the corresponding figure. It shows that vehicle from above.

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ELIZABETH D. FLANNERY: Let's go to Figure 1, which is a little further up, page up, maybe to page 7 or so of the document.

There you go. Perfect. If you could turn it. There you go. Perfect.

BY ELIZABETH D. FLANNERY:

Q So we were discussing control vehicle 42.

A Yes.

Q That's there down at the bottom left-hand side.

A Yeah, I see 40 and 42.

Q Okay.

What type of vehicle, in general, does that appear to be to you when you look at that figure?

A Figure 1 -- so it looks like a truck and there's a trailer in the back 40 -- in fact, there's a description of those items.

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So this is referred to as control vehicle in column 5 that we just looked at, referring to 42.

Q Is that where the interface for the operator, like the graphics panel and the touchscreen that we talked about, is that where those would be located?

A Well, the pump control data monitoring equipment says 40 in column 5. So -- it's on the back, that rectangle that is labeled 40. And then 42, says a control vehicle. So that's where 42 is pointing.

Q So would the interfaces for the operator, like, a console or graphics panel, would that be located in sort of a trailer or a truck like that's shown there?

A Column 5 says monitoring equipment in 40, so that's in the trailer -- what is shown as a trailer in this schematic and labeled as 40.

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Q Would that be -- do you understand that to be some sort of space where people could sit and interact with the equipment?

A Yeah.

Q Have you been in those types of places before, those types of vehicles?

A Yes, not in that particular context, though. I have been in those for drilling operations. But they are related, yeah.

Q A trailer like that, is that -- could one example of that be like a temporary building that's transported on a trailer like this?

A It could be anything that one understands by the term "trailer." I guess it's something you can pull and it's movable and it's good enough to house the equipment that one wants to use.

Q At the drilling operation that

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you mentioned having been there, have you seen instances where those trailers are -- once they arrive at the site, are they detached from the trailer -- from the vehicle, excuse me, that towed them perhaps?

A I can't recall that with certainty, to be honest with you. The capability existed, as I recall, but I didn't recall specifically what was done.

Q So in the instance that's shown here in Figure 1, it appears that the equipment portion where the trailer where this would be -- where the equipment would be located in 40 is attached to some sort of -- some sort of vehicle 42, right?

A Well, it shows -- I am not sure whether there's a distinction of the attachment or not, clearly there's reference to a control vehicle and to the place where the data monitoring equipment

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is. So there's 40 for the data monitoring equipment and 42 for control vehicle.

Q At some point during the operation, is it your understanding that 42, the control vehicle, could become decoupled from 40 and just sort of leaving the trailer sort of stationary there?

SCOTT BORDER: Objection. Form.

THE WITNESS: Yeah, I cannot answer that with certainty because I don't know the specifics.

BY ELIZABETH D. FLANNERY:

Q Okay.

A There could be power requirements, for example. There could be whole number of factors that I would have to know in more detail to tell whether this is doable or not.

Q Okay.

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At least the interior -- excuse me - the interior of 40, you agree that's something that should be suitable for an operator to sit in and monitor equipment or, you know, other personnel to sit and monitor equipment.

You agree with that?

A In the interior of 40 should be a place where people can actually use the data monitoring equipment, yes.

ELIZABETH D. FLANNERY: Let's go back to Claim 7, that last page of the document.

BY ELIZABETH D. FLANNERY:

Q And looking at Claim 7 there, do you agree, sir, that Claim 7 is a system claim?

A Yeah, a system for hydraulically fracturing, et cetera, et cetera. Yes.

Q And you agree that's also true of all of the dependent claims that depend from Claim 7; so Claims 8 through

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16?

A You mean the claims that say the system of Claim 7 and then continues?

Q Correct. Claims 8 through 16.

A Yes.

Q So those are all system claims as well?

A Yes. They refer specifically to the system of Claim 7 or the system of Claim 9, which internally refers to the system of Claim 7, and so forth.

So I understand they are all dependent of 7, yes.

Q And so Claim 7, and then each of its dependents, you understand it recites certain elements that are required.

So in Claim 7, after the word "comprising" at the end of that first paragraph, there are a list of things, a pump, an electric motor --

(Simultaneous Crosstalk.)

A Yes, I see that.

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Q -- variable frequency drive.

Those three elements.

A I see that, yeah. Immediately after "comprising," yes.

Q So you understand that as long as a system has all of the components that are listed after "comprising," then that system will fall within the scope of Claim 7.

Do you understand that?

A Yes.

Q Do you understand that to be true, even if the system is not actually used to perform a fracturing operation?

SCOTT BORDER: Objection. Form.

THE WITNESS: I am not sure that I can answer that. This Claim 7 is written specifically for a system that says "for hydraulic fracturing an underground formation in an oil or

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gas well..." et cetera et cetera.

So I am not sure whether this would apply to something else not stated here. My understanding is that the claim has -- specifies the limitations so that can become clear when first -- how far it goes.

BY ELIZABETH D. FLANNERY:

Q Okay.

Is it your understanding that a system has to actually be used in a fracturing operation to meet the elements -- to meet Claim 7?

A Has to be used -- what do you mean, that the system has to be built and actually used, a real well and all that or something else?

Can you please provide an explanation?

Q Yeah.

Does the system actually have to

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have been used in a fracturing operation, an actual operation, in order to meet the element -- in order to meet Claim 7?

A Well, Claim 7 explains what that system would be and what would be its purpose. So whether it was used or not used, I don't see a specific reference to that here. It says what the system is for. It's for hydraulic fracturing and underground formation in an oil or gas well.

Q So if I have a system, let's say I have a system that has all the components, the pump, the electric motor, and it's connected in all the ways that are described in Claim 7, but I haven't actually turned it on, I haven't actually started it performing its function, do you understand that system would still meet Claim 7?

SCOTT BORDER: Objection. Form.

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THE WITNESS: I would need more details to answer that because that system would have to be built -- designed and built in a way that indeed it's for a particular job, in a particular well, in a particular way, and so forth.

So to the extent that it conforms to these specifications, satisfies the limitation, I would look at the system and form an opinion.

BY ELIZABETH D. FLANNERY:

Q I guess what I am saying is, does the system have to be turned on for you to understand whether or not it meets the elements of Claim?

A Let me see. (Reviewing.)

It would have to -- to satisfy all of these requirements, for example, it says, "a pump fluidly connected to the

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well." So that pump would have to be fluidly connected to the well, and that would have to be satisfied. Or, "the pump configured to pump fluid into the wellbore." So there would have to be this configuration. It's specific here in the limitation.

So those -- that's why I am saying I need more details. I cannot offer an immediate answer tentatively on an assumption. I would like to see the system and see how it's been configured and what it does.

Q Okay.

So let's take that as an example; "the pump configured to pump fluid into the wellbore."

Do you see that?

A Yes.

Q Is it your opinion that -- would the pump actually have to be on and pumping fluid for you to understand

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whether it is configured to do that?

A The configuration should be such that it allows this, to pump fluid into the wellbore.

Q Is that something that would be possible to assess without the pump being turned on and running?

A Again, I would need more details. I can say, well, based on my design and specification of that, I think this is going to work. But that's why there is a test when you actually put this thing on the line, and after the test is successful, you actually commission it so that it can continue its operation.

Q Let's take another example. Let's go to Claim 8, just directly below that.

A Hm-hm.

Q See, "the system of Claim 7, wherein the electric pump is mounted on a

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vehicle, and can be ported from one well to another"?

A Yes.

Q Okay.

Would the electric pump have to be running for you to understand whether it meets that element of Claim 8, just that one?

A Well, that claim is specific about the pump being on a vehicle so that it can be ported from one well to another. So the emphasis here is portability; that you don't have a pump placed there fixed, so that it would be a major hassle to move it around.

This claim wants the pump on a vehicle so it can be ported from one well to another, using the vehicle obviously.

Q So would you agree you can assess whether or not a system meets the element of Claim 8, just that specific element that's stated there, without the

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pump being on and running?

A Yeah. If the pump is on a vehicle and indeed the vehicle is movable and all that, I can assess indeed that 8, to the extent that it satisfies Claim 7, because it says the system of Claim 7, so as long as it's a system of Claim 7, portability, I can assess by checking whether the vehicle is movable, in good condition and all that.

So as a matter of principle, I would need a few more details whether this is indeed going to work. But yes, it's not something that would be impossible to do at that point.

Q And do you understand that to be true of system claims in general, that regardless whether or not they are actually -- how many times or if they are actually used, you are assessing whether the system itself, not its use, infringes -- or meets with the element of

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the claim?

A I am not sure I understood the question.

So are you asking whether there is an issue of infringement on this patent or -- I missed you there.

Q Let me rephrase a little, I didn't mean to ask you about infringement.

So you understand that when you were assessing whether or not the prior art falls within the scope of Claim 7, for example --

A Yes.

Q -- that you are assessing whether the system described in the prior art would do that, would have those elements?

A Well, I am talking about that in my declaration about the criteria used to tell whether the -- transfer know-how from one system to another by having

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things in the same area of application, and then obviousness and discuss further down about other things.

So to make sure I do answer your question, can you phrase it one more time, please. And I apologize for asking this again and again.

Q That's okay. I am happy to repeat.

When you are assessing whether or not prior art falls within the scope of Claim 7, you understand that you are assessing whether the system described in the prior art have those components?

A I would check whether the system described in the prior art has these components, yes.

Q And is it your understanding that a system can have those components, regardless of whether it is actually used in a particular way?

A That -- I need to qualify my

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answer.

For example, 7 says, "a pump fluidly connected to the well." So the system may have a pump, but was this system -- in prior art -- so was this system that -- did include the pump fluidly connected to a well? I would look for that.

I would try to stay as close as possible to what the limitations are in this claim so that I can offer an opinion.

Q Okay. Let's go to another example.

ELIZABETH D. FLANNERY: Let's go to Claim 15. Scroll down a little bit there, sir. Thank you.

BY ELIZABETH D. FLANNERY:

Q So Claim 15, this is another system claim.

Do you agree?

A Yes.

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Q Okay.

It refers, "The system of Claim 7, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more."

A Hm-hm.

Q Did I read that correctly?

A Yes.

Q Okay.

So are you able to assess whether or not a system meets this claim element without the system actually running?

A Somehow there would be -- there would have to be a way to tell whether the prior art system, which would satisfy Claim 7, presumably, has an electric motor such that the electric motor can offer a power output of about 1750 horsepower or more on maximum continuous basis.

Q The prior art that's in this

case that you have looked at is obviously contained in paper documents; is that fair to say?

A Those documents do contain prior art.

Q Okay.

And so when you have assessed the prior art contained in those documents, have you assessed -- how have you assessed whether the prior art meets this element.

Have you -- well, let me -- strike that. Let me ask a different question.

Is it possible for you to assess whether the prior art in those documents that you have reviewed in this case meets this element without a description of those systems operating, actually operating?

A You mean without actually having seen a system described in the prior art

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or without having a record of such a system operating or --

Q Let's start with the first part. I will ask it.

Are you able to assess whether the systems described in the prior art meet the element of Claim 15 without seeing them operate?

A I didn't see any of these systems operating. Yes. I relied on a specifications and statements made in the prior art that I looked at.

Q And so -- so we will take that a step further.

Are you able to assess whether or not the elements of Claim 15 are met based on the descriptions of only those systems as they exist in those documents?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, I may have missed the essence of your

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question.

So I looked at these documents. There's a description of electric motors with a certain power output, and based on these descriptions, I could tell that they don't meet the specifications -- the limitation of maximum continuous power output of about 1750 brake horsepower or more. That was my line of reason.

ELIZABETH D. FLANNERY: Okay.

This is probably a good time for a break. We have been going about an hour.

THE WITNESS: Okay. Thank you. Come back in five, ten?

ELIZABETH D. FLANNERY: Ten minutes I think is probably good enough for folks to get the restroom and all that. So 10:25 our time.

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THE REPORTER: Off the record.

(Whereupon a Recess Commenced at 10:14 a.m. and Testimony Recommenced at 10:24 a.m. CST.)

ELIZABETH D. FLANNERY: All right. I would like to pull up Exhibit 1006.

(Previously Marked Exhibit 1006 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q Dr. Nikolaou, do you recall reviewing this document in this matter?

A Yes.

Q Do you understand this is the operation manual for a Toshiba G7 Adjustable Speed Drive?

A Yes.

Q Do you understand this to be -- do you understand adjustable speed drive to be synonymous with a VFD?

A Yes, they call it ASD here,

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correct.

Q Okay.

Do you agree that the Toshiba Manual describes -- Exhibit 1006, the Toshiba Manual describes a VFD that has a heat sink.

Do you agree with that?

A (Reviewing.) I believe so.

Q Where is that heat sink located?

A I will have to -- I will have to look it up again in my declaration. I don't recall in detail where it is located.

ELIZABETH D. FLANNERY:

Actually, let's pull up Exhibit 1007. I think the file in is in two parts, but Part 1, that may be helpful.

(Previously Marked Exhibit 1007 was Shown to the Witness.)

THE WITNESS: (Reviewing.)

BY ELIZABETH D. FLANNERY:

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Q If you could go to page 20 of that document. I'm sorry, it's the one up from where you are -- the Toshiba GX7.

A Hm-hm.

Q Do you understand this is a document that you reviewed --

(Simultaneous Crosstalk.)

A Yes.

Q -- in connection with your work as well?

A It's a lengthy document indeed, yes.

Q Okay.

I'm sorry go down one page there.

Do you understand this is a photo of the Toshiba G7 ASD that we were looking at in Exhibit 1006?

A Yeah, correct.

Q And the heat sink, do you see where that is depicted in the photo on

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the right?

A Yep. It says heat sink out of the back.

Q It says, heat sink "out-the-back," what does that mean to you?

A It's the location of the heat sink.

Q When it says "out-the-back," out the back of what?

What is it referring to there?

A The entire casing that has all the equipment --

(Reporter Clarification.)

THE WITNESS: Equipment shown inside on the left.

BY ELIZABETH D. FLANNERY:

Q When you talk about a casing, what are you referring to?

A The box that contains this equipment.

Q And the equipment would be the

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operating components of the VFD; is that correct?

A It's everything that is indicated there.

Q Do you agree the purpose of the heat sink that's described in this and in Exhibit 1006 is to dissipate heat from the VFD?

A It's dissipating heat indeed.

Q Do you agree a person of skill in the art would understand that this adjustable speed drive needs to be cooled to a certain level to function properly?

A This particular drawing that we are showing here?

Q Yes.

A Well, by default, this already has a heat sink, so somebody thought that this would be necessary, that's why they built it this way indeed.

Q Would you agree the only component in this device that dissipates

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heat from the VFD is the heat sink?

A I haven't checked to that level of detail because my focus was the heat sink itself.

Q Okay.

So sitting here right now, you are not able to identify any other components in the VFD that's described in this reference that dissipates heat from the VFD?

A I focused on the heat sink which was the point of contention in this whole discussion.

Q Understood.

I am just asking sitting here today, one way or the other, are you able to identify any other component that dissipates heat from the VFD?

A I will have to check that in detail, obviously.

Q Not able to do that sitting here right now?

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A There are so many elements in that. You see all the arrows pointing to various elements. I would have to check each and every one of them to see what it does.

Q And that's not something you have been asked to do?

A Well, I was asked to understand what the system does and then to focus on the heat sink, obviously.

Q You haven't done any analysis as to whether or not there are other components that dissipate heat?

A Not explicitly.

Q Okay.

Have you done an analysis as to whether there's any components that do that implicitly?

A No.

Q Okay.

ELIZABETH D. FLANNERY: Let's go back to Exhibit 1006, I

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apologize for flipping back and forth.

Let's go to page 180 of the PDF.

BY ELIZABETH D. FLANNERY:

Q You see, sir, this is under a heading "Alarms"?

A (Reviewing.)

Q Sorry, sir, do you see this is a page that discusses a heading called "Alarms"?

Do you see that?

A Yes.

Q Okay.

And table 10 includes a list of different alarm displays functions, there are descriptions and possible causes.

Do you see that?

A Yes.

Q Sort of towards the bottom of the screen there, you see the one that has the EOI code OH called overheat.

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Do you see that?

A In what column again?

Q I'm sorry, it's -- well, wait, there you go.

So it's the row that's about the second from the bottom. It says "OH" on the left-hand side.

A Yes.

Q And the function is overheat --

A Yes.

Q -- in the next column?

A (Reviewing.) ASD ambient temperature excessive.

Q When this refers to overheat, what do you understand that this is saying is overheating?

A Can you -- let me see if I can see what the table actually has at the top.

ELIZABETH D. FLANNERY: Maybe zoom out on the page there so we can see the full page.

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THE WITNESS: (Reviewing.)

BY ELIZABETH D. FLANNERY:

Q Also, sir -- is that one that you have a paper copy of?

A Yeah, I do have a paper copy of it.

Q Great.

A Yeah. We are on page 174, right?

Q It says 174 at the bottom, yes, sir.

A Very good. (Reviewing.)

Okay. So your question again was what?

Q Yes, I will ask it again. Let me just ask it again so we have the record clear.

So when this table refers to "overheat," what is it that is overheating, I guess, in ASD?

SCOTT BORDER: Objection.

Form.

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THE WITNESS: So it's -- these are alarms on G7, this is table 10, says the system -- the G7 is the one we are looking at, G-7. So this is overheat of the system. It doesn't specify in any more detail.

BY ELIZABETH D. FLANNERY:

Q Can you tell from this one way or the other -- I'm sorry. I didn't mean to --

(Simultaneous Crosstalk.)

A Yeah. Yeah. I was saying that that particular overheat is just the term used there. And there is a column which I read also a moment ago to you, on the right, that says description, "ASD ambient temperature excessive." So it describes what that overheat refers to.

Q So it's your understanding that the overheat alarm is when the ambient temperature is excessive above a certain

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level?

A Let me see. (Reviewing.)

So that's what it says here about the description of the alarm.

Q When it says "ASD ambient temperature excessive," where is that temperature being measured?

Where do you understand that to be measured from?

A (Reviewing.) I take that literally as stated there; ambient temperature of ASD.

Q Okay.

Where in the ASD, in that, you know, casing -- I guess I should ask, is it referring to a temperature within the -- within the casing of the ASD?

A It calls it ambient, so that's how I understand it, literally as indicated there.

Q Okay.

Do you understand, when it says

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"ASD ambient," do you understand that to be a temperature within the casing or outside of the casing?

A Again, I understand it literally as stated there. That's ambient, so whatever the specific ASD would consider as ambient temperature.

Q Do you know one way or the other whether --

(Simultaneous Crosstalk.)

A That's --

Q I'm sorry, let me finish.

Do you know one way or the other in this reference, when they refer to ASD ambient temperature, if they are talking about outside the casing or inside the casing?

A I would have to study this further because this was not something I have looked into in detail. I went through the document but not for that particular aspect. So I would look into

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that.

But I would try to understand what exactly they referred to by ambient temperature. For now, we understand it according to the standard general term, ambient temperature.

Q Do you understand whether the ambient temperature is measured at the heat sink?

A I don't see any particular specification to that here.

Q Do you know one way or the other whether the temperature was measured at the heat sink?

A Again, I don't see any particular indication of that.

Q I am just asking -- so after having reviewed that, do you know one way or the other whether the temperature is measured at the heat sink or not in this reference?

A Again, I specified this in my

declaration that I didn't see any particular indication of that.

Q So you didn't see anything in the reference indicating that the temperature was measured at heat sink; is that --

(Simultaneous Crosstalk.)

A Well, for the precise language, I would have to pull my declaration to see how this is phrased.

But I do recall from memory that the essence of this was that -- this analysis, my analysis on this, was that I didn't see any particular indication that said there would be a heat -- there would be heat sink that would have a thermal sensor.

Q Okay.

Is it -- is there a difference between overheat and heat sink overheat, to your understanding?

A In general?

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Q In the context of this reference.

A So overheat is a general term. Heat sink overheat is more specific term.

Q The more specifics around heat sink overheat --

(Simultaneous Crosstalk.)

A Don't --

Q Hang on. Let me finish my question.

Would the more specific term "heat sink overheat," would that indicate a temperature at the heat sink?

SCOTT BORDER: Objection. Form.

THE WITNESS: I would understand this as overheat of the heat sink.

BY ELIZABETH D. FLANNERY:

Q Okay.

Does the Toshiba Manual, this Exhibit 1006, does it describe any way of

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detecting overheat that doesn't involve a temperature sensor?

A Again, I was -- I focused on looking at the temperatures in relation to the heat sink. Because again, the contested item was heat sinks having sensors. So I would have to go over the document again to see what exactly they would do in the way you described without using a sensor.

Q Are you aware of any disclosure in this document of detecting overheating without using a temperature sensor?

A I didn't specifically look for that. I will have to go over that again to see what this does. I don't recall the details of that.

Again, I would have to look at my declaration to see what conclusions I drew from my analysis of the document to be precise on what exactly the claim they are making is.

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Q Going back to what is described here, the "ASD ambient temperature excessive," how do you understand that Toshiba Manual measures that temperature?

A I would have to -- again, I would have to look at my declaration to see the details. One way would be with a sensor, a standard sensor.

Q Where are the possible locations that that temperature sensor could be located?

SCOTT BORDER: Objection. Form.

THE WITNESS: That depends on the system, on what is easy, what is economical, what is feasible, what is infeasible. There are many, many ways you could do that.

BY ELIZABETH D. FLANNERY:

Q In the Toshiba Manual document, does it describe where the temperature sensor is located?

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A Again, I was looking for whether there was a heat sink that has a temperature sensor. I couldn't see that. That was the point I was looking for.

Q Okay.

So you'd agree you didn't -- in your analysis, you did not find disclosed in this document a temperature sensor located on the heat sink?

You didn't find that in the description?

A I didn't see a heat sink having a thermal sensor, that is correct.

Q Did you find any description of where the temperature sensor is located?

A I don't recall whether I found anything related to that but my focus was to find whether there is a heat sink having a thermal sensor, I could not find one.

Q Can you give me an example of where the temperature sensor could be

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located to perform the function that's stated here?

A You mean where else other than the heat sink?

Q Just give me an example. I am just looking for an example. I am not trying to limit you.

A Well, that, again, I haven't -- all of this should be a simple thing to do if one studies the system. I haven't studied that aspect of the system.

Q You haven't studied where the temperature sensor is located. Is that your testimony?

A Well, you asked me where else that sensor could be located, correct?

Q I didn't say where else.

I said can you give me an example of where the temperature sensor could be located?

A The temperature sensor could be located on the heat sink.

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Q Okay.

Where else could it be located?

A I will have to study that.

Q Okay --

(Simultaneous Crosstalk.)

A Again, the reason why -- and sorry for interrupting you. The reason why I would have to study that is because I didn't focus on that. I focused on whether the heat sink has a thermal sensor. And I didn't find one and that's what I reported.

Q As a person of skill in the art -- again, back at the time of 2012 as we were talking about earlier, would a person of skill in the art in 2012 have an understanding of where the temperature sensor could be, where it would be located?

A So you're asking me whether a POSITA would have a general understanding of where temperature sensors could be

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placed?

Q Where they could be located in this ASD, would they understand that?

A In general, a person of skill in the art would have ideas about where to place temperature sensors; that is correct, yes.

Q Okay.

Can you give me examples of what those ideas would be?

A In various places, would have been, like I said, economical, practical, feasible in the first place. It would be good for the purpose and so forth. Easy to maintain, easy to connect, perhaps all these things.

But again, I didn't look at any of those aspects in my analysis because, again, I was asked to focus very, very specifically on whether the heat sink has the thermal sensor.

Q Okay.

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Would a person of skill in the art have been able to take those factors into account in determining where to put the temperature sensor in the VFD of the Toshiba Manual?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, a person of skill in the art would certainly be in a position to do an analysis, and then beyond that, I don't know what their conclusions would be. Where they would put the sensor, whether on the heat sink or elsewhere, that would depend on the system.

But again, I didn't see any particular reference to what we have already mentioned several times, heat sink with a thermal sensor.

BY ELIZABETH D. FLANNERY:

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Q The ASD that's described in the Toshiba Manual, approximately how big is it, do you understand?

A It's shown in the schematic about making one's height roughly --

(Reporter Clarification.)

THE WITNESS: Yeah, about a few feet.

BY ELIZABETH D. FLANNERY:

Q A few feet tall?

A Yeah.

Q Okay.

And the width of the ASD?

A I have no particular estimate of that. Again, that's not something I focused on.

Q Okay.

It's described in the document. You don't have any reason to dispute the dimensions that are described in the document?

A No -- precisely. If I described

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that, apparently I looked into that detail and I recorded it. But I don't recall from memory, but I do stand by what is in my declaration.

Q Okay.

Other than being located on the heat sink, can you identify any other location within the ASD where it might be located?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, that would be for somebody to work on, but I didn't work on this because I had a very specific task. So I -- I wasn't asked to do that.

BY ELIZABETH D. FLANNERY:

Q Do you know if a person of skill in the art back in the 2012 timeframe, would have been able to identify any location other than the heat sink as the location for the temperature sensor?

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A I know that a person of skill in the art would analyze the situation, make a rational decision. So where that sensor would be placed would be dependent on the specific system.

Q And the heat sink would be at least one of the locations they would consider?

A They would consider various locations. Again, that depends on the specific system.

Q Is the heat sink one of the locations that a person of skill in the art would consider?

A Again, there could be many locations, depending on the particular system. So that depends on how the system is configured, how it is operated, how it is constructed, how it is designed, all of these -- all of these factors.

Q Is the heat sink one of the many

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locations that a person of skill in the art would consider placing the temperature sensor?

A It depends on the outcome of the analysis. It depends on the configuration of the system, if it is -- like I said, that would be considered if it is considered to be feasible, practical, maintainable, easy to connect, easy to maintain, like I said, and so forth.

Q In the Toshiba ASD that's described in Exhibit 1006, is the heat sink one of the locations that a person of skill in the art would consider?

A I would have to study more details of that system to see whether this would be something considered or not by a POSITA, whether that would be something that wouldn't come up, and other solutions would immediately come up.

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Q Can you identify any other location that would be considered by a person of skill in the art to place the temperature sensor in the Toshiba Manual -- in the ASD described in the Toshiba Manual?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, it would be any location that would be fit for the purpose. But where that location might be depends on the particular design.

BY ELIZABETH D. FLANNERY:

Q Can you identify an example of any other such location?

A I haven't studied that to be able to identify any such location.

Q Could a temperature sensor detect the temperature of a heat sink, if it's not located on the heat sink?

SCOTT BORDER: Objection.

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Form.

THE WITNESS: This is an open theoretical question. So again, it requires more details and a better specification of the context so that it can be answered in a meaningful way.

BY ELIZABETH D. FLANNERY:

Q Are you aware of temperature sensors that can measure the temperature of a heat sink without actually being located on the heat sink?

A That's not something I have looked at in preparation for this discussion.

Q Sitting here today, are you aware of any such temperature sensors?

SCOTT BORDER: Objection.

Form.

THE WITNESS: For that particular -- again, for that particular item, I would have to

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do my search and study and I would be happy to do that but I haven't been prepared for that.

BY ELIZABETH D. FLANNERY:

Q So without doing that kind of search, can you identify a type of temperature sensor that could measure the temperature of a heat sink, even though it's not located on the heat sink?

Can you identify that without having done any research?

A I need to do my research and not speak around them without other facts.

Q Are there any such temperature sensors in your mind that you are just not identifying right now?

A Not identifying, what do you mean, that I cannot think of or --

Q That's what I mean; that you can think of right now.

A I would know how to do my search and study so that I can offer an informed

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opinion. But I am very hesitant to offer an opinion if it's not informed.

ELIZABETH D. FLANNERY: Let's go back to Exhibit 1001, just the '870 patent.

If you could go to column 3, which would be three pages from the end -- two or three pages from the end. There you go column 3.

If you could go to the bottom of column 3. There you go.

That's fine.

BY ELIZABETH D. FLANNERY:

Q And I am looking at the paragraph that begins around line 51, where it describes the electric motor 14.

Do you see that, sir?

A Yes, ma'am. I see that.

Q Okay.

It says, "In some embodiments, each electric motor 14 can be capable of delivering about 1500 brake horsepower

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(BHP)."

Do you see that first part of the sentence?

A Yes.

Q Okay.

When it says "in some embodiments," what is your understanding of what that means?

A In some of the ways in which the description of this patent can be realized.

Q So that's saying in some of the ways this patent can be realized, the electric motor could be capable of delivering 1500 brake horsepower.

Is that consistent with your understanding of that sentence?

A That -- yes. So it gives one way in which this description can be embodied and it specifies that each electric motor can be capable of delivering 1500, et cetera.

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Q Do you understand that sentence to be stating that the electric motor has to deliver 1500 brake horsepower to be able to satisfy the invention?

A For that particular sentence, there is the 1500 and 1750 or more. But to understand that sentence better, I would go to Claims 14, 15, and 16, which give numbers there as well. They specify better what are the limitations of this.

Q Okay. Let's actually go back to the point you just mentioned in this sentence.

So after the part that I read, the sentence goes on to say, 1750 -- 17 -- I'm sorry -- 1750 BHP, or more --

(Simultaneous Crosstalk.)

A Hm-hm.

Q -- and each pump 10 can optionally be rated for about 2250 hydraulic horsepower or more. [As Read.]

Do you see that?

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A Yeah.

Q When that sentence says "optional," is it your understanding that the invention may provide that level of hydraulic horsepower or it may not?

A Well, again, I would go back to Claim 14, the optionally there could be rated for about 2250 or more. So you can take the option at 2250 or more. Claim 14 explains that you need at least -- well, you need about 2250 hydraulic horsepower or more. So it clarifies what that refers to.

Q Does Claim 7 -- you were looking there at the claims.

Does Claim 7 include any requirement of the certain amount of horsepower or not?

A It's 14 which is the system of Claim 7, so it's dependent.

Q I understand.

Does Claim 7 require any

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particular rating of horsepower or amount of horsepower?

A I don't see a number in Claim 7, no.

Q Okay.

So is it your understanding that something could be within the scope of Claim 7, regardless of how much horsepower it provides?

A No, because it continues. There's a continuation of the limitation. So 14 gives a clear indication of what this limitation is --

(Simultaneous Crosstalk.)

Q Are you able to -- I'm sorry, go ahead.

A I was going to say, there's inference to pump, and that's why in 14 says the pump. And it explains it's a triplex or quinteplex pump and rated at about 2250 hydraulic horsepower or more.

So it tries to specify -- it

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specifies, rather, the limitation in 14.

Q Let's go to Claim 7, it's on the last page of this document.

A Yeah.

Q All right. You understand when you're assessing Claim 7 and whether or not prior art falls within the scope of Claim 7, are you able to assess that without looking at Claim 14?

A To assess what in particular?

Q Whether prior art falls within the scope of Claim 7.

A I mean, I would check each and every limitation. So I would go to 7 and then I would see, indeed, those limitations in 7 are met and I would continue with everything else. But I --

(Simultaneous Crosstalk.)

Q Okay.

A I am not sure I understood your question correctly. So I may have answered the wrong question, but go

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ahead, please.

Q If a limitations of Claim 7 are met --

A Yes.

Q -- and the pump is rated for only 1750 horsepower, would that meet the requirements of Claim 7?

SCOTT BORDER: Objection. Form.

THE WITNESS: (Reviewing.) I am not sure I can answer that question.

BY ELIZABETH D. FLANNERY:

Q Let's go back to where we were in column 3, that paragraph, "In some embodiments, each electric motor..." where we were, sir.

Do you recall that paragraph?

A What line in column 3 again?

Q Oh, yeah. Around line 51.

A 51, yes.

Q Yes. Okay.

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You understand that the VFD delivers the required horsepower to the electric motor?

Do you understand that?

A So are you asking about what is stated further down where --

(Simultaneous Crosstalk.)

Q Yes.

A -- in line 60 and et cetera, the VFD controls the speed of electrical motor?

Q Yes.

A So the horsepower is about the electric motor in line 51. So that electric motor has to be capable of delivering about 1500 brake horsepower, 1750 or more. Then the VFD controls the speed of electric motor and enhance the speed of the pump.

Q Okay. And just so we got the full chain.

The electric motor delivers the

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horsepower to the pump, right?

A (Reviewing.) I may have misunderstood. Are you saying whether the electric motor actually moves the pump? Yes, it does.

Q I am just saying, does the electric motor deliver horsepower to the pump?

A That is the horsepower that the electric motor delivers.

Q Yes.

And the variable frequency drive controls the speed of the electric motor, right?

A Yes, it's stated in line 61.

Q Okay.

Is it your understanding that only a single VFD has to be able to perform that function?

A Sorry, are you asking me whether it's feasible to use multiple VFDs or -- I am not sure I understand what exactly

the question is.

Q So I'm asking in the operation of what is described here in the '870 patent, does the patent require only a single VFD to perform that function?

A It has -- it talks about VFD, and it's referred to as the VFD and so forth. So there is no reference to multiple VFDs. I didn't see any of that.

Q In your --

(Simultaneous Crosstalk.)

A I'm sorry, again, for interrupting. It's frequently stated as the VFD. So it's one VFD that is used there.

Q So in your analysis -- let's go to Claim 1 actually. Last page.

A Hm-hm.

ELIZABETH D. FLANNERY:

Sorry, it's on the last page of the document, Adrian.

So let's scroll down to Claim

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1 it's on the bottom. Okay.
BY ELIZABETH D. FLANNERY:
Q So when Claim 1 says, "a variable frequency drive connected to the electric motor to control the speed of the motor..."
Do you see that I just read that last limitation?
A (Reviewing.) Yes. At the very bottom of this column 7, yes.
Q Is it your understanding that the claim requires that that be performed by one single variable frequency drive?
A I interpret that literally. So I don't see a reference for multiple drives here.
Q If multiple VFDs are used to control the speed of the motor, is it your understanding that would fall within the scope of Claim 7 -- or Claim 1, excuse me?
A I did not consider that

possibility, and I don't even know whether it's technically feasible, advisable, practical, and all of the above. But this is written here in the sense a variable frequency drive connected to the electric motor.

So there's clear reference to that one frequency drive, which is referred to, by the way, as a ven VFD further down.

Q In your analysis of the claims in this patent, we are looking at Claim 1 -- actually, just to make it super clear.

Each of the claims of this patent requires a variable frequency drive connected to the electric motor to control the speed of the motor.

Do you agree with that?

A Are you asking whether that VFD is explicitly mentioned in these or whether because they depend in 1 and 7

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the VFDs understood to concern all of these?

Q Fair point. I will clarify my question.

So do all of the claims of the '870 patent either expressly or by virtue of their dependency, do all of them require that the -- a variable frequency drive connected to the electric motor to control the speed of the electric motor?

A So one -- Claim 1 talks about VFD, and then there are claims further down that depend on 1. So the answer to your question is yes, there's definitely a connection there.

And then 7, let me see -- yes, 7 does have a limitation where it explicitly a VFD is mentioned, and then everything that depends on 7 talks about the VFD.

Q Okay.

And let's just close the loop to

go to Claim 4, if we could scroll up a little bit.

Claim 4 states it a little bit differently but it also states "controlling the speed of the motor using a variable frequency drive..."

Do you agree with that?

A Yes, I saw that.

Q Okay.

So Claim 4, and all of the claims depending from Claim 4, would require that?

A Yeah. This is understood in that way, yes.

Q Okay. Very good.

Let's go back to Claim 1. Okay. So I just want to make sure I understand.

When you were assessing whether or not the prior art falls within the scope of Claim 1, is it your understanding that a single variable frequency drive has to control the speed

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of the motor?

Is that your understanding?

SCOTT BORDER: Objection.

Form.

THE WITNESS: (Reviewing.)

The way that it is phrased here, it says a variable frequency drive, and it is referred -- that variable frequency drive is further down referred to as the variable frequency drive.

So prior art -- I would have to look for whether this is anticipated or suggested or made obvious. So there are various criteria that you can use to address that issue.

BY ELIZABETH D. FLANNERY:

Q Is it your understanding that that language that you just read required that a single variable frequency drive control the speed of the motor; yes or

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no?

A Is it required to do what? For what?

Q Is it required to meet the claim?

A So the claim -- the limitation of this claim is a variable frequency drive. So I understand one to be -- one variable frequency drive to be there. That is the limitation specified there.

Q So if multiple VFDs are used to perform that function, would that meet the requirements of the claim or not?

SCOTT BORDER: Objection. Form.

THE WITNESS: So I don't remember -- did I discuss this in my declaration? I don't recall.

BY ELIZABETH D. FLANNERY:

Q Let's go ahead and go to your declaration.

A If I discussed this, then

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probably I can refresh my memory as to what I said there.

Q If you look at paragraph 79 of your declaration, as an example.

A (Reviewing.)

Q Does that refresh -- okay.

There in paragraph 79, I think it is the second sentence says, "One cannot use a single Toshiba GX7 VFD to power Coli's hydraulic fracturing operation because its power output is insufficient..."

Do you see that?

A Yeah. I didn't discuss anything about multiple VFDs.

Q Does that refresh your recollection as to whether or not you read Claim 1 to require single VFD to control the speed of the electric motor?

SCOTT BORDER: Objection.

Form.

THE WITNESS: So my

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understanding is this is what the VFD that is used, should satisfy -- there is talk about a VFD to be used. That VFD has to have the properties that are indicated there.

BY ELIZABETH D. FLANNERY:

Q Okay.

A So I didn't -- I mean, I didn't try to come up or examine different configurations because this wasn't in the scope of this analysis. It wasn't an issue whether this could be redesigned in a different way, multiple VFDs or use another technology.

Q Okay. So --

(Simultaneous Crosstalk.)

A What I looked at was there is a VFD, that VFD has these properties. I didn't find that in what I state in my declaration.

Q When you say "these properties,"

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which properties are you referring to?

A The horsepower, the delivery -- the numbers that we discussed at this point; the 1500, 1750, so forth.

Q Did you consider whether multiple of the VFDs described in Toshiba Manual could be used to control the speed of the motor in Coli?

Did you consider that?

A I only looked at what -- the configuration described in the patent specifies, and it says a variable frequency drive. So that's what I looked at.

Q So you didn't consider other configurations -- you didn't consider configurations where there might be multiple VFDs controlling the speed of the motor?

A That is subject for a different discussion.

Q Okay. All right.

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Does the '870 patent say that the pumps or the motors or the VFDs have to be portable?

SCOTT BORDER: Objection. Form.

THE WITNESS: There was reference to these things. And frankly, I would have to go through the patent again in detail to tell whether something is portable or not.

For example, a moment ago you asked me about portability of equipment and what this meant, using the trailer and there are other places where this issues touched upon. So I can answer that if given enough time to go through all the details of this, what is portable or what is not.

But the basic idea for having a trailer attached to a truck and

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having ways to move things around is essential in this patent.

BY ELIZABETH D. FLANNERY:

Q Okay.

Let's look at Claim 7, which I think is conveniently on the screen here on the right.

Is there anything in Claim 7 that suggests to you the elements of this claim, the pump, the electric motor, the VFD, that those have to be portable?

A So in this text alone you mean, right.

Q Claim 7 alone? Just asking Claim 7?

A Just Claim 7, very good. Thank you --

(Simultaneous Crosstalk.)

Q Yes, sir.

A -- verification. Let me read it again, just give me one second, please.

(Reviewing.)

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Okay. So on that Claim 7, I don't see any text that talks about portability.

Q Okay.

I think in your previous answer you talked about the '870 patent discusses portability in the sense of things being mounted to trucks or trailers or vehicles.

Do you recall that?

A Yeah. Yeah.

Q Are there any -- other than in that -- other than in that in being mounted to or on a truck or trailer or vehicle, does the '870 patent provide any other requirements for something to be portable?

A They have various descriptions of these details and the idea is that you go from well to well performing all of these tasks. And like I said, if you need something specific, I would go

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through the patent to see where exactly there is particular reference to what is portable, what is not, and so forth.

Q Okay.

Can you give me an example of somewhere in the patent where it describes what is required to be portable?

A Well, let me check real quickly. I can tell immediately figure -- (Reviewing) -- that has 40 and 42, Figure 1, has the trailer that is definitely portable, and it has other things as seen in figure -- Figure 1, there are various trucks that have pumps there. So things are portable there.

Q Okay.

Other than things being on trucks for trailers, does the '870 patent describe any other manner in which equipment is portable?

A Again, I would have to read it

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in detail to see, for example, hoses. There are various things that are fittings, there are things that are this, that, and the other; do they stay in place, do they move place to place. I have to look into all the details.

But portability is prevalent in this patent. Give me just one second, if I may look at something here.

(Reviewing.)

So yeah, the portability issue is central in that this is part of the motivation for this whole patent. If you go to column 1, line 44. It says, For example, the diesel pumps are very heavy and thus must be moved -- moved on heavy duty trailers, making transport of the pumps between oilfield sites expensive and efficient --

(Reporter Clarification.)

THE WITNESS: -- in addition -- and it continues along

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this same lines.

So portability is an issue.

Easy transfer is an issue, which is part of the reason why this patent was conceived in the filing.

BY ELIZABETH D. FLANNERY:

Q Okay.

When the patent discusses the elements of the invention, the motor -- I'm sorry -- the electric motor, the variable speed drive and the pump, it discusses putting those on trucks and trailers and vehicles, right?

A It shows -- yeah, it shows in Figure 1 things that are trucks and trailers, yes.

Q Okay.

Because they can be put on a truck or trailer or other vehicle, you agree that means they are portable?

A Yeah. There are more specifics.

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For example, 40 is a trailer, there are other trucks, 14 and 10 are trucks, and there are descriptions of what those things are. There are various details there. (Reviewing.)

Q These pumps that are used in '870 patent invention, they are not small enough to be carried in a briefcase, right?

A No. No. Certainly not.

Q Okay.

You don't understand the '870 patent to require that equipment be of a certain size in order to be portable; is that right?

A To be small enough to be easily portable. If like, handheld, no.

Q Right.

A No.

Q And at least the equipment that's described in the '870 patent is portable in that it can be placed on a

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truck or trailer?

A Yeah. It show specific cases, like, for example, you see 14 is an electric motor. In Figure 1, 10 is a pump, and there are multiple of those, and there are trucks shown there. Item 12, it's a vehicle in general, if you can call it.

So this is -- yeah, this is throughout the whole patent.

Q I think I know the answer to this but I am going to confirm.

In your analysis, have you considered whether multiple VFDs could be connected in parallel to control the speed of a motor of an electric motor, did you consider that at all?

SCOTT BORDER: Objection. Form.

THE WITNESS: I only focused on what the claims are which the limitation it says a variable

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frequency drive.

BY ELIZABETH D. FLANNERY:

Q Okay.

It's your understanding that doesn't -- that doesn't describe a configuration of having multiple VFDs connected in parallel?

A I understand it to show just that, a variable frequency drive. So whatever one understands by the normal use of the term, that's what I understand too.

Q When you read that, you weren't prompted to understand -- you weren't prompted to think about multiple VFDs connected in parallel?

SCOTT BORDER: Objection to form.

THE WITNESS: I wasn't asked to find alternative solutions. I focused on the description which talks about the variable frequency

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drive in Claim 1, and then the properties of that would be such that it would deliver the particular horsepower to the --

BY ELIZABETH D. FLANNERY:

Q So connecting multiple VFDs in parallel to control the speed of a motor, do you consider that to be an alternative to what is in Claim 1?

A I haven't thought about that. I would be glad to research that, but I haven't thought about it. It wasn't the focal point.

Q You did consider what was described in Claim 1, correct?

A Correct, yes.

Q Okay.

And that did not include considering multiple VFDs connected in parallel?

A I only looked at a variable frequency drive connected to the electric

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motor.

Q So can you confirm one way or the other for me if you considered multiple VFDs connected in parallel?

A That wasn't in the scope of the things I examined.

ELIZABETH D. FLANNERY: Okay.

Let's go to Exhibit 1005, which is the Coli reference.

(Previously Marked Exhibit 1005 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q This is a reference you reviewed in this case; is that correct?

A Yes, that is correct. It's in my binder also.

Q Good. All right.

ELIZABETH D. FLANNERY: Let's go to paragraph 46, please. Go to page 19 of the document -- maybe 18. Good guess. 46.

There you go.

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BY ELIZABETH D. FLANNERY:

Q You see paragraph 46 there on the left-hand side there, sir?

A Yeah, I do.

Q Okay.

And I guess paragraph before that is a heading "Fracturing Module."

Do you see that?

A Yes.

Q Okay.

And in the second sentence there of paragraph 46, it says, "Fracturing module 20 can include an electric motor 21 coupled to one or more electric pumps 22, in certain illustrative embodiments."

Do you see that?

A Yes.

Q And next sentence says, "A suitable pump is a quintiplex or triplex plunger style pump, for example..." and it describes an example of a Gardner Denver pump.

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Do you see that?

A Yes, I do.

Q Do you understand that pump to be rated for 2500 brake horsepower?

A (Reviewing.) I will have to look it up.

Q Well, let me help you.

ELIZABETH D. FLANNERY: Let's flip over to Exhibit 1011.

We need 1011, it's one we haven't looked at but it should be in the set. 11 at the end, not 1.

There you go.

(Previously Marked Exhibit 1011 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q Do you understand this to be the operating and service manual for the pump that was referenced in Coli?

A Indeed, yes.

Q Okay.

And if we go to page 20 of this

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document.

A Hm-hm.

Q Just to confirm, Dr. Nikolaou, you recognize this as a document you reviewed in this case?

A Oh, yes, yes. I do recognize the document. I have it in my binder also.

Q Right. Okay.

ELIZABETH D. FLANNERY: So I am looking at page 20 of the PDF. Can you scroll down a little bit to see if there is a page number on the bottom. It's page 14 of the manual, that might help you find it in your paper document.

Sorry, stay on page 20 of the PDF. I am trying to help him find the page in his notebook.

BY ELIZABETH D. FLANNERY:

Q You see the chart there in the middle of the page says, "Rated Brake

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Horsepower," it says 2500 brake horsepower.

Do you see that?

A Yes.

Q Okay.

Does that refresh your memory that the pump that was described in Coli was rated for 2500 brake horsepower?

A Yes, that 2500 brake horsepower, yes.

Q Okay.

ELIZABETH D. FLANNERY: I'm sorry, let's go back to Coli, which is Exhibit 1005.

Let's go back to that page, probably page 19, I think. Go up. Sorry.

We are going to paragraph 46. Keep going. One more page. There you go. Okay.

Paragraph 46 where we were here, again, okay.

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BY ELIZABETH D. FLANNERY:

Q So paragraph 46 says "a suitable pump" is that Gardner Denver one we looked at a second ago, right, Dr. Nikolaou?

A Yes, that is the one we just looked at.

Q Does the -- does Coli say that that is the only kind of pump that could be used?

A Let me see again. (Reviewing.) It says it's a suitable pump.

Q Does Coli say there are no other suitable pumps that could be used?

A Not in this sentence, no.

Q Okay.

As a person of skill in the art, would you understand that there are pumps other than the specific one identified here that could be used?

A I would do my check -- I would know that there are other pumps and I

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would check whether those other pumps are suitable or not.

Q Okay.

You would at least consider whether other pumps could be used?

A Yes.

SCOTT BORDER: Objection to form.

BY ELIZABETH D. FLANNERY:

Q Okay.

A One might have other pumps, yes.

ELIZABETH D. FLANNERY: If we could go to paragraph 48. Let's actually go to the top of this page.

I'm sorry, it's paragraph 49. I was wrong.

BY ELIZABETH D. FLANNERY:

Q In paragraph 49 there, you see in the middle of the paragraph, it states that, "For example, a conventional diesel powered fluid pump is rated for 2250 hp."

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Do you see that?

A (Reviewing.) Yes.

Q Okay.

Then it says, However, due to parasitic losses in various systems diesel fuel systems typically only provide 1800 horsepower to the pumps. [As Read.]

Do you see that?

A Yes.

Q So at least in conventional systems, even though the pump is rated for 2250 horsepower, it will operate with 1800 horsepower provided to it?

A Well, this is a claim made for that system here. So even though the rating is for 2250, the pump will typically provide 1800. I mean, the system will provide the 1800 to the pump.

Q It's consistent with your understanding that a pump rated for 2250 horsepower will still operate, even

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though 1800 horsepower is provided, a lesser amount of horsepower is provided to it?

SCOTT BORDER: Objection. Form.

THE WITNESS: Sorry. Are you asking me whether a pump can operate below its peak horsepower rating?

BY ELIZABETH D. FLANNERY:

Q Yes, in this circumstance.

A So for that particular case, this text makes it clear that this pump that they consider can operate at 1800 -- will likely, rather, operate at 1800 horsepower.

Q For fracturing operations in the 2012 timeframe, back when the '870 patent was filed, do you know if all fracturing pumps were rated at least 2250?

SCOTT BORDER: Objection. Form.

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THE WITNESS: I don't recall that. I don't know that number. I don't recall. I do not know that number. I would have to look it up.

BY ELIZABETH D. FLANNERY:

Q Do you know one way or the other if lower -- pumps with a lower horsepower rating could be used in fracturing?

A Lower than what?

Q Other than 2250.

A Oh, I would have to look it up.

Q You don't know one way or the other sitting here right now?

A I haven't checked that particular number for -- in general.

Q Looking back here at Coli, after the sentence we just read, "However, due to parasitic losses..." after that sentence. It says, "In contrast, the present system can deliver a true 2500 horsepower directly to each pump."

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Do you see that?

A Yes.

Q Sorry about that.

Do you understand the pump in Coli requires 2500 horsepower to run?

A It says that the system, the present system, can deliver 2500 horsepower to that pump. So obviously the pump can operate at 2500.

Q Would it necessarily have to receive 2500 horsepower to operate at all?

A I am just reading that statement as is phrased literally. So --

(Simultaneous Crosstalk.)

Q Okay.

A -- that this system can deliver true 2500 horsepower directly to each pump.

Q If the pump is rated for 2250 horsepower, does it need 2500 horsepower to operate?

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SCOTT BORDER: Objection. Form.

THE WITNESS: Well, that's -- again, a statement one has to be a bit more precise.

For example, if the pump is rated for 2250 of continuous operation, can it go temporarily higher to 2500, rather than 2250? Well, temporarily maybe, but maybe not continuously -- or how far higher could it go, is -- could it go to 2260 or 3000?

So all these are things that one has to have an opinion on by knowing more specifics about the pump, the design, particular configuration, all that.

ELIZABETH D. FLANNERY: Okay.

Are you okay to go for another 20 minutes or so or do you need a break?

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THE WITNESS: Another 20 minutes is fine, if the rest of the group is fine with it.

ELIZABETH D. FLANNERY: I am okay. You're the one whose vote counts the most.

THE WITNESS: It's okay.

ELIZABETH D. FLANNERY: All right.

BY ELIZABETH D. FLANNERY:

Q Does Coli say anything about the pumps -- well, let me ask it a little differently.

Do you understand the pumps and the motors and the VFDs in Coli are portable?

A In the sense we discussed, they are on a truck or something that is movable, that I understand, yes. There are pictures in Coli that show Figure 3, for example, that shows the equipment on the trailer. So yes, I understand that.

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Q Okay.

Are the pumps -- let me ask this -- are the pumps and motors, for example, in Coli, are they portable before they are loaded onto a truck?

A What do you mean? I mean -- if you load them on a truck, they are portable almost by definition, right? So they are not mounted permanently on something.

Q Fair enough.

So the pumps and motors that are described in Coli, they would be portable -- they would be portable because they could be loaded onto a truck or trailer; is that fair to say?

A Yeah. Again, I would use Figure 3 that shows box 20 which is showing more detail in Figure 4A and so forth. So it's this configuration that I am referring to.

Q You would agree --

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ELIZABETH D. FLANNERY: Let's go to Figure 3, actually -- it's a few pages up in Coli, page 5 --

(Reporter Clarification.)

ELIZABETH D. FLANNERY: Page 5 or 6.

There you go. Perfect.

BY ELIZABETH D. FLANNERY:

Q So I think as you noted, this shows putting -- this shows motors and pumps that have been loaded onto a trailer?

A It shows skid boxes 20, you know, the fracturing module that is 20 there, that is loaded on this -- it shows some wheels there on the trailer.

Q Would you agree that a person skilled in the art would understand the pumps and motors get loaded onto the trailer, so at some point they are not on the trailer and then they are loaded onto it by a forklift or some other type of

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machine, right?

A That capability should exist, yes.

Q That existed before the '870 patent, right?

A Of loading something on the trailer, yes. And that particular equipment, yes, that pump, yes.

Q All right.

ELIZABETH D. FLANNERY: Let's go to Exhibit 1047.

(Previously Marked Exhibit 1047 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q Sir, do you recognize this as one of the documents that you reviewed in this case --

(Simultaneous Crosstalk.)

A Yeah, exactly.

Q Okay.

A Hm-hm.

Q You understand that this is

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showing the standard specifications for the G7 ASD?

A Yeah. This, you mean this document, right, or this page?

Q This page.

A This page, yeah, I see GX7 standard specifications, and has a bunch of things below that, yes.

Q Okay.

And the table there at the bottom, the second line says maximum HP, maximum horsepower.

Do you see that?

A Yes.

Q Okay.

It gives a range thereof 500 horsepower to 800 horsepower.

Do you see that?

A Yes.

Q If three of these VFDs were running in series, would you agree that that would provide a maximum horsepower

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of 2400 horsepower?

A That I will have to check to see whether this is feasible, whether those indeed work as intended when placed in series and so forth.

Q You have not done that analysis?

A I have not.

Q Okay.

Would you agree if you connect these in -- multiple of these in parallel, it would provide more horsepower than just the maximum for one?

Would you agree with that?

A Again -- I mean, even though something may sound trivial, I don't want to offer an opinion unless I have really thought about that, have checked the references, even very briefly to make sure that I am not speaking in just -- without taking all the facts into account.

ELIZABETH D. FLANNERY: Okay.

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Let's go back to Exhibit 1006, please. It's the Toshiba Manual, the big document.

THE WITNESS: Hm-hm.

ELIZABETH D. FLANNERY: And let's go to page 24 to 25, page 24 of the 25. Page 24 of the PDF. Kind of the bottom.

BY ELIZABETH D. FLANNERY:

Q And you see the heading there where it says, "Mounting the ASD"?

A Hm-hm. Yes.

Q Okay.

ELIZABETH D. FLANNERY: And so a little further down in that same heading, let's go to page 25, next page.

THE WITNESS: Yes.

ELIZABETH D. FLANNERY: Yeah, perfect. If you can kind of have both of those on the screen.

BY ELIZABETH D. FLANNERY:

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Q There in that top paragraph on page 25, it says, "When installing multiple ASDs, ensure there's a clearance space of at least 8 inches (20 cm) from the top and the bottom of adjacent units."

Do you see that?

A Yes.

Q And this is a document that you reviewed in your analysis, just to confirm, right, Dr. Nikolaou?

A Yes, I did.

Q So would you agree in this paragraph, this is describing a situation where multiple ASDs would be installed?

A Yeah. It specifically talks about installing multiple ASDs, yes.

Q Do you agree the Toshiba Manual contemplates installing multiple ASDs sort of in one location?

A Yes. That's exactly what this talks about, multiple ASDs installed,

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yes.

Q Okay.

ELIZABETH D. FLANNERY: Let's go to page 185 of the PDF, please.

There you go.

BY ELIZABETH D. FLANNERY:

Q The row that says, "Phantom Fault."

Do you see that?

A (Reviewing.) Page 185. Just one second.

Yes, I am with you. Where should I look again?

Q Yeah. It's in that table that's shown there, the row that says, "Phantom Fault."

A Phantom fault, yes.

Q That's a display on the fault screen, do you understand that?

A Hm-hm.

Q Okay.

And then it gives possible

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causes for that -- for that fault display on the right.

Do you see that?

A Yes.

Q It says, "In a multiple ASD configuration a faulted ASD signals the remaining ASDs that a fault has occurred..."

A I see that.

Q Do you understand what kind of configuration that's referring to?

A It's a configuration with multiple ASDs.

Q That's described in the Toshiba reference?

A Yes. This is the Toshiba reference, and I would presume that it refers to what we looked at the moment ago in the previous page, yes.

Q Did you consider whether this configuration would meet the requirements of, say, Coli -- any horsepower

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requirements of Coli?

SCOTT BORDER: Objection.

Form.

THE WITNESS: This was not even close in the scope of things that I was asked to review here. This is a different configuration. I don't know for what purpose, in what context, in what application. This was completely out of the scope of my analysis.

BY ELIZABETH D. FLANNERY:

Q You weren't asked to consider whether this configuration would meet any horsepower requirements that are in Coli?

SCOTT BORDER: Objection.

Form.

THE WITNESS: This was not, again, the focus of the things that I looked at in Coli and in the overall analysis in this discussion.

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BY ELIZABETH D. FLANNERY:

Q So I am not asking about whether it was the focus.

I'm asking whether you considered at all whether the multiple ASD configuration that goes described here would meet the horsepower requirements of Coli.

Did you consider that at all?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, this wasn't anything that I even looked at or was asked to look at.

ELIZABETH D. FLANNERY: Okay. We can take our break now.

THE REPORTER: Off the record.

(Whereupon a Recess Commenced at 11:45 a.m. and Testimony Recommenced at 11:57 a.m. CST.)

BY ELIZABETH D. FLANNERY:

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Q I want to go back and look at Exhibit 1005 which is Coli.

Dr. Nikolaou, do you know if the system in Coli requires using one VFD to control the electric motor?

A Let me see. (Reviewing.) I will have to look it up because I don't recall whether there is a requirement that is specific to that level or whether there is flexibility to allow something else.

Do you want me to go over that or --

Q So let's look at your declaration actually for a moment which is Exhibit 2002.

ELIZABETH D. FLANNERY:

Sorry, Adrian. And we will go back to that paragraph 79 that we were talking about earlier at the bottom of page 53.

THE WITNESS: Yes.

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BY ELIZABETH D. FLANNERY:

Q Okay.

And you see there in that paragraph 79, you said, One cannot use a single Toshiba GX VFD to power Coli's hydraulic fracturing operation. [As Read.]

That was your opinion you gave in this case.

A Yes.

Q You gave that opinion, but you do not know whether Coli requires using a single VFD to control the electric motor?

SCOTT BORDER: Objection. Form.

THE WITNESS: I didn't say whether -- I didn't say I don't know that. I only said whether the possibilities left that something else could be used, I will have to check again.

But the fact that there is

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the power delivered from a motor to pump and all that, yeah, it's all there.

BY ELIZABETH D. FLANNERY:

Q The preceding sentence in this paragraph said it was your opinion that a person having ordinary skill in the art would not combine Coli with Toshiba Manual because the device disclosed in Toshiba... would not meet the requirements of -- power output requirements for Coli.

Do you see that sentence?

A Yes. And I explained further down it's an issue of horsepower, max output for continuous, and so forth.

Q Okay.

And that's because you determined that one single Toshiba GX7 VFD would not meet the horsepower requirements for Coli's fracturing operation?

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A Yeah. The power of GX7 is lower -- continuous power would be lower than what is the continuous power requirement in Coli.

Q Did you consider whether Coli required using only a single VFD to meet its horsepower requirements?

Did you consider that?

A I saw what Coli stated and it has that specific configuration, a VFD, the motor, and then the pump.

Q Your understanding is that VFD required -- I'm sorry -- that Coli requires a single VFD to control the motor?

SCOTT BORDER: Objection.

Form.

THE WITNESS: (Reviewing.)

Again, I checked the configuration as indicated in Coli, specifically. And it shows there the motor and the pump and --

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there are no other exclusions mentioned or details that I can think of at this point.

BY ELIZABETH D. FLANNERY:

Q It's your testimony that Coli requires a single VFD to control the electric motor.

That's your testimony?

A Let me check again in Coli to see what is the language used.

(Reviewing.)

So with your permission, can I read really quickly Coli's language so that I can --

Q Of course. Just tell me where you're reading so I can follow along.

A Very good, thank you.

(Reviewing.)

Q Sir, can you tell me what portion of Coli you're reading?

A Yeah. I am practically done, actually, simply looking at the electric

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motor 51, which is where I was hoping to see more details and I do not see any explicit mention to VFD.

Coli talks about electric motor and the power to be delivered to the electric motor.

Q Okay.

So you haven't been able to identify any portion of Coli that says that a single VFD controls the electric motor; am I correct?

A I didn't see that.

Q Okay.

ELIZABETH D. FLANNERY: All right. Let's go ahead and go to a different exhibit. Let's go to Loucks which is Exhibit 1009, please.

(Previously Marked Exhibit 1009 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q This is a reference you reviewed

in this case?

A Yes, it is.

Q Okay. And let's go to Figure 1.

You understand this is a diagram of a cooling operation in an equipment room?

You understand that's what is shown?

A Yes.

Q Okay.

And if you could -- let's leave that figure up, but in your paper document, if you could look at paragraph 25.

Can you do that for me?

A Absolutely (Reviewing.) 25, yes.

Q And that provides some text describing Figure 1.

Do you see that?

A Yes, I do.

Q Okay.

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It says, "Figure 1 is a functional block diagram illustrating a typical data center 100 that utilizes convection cooling to cool equipment."

Do you see that?

A Yes.

Q Okay.

Do you agree the equipment that is being cooled is shown here as equipment 115 in Figure 1?

A Yes. You are referring to the fourth line of paragraph 25 that says IT equipment 115, right?

Q Yes, correct.

A Yes.

Q And Loucks says that equipment 115 can include servers, routers, switches, and circuit protection devices.

Do you understand that?

A Yes, in that sentence, yes.

Q Are those the type of equipment that you would expect to see in

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computers -- computer equipment in general?

A Definitely those, yes. Servers, routers, switches, server protection -- why is this -- all of these are things that wouldn't surprise me if I saw them there.

Q Yep.

And paragraph 25 also says the equipment 115 is housed in racks of enclosures 110.

Do you see that?

A Yes, I saw that.

Q Do you have an understanding of what enclosures 110, what the structure of those is like?

A Yeah, I do. I have seen some of those in other context.

Q Okay.

In what context have you seen an enclosure?

A It was electronic equipment that

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was used in various plans, such as gasoline butane blending plant, for example, where there would be an electronic system, there would be an enclosure, and there would be various pieces there. Very much along the lines shown in 115 -- rather 110.

Q That gasoline butane blending plant, that didn't involve data server rooms, did it?

A I can't recall actually whether it was this capability. There were -- there were other cases where -- I am trying to think -- there were data servers there, yes.

Q Data equipment like this and enclosures like this, those could be located in locations other than data rooms, data servers?

A Well, I am not sure I can answer this accurately, but definitely what is shown here is something I have seen

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before and it makes sense.

Q You are not an IT computer specialist.

You don't spend your time in data rooms for computer systems, do you?

A I have been in those and I do use IT all the time. But no, I am not -- that's not my main job, no.

Q But you have been exposed to equipment similar to that?

A Oh, yes.

Q In the 2012 time period, had you been exposed to equipment like that back in that period?

A I am trying to think -- yeah, I believe so. Yes.

Q All right. Figure 1 shows the enclosures 110 of equipment 115 in a data center room 100, correct?

Have I read that correctly?

A Yes. That's what paragraph 25 states, yes.

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Q How -- how would you expect the equipment had gotten there?

SCOTT BORDER: Objection. Form.

THE WITNESS: I can only guess -- I would say I wouldn't know.

BY ELIZABETH D. FLANNERY:

Q No idea how the equipment would have gotten there?

A Well, I don't know how people put equipment there and I don't know what this particular application would refer to about putting the equipment there.

Q Possible that equipment was shipped on a truck?

SCOTT BORDER: Objection. Form.

THE WITNESS: I have no idea.

ELIZABETH D. FLANNERY: Let's go to Figure 5. Few pages down.

All right. There we go.

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BY ELIZABETH D. FLANNERY:

Q And you understand Figure 5 is disclosing an equipment -- Figure 5 shows an equipment enclosure with some equipment installed in it?

A Yes.

Q Do you understand the equipment enclosure that's shown here could be an example of one of those equipment enclosures 110 that was in Figure 1?

A Is that what is stated in the text? I am not going to dispute that -- to save time.

Let's see, 530, 520, let's see reference to this (Reviewing.)

So this is a cooling, Figure 5 illustrates cooling system monitoring system, include single power consumption sensor that monitors power input to an enclosure 505. Okay.

Q Let me see if I can --

(Simultaneous Crosstalk.)

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A -- the system to be what is described in paragraph 63, where there is a description of that system.

Q Okay.

And so you understand that what is shown in Figure 5 is a system that's using that cooling efficiency technique that's described in Loucks, correct?

A Yes. It says "illustrates a cooling efficiency monitoring system 500."

Q Okay.

Is it your understanding that the type of equipment enclosure that's shown in Figure 5 would be installed in a data center?

A Let me see carefully.

(Reviewing.)

Yeah, so paragraph 61 says, "Figures 4 - 6 illustrate various examples of how sensors could be installed in typical enclosures

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containing variety of heat producing electrical devices."

This is one of them.

Q Okay.

Do you have an understanding of what type of equipment the equipment Figure 5 could be?

A It says described there, labeled -- there are labels 515, 510, 530 and 520. So it's all of those things.

So for example, 520, a microprocessor temperature sensor -- 520, installed within the enclosure and so forth, in paragraph 63.

Q Okay. My question was a little bit unclear, I admit that.

Do you have an understanding as to what the overall device, for example, element 500, what type of equipment that overall device could be?

I am not asking about the components of it.

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I'm asking what type of machine could be within that enclosure?

SCOTT BORDER: Objection. Form.

THE WITNESS: I understand it to be what is stated in paragraph 63, that says, "Figure 5 illustrates a cooling efficiency monitoring system."

BY ELIZABETH D. FLANNERY:

Q And what is that system trying to cool?

A It's actually not trying to cool. It's trying to monitor the cooling efficiency. This is the main objective of this patent. So they try to easily and quickly perhaps get a sense of the cooling efficiency, a room that contains this electronic equipment, and they do this in a particular way. So --

(Simultaneous Crosstalk.)

Q What type --

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A -- monitor this cooling efficiency, it states here in paragraph 63 it's described in Figure 5.

Q What type of electronic equipment is it attempting to monitor the cooling efficiency of?

A It uses -- well, it has various numbers indicated there. So it's as stated in paragraph 63, all the numbers indicated there.

Q Okay.

You see it describes element 505 as an enclosure around the other components there.

Do you see that?

A Indeed, yes.

Q Do you know what type of electronic equipment the enclosure is within the enclosure?

A It's, again, as stated in that paragraph; numbers 515, 510, 530, 520, all of these things are there --

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(Reviewing) -- that paragraph states what those elements are there. So...

Q Okay.

Could the enclosure that's shown there in 505, could that be an enclosure for a VFD?

A That I don't know. I haven't checked that. I need more to be able to tell that.

Q Do you know if Loucks describes using its cooling efficiency method in a VFD?

A Loucks describes cooling efficiency in a room that has this type of electronic equipment that we referred to a few minutes ago in reference to Figure 1 as shown there. So this is as much as I can tell from reading the description in Loucks.

Q If you look at paragraph 60, which is just a few paragraphs up from where you looked at.

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A Yes.

ELIZABETH D. FLANNERY: Why don't we go to page 5 of the text. It's a few pages down on the screen.

THE WITNESS: And I have the hard copy, if you need to refer to the figure.

ELIZABETH D. FLANNERY: Yeah. Yeah. Definitely. I got a few questions about the text.

Keep scrolling down there to paragraph 60, 6-0.

One more. There you go.

BY ELIZABETH D. FLANNERY:

Q So on the right-hand side top of page 60 [sic], "The cooling efficiency techniques and systems described herein may be used on any device that consumes electrical energy and exhausts waste heat."

Do you see that?

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A Yes.

Q Would you agree a VFD consumes electrical energy?

A Yes.

Q Would you agree that a VFD exhausts waste heat?

A That it generates waste heat, yes.

Q Okay.

And you see a little bit further, I guess three lines below or two lines below where I was just reading, where it says, "Examples of such devices include:" And it lists variable or adjustable frequency drives.

Do you see that?

A Yes, absolutely.

Q Having read that testimony, would you agree that Figure 5 could be showing a VFD?

SCOTT BORDER: Objection.

Form.

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THE WITNESS: I understand that what this technique may be applied to as clearly stated in paragraph 60, could include VFDs. It's clearly line 5, it says from the beginning paragraph 60, "The cooling efficiency techniques and systems described herein may be used on" -- then keeps going, and says "variable or adjustable frequency drives."

BY ELIZABETH D. FLANNERY:

Q And the cooling efficiency techniques and systems, one of those systems is shown in Figure 5, correct?

A It shows how they would implement the cooling efficiency monitoring technique, yes. That is what is described in paragraph 63, which that figure illustrates cooling efficiency monitoring system. Yes.

Q Okay.

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ELIZABETH D. FLANNERY: Let's go back to Exhibit 1047. Let's go to -- let's go to page 20, I believe. Hold on one second. Bear with me.

THE WITNESS: 20 of the PDF?

ELIZABETH D. FLANNERY: There actually aren't 20 pages of the PDF. Hold on, let me find out where I need to go. Just one moment.

Let's go to page 2, and under "Construction."

So you understand this chart is showing different categories of specifications for the Toshiba Manual GX7 drive?

THE WITNESS: Yeah. This from the document GX7 adjustable speed manual.

BY ELIZABETH D. FLANNERY:

Q Yep. I don't think this is from

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the manual, this is from 1047. Let's go back up to page 1 of Exhibit 1047.

You see the tab that's in green there sort of at the bottom, says specifications?

A Hm-hm.

Q Showing GX7 standard specifications.

Do you see that?

A Yes.

Q Okay. Let's go back to page 2.

And under the heading "Construction," it's showing specifications for the construction of that device.

Do you agree with that?

A Under heading -- I'm sorry, I lost you -- construction, yes.

Q Construction. Okay. You see that.

A Yes.

Q And where it says "Enclosure,"

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it's the first one listed under there.

Do you see that?

A Yes.

Q And it lists NEMA 1.

Do you see that?

A Yes.

Q Do you understand what that is referring to?

A Not off the top of my head. There are various specifications there for various issues. I don't remember. I don't remember -- I don't recall what NEMA stands for.

Q Do you know if that's an enclosure that would have been relevant to the '870 patent, that type of enclosure?

A Relevant to the '870 patent in what way?

Q Do you know if --

ELIZABETH D. FLANNERY: Well, let's -- let's go to Exhibit 1001,

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sorry for flipping around. The '870 patent. Let's go to column 4. Yeah.

Obviously, if you want to go to the paper copy before he gets there, that's fine.

BY ELIZABETH D. FLANNERY:

Q Do you see column 4 is around line 8, the paragraph that begins, "The VFD..."

A Hm-hm. Yes.

Q You agree this paragraph of the '870 patent is describing what the '870 patent inventors wanted to see in the design for the VFD to be used in their system?

A Yes.

Q Okay.

And the second sentence there says, "For example, as far as hardware is concerned, the VFD can include packaging receiving a high rating by the National

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Electrical Manufacturers Association (such as NEMA 1 packaging)."

Do you see that?

A Yes.

Q Is it fair to say the '870 patent inventors were looking at the type of enclosures that would be used for the VFD in its invention?

A They gave this as an example as far as hardware is concerned, that's what they say; that this VFD can include packaging receiving high rating from NEMA.

Q Do you know how that type of packaging compares to the enclosures discussed in Loucks that we discussed a minute ago?

A That wasn't something that I was asked to look at.

Q Does Loucks state whether the equipment that was shown in Figure 1 and Figure 5 that we looked at a few minutes

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ago, does that state whether that equipment is portable?

A Let me look again really quickly, if I may. (Reviewing.)

Q Just let me know what portion of Loucks your reading.

A Talking about which equipment being portable, the one we looked at in Figure 5.

Q Figure 1 and Figure 5 is particularly what I am interested in.

A Figure 1 is the room and it's -- everything is there in the room, all that equipment. So this is not something that is easily portable. Of course, you can always, with enough effort, move things around. So that is the thing there. Mainly, this is not designed for portability.

And I understand the rest is also -- also conforms with that idea. But that's not the main -- portability

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doesn't appear to be a concern. The main focus on Loucks.

Q Let's look at your declaration, paragraph 102 of your declaration. This is Exhibit 2002.

There -- I guess it's the third sentence of that paragraph 102, you said, "Because Loucks does not describe any portable equipment..."

A Yeah. Correct, yes. Things are in a room. They are fixed. They are in a room.

Q How do you -- what is your basis for understanding that the equipment in Figure 1 is fixed?

A I understand it to be equipment in the room as described in the patent.

Q What is your basis for understanding that equipment is not portable?

A Well, let me -- again, the way it is described in the patent, give me

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just one second. (Reviewing.)

For example, Figure 1 has the caption in paragraph 11, that, "Figure 1 is a functional block diagram of cooling operation in an equipment room."

Q Your understanding an equipment room cannot be portable?

A Well, I said a room -- in the standard meaning of the term. It's a room, so it is something -- you could move things with enough effort. You could move anything with enough effort. But there's no specific reference or indication of portability being in the picture here.

Q Is there anything to indicate -- I understand your testimony that the room -- there's nothing to indicate the room is portable.

What about the equipment?

What is your basis for understanding that the equipment in

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Figure 1, so the enclosure 110 and equipment 115, what is your basis for understanding those are not portable?

A Well, those are -- those are in that room. So they are placed there to be used for some time at least.

One can always -- again, with enough effort, things can be moved around. But I understand this is not meant to be movable in the sense of putting it in a trailer or having to a truck or anything of that kind.

Q So it's your testimony that because Loucks doesn't disclose putting in a trailer or truck, a person of skill in the art would not understand it to be portable?

A Are you referring to my declaration -- the text in my declaration or are you just asking the question now?

Q I'm asking for the basis of the statement in your declaration that Loucks

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does not disclose portable material -- portable equipment. I am trying to understand why -- why you believe that.

A Well, again, there are specific places and terms such as room that I mentioned there. And again, the whole tone of the patent is written in the sense portability is not what is looked at here.

BY ELIZABETH D. FLANNERY:

Q You have a laptop with you today, I think you testified earlier?

A I do, yes.

Q The laptop is in the room with you, yes?

A It is.

Q Is that laptop portable?

A Is it portable, yes.

Q Okay. Thank you.

ELIZABETH D. FLANNERY: Let's take a look at Exhibit 1048. I don't think we have looked at that

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yet. I don't know if it's in your binder or not.

(Previously Marked Exhibit 1048 was Shown to the Witness.)

THE WITNESS: Which one is that?

ELIZABETH D. FLANNERY: It's the final written decision in a different IPR.

It is something listed in your declaration. Can you take a look at this document and let me know if this is something that you have reviewed.

BY ELIZABETH D. FLANNERY:

Q I think Adrian is also putting it as an attachment in the chat. If you want to -- if you want -- if you don't have a copy of it there with you and you want to page through it, you can download the PDF.

Do you know how to do that?

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A It's in the chat you said?
Q It is, yes.
A Let me download it. So Exhibit 28?
Q 1048, yes, sir.
A 1048.
Q The only question pending is, is this something you viewed -- something that you reviewed?
A (Reviewing.) Yeah, I remember seeing that.
Give me just one second to access this document. (Reviewing.)
Do you want me to open another file -- that's fine. Let's go like this.
ELIZABETH D. FLANNERY: Okay.
If we can go to page 45, please.
BY ELIZABETH D. FLANNERY:
Q All right. You see under heading 1 in this proceeding it says, "Petitioner argues that Claim 16 would have been obvious over Coli, Horikoshi,

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API Standard, and Stark."

Do you see that?

A I do.

Q Coli and Horikoshi, I will represent to you those are the same Coli and Horikoshi references that are described in your declaration.

A Perfect.

Q Do you recall reviewing references with those names?

A Oh, yes, both of them. Yes.

Q Okay.

Do you recall reviewing Stark at all?

A Stark, can I see the document -- so maybe the name escapes me. But if I see text --

(Simultaneous Crosstalk.)

Q I am not trying to trick you. It's not listed -- it's not listed or cited in your declaration.

A Okay.

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Q So subject to that representation being true --

(Simultaneous Crosstalk.)

A Yeah --

Q -- Stark in this case?

A If this is what you want to bring up, please do.

Q I am just asking if you believe you have reviewed Stark in this case?

A Well, if you say this was not included anywhere, then I trust. But like I said, I don't remember all the names.

This is not in my declaration you said, is it.

Q It is not.

A It is not. So if it's not in the declaration, then I didn't review it in all likelihood.

Again, I have to see -- if I see it, I will remember more vividly whether I saw anything like that or not.

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Q Okay --

(Simultaneous Crosstalk.)

A So let's --

Q Yeah. You certainly have not given any opinions in your declaration about the systems that are disclosed in Stark?

A Well, I don't -- yeah, I don't -- I am not using anywhere in the declaration. There's no Stark.

Q You have not compared the systems of Stark to, for example, the systems of Loucks or Toshiba Manual, correct?

A I trust you didn't see anything related to Stark in my declaration, correct?

Q I did not.

A Okay. Good, I trust this is correct.

Q Do you know if Loucks -- well, hang on. Sorry. One second.

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ELIZABETH D. FLANNERY: Let's go back to the '870 patent which is Exhibit 1001.

THE WITNESS: Yes.

ELIZABETH D. FLANNERY: Let's go to Claim 1, last page of the document.

THE WITNESS: Yes.

BY ELIZABETH D. FLANNERY:

Q In that last element, the variable frequency drive, in the second-to-last line, it says, "the variable frequency drive performs electric motor diagnostics to prevent damage to the one or more electric motors."

Do you see that?

A Yes.

Q And you understand that's a requirement also of the other independent claim -- of independent Claim 4 as well?

A All claims coming from this,

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yes.

Q Yes. And Claim 4, as well.

Claim 4 is independent but it also requires this.

A Let me see. (Reviewing.)

I'm sorry, it's the same text of the -- variable frequency drive performs electric motor diagnostics to prevent damage to the electric motor.

Q Okay.

Does the '870 patent give examples of what electric motor diagnostics are?

A Does the '870 patent give examples of what those diagnostics are?

Q Yes.

A It talks about what these might include. If given enough time, I can find the element in the text. It talks about the motor having this problem or that problem or that problem.

Q So I might be able to help you.

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Let's go to column 4. And in that paragraph in column 4, starting around line 8, this is one that we reviewed earlier today.

Do you recall that?

A Indeed, yes.

Q Yes.

And towards the end of that paragraph, it's around line 20, it says, "For example, motor diagnostics can be performed frequently..."

Do you see that?

A Yes.

Q Okay.

Does that paragraph give an example of the type of motor diagnostics they are describing in the '870 patent?

A Again, I would read this literally as stated there. So they say number of things can be done, and, for example -- now, I am going to read verbatim -- "motor diagnostics can be

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performed frequently..." there's some parenthesis -- "then to prevent damage to grounded or shorted electric motor."

So it gives some -- a bit more specificity there as an example.

Q Okay.

When it says there to prevent damage to a grounded or shorted electric motor, what types -- is that -- is that a single motor diagnostic or is that many different kinds?

A When you say single motor diagnostic, you mean a diagnostic for a single motor or a single diagnostic for a motor?

Q Single diagnostic for a motor, the latter.

A Well, there are two things mentioned here, says grounded or shorted electric motor. So this thing is diagnosing two things, so it's diagnostics.

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Q Does the '870 patent describe how that -- those things are diagnosed?

A I didn't see any details. It basically says there can be diagnostics done. There are some details given about what those might be, but it wasn't the focal point of this.

Q How would that diagnostic be performed?

A The patent basically says that this can be performed in whatever would be the standard way to do that.

Q Would a person of skill in the art before this patent was filed would they understand how to perform a diagnostic like that?

SCOTT BORDER: Objection. Form.

THE WITNESS: So again, as the patent states, for example, motor diagnostics can be performed frequently -- there's a

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parentheses -- to prevent damage blah blah blah.

So it assumes -- my understanding is that it assumes that those would be done -- those diagnostics would be done in the standard way that diagnostics of this nature would be done, using this state of the art.

BY ELIZABETH D. FLANNERY:

Q And what is the standard way a person of skill in the art would do that?

A I would have to go back to my notes. So fault detection in diagnostics, which is what diagnostics refers to is huge subject. There are all kinds of techniques and ideas and technology and software and hardware, and all these things that one could use depending on the situation, the system, and so forth.

But -- touched upon here, it

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simply says diagnostics -- would be done in an appropriate way. That's how I am interpreting this.

Q So a motor diagnostic to prevent damage to a grounded electric motor?

A Grounded or shorted, yeah.

Q Grounded or shorted.

Can you give me one example --

(Simultaneous Crosstalk.)

A -- lead to diagnoses -- I'm sorry for interrupting you.

Q That's okay.

Can you give an example of a diagnostic that would be used to perform that function?

A So what function are you referring to?

Q To prevent damage on a grounded or shorted electric motor.

A That's not something I can recall off the top of my head what that might be. And --

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(Simultaneous Crosstalk.)

Q You have -- sorry.

A Go ahead.

Q You have given the opinion that Claim 1 requires doing more than one electric motor diagnostics?

A It requires diagnostics, correct. I see this as plural.

Q Yep. Can you identify even one motor diagnose --

(Simultaneous Crosstalk.)

Q Wait, let me finish my question. I want to make sure you can answer it appropriately.

A Sorry. I thought you were done. That's why, I'm sorry.

Q You can't answer a half question.

Can you give me an example of one electric motor diagnostic that can prevent damage to a grounded or shorted electric motor?

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SCOTT BORDER: Objection.
Form.
THE WITNESS: So here -- I am not going to make this up. I am going to rely on the patent that says that motor diagnostics can be performed. One can do diagnoses on problems with the motor and it gives two of those, one is diagnosis grounded electric motor, the other diagnosis is shorted electric motor.

BY ELIZABETH D. FLANNERY:

Q Your understanding is those are two separate diagnostics on a grounded electric motor and on a shorted electric motor.

Do you understand those are two separate things?

SCOTT BORDER: Objection.
Form.
THE WITNESS: I understand

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those as being two things, yeah.

BY ELIZABETH D. FLANNERY:

Q Okay --

(Simultaneous Crosstalk.)

A One is a ground, one is a short.

Q What diagnostic would be performed to understand if the electric motor is shorted?

A That I would have to look up again to see what techniques are available or were available at the time for somebody to do this.

Q Do you know if any of those same techniques could be used to do a diagnostic on a grounded electric motor, do you know?

A Diagnostic on a grounded motor -- again, that would be state of the art that a person capable and knowledgeable enough would apply there.

Q Is it possible that the same diagnostic could be used on a grounded --

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to prevent damage on a grounded motor and to prevent damage on a shorted electric motor?

A That again, depends on what -- how these diagnostics function and what particularly the technology is used for that.

Q Let's go to Claim 1.

So again, that phrase we were referring to a second ago, "the variable frequency drive performs electric motor diagnostics."

Again, your understanding of that is it requires more than one?

A Yeah, I understand this to mean that the system can diagnose a number of things to prevent damage to the one or more electric motors.

Q So it's your interpretation of that phrase that you have to diagnose more than one type of thing?

SCOTT BORDER: Objection.

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Form.

THE WITNESS: It's not that you have to. Again, diagnosis is finding what is the culprit for the problem that you just detected. So when you diagnose it, you find the culprit -- maybe it's a culprit or chain of things, whatever. But the thing is, diagnostics basically says that there can be a number of culprits and you would check which one or ones are the ones that are responsible for the problem.

ELIZABETH D. FLANNERY: Let's go to page 35 of your declaration.

Adrian, you can leave the patent up, but I ask you, Dr. Nikolaou, to go to page 35 of your declaration.

THE WITNESS: Yes.

(Reviewing.)

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ELIZABETH D. FLANNERY: I apologize, I got the wrong page. Hold on one moment.

Page 42. Sorry about that.

THE WITNESS: 42, yeah.

(Reviewing.)

BY ELIZABETH D. FLANNERY:

Q So page 42, I am at paragraph 61.

Are you there, sir?

A Yes.

Q Okay.

First sentence of that paragraph you say, "Claims 1 and 4 require 'electric motor diagnostics'" -- and you have underlined the S in that; is that right?

A Yes.

Q And you say "plural," in parentheses, there?

A Yes.

Q Okay.

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A Yes.

Q How many different types of diagnostics do you understand are required by that statement -- by electric motor diagnostics, plural?

SCOTT BORDER: Objection. Form.

THE WITNESS: So Horikoshi, in summary, shows how to diagnose an overcurrent, what is the culprit for an overcurrent. And he found a way to say it is due to this or that.

BY ELIZABETH D. FLANNERY:

Q Okay.

And it's your understanding that is one electric motor diagnostic?

A A diagnosis, one fault. It finds the culprit, which is the culprit for one fault which is overcurrent.

Q It's your understanding that that doesn't meet electric motor

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diagnostics because electric motor diagnostics requires more than one culprit?

A No. It would require more than one situation where you have a problem, say, multiple faults, for example, where there would be a problem.

Q Okay.

A And find who is the culprit.

Q Okay.

So there only has to be one culprit?

A If it's one culprit, the fault is always due to that one culprit. But the thing is there may be multiple situations where there is a problem and you find among possible culprits, which one is the one that caused this problem.

Q But if I've got one problem, is that one electric motor diagnostics?

A For one problem that's a diagnosis that you do on this one

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problem. So you have a diagnostic on that particular problem.

Q Meet the claim element diagnostics, plural, how many problems do I have to find?

SCOTT BORDER: Objection. Form.

THE WITNESS: Potentially more than one. I mean --

(Simultaneous Crosstalk.)

Q So potentially --

A I'm sorry.

Q I just want to make sure I understand.

You said potentially more than one. Is more than one required?

A Well, there is a list of problems. Each time I may face at least one of these problems. Some of these different problems that may appear, I can do diagnosis. So I detect the problem and then I try to find the culprit.

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Finding the culprit is the diagnosis. If I can do this on many of those situations, these problems, then these are diagnostics.

Q That would be plural diagnostics at that point?

A Plural, yes.

Q Okay.

Prior to this case, did you have an understanding of what electric motor diagnostics meant?

A You said prior to this case?

Q Yeah.

A In general, yes. But not to the extent that I got involved after I was shown these documents. But in general, yes.

Q Is electric motor diagnostics a term of art that persons of skill in the art use?

SCOTT BORDER: Objection.

Form.

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THE WITNESS: There are -- well, I am actually quite familiar with the broad category of fault detection and diagnosis. That's not just for electric motors, but it's for many things that engineers deal with.

So fault detection basically says find what is wrong -- if something is wrong, of course. And diagnosis means find the culprit, what is it that caused this problem, that fault.

So combining the ideas in the context of this discussion, one uses the term "diagnostics" which certainly involves doing a diagnosis on a problem finding the culprit.

BY ELIZABETH D. FLANNERY:

Q Can electric motor diagnostics, can it have a false result, like it

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implicates that there's a problem when there really isn't one?

SCOTT BORDER: Objection. Form.

THE WITNESS: You're asking me can there be mistakes in the diagnosis or in the detection, if not done well enough? Yeah, there can be mistakes.

Same thing in medical diagnosis and all kinds of diagnosis.

BY ELIZABETH D. FLANNERY:

Q Kind of the flip situation: Can electric motor diagnostic show you there's nothing wrong when there really is a problem?

Is that a possible outcome of an electric motor diagnostic?

A You're asking me if the possibility exists that the diagnostic system may not be perfect? Yes, the

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diagnostic system may not be perfect, that's true.

Q Even an imperfect electric motor diagnostic, that's still an electric motor diagnostic?

A So again, is the outcome of diagnosis or the function of the diagnostic system going to be guaranteed a hundred percent of the time? Well, this is a level of perfection that one would be hard-pressed to require from an engineered system.

ELIZABETH D. FLANNERY: We have been going about an hour. I promised we would get lunch, so we should stop and get lunch.

THE WITNESS: Okay.

THE REPORTER: Off the record.

(Whereupon a Recess Commenced at 1:00 p.m. and Testimony Recommenced at 1:47 p.m. CST.)

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BY ELIZABETH D. FLANNERY:

Q Dr. Nikolaou, I would like to go back to the '870 patent, Exhibit 1001, Claim 1.

Again, the last limitation we have been talking about a little bit, the variable frequency drive, and it states, "wherein the variable frequency drive performs electric motor diagnostics."

See that?

A Yes, left column, bottom.

Q Yes.

You would agree with me that according to Claim 1, it is the variable frequency drive that is performing the electric motor diagnostics?

A Yeah. According to this, it's the variable frequency drive, the VFD, that performs the electric motor diagnostics.

Q In other words, the electric motor is not performing the diagnostics

on itself, according to Claim 1.

Is that fair to say?

A That is correct. That's what is stated in this claim.

Q And that would be true of Claim 4 as well -- let's scroll up a little bit.

A Yeah, it's the same sentence essentially.

Q Okay. Very good.

Could the electric motor diagnostics be performed by sensors?

A The sensors, in general, provide information about the state of a variable that has been sensed by the sensor. So the sensor provides a measurement, but if it's just that, just a sensor, it has no intelligence to do any number of crunching or detect anything beyond that, let alone diagnose.

So sensor just provides a measurement, basically.

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Q Fair enough.

Would you agree that the electric motor diagnostics could be performed using the sensors, at least to perform a part of what is needed for the electric motor diagnostics?

SCOTT BORDER: Objection. Form.

THE WITNESS: Sorry, are you asking me in general whether VFD could perform diagnostics using information from sensors or what specifically is claimed here in this patent?

BY ELIZABETH D. FLANNERY:

Q I'm asking specifically with regard to the claim, but let me ask it a little differently to make it clear what I'm asking.

A Yeah.

Q For the electric motor diagnostics in Claim 1, could those

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electric motor diagnostics be performed using data from a sensor?

SCOTT BORDER: Objection. Form.

THE WITNESS: There is -- as a general statement, data from a sensor could be used to perform a diagnosis -- detection and diagnosis. So once the diagnostics -- are you asking about something in particular on a sensor or -- I am afraid I am not answering the right question here.

BY ELIZABETH D. FLANNERY:

Q Yeah. I am not asking for a specific function.

I am just asking if Claim 1 allows for the possibility that the claimed electric motor diagnostics are performed using data from a sensor?

A There is no specification. Let me read it real quickly. Let me glance

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through that. I don't see anything about a sensor here. Let me really quickly go through it.

Yeah, so Claim 1 basically says diagnostics are performed and leaves it at that.

Q Is it possible to meet that limitation with a diagnostic that relies on data from a sensor?

SCOTT BORDER: Objection. Form.

THE WITNESS: To me, that limitation, one would have to satisfy what is stated in the claim in its limitations. So whether that would be -- involve sensors or not is another matter.

BY ELIZABETH D. FLANNERY:

Q If sensors are used, that doesn't preclude it from meeting the limitation of Claim 1, do you agree with that?

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A Again, whether the claims and limitations -- I mean, the limitations of Claim 1 are met is a matter of meeting literally what is stated in that claim and its limitations.

Q Electric motor diagnostics -- sorry, were you finished?

A Yeah. I was going to say, in the way that those are phrased in that claim.

Back to you. Sorry.

Q Okay.

If an electric motor diagnostic diagnoses a problem with a shorted motor using a sensor, would that satisfy the requirements of this claim?

SCOTT BORDER: Objection.

Form.

THE WITNESS: There is no specification here of how all this would be done. The only thing that is stated is that the VFD,

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the variable frequency drive, performs electric motor diagnostics.

BY ELIZABETH D. FLANNERY:

Q And so would what I just described to you meet the requirements that are stated in the claim?

SCOTT BORDER: Objection. Form.

THE WITNESS: So can you repeat what you just described. Whether you would do the diagnostics with a sensor, is that what you mean?

BY ELIZABETH D. FLANNERY:

Q Let me repeat what I said.

A Yeah, I don't want it misstated.

Q If an electric motor diagnostic diagnoses a problem with a shorted electric motor using data from a sensor, would that satisfy the elements of the claim?

SCOTT BORDER: Objection to form. Outside the scope.

THE WITNESS: Again, the claim doesn't touch the issue of sensors there at all. It only talks about doing -- performing, rather, an electric motor diagnostics. So that's what I would look at.

BY ELIZABETH D. FLANNERY:

Q If you use an electric motor diagnostic to diagnose a shorted motor without using a data -- without using data from a sensor, would that meet the requirements of the claim?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: Again, I would only look at whether the VFD performs electric motor diagnostics.

BY ELIZABETH D. FLANNERY:

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Q So your analysis would be agnostic as to whether data from a sensor is used or not; is that fair to say?

SCOTT BORDER: Objection. Foundation. Form.

THE WITNESS: Again, I would look at literally what the limitations states, VFD performs electric motor diagnostics.

BY ELIZABETH D. FLANNERY:

Q In your analysis, did you require that data be used from a sensor to determine whether an electric motor diagnostic has occurred?

A Let me understand this. In my analysis, you mean in my declaration? In analysis I did to write my declaration?

Q Yes, correct.

A Okay. Did I consider, again, whether a sensor was used to perform the analysis or the diagnoses?

Can you repeat that, please?

Q Yes, that's what I'm asking, just what you said.

A So I looked at whether -- whether this Claim 1 is satisfied -- is met or not, I just look strictly to the limitations of that particular claim --

(Simultaneous Crosstalk.)

Q And --

A -- and limitation. I'm sorry.

Q And a temperature sensor is not one of the limitations of the claim, right?

A Not in Claim 1, there isn't anything about temperature sensor. I don't believe I see this there.

Q I'm sorry, I misspoke there.

Claim 1 doesn't say anything about any sort of sensor, right?

A I don't believe so. Give me just a few seconds to glance through it once more to be 100 percent sure.

Indeed, there is no explicit

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reference to sensors in Claim 1.

Q Just to make sure we are on the same page. The variable frequency drive is the component that performs the electric motor diagnostics, right?

A Yeah. That's what is stated in the last three lines of Claim 1, as you pointed out.

Q How can a variable frequency drive determine if there is a problem with the motor?

What information would it use to do that?

SCOTT BORDER: Objection. Form.

THE WITNESS: That is as discussed in the patent and here in Claim 1, this is left open. I presume the state of the art would be used as described in the patent.

BY ELIZABETH D. FLANNERY:

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Q Can you show me in the patent where it describes how the VFD gets information about what is going on in the motor?

A I can go through that -- I -- I don't -- before going through that and spending a long -- a lot of time, I don't recall off the top of my head that there's any particular distinction about how such information is transferred to the VFD or used, but I can certainly go through that and try to answer to your question.

Q Other than what is described in the patent, do you know how the VFD would obtain any information about the motor to perform the diagnostics?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: It's not something I focused on how this is done.

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BY ELIZABETH D. FLANNERY:

Q Okay.

Is one possible way of doing that obtaining information from a sensor?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: Again, there are many ways. I will have to do more about what is going on so that I can offer an opinion.

BY ELIZABETH D. FLANNERY:

Q I am just asking if that's one way. I am not asking you to identify all of the ways.

I am just asking if there is one -- if obtaining information from a sensor is one way the VFD could obtain information about the motor?

SCOTT BORDER: Same objections.

THE WITNESS: Again, I would have to look at the details to

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offer an informed opinion on this.

BY ELIZABETH D. FLANNERY:

Q You would have to look at the details of what?

A Of what configuration we are dealing with; VFD, motor, for what application, and so forth.

Q Okay.

Does the VFD have to interrogate the electric motor to perform an electric motor diagnostic?

SCOTT BORDER: Objection. Form.

THE WITNESS: Again, I didn't see that particular statement in the patent, interrogating the motor to get information.

BY ELIZABETH D. FLANNERY:

Q Okay.

I would ask you to identify one way that the VFD obtains information about the motor to perform the electric

motor diagnostics. If that means you have to look at the patent to look at it, then let's look at it. But if you can identify one way, then we can do that.

If not, however, you would like to answer that question. I just need to know if you can identify one way.

SCOTT BORDER: Objection -- objection. Form. Outside the scope.

THE WITNESS: I can certainly look at the patent, with your permission, so that I can find specifics.

BY ELIZABETH D. FLANNERY:

Q Just so we got it clear for the record.

The question is, please identify one way that the VFD in the '870 patent obtains information about the electric motor to perform the diagnostics.

That's my question. With that,

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look at whatever you need to look at.

A Let me look at the patent.

(Reviewing.)

Okay. So on specifics as I -- as was my recollection, I didn't find any specifics. The closest I would see which is again tangential perhaps related to how the VFD and motor communicated, is column 5, line 40 -- or 39. "For example, the pump control and data monitoring equipment 40 can include an A/C console that controls the VFD, and thus the speed of the electric motor... and the pump."

But there's no specific reference as to what exactly the VFD's measuring and using in its diagnostics.

Q So it's your opinion that relates, what you just read in column 5 relates to how the VFD performs electric motor diagnostics?

A Well, it only talks about the

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VFD and the electric motor being attached to each other and basically as it states here, so the VFD -- actually, by having the system in A/C controller that controls the VFD, the VFD in turn can adjust the speed of the electric motor. So that's basically what it is stating --

(Simultaneous Crosstalk.)

Q Okay --

A There's no -- other than this connection being there and I couldn't find, again, any specific mention of what sensor, what signal would be from the motor to the VFD or anything of that nature.

Q So the only thing that you were able to locate that explains how the VFD performs electric motor diagnostics is a description via these --

(Simultaneous Crosstalk.)

A No --

Q -- to the electric motor?

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A This is not even about diagnostics. It's about the connection between the two.

Q Do you remember what my question was, sir?

A Yeah. Whether the VFD uses any data from any sensors associated with the motor, correct?

Q That wasn't my question. I will repeat it once more.

In reading the patent, did you find anything that describes a way, any way, in which the VFD obtains information about the electric motor --

(Simultaneous Crosstalk.)

A There --

Q -- perform the motor diagnostics?

A There isn't anything clear about that.

Q Okay.

As a person of skill in the art

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relevant to this patent, what would that person understand as a way to obtain information about the electric motor to perform the electric motor diagnostics?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: Yeah, that's -- anything that the technology of fault detection in the diagnostics can use to provide that and there's no single will way that this can be done.

BY ELIZABETH D. FLANNERY:

Q Would that include the use of sensors?

A The use of sensors is universal in that it provides information about the state of a variable that may be used for some sort of analysis that would lead to default detection and diagnosis, to perform diagnostics.

Q Would a person of ordinary skill

in the art understand that?

A That -- understand that the sensor can provide information about the state of a variable that could be used in fault detection and diagnosis?

Q Yes, that's my question.

A Yeah. Person of skill in the art would understand this could be used, correct.

Q In order to perform that type of diagnosis on electric motors, where would the sensor have to be located?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: That, again, as I said, is dependent on the particular situation, the technology used for diagnostics. It's a number of things. There's no one-size-fits-all solution to that.

BY ELIZABETH D. FLANNERY:

Q Are there instances where the sensor might be located in the electric motor itself?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: I would say neither yes nor no. In the sense that whatever can help you measure something that gives you information about your system which can be used for diagnostics, that -- that would be something you would consider.

BY ELIZABETH D. FLANNERY:

Q So as long as the sensor can measure something that is used in the diagnosis, its location doesn't matter?

SCOTT BORDER: Objection. Foundation. Outside the scope.

THE WITNESS: I didn't say that the location does not matter. I only said that there are many

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factors that need to be taken into account in what measurements one uses. Where these measures may come from, and where you put your sensors and how you process some of these measurements is technology that -- there are multiple technologies for that. In fact, it's an evolving field for how you do, say, smart diagnostics or this or that or whatever.

BY ELIZABETH D. FLANNERY:

Q Back in 2012, so back when the '870 patent was filed, what type of sensors could have been used to obtain information from the electric motor to perform the diagnostics?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: Again, whatever a person of skill in the art would

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understand to be helpful for performing diagnostics.

BY ELIZABETH D. FLANNERY:

Q Can you give me an example --

(Simultaneous Crosstalk.)

A That --

Q I'm sorry.

A That wouldn't be unique. It could be a number of things. And there's always, for example, a cost benefit analysis that one has to do, where do you put the sensor, where the sensors or some sensors, what do you actually measure, how you process the measurements, how reliable the use of the sensors is, whether the conclusions are confident or not. It's a broad technology doing this kind of fault detection diagnosis.

Q When you say "it's a broad technology," does that breadth extend sort of outside the scope of oil field applications or are there applications

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you are referring to outside oil field?

SCOTT BORDER: Objection to form. Outside the scope.

THE WITNESS: You're talking about fault detection and diagnosis?

BY ELIZABETH D. FLANNERY:

Q Yeah, whatever --

(Simultaneous Crosstalk.)

A -- diagnostics in general.

Q Whatever technologies you say a person of skill in the art would look to to understand what type of sensors to be used, is that limited to the oil field or is that broader than that scope?

SCOTT BORDER: Same objection.

THE WITNESS: In the context of this discussion, one would look for a solution to that particular setting for this kind of situation where you want the VFD drive to

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make sure the motor works well during the oil field option and so forth.

Overall, the field of diagnostics, as we said, yeah, it's a broad field, with many applications. And the particular approaches may be different in various fields.

BY ELIZABETH D. FLANNERY:

Q In the oil field, what type of sensors would be used?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: Again, that depends on the particular configuration, the situation, the technology. There's no one size fits all.

BY ELIZABETH D. FLANNERY:

Q Can you identify any type of sensor, one type?

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SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: Again, I would have to know specifics, so I can know -- for an informed opinion.

ELIZABETH D. FLANNERY: Let's go to Exhibit 1006, which is the Toshiba Manual.

Let's go to page, I think, it is 182 of the PDF.

BY ELIZABETH D. FLANNERY:

Q So you see on page 182 there's a Table 12 under the heading Trips/Faults?

A Page 182. Where again, I'm sorry?

Q It's page 182 of the PDF.

A Right.

Q It's -- page number, but Table 12 --

(Simultaneous Crosstalk.)

A Table 12. Yes, I am there.

Q Okay. Great.

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And you see under the heading Trip/Fault, it says, "A trip is an ASD response to a fault."

A Hm-hm.

Q See that?

A Yes.

Q And it says, "Listed in Table 12 are the possible faults that may cause a trip and the possible causes."

See that?

A Yes.

Q So let's look at a couple of the examples of those. The first one in Table 12 is listed as an ASD overload.

Do you see that? That's the fault screen display.

A Yes.

Q Okay.

In the right-hand side of that chart it lists possible causes.

Do you see that?

A Yes.

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Q Okay.

When it says "ASD overload," what component there would you understand to be malfunctioning?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: So what is observed is an overload of the ASD, that is the fault.

BY ELIZABETH D. FLANNERY:

Q Would you consider this to be an ASD diagnostic?

SCOTT BORDER: Objection. Form. Outside the scope.

THE WITNESS: This is a detection. It detects there is an overload and then the diagnosis is on the right, possible causes.

BY ELIZABETH D. FLANNERY:

Q Of the causes, the fourth bullet down lists "motor running during restart."

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Do you see that?

A Yeah.

Q So is that -- I guess to use your word culprit -- is that a culprit with the ASD?

SCOTT BORDER: Objection.

Outside the scope.

THE WITNESS: This basically says that the reason why you observed an ASD overload, may be that the motor is running during restart.

BY ELIZABETH D. FLANNERY:

Q Okay.

Why would that -- why would that cause an ASD overload?

SCOTT BORDER: Objection.

Outside the scope.

THE WITNESS: I would have to know how those are interconnected.

But -- it could be any reason.

But just by looking at this,

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without having studied this in detail, I can say that obviously the motor -- if the motor is running, that could result in ASD overload.

So this is something that one checks to see if indeed this was the culprit for what was observed.

BY ELIZABETH D. FLANNERY:

Q Let's go down two pages to page 184. I am looking at the top one on that list "Motor Overload."

Do you see that?

A Yes.

Q Okay.

And that is the fault screen display on the left and then it lists possible causes on the right.

Do you see that?

A Hm-hm.

Q The second one that's listed there, "Motor is locked."

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Do you see that?

A Yes.

Q Would you agree that's a problem or a malfunction of the motor?

A It's a state of the motor, if I understand correctly what they mean by motor is locked. So they observe that and they may have this motor overload by any of those five bullet points being the culprit; the second one is the motor is locked.

Q But that would be a state of the motor, not a state of the VFD, for example, correct?

A It's state of the motor, yes.

Q Okay.

The first bullet, "V/f setting needs to be adjusted."

Do you understand what "V/f setting" means?

A Is it volt frequency, I have to check what the acronym means. It's used

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several times. I don't recall off the top of my head what it stands for.

Q Is that something that would be an issue with the electric motor?

A I will have to check. Honestly, I don't remember off the top of my head.

Q Let's go a little further down on the list, I think maybe four rows down, the "Overcurrent During Acceleration."

Do you see that?

A Hm-hm.

Q Okay.

A Yes.

Q It lists several different causes there.

Do you see that?

A Indeed, yes.

Q The "motor/machine jammed," that's about six or seven down.

Do you see that?

A Yes.

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Q Would you agree that that's at least reflecting a state of the motor?

A Yes.

Q Can you -- where it says, "The ASD is starting into a rotating motor."

Do you see that?

A Yes. Third bullet.

Q Yes, correct.

You agree that's a cause that at least has something to do with the state of the motor, yes?

A Indeed, yes, this was the previous one, running motor. Yeah. Same thing.

ELIZABETH D. FLANNERY: Let's go down to next page -- I'm sorry we need to go up. We need to go to earth fault in this table. Looks like it's in alphabetical order. There you go.

BY ELIZABETH D. FLANNERY:

Q You see the listing for earth

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fault?

A Earth fault, yes. It has three bullet points to the right, right.

Q So this lists three potential causes for that fault.

A Hm-hm.

Q The first one is a "ground fault at the motor."

Do you see that?

A Yes.

Q Would you agree that cause has to do with the state of the electric motor?

A Yes.

Q Okay.

The ground fault -- the second bullet, is the "ground fault at the output of the ASD."

Do you see that?

A "Ground fault at the output of the ASD." Yes.

Q The output of the ASD, you agree

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that's what is connected to the electric motor, correct?

A Yes, that's what is going to the motor, correct.

Q Okay.

And so this potential fault -- this potential cause, excuse me -- has to do with a problem at the connection where the ASD is connected to the electric motor; is that correct?

A Yes. Although -- yeah, I would have to say it's probably closer to the ASD before anything goes to the motor. It's right at the output of the ASD.

Q Closer to the ASD. I am not sure what you mean by that.

A That there is a connection between ASD and the motor. There is a certain signal that would go from the ASD to the motor. The fault is before even that -- goes to the motor. There's a ground fault at the output coming from

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the ASD.

Q So there's a ground fault somewhere between the electric motor and where it is connected to the ASD?

A Yeah, that's a fair statement, yeah.

Q Okay.

Third potential cause that's listed there is a "Current gets Earth Ground."

A Hm-hm.

Q What is your understanding of what a current leakage is to earth ground?

A There's a leakage current, so somehow something is touching or is connected to the earth ground and there is a leakage current there.

Q Is it possible that leakage current is in the motor?

A It doesn't say.

Q So those are the only three

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causes that Toshiba Manual identifies for the earth fault, correct?

A That's what I see there, yes. The three bullet points.

Q Those three causes are a fault at the motor, a fault at the connection between the motor and the ASD, or a leakage to earth?

SCOTT BORDER: Objection. Foundation. Form.

THE WITNESS: It's stated there in the bullet points, yes.

BY ELIZABETH D. FLANNERY:

Q You are not suggesting there could be some other cause for the earth fault?

A I wouldn't -- anything in addition to the three bullet points you mean?

Q That's right.

A I wouldn't think so, without having studied that system. Obviously,

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this was a list that was put together after a serious consideration and that's what these people thought is a good list. So I would leave it at that, at this point.

Q Of those three potential causes that it lists, do you know which one would be the most likely cause?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: That I cannot tell.

BY ELIZABETH D. FLANNERY:

Q Do you have any reason to think that the second and third bullets would be more likely than the first -- the first one?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: I have no information on which to base my answer to this.

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ELIZABETH D. FLANNERY:

Understood.

All right. Let's move top let's see Exhibit 1008, which is the Horikoshi reference -- if you're looking in your binder.

(Previously Marked Exhibit 1008 was Shown to the Witness.)

BY ELIZABETH D. FLANNERY:

Q This is one of the references you talked about in your declaration, correct?

A Indeed, yes.

ELIZABETH D. FLANNERY: Let's see, if we can go to paragraph 11, please, probably -- let's see what page it's on -- it's probably on the third to last page, probably like page 8.

THE WITNESS: Paragraph 11, that says "Summary of the Invention"?

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ELIZABETH D. FLANNERY: Yes, sir.

THE WITNESS: Yes, I am there.

BY ELIZABETH D. FLANNERY:

Q All right. So here you see it describes "it is an object of the present invention to achieve while minimizing increasing cost, a motor driving apparatus having a fault diagnostic function..."

Do you see that?

A Yes.

Q Okay.

And it says that fault diagnostic function is capable of detecting during operation at ground fault and a phase-to-phase circuit -- short circuit by distinguishing one from the other?

A Correct.

Q Do you see that?

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A Yes, ma'am.

Q Okay.

And so you agree that Horikoshi discloses distinguishing a ground fault from a phase-to-phase short circuit?

Do you agree with that?

A Yes.

Q You agree those are two possible problems associated with an electric motor?

A Actually, the thing is that he knows there is an overcurrent, as he speaks about it in several places in the patent, and then to distinguish -- to figure out why there is an overcurrent, what it is due to, indeed, he found a clever way to distinguish between -- an overcurrent due to ground fault and a phase-to-phase short.

Q So Horikoshi discloses a way of distinguishing between those two possible problems, correct?

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A Correct. Yeah. Correct.

Q In some instances, it will identify the problem as a short circuit, correct?

A In some instances, he will say, yes, the overcurrent is due to a phase-to-phase, the short circuit --

(Simultaneous Crosstalk.)

Q In some instances -- I'm sorry, I didn't mean to interrupt you.

A Yeah, go ahead, please.

Q Okay.

And in some instances, the system will identify that it's a ground fault that is the problem, correct?

A Correct.

Q Okay.

Let's see, that sentence when it says -- it says "having a fault diagnostic function capable of detecting during operation," those things we just discussed.

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Do you see that?
A Yes, the fourth line, yes.
Q When it says "during operation," what do you understand that to mean?
A When the system is in operation.
Q Okay.
And that's going to be for some period of time, right?
A At the moment, when this thing is looked at, at least, yes.
Q When could the ground fault or the short circuit occur during that operation?
A When could it occur? Are you suggesting that -- are you asking whether this is continues or instant or are you asking whether this happened and then later detected?
I am afraid I am not following exactly what you're asking.
Q That's fair. Maybe I can ask a better question maybe.

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Would you agree that the ground fault of the short circuit could occur at any point during the operation of the device?

A Yes.

Q Would you agree that this fault diagnostic function that's provided, this function could be used any time the system is activated; is that right?

A System being activated, you mean the diagnostic system being activated?

Q Right.

In the device -- you know, the device that it is diagnosing.

A Yeah. The idea about activation, I didn't see emphasized. But the system can definitely be used to distinguish between the two causes of this overcurrent.

Q And so let me just make sure I am being clear about it, I'm probably not being very clear here.

In paragraph 11, it talks about a motor driving apparatus having this fault diagnostic function, right?

A Indeed.

Q Okay.

And so any time that motor driving apparatus is used, that fault function -- that fault diagnostic function could detect a fault?

A It would distinguish between the faults, yes.

Q Yes.

And so if I operate that motor driving apparatus for an hour, it might detect a fault or it might distinguish between a fault during that time, right -- during that hour; is that correct?

A Yeah. If an overcurrent is detected -- and by the way, Horikoshi distinguishes the overcurrent detection. He says when overcurrent is detected by

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an overcurrent detector, then I can use my apparatus.

So if this apparatus is used for an hour and an overcurrent was detected, would that apparatus actually diagnose what caused the overcurrent? Yes.

Q Okay.

And so I might then use it the next day use, that motor driving apparatus the next day, turn it on, and use it for another hour. And it might -- and that fault diagnostic function might operate again during that next hour on day two, right?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: If -- again, if an overcurrent is detected, indeed, that perhaps can be used another day, yes.

BY ELIZABETH D. FLANNERY:

Q That would happen any day that I

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used the motor -- I used that one same motor multiple days, that same thing could occur each of those days?

SCOTT BORDER: Same objection.

THE WITNESS: Well, whether the overcurrent would occur, no, that's another story. Depends -- it might -- the overcurrent might occur very infrequently, very frequently. It might occur once and damages the motor, who knows. There are various scenarios.

But to the extent that an overcurrent is detected, Horikoshi claims his apparatus can actually distinguish between the two cases that caused the overcurrent.

BY ELIZABETH D. FLANNERY:

Q Okay. That makes sense.

So describe one example. I use that motor driving apparatus on day 1, it

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detects a ground fault -- or it distinguishes between a ground, there's an overcurrent that occurs and it and determines that there was a ground fault.

Are you with me so far?

A Yes. So there has been an overcurrent --

(Simultaneous Crosstalk.)

Q Yes.

A -- the device -- the driving apparatus, Horikoshi's apparatus is used, it figured out the cause of this is one of the two, and we are here now at this point.

Q Yes.

And you would agree that performed an electric motor diagnostic, one?

A It performed -- yeah, an electric motor diagnostic, correct. It diagnosed what is the cause of the fault, the problem, in general that was

detected, correct.

Q Okay. So that occurred.

Let's say there was no damage to the motor. Let's say nothing bad happened. A week later, a week later, I used that same motor, that same motor driving apparatus, I turn it on, it detects an overcurrent, and this time it detects a short circuit -- it detects overcurrent and it determines that it was a short circuit.

A Okay.

SCOTT BORDER: Objection to form. Outside the scope.

BY ELIZABETH D. FLANNERY:

Q I haven't finished my question, that's okay.

A That's why I said --

Q So in that circumstance, it has run another electric motor diagnostic.

Do you agree?

SCOTT BORDER: Objection.

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Form. Outside the scope.

THE WITNESS: Well, it's another instance of the diagnostic that is used to determine which of the two options is the cause of the fault detected. It's this diagnostic -- the output of this diagnostic, was one the first day, it was different the second day.

ELIZABETH D. FLANNERY: Understood.

Let's go to -- let's go to your declaration. This is Exhibit 2002.

BY ELIZABETH D. FLANNERY:

Q And I am going to paragraph 104.

Are you there?

A Yes. 104, right?

Q Yes, paragraph 104. Yes, sir.

A Yes. The section that says, 1. A truck-trailer... (Reading.)

Q That's correct. All right.

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And your conclusion of this paragraph is that you understand "truck" to have its plain and ordinary meaning in the '870 patent, correct?

A Yeah. Truck is what anybody would understand by truck.

Q Okay.

What would a person skill in the art of the '870 patent understand a truck to be, the plain and ordinary meaning?

A A person of ordinary skill in the art in 2012 you mean?

Q Yes. Yes.

A Yeah, a truck, whatever a truck would be in 2012.

Q Is there any further understanding of what -- how you would define a truck as of that time?

A One could perhaps give a sophisticated definition, and we discussed this in my declaration somewhat, but I would understand as an

ordinary truck.

Q What elements does a truck have to have based on its plain and ordinary meaning in 2012, to a person of skill in the art?

A Size, ability to carry things, these things.

Q Anything else?

A Not that I could think of at this time.

For example, if it was small, you would call it a light truck. The government even has a separate category when counting sales of vehicles.

Q Okay.

A I understand things in this sense.

Q Okay.

A As we show there, and I already mentioned, we discussed this a bit more in section -- paragraph 105.

But again, as I said, the

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ordinary meaning of the term is what I understand, as I am stating in 104.

Q Understood.

ELIZABETH D. FLANNERY: Okay. Let's go back to the '870 patent, Exhibit 1001.

Go to the claims. Last page. Sorry I keep flipping back and forth.

BY ELIZABETH D. FLANNERY:

Q I am looking at Claim 15 specifically.

A Yes, I am there.

Q All right. "System of Claim 7, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more."

Do you see that?

A Yes.

Q Okay.

I want to ask you about the phrase "maximum continuous power output"

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for a second.

Have you been asked to construe -- or define that term, excuse me?

A Yeah. We discuss this in the -- "we" meaning I discuss this in the declaration -- after a number of discussions, of course, in reading all these documents that are indicated here.

So the continuous maximum power is what the term indicates; namely, the motor can provide at least -- can provide that level of power continuously over a reasonable amount of time.

Q A reasonable amount of time?

A Yeah.

Q Is that something that a person of skill in the art would understand how long that is?

A Reasonably well, in the same way that if you have the tachometer in the car and there's an RPM, there's a red zone, and the indicator is if the needle

goes to the red zone, make sure it doesn't stay there for too long. In fact, motor cars immediately cut off supply of fuel so it can go back to normal.

But when somebody says you can only stay there for a very little, they leave it at that, very little.

By contrast, continuous means you can do this for a long time. So for this instance, for maximum continuous power output of about 1750 brake horsepower or more, I would understand this to mean that if I need to put this system in operation to perform one job at least, I can continuously deliver that horsepower. I am not jeopardizing the system.

Q When you say "one job," are you referring to a fracturing job?

A It could be that, yes.

Q Okay.

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In the course of a fracturing job, do you know if a fracturing pump has to operate continuously throughout the entire fracturing operation?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: That's an interesting question. It has a lengthy answer because how you actually do that well is subject to how the fracturing job is designed and executed and all that.

So I am familiar with this, but the answer is -- is not one size fits all again.

BY ELIZABETH D. FLANNERY:

Q How do you know if an electric motor has a sufficient -- can output 750 [sic] brake horsepower for sufficiently long to meet this claim?

SCOTT BORDER: Objection.

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Outside the scope.

THE WITNESS: How do you know that your motor has this rating when you buy it?

BY ELIZABETH D. FLANNERY:

Q Is it your understanding claim 15 calls for a rating?

A Well, it says the system -- it has an electric motor that has a maximum continuous power output of about 1750 brake horsepower, right?

So the question was, how do I know that my motor can deliver that? That's what the question was, right?

Q Yeah, that's my question.

A Yeah. I know that because I bought a certain motor and I am using it there and it has certain specifications so --

(Simultaneous Crosstalk.)

Q Okay.

A -- the specifications in the

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rating for this.

Q Okay.

So you would rely on the ratings for a pump to determine if it -- what its maximum amount continuous output is?

A I would make sure that the electric motor that I am using can deliver a continuous power output which is at least 1750 brake horsepower.

Q Do you know if fracturing pumps have a separate continuous maximum continuous power rating and a separate instantaneous power output rating?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: Whether this is standard specification, is that what you are asking?

BY ELIZABETH D. FLANNERY:

Q Yes.

A That I would have to check. It depends, I guess, on the vendor and the

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manufacturer and so forth. So I would check for each system what the vendor claims.

Q Let's go to Claim 16. And that talks about, "The system of Claim 7, wherein the electric motor has a maximum continuous torque of about 8750 pound-feet or more."

Do you see that?

A Yes, ma'am.

Q Okay.

That term "continuous torque," what is your understanding of what continuous would require in the context of this claim, how long would it have to output that torque?

A It's the same idea, that this is not for a very short time where you deliver this as a peak. But you can continuously, namely, over a reasonably long interval, you can provide this level of torque of 8750 pound-feet or more.

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Q How do we know what is long enough for reasonably long?

A Reasonably long would be for at least one job that require this continuous operation or something comparable to that.

Q So it's your understanding that maximum continuous torque means continuous for the span of operation?

SCOTT BORDER: Objection, foundation.

THE WITNESS: It's one practical way to have a sense for how long that long -- that continuous would be. But continuous, just basically means what the term says, continuous.

BY ELIZABETH D. FLANNERY:

Q If I have an electric motor that can't provide that maximum continuous -- that maximum amount of torque for the entire operation, but it will do so if I

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reset the motor once at the halfway point, would that be sufficient maximum -- sufficiently long to be a maximum continuous torque?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: No, that's not the essence of this here. The maximum continuous torque refers to having this continuous operation over long -- reasonably long intervals.

So whether you may have to reset this, say, halfway and redo it or not is something that is different. And the idea is can you do the continuous torque for, again, continuously -- continuous long enough interval that is not just a spike in time. Let's say, very, very short interval.

In the same way that as I

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used an example, in a car, you can go temporarily through the red in RPM and you have to go back down. How quickly back down is quick enough? Well, it's relative, but definitely it's not half an hour. That would burn the engine, for example.

BY ELIZABETH D. FLANNERY:

Q Do you know how long Coli can maintain the maximum torque that is described in that reference?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: It's in the standard way that the manufacturer would explain what maximum continuous torque means in their specifications.

ELIZABETH D. FLANNERY: So hang on. Let's go to Coli which I think is 1005 again.

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Paragraph 11, this is going to be about -- there you go.

Perfect.

BY ELIZABETH D. FLANNERY:

Q So paragraph 11, on the right-hand side there, you see where it says, The electric motor can be capable of operation in the range of up to 115 -- 1500 RPMs and up to 20,000 foot/pounds of torque.

Do you see that?

A Up to 20,000 pounds feet -- pounds of torque, yes.

Q Do you know how long the motor -- electric motor in Coli would be able to maintain that 20,000 foot/pounds?

A It doesn't say. So it doesn't say this is continuous. It says it can reach that. Well, it can reach that, but for how long.

Q Okay.

Do you consider that to be the

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peak torque, maximum torque?

A There is no indication, again, that this would be something that you could maintain continuously. So it says you can go that high.

Q Right. So I am not asking about continuous at the moment.

I am just asking, does this description what is the maximum torque?

A Yes. It says the electric motor can be capable of operating -- up to 20,000 foot/pounds of torque. It should be capable to operate up to that limit bound.

Q Okay.

Is it your understanding that the electric motor would be able to have some level of continuous torque, it just wouldn't be that high?

A Well, this is almost tautology, I would say, in the sense that you can run the motor continuously and then the

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maximum torque at which this motor can run continuously is the maximum continuous torque.

Q Okay.

So it would have some amount of maximum continuous torque. Can we agree on that?

A There would be a number there, yes.

Q Okay.

Is your opinion it would be lower than 20,000 foot/pounds?

SCOTT BORDER: Objection. Outside the scope.

THE WITNESS: So as stated here, I can say it wouldn't be higher than 20,000, yes.

BY ELIZABETH D. FLANNERY:

Q Okay.

Based on this -- based on this amount of maximum torque, would you be able to calculate what the maximum

continuous torque of that motor would be?

A Based on the 20,000?

Q Yes.

A No, I would have to know -- I would have to know more. In fact, the manufacturer would be in the best position to calculate, to give me that number.

Q Would you have any way of estimating how much torque would be the maximum continuous torque that this motor would output based on that 20,000?

A I haven't studied that to have an opinion, informed opinion about this.

Q Would you expect that -- would a person -- let me strike that and try again.

Would a person of skill in the art expect the maximum continuous torque of this motor to be less than 5 foot/pounds?

A Again, that sounds like an

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awfully low number. But nevertheless, I would say for a realistic number, one would -- person of skill in the art would need additional information preferably from the manufacturer of the equipment.

Q Why do you say that number sounds low?

A You said five, not 5,000, right?

Q I did, I said five.

A It's four orders of magnitude lower than peak. So one might say this sounds as a guess and speculation, this looks low. But what would be realistic number, one cannot tell.

Q Can you estimate how many orders of magnitude of the 20,000 foot/pounds the continuous maximum torque would be of this motor?

SCOTT BORDER: Objection.

Outside the scope.

THE WITNESS: No, there is definitely a need for additional

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information here.

BY ELIZABETH D. FLANNERY:

Q I want to ask you a couple of questions about your work --

ELIZABETH D. FLANNERY: We can take Exhibit 1005 down. Thank you.

BY ELIZABETH D. FLANNERY:

Q Have you ever designed or worked with pumps that are used in fracturing operations?

A Designed or used pumps in fracturing operations? No, not me personally.

Q Okay.

Have you ever designed or worked with control systems that are used in fracturing operations?

A With control systems, yes, several times, but not in fracturing operations specifically.

Q Okay.

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What types of control systems have you worked with --

(Simultaneous Crosstalk.)

A I --

Q -- fracturing operations?

A I have been involved in control systems in various industries from petrochemicals and refining to snack food manufacturing to semiconductor manufacturing, plus matching reactors. Those are some applications I can think of immediately.

Oh, yes, I forgot, in the upstream business in drilling operations, particularly for horizontal drilling.

Q Have you designed or worked with motors that are used in fracturing operations?

A Motors in fracturing operations, no. Motors in oil field operations, yes.

Q Have you ever designed or worked with trucks or trailers that are used in

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oil field operations?

A Design, no. Used -- well, have I been in some of these or in a trailer carried by a truck in an oil field operation, yes, I have.

Q Okay.

That was in the drilling operation --

(Simultaneous Crosstalk.)

A -- drilling operation, yeah. Both in a couple of occasions, one was a real well and another one was an experimental facility where we were developing a horizontal drilling technique.

Q Okay.

The experience with control systems that you mentioned with snack foods and petrochemical, well blending, those are for treatments at an oil site -- at an oil well, right?

Those aren't -- let me try that

again.

Those don't involve treatments that would be used in the context of a well site, do you agree with that?

A What do you mean by that?

Q Let me try that again. Let me ask you a better question.

Let's actually, let's go to your declaration again, and let's go to paragraph 4 of your declaration.

So this is Exhibit 2002.

And I think it is about two sentences -- three sentences in, you state, It is my opinion as of November 12th -- November 16, 2012, a person of skill in the art pertinent to the subject matter '870 patent would have had at least...

You see where I read from there?

A Yes, go ahead, please.

Q Yes. And so I mean, I am going to talk about item 1 there, the number 1

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item there.

"A bachelor of science in mechanical engineering, electrical engineering, petroleum engineering, or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including well drilling, completion of production."

Do you see that?

A Yes.

Q Do you consider yourself to have a bachelor of science in mechanical engineering, electrical engineering, petroleum engineering, or an equivalent field?

A I have a BS in chemical engineering.

Q Okay.

That is not mechanical engineering, electrical engineering, or petroleum engineering, right?

A It's in the last item, the "or

an equivalent field."

Q So you consider chemical engineering to be an equivalent field?

A For the purposes of this analysis, yes.

Q Okay.

A That's what is -- different engineering disciplines listed there. In fact, they are listed areas of competence such as mechanical, electrical. And then there's petroleum in terms of the commodity that one learns about.

And the equivalent chemical also deals both in the commodity, mainly oil and gas, and the competence needed to actually do meaningful work in that field.

Q Just so I understand, what standard are you using to determine whether or not a field is equivalent to those that are listed?

A Whether one has the competence

to do meaningful work in that field.

Q Are you saying whether one has competence in the mechanical, electrical, or petroleum field?

Is that what you are saying?

A The competence required to do what the skill of a POSITA would involve to have -- to do meaningful work related to the patent we are looking at.

Q Okay.

Does the competence -- in what field does the competence have to be?

A In the field -- well, of the patent that we are looking at, which is oil and gas operations, and in particular, it's the fracturing aspect that one obviously would know a lot more about --

(Simultaneous Crosstalk.)

Q Okay.

A -- peripheral.

Q So as an example, would you

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consider biological engineering, would you consider that to be an equivalent field for purposes of this definition?

A Equivalent, no. Because the emphasis there is on processes that they are not directly related to what '870 is discussing.

And again, if this was about, say, a waste treatment and remediation of a field or something like that, that might be an issue with oil and gas operation, for example, how do you dump the water from the fracturing operation or how do you make sure you clean it and don't pollute this and that, and biological engineer would be certainly one that would be relevant there to a firm opinion.

Q What aspects of chemical engineering do you think are relevant to the '870 patent?

A Aspects of chemical engineering?

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Yes, it's the basic foundational fields of transport phenomena; how energy, mass, and momentum get transferred. And then it's thermodynamics, particularly equilibrium thermodynamics, how oil and liquids and gases mingle and one goes from one state to the other.

There are reaction concepts which for this particular pattern are not immediately relevant. And then it's the engineering of all of the above; namely, how do you design a system at various levels of detail, how do you make sure that it can be built and run economically, and how you actually manage the system, meaning, how you can optimize it in realtime and control it in realtime.

Those are all things that a chemical engineer learns very well. Which, by the way, is why I have a joint appointment in the petroleum engineering

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department at the University of Houston.

Q So looking at the second part of this definition, so it says a bachelor of science in one of the fields listed there, and, at least two years of academic or industry experience in the oil and gas industry including, well drilling, completion, or production.

Do you see that?

A Yes.

Q Describe for me your academic or industry experience in the oil and gas industry.

A Yes. So it has been through a number of involvements. Let me -- mostly through consulting, but also to a large extent over the years, through project academic, projects supported by industry, on which there have been some patents issued where our name is included.

So let me mention just a few of these projects. So one is the project

that involves development of automated horizontal drilling system that led to the foundation of a small company by the directors of this project, the company was called Slider, and the technology was eventually bought by Schlumberger. It is now being offered -- if you go to SLB.com and do a search on Slider, it will come up. So that's a technology that I helped develop. I worked as a consultant in that project.

Other things that I did was development of automation for drilling with -- that was with Noble Drilling, in early 2000, on which I have some consulting experience.

We did projects with oil field operators on how to do production optimization. Essentially, how to use data, build the model, use the model to optimize, run the model, and keep updating the optimum as new data come in.

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So that eventually led to a patent application.

And those are some basic projects I can think of over the years.

Q How long did you work on the automation -- drilling automation project with Noble?

A With Noble, that was less than two years I believe. It was 2001, 2002, if I remember correctly.

Q During that period of time, that span of time over two years, was this your full-time job?

A No. No. It was a consulting job.

Q About how much of your time was spent on that during that time?

A Up to -- up to 52 days per year. I don't remember the exact numbers, but this is a university regulation.

Q And this was -- I'm sorry, what timeframe did you say this was in, 2002?

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A 2001, 2002. It should be in my CV.

Q Okay.

And then the project involving the development of Slider?

A That was -- Slider projects that I mentioned. Yeah. That was the automation -- it was these two things, the development of Slider and other automation issues with those were with Noble all that --

(Simultaneous Crosstalk.)

Q Okay. I'm sorry.

A The years were 2001, 2002 around that time.

Q Okay.

A There have been others. One very quickly, let me mention, also my involvement with RotoSlide, which was, again, a development project, didn't go as far as we had hoped.

But nevertheless, I was involved

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for a couple of years with them in the development of a new horizontal drilling technology.

Q And what was your role in that project?

A I was a technical advisor on automation issues, data analysis, modeling automation.

Q How long did you work on that project?

A It was a couple of years, as I recall.

Q Was that -- was it before 2012 or after?

A After 2012. Again, that's in my CV. If I don't remember any dates correctly, they are all there.

ELIZABETH D. FLANNERY:

Checking my notes real quick here.

THE WITNESS: Yeah.

ELIZABETH D. FLANNERY: I don't think I have anymore

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questions. I will pass the witness.

SCOTT BORDER: Okay. I just have one question.

EXAMINATION

BY SCOTT BORDER:

Q Dr. Nikolaou, can you open up your declaration, Exhibit 2002, to paragraph 59.

A Paragraph 59. Yes, sir, I am there.

Q Okay.

After the chart that you see, can you just read the next two -- next paragraph after the chart, so starting with, "Given that..."

A Paragraph in the following -- yeah.

"Given that" -- want me to read this out loud?

Q I'm sorry, you can read it to

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yourself, please.

A Yes. (Reviewing.) Okay.

Q So my question is just this: Are there any typographical errors in any of those sentences that you would like to correct?

A Yeah -- yeah, there's an obvious one, first line.

Q Okay.

A They do show. They do not show. Sorry.

Q Okay. Thank you.

So it should state, Given that these faults have causes unrelated to the electric motor, they do not show --

(Simultaneous Crosstalk.)

A They do not show.

Q -- that these faults are diagnostics for the electric motor --

(Simultaneous Crosstalk.)

A That's a whole essence of this paragraph.

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SCOTT BORDER: Great. Thank you.

I have no further questions.

ELIZABETH D. FLANNERY: Done here. I think we are finished.

THE REPORTER: Off the record.

Mr. Border, did you want a copy of the transcript?

SCOTT BORDER: I don't think I need one. I assume it will be filed with the other folks.

THE REPORTER: Since you got the realtime, I think it is automatic.

SCOTT BORDER: All righty. Lucky me.

THE REPORTER: Good night, everybody.

(Whereupon Testimony Concluded at 3:13 p.m. CST.)

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A C K N O W L E D G E M E N T

STATE OF _____

COUNTY OF _____

I, the undersigned, hereby certify that I have read the transcript of my testimony taken under oath in my deposition; that the transcript is a true and complete and correct record of my testimony, and that the answers on the record as given by me are true and correct.

_____

DR. MICHAEL NIKOLAOU

Signed and subscribed to before me this _____ day of _____,

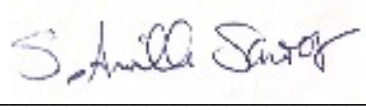
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Notary Public

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I, S. Arielle Santos, CSR, CLR,
do hereby certify:
That prior to being examined, the witness named in the forgoing deposition, was by me duly affirmed remotely under order SC of FL No. AOSC20-23 Amendment 4 (II)(C)(2) to testify the truth, the whole truth, and nothing but the truth.
That said deposition was taken before me at the time and place set forth and was taken down by me in shorthand and thereafter reduced to computerized transcription under my direction and supervision, and I hereby certify the foregoing deposition is a full, true and correct transcript of my shorthand notes so taken.
I further certify that I am neither counsel for nor related to any party to said action nor in anywise interested in the outcome thereof.



_____

S. Arielle Santos, CSR

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