UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NABORS DRILLING TECHNOLOGIES USA, INC.,

Petitioner,

v.

MOTIVE DRILLING TECHNOLOGIES, INC.,

Patent Owner

CERTIFIED COPY

IPR2022-00288

Patent No. 9,865,022 B2

CM#38496.527US01

and

IPR2022-00289

Patent No. 10,726,506 B2

CM#38496.528US01

DEPOSITION OF L. BRUN HILBERT, JR., Ph.D., P.E.

TAKEN ON JANUARY 6, 2023

BY REMOTE VIDEOCONFERENCE TECHNOLOGY

REPORTED BY:
LYNETTE MARIE NELSON, CSR NO. 11585, RPR
CRR, CRG, CCRR, REALTIME SYSTEMS ADMINISTRATOR
JOB NO. 23-118908

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DEPOSITION OF L. BRUN HILBERT, JR., PH.D., P.E., taken by the Petitioner, commencing at the hour of 9:02 a.m. Central Standard Time on Friday, January 6, 2023, remotely held via videoconference technology, before Lynette Marie Nelson, Certified Shorthand Reporter in and for the State of California.

APPEARANCES:

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I N D E X

E X H I B I T S

REMOTE DEPOSITION; FRIDAY, JANUARY 6, 2023

9:02 A.M. CENTRAL STANDARD TIME

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MR. STAVINOHA: This is Clarke Stavinoha with Baker Botts, LLP, on behalf of patent owner, Motive Drilling, Inc.

With me today will be my colleagues Chad Walters and James Williams.

MR. BOWSER: And for petitioner, it's Jonathan Bowser and Angela Oliver, and we represent Nabors Drilling Technologies USA, Inc.

(Witness sworn.)

THE WITNESS: Yes, I do.

THE STENOGRAPHER: Thank you.

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L. BRUN HILBERT, JR., Ph.D., P.E.,
HAVING BEEN DULY SWORN BY THE CERTIFIED SHORTHAND REPORTER, WAS EXAMINED AND TESTIFIED AS FOLLOWS:

EXAMINATION

BY MS. OLIVER:

Q. Good morning, Dr. Hilbert.

A. Good morning.

Q. My name is Angela Oliver, and I'm counsel for the petitioner in this case as we just mentioned. I will be asking you questions today about your declarations in IPR2022-00288 and IPR2022-00289.

Would you please state your full name for the record.

A. My name is Lawrence Brun Hilbert, Junior.

Q. Thank you.

Is there any reason why you would not be able to answer my questions today fully, accurately, and honestly?

A. No. I'm able to answer them.

Q. And you understand that during today's deposition, you're under oath and providing sworn testimony just as if you were in court?

A. Correct. I understand that.

Q. As I mentioned, I will be asking you questions about your declarations. If you don't understand one of

my questions, just let me know. And if you understand my question or if you answer my question, I assume you understood the question. Is that fair?

A. Yes, that's fair.

Q. Your counsel may object to questions throughout this deposition. But unless your counsel instructs you not to answer a specific question, you are required to answer my questions. Is that understood?

A. I understand that, yes.

Q. The court reporter will prepare a transcript of today's deposition. And so just to ensure that we have a clear record, please answer each question with a verbal "yes" or "no." Please don't use "uh-huh" or head movements. Is that okay?

A. I'll try to remember that, yes.

Q. I understand. Thank you.

Also, to ensure a clear record, I'll ask that you just let me finish my questions before you start answering. Just because the court reporter may have trouble accurately recording who is speaking if we're both talking. Is that understood?

A. Yes, it is.

Q. We will plan to take a break about once an hour, and once it gets to be about noon Central, we will break for lunch as well. But if you need a break any

time other than that, would you agree to just let me know?

A. Yes, I will. Certainly.

Q. All right. During the part of this deposition where I'm asking you questions, you're not permitted to speak with your counsel about the substance of your testimony, including your declaration and your deposition today. Do you understand that?

A. Yes, I do.

Q. Where are you located today?

A. I'm in the offices of Baker Botts in Dallas, Texas.

Q. Are you alone in whatever room you're in at Baker Botts?

A. No, Mr. Stavinoha is on the other side of the monitors from me. I can't really see him very well.

Q. Do you agree not to communicate with Mr. Stavinoha -- sorry, Stavinoha about the substance of your testimony until this deposition is complete?

A. Correct, yes, I understand that.

Q. All right. What equipment are you using for this deposition today?

A. A laptop has been provided to me without -- I guess I have a keyboard and a couple of monitors. And I -- in full disclosure, I have a cell phone here to

control my hearing aids --

Q. Okay.

A. -- if I need to adjust volumes, but I'm not using it to check emails and text while you're asking me questions.

Q. Thank you.

Do you have hard copies of any of the documents from these proceedings in front of you today?

A. Yes, I do.

Q. Just so that we stay on the same page during the deposition, would you agree to not use those documents and then use the ones that we will provide digitally to you through the chat window?

A. Yes. I have practice using Zoom and can download those documents to the desktop where I can use those.

If we are in the case of looking at multiple documents, may I use a hard copy? These are clean and were provided me this morning. That way I can flip back and forth and see both documents, for instance, if we're looking at a declaration and have to go back to a patent, it might be easier just to use one hard copy and one on the screen.

Q. Sure. Yeah, that's completely fine.

A. Okay.

Q. And you've already confirmed that those are clean copies. They don't have any notes from you or anyone else on them?

A. That's correct. There's nothing on them. They're clean copies.

Q. Great. Thank you.

Do you have any other notes in front of you today either in hard copy or on your laptop?

A. No.

Q. While we're doing this deposition today, I ask that you just not have any other documents open on the laptop that you have provided. As I mentioned, I'll share the documents with you through the chat window and you can download them; is that okay?

A. Yes, that's works.

Q. All right. And do you have any chat windows open on your laptop?

A. Not the laptop. It's just on the monitor. Laptop is over on the other side of all of this stuff. Just the chat box for the Zoom meeting with you.

Q. Thank you.

Okay. Have you been deposed before?

A. Yes, I have.

Q. How many times?

A. Over 30.

Q. Have you been deposed in connection with any other inter partes review, IPR proceedings, or post grant review, PGR, proceedings?

A. Yes, I have been deposed in such matters.

Q. To your knowledge, has any other court or tribunal ever excluded or stricken your testimony in any case for any reason?

A. No, not to my knowledge.

Q. You were retained by Motive Drilling Technologies, Inc., to provide testimony in these two cases; correct?

A. That's correct.

Q. So during today's deposition, if I refer to "Motive," do you understand that I'm referring to Motive Drilling Technologies, Inc.?

A. Yes, I do.

Q. Had you heard of Motive prior to being asked to testify in these cases?

A. Not in detail. I was aware of them. I've worked in the petroleum industry a long time, and I've come across their name a couple of times. But I've not done -- I've not performed work for them before. And not intimately familiar with them prior to being retained in this matter.

Q. Have you ever served as an expert witness for

Motive's parent company, Helmerich & Payne?

A. That's kind of a confusing question because of the nature, I guess Helmerich & Payne owned or acquired some or part of Motive. I've heard of them, but I have not -- I've not done work for them except in these matters.

Q. Are you serving as the expert witness for the patent owner in the parallel district court litigation involving the '022 and the '506 patents?

A. Currently, I'm consulting on that.

Q. Who did you meet with to prepare for your deposition today?

A. Mr. Stavinoha.

Q. Approximately how long did you meet with Mr. Stavinoha to prepare for your deposition?

A. I've been here for a couple of days. I've been here Tuesday and Wednesday. And we've met for a few hours each day. "A few hours" being three to four hours. Occasionally, to answer your question fully, occasionally other people have popped in and I've met them. Mr. Williams and perhaps another attorney. But the bulk of the discussions were with Mr. Stavinoha.

Q. Great. So let's talk a little bit about your background.

You're currently employed at Exponent; correct?

A. Exponent, Incorporated, that's correct.
Q. And what are your responsibilities in that role?
A. I'm a principal engineer, and I have a group of people that report to me. My work comprises both research and development, nonlitigation matters for clients who contract with us. And then expert work in other retentions. That's my role at Exponent.
Q. And how long have you been at Exponent?
A. Approximately 26 years. I arrived there in 1996. So 26, 27 years.
Q. Prior to working at Exponent, how many oil companies or oil and gas companies did you work for?
A. Prior to going to work for Exponent, I worked for Exxon Production Research Company in Houston, Texas. From 1981 to 1992 in the drilling and completions department.
Q. And what were your responsibilities in your role at Exxon?
A. Applied research and developments, sort of consulting with Exxon affiliates' operating affiliates around the world that actually do the drilling. And at Exxon Production Research Company in Houston, as I said, we did applied research in casing, tubing, well development, well construction, well design, and taught

courses around the world on drilling, completions technology, hydraulic fracturing.

My training from Exxon as -- I characterize myself as a mechanical and petroleum engineer as a result of that work and my continuing work at Exponent.

Q. Did your responsibilities at Exxon include designing well paths?

A. Yes, it did.

Q. I'm sorry. I didn't mean to interrupt you.

A. It did. Yes, I had the opportunities to both evaluate and more -- more commonly evaluating a well-bore path rather than designing one. The operating affiliate drilling engineers generally design the well path, for example. And then if there were issues with those or they were very difficult conditions, they would call upon the researchers at Exxon Production Research to do applied research for them or solve their problem.

Q. Would you consider yourself an expert particularly in designing well paths?

A. Yes.

Q. And how many well paths do you think that you've designed over the course of your career?

A. I've been involved with or helped to design probably 40 to 50 different -- for different wells, 40 to 50, something like that. I don't do that on a daily

basis because of the work I do in consulting and at Exxon, maybe 40 to 50.

Q. Great. Thank you.

So let's talk a little bit about your declarations that were submitted in these cases.

So Dr. Hilbert, you provided testimony in both of these IPRs involving the '022 patent and the '506 patent; correct?

A. That's correct.

Q. Just to be clear, IPR2022-00288 involves U.S. Patent No. 9,865,022; correct?

A. That's correct.

Q. And IPR2022-00289 involves U.S. Patent No. 10726506; correct?

A. That's correct.

And when I look over to the side here, I'm looking at the hard copies following what you say.

Q. If I refer to the "'022 IPR," you'll understand that I'm referring to IPR2022-00288; correct?

A. That would be correct, but I would probably be much more aware of it if you just said the '022 declaration and the '506 declaration. I follow it by those last three numbers of the patent number.

Q. Yeah. We can do that. That sounds great.

Okay. Did you prepare your declarations in the

'022, the '022 declaration and the '506 declaration?
A. Yes, I did.
Q. I'm going to share the '022 declaration with you in the chat window. So give me just one second.
I just sent it so let me know whenever you have that open.
A. Received it and saving it to the desktop, I think.
Yeah, there it is. It's opening.
I have it.
Q. Is this your '022 declaration?
A. It is, yes, it is.
Q. And would you turn to page 100 of your '022 declaration.
A. Yes, I'm there.
Q. Is that your signature on this page 100?
A. Yes, it is.
Q. And did you sign this '022 declaration on October 20th, 2022?
A. Yes, I did.
Q. Great. All right.
So I'm going to next share with you your '506 declaration. So give me one second.
Okay. I just sent that so let me know whenever you have it open.

A. Yes, I have it.
Q. Great. Is this your '506 declaration?
A. It is. Yes.
Q. And would you turn to page 92 of your '506 declaration.
A. Yes, I'm there.
Q. And again, is this your signature here?
A. Yes, it is. It is.
Q. All right. And did you sign this on October 20th, 2022?
A. Yes, I did.
Q. Great. Do you recall about how much time you spent preparing these declarations in the '022 and '506 cases?
A. The writing of it took a little bit more than a month of time spread -- spread maybe out a couple of months, I would say. And then I can't recall when I've actually been retained. But I think that was in 2021. So a lot of work has been spread out over quite a bit of time. But the focus of writing these was done over a couple of months.
Q. And did you prepare the first draft of each of these declarations?
A. I was provided the -- some of the legal language in the front portion of it. And then reviewed

that and made revisions to it as I saw fit, kind of a template for that. And then the rest of it was drafted by myself and interactions with Mr. Stavinoha.

Q. And did anyone at Exponent provide comments to you or talk with you about the substance of your declaration?

A. Yes.

Q. Who -- who did you speak with or who provided comments to you on these declarations?

A. It was primarily Dr. Julian Hallai, H-A-L-L-A-I. He reports to me. He is a managing engineer that we hired two or three years ago. And he is -- got a Ph.D. in naval architecture, offshore engineering, and he reviewed documents, synthesized some of the information, and reviewed my reports with me.

At times, we have, at Exponent, a quality management system in which if I write a report, we have a technical reviewer such as Dr. Hallai. And then I end up approving it, but it also includes reviews by my editorial staff and other -- other people in that -- and that's a formalized system. That's not somebody assisting me. That's a formalized system for quality of the documents.

Q. Did Dr. Hallai draft any portions of either of your two declarations here?

A. No, I wouldn't say so. He made some editorial comments, and I revised some things where he may say this is not clear. I've reviewed this other document and this doesn't seem clear to me. Then we would -- I would revise that.

Q. How many hours would you say that Dr. Hallai spent working on your '022 and '506 declarations?

A. I would say just recalling, maybe 40 hours on each of those, something less than the couple of months that I worked on them. But I would say that's probably the amount of effort that he put into each of those.

Q. And why did Dr. Hallai not sign your declarations?

A. He's not responsible for writing it. I was responsible for writing the document and for the opinions of those documents -- that I expressed in those documents.

Q. And so you said that you spent months working on these two declarations. Is that in terms of hours?

So I'm not sure how many hours are in a month. But however many hours are in a month times a couple? Would that be accurately reflecting how much time you spent on these declarations?

MR. STAVINOHA: Objection. Form.

THE WITNESS: When I -- when I referred to a

couple of months, I have many other matters that I'm working on at the same time. So over the couple of months of each of these documents in their printed form, the finalized portion, I would say that that would be maybe 80 hours on each one over the period of a couple of months. I would drop it for a while then come back to it. You know, probably how you work, similar thing.

BY MS. OLIVER:

Q. And did you have any disagreements with Dr. Hallai about the positions taken in your declarations?

A. Not in this matter. Sometimes, we disagree but not in this matter.

Q. So did you -- sorry, scratch that.

Did you adopt all of Dr. Hallai's recommendations regarding these two declarations?

A. No. They were -- they were primarily editorial, make this clearer, those sorts of comments. There weren't any disagreements on the context and opinions generally. So the answer is no. If we didn't -- didn't adopt all of them.

Q. Great. And you mentioned a few minutes ago that Exponent has a quality review process; correct?

A. Yes, that's correct.

Q. Would you explain a little more about that

process?

A. We have a -- just -- just to ensure that our work is technically accurate to the extent that we can make it involving really very, very technical matters as we do, we have that review process that includes, for example, the author of a report signing off on that. Well, I shouldn't say that. The author of a report submits that online, and then our editorial reviewer makes sure that it's in a format that we like or a format that was provided to us.

In some cases, like these, we are provided with a format with the paragraph numbers and that sort of thing. And he made sure -- and reviews that editorial. Then we have the technical reviewer such as Dr. Hallai. And he approves that the document as it's going out is technically meets -- he's approved that. And then in the end, a principal reviewer such as myself, since I'm a principal engineer at the firm, has the final sign-off on it. That may be the author or it may be another principal in the firm with some knowledge of these types of things but is not the expert who reviews it for our limitations language that we have in a paragraph. And just generally, meets the standards of our quality system.

Q. I see. Okay.

So the person with the final say during the quality review process is the principal reviewer?

A. Yes, that's correct.

Q. And were you the principal reviewer with respect to the '022 and '506 declarations?

A. That's correct.

Q. And that means that you reviewed both of these declarations before they were submitted?

A. I wrote them and reviewed them and -- and the -- I'm the principal reviewer on these because in certain situations such as these highly technical matters, it's difficult for another principal without that background to come in and fully understand it and take the time to fully understand it so we could have a provision for somebody like me, I wrote the report, but I have, as I said, editorial review and technical review to ensure that the document meets our standards. And then I have the final sign-off.

Q. So next, I'm going to share a few more documents with you through the chat window so that you have them easily accessible for you. The first --

A. Okay.

Q. -- I'm going to share Exhibit 1001 from the '022 IPR, that's the '022 patent.

So give me just one second.

A. Yes.
Q. I just sent that file. Let me know when you have it downloaded.
A. Yes, it's downloaded.
Q. Great.
A. And I have it open.
Q. Thank you.
So this is U.S. Patent No. 9865022. Do you recognize this patent?
A. Yes, I do.
Q. And if I refer to the "'022 patent" during today's deposition, will you understand that I'm referring to U.S. Patent No. 9865022?
A. Yes, I will.
Q. All right. Now I'm going to share Exhibit 1001 from the '506 IPR, that's the '506 patent. I just sent that.
Let me know when you have it open.
A. It's open.
Q. This is U.S. Patent No. 10726506. Do you recognize this patent?
A. Yes, I do.
Q. And if I refer to "'506 patent" today, will you understand that I'm referring to U.S. Patent No. 10726506?

A. I will.
Q. Great. Thank you.
I'm now going to share with you Exhibit 1005, also called Budiman, in the chat window.
I just sent that. Please let me know when you have it open.
A. I have it open.
Q. This is U.S. Patent No. 8892407 to Budiman, et al. Do you recognize this patent?
A. Yes, I do.
Q. Today if I refer to "Budiman," will you understand that I'm referring to U.S. Patent No. 8892507?
A. Yes, I refer to it and most commonly remember it by Budiman.
Q. Great. And you understand that that is Exhibit 1005 in these two cases?
A. Yes, I understand that. But that's not the way I remember it.
Q. Totally understand. Thank you.
And you understand that Budiman is Exhibit 1005 in both of the two IPRs; correct?
A. Yes, I understand that.
Q. Thank you.
I'm now going to share Exhibit 1006, also

called "Pirovolou" in the chat window.

Okay. I just sent that so let me know when you have it open, please.

A. It's open. I have it.

Q. Great. So this is U.S. Patent Application Publication No. 2010/018-5395 to Pirovolou, et al.

Do you recognize this publication?

A. Yes, I do.

Q. Similarly, if I refer to "Pirovolou," will you understand I'm referring to U.S. Patent Publication 2010/018-5395?

A. Yes, I will understand that.

Q. And you understand that Pirovolou is Exhibit 1006 in both of these two cases?

A. Yes.

Q. Thank you.

All right. I'm now going to share Exhibit 1014 in the chat window.

Okay. I just sent that. Would you please let me know when you have it open.

A. Yes, I have it. It's open.

Q. Thanks.

If I refer to the "landmark user guide" today, will you understand that I'm referring to the excerpts of this landmark user guide contained in Exhibit 1014?

A. Yes, I will understand that.
Q. And you understand that the landmark user guide has been submitted as Exhibit 1014 in both of the two cases?
A. Yes, I understand that.
Q. Great. I'm now going to introduce through the chat window Exhibit 2012 which is the claim construction memorandum and order. Give me one second.
Okay. I just sent that. Let me know whenever you have it open.
A. I have it open.
Q. And if I refer to this today as the "claim construction order," will you understand that I'm referring to this document?
A. Yes, I will.
Q. And you understand that this has been submitted as Exhibit 2012 in both of the cases today?
A. Yes, I understand that.
Q. Thank you.
Are you aware that the '506 patent is a continuation of the '022 patent?
A. Yes, I'm aware of that.
Q. So you understand, then, that the specification of the '022 patent is the same as the specification of the '506 patent other than the claims of each patent and

the section titled "Cross-Reference to Related Applications"?

A. I haven't performed an analysis word by word. I have certainly reviewed both '506 and '022 patents, but I'm aware that the specifications are generally the same.

Q. So if I refer, then, today to the specification of the '022 patent, you will understand that the '506 patent has generally the same disclosure?

A. Generally the same disclosure; correct, yes. I would -- we will have to go and -- if I think it's different or if I think there is a difference, I will be sure to mention that I disagree or we can look at the word. But they're generally the same.

Q. That sounds great. Thank you.

So next I would like to look at your '022 declaration. And do you still have access to that on -- from the file I downloaded for you? Or I sent you?

A. Yes.

Q. Let's look at paragraph 18 of your '022 declaration. And this starts on page 11 if that helps.

A. Materials considered?

Q. Yes.

A. Yes, I have that.

Q. This is a list of documents that you considered

in preparing your declaration; correct?
A. That's correct.
Q. Are there any other documents that you considered in preparing your declaration?
A. No, I don't believe so. As part of my process, these types of matters, I have access to Society of Petroleum Engineers' library of papers. I keep up the current technology. And so I read papers from time to time. But these are the documents that I relied upon.
Q. And does this also include any documents that Dr. Hallai relied upon in his analysis?
A. Yes, he probably reviewed all of these as well.
Q. Did Dr. Hallai review any other documents that are not listed here?
A. Not that I'm aware of.
Q. Did you confirm with Dr. Hallai whether he reviewed any other documents?
A. Yes. He would -- he would, in fact, bring them up to me if he thought it was relevant. And I don't recall him bringing up anything that was not on this list that was relevant to our discussions.
Q. Did you specifically ask him just to confirm that there was nothing else that should be listed here?
A. Yes, I would ask him, have you seen anything recently that might help? And he would -- and that's

part of his duty is to assist me in these matters and this -- this would be a complete list of the things that he reviewed that were relevant to writing the report. Declaration, excuse me.

Q. Let's look quickly at your '506 declaration.

A. Yes, it's up.

Q. Great. Let's look at paragraph 18 of that declaration.

A. Yes.

Q. So these are the documents that you considered in preparing this '506 declaration?

A. Yes, that's correct.

Q. Are there any other documents that you considered in preparing this declaration?

A. It would be the same as the '022 and as we talked about before, the specifications of both patents are roughly the same, generally the same. So these documents have similarities. I can't remember if they're identical lists, but these -- same answers I had before. These are the documents I relied upon.

Q. Great. And so then for both of the declarations, the '022 declaration and the '506 declaration, are there any documents that other reviewers at Exponent considered?

A. No. I don't believe so. I really was just me

and Dr. Hallai.

Q. And is there a process in place during the quality review procedure that would ensure to list any documents that any reviewer considered?

A. Yes, we maintained files, folders, project files, project folders. And if there was important information that -- that was relevant and we wanted to consolidate it into one place, we have those documents. And those documents are on our files.

Q. Let's turn back to your '022 declaration.

A. Okay.

Q. Let's look at paragraph 15.

A. 16?

Q. I'm sorry, 15, 15.

A. 15.

All right. Yes, I have that up.

Q. What is your understanding of the meaning of the term "person of ordinary skill in the art"?

A. That is -- that is a -- there is a definition of it, and there's a definition applicable or defined by the parties in the matter. That's one definition.

But essentially, it is a person of education and experience who would be able to understand the content of the specifications claims of the patents in the matter and the prior art in the matter at the time

of the publication of the patent at the subject of the matter.

For example, in these two patents, '022 and '566 [sic], those have priority dates of -- I believe it's June 2013. And so the POSITA would meet those requirements of expertise, technical expertise, education, and experience for that time period.

Q. Thank you.

Let's now turn to paragraph 2 of your '022 declaration.

A. Yes, I'm there.

Q. So you state in this first sentence of paragraph 2 that the petition challenged Claims 1 through 6, 9, 10, 13 through 18, 21, and 22 as allegedly being unpatentable; is that correct?

A. You read that correctly.

Q. Thank you.

Let's flip one page earlier and look at the table of contents on page 3 of your '022 declaration.

A. Yes.

Q. Let's look at Section 7, "Detailed Obviousness Analysis." Do you see that?

A. Yes, I do see that.

Q. Which claims of the '022 patent have you addressed in this declaration?

A. As you know or as you just pointed out to in the other paragraph, there are grounds which address various claims of the '022 patent. I addressed Claims 1 or certain elements of Claims 1 and 13 in this table of contents, the Limitations 1.2 and 13.2; in No. 2, Limitations 1.3 and 13.3; in No. 3, Limitations 1.4 and 13.4; and No. 4, 1.5 and 13.5.

And then there's a subject heading B, "Dependent Claims," in which I've addressed Claims 9 and 21, which are dependent on 1 -- Claims 1 and 13 respectively, I believe.

Q. And did you decide which limitations of Claims 1 and 13 to include in your declaration?

MR. STAVINOHA: Caution the witness not to reveal any communications with counsel.

You can answer the question to the extent you can do that without revealing any communications with counsel.

THE WITNESS: Yes, I reviewed all claims of the patents and reviewed all of the specification of the patents. And I will speak in plural for the '022 and '506 patents because they have that generally same specifications and similarities in the claims.

I reviewed all of those and then as we worked through the report and started the draft report, then we

refined with Mr. Stavinoha which we should address, which ones we should address in final -- in the final version of the report.

BY MS. OLIVER:

Q. And did Dr. Hallai have any involvement in deciding which limitations to address in these declarations?

A. No. Per my recollection, I was responsible for that.

Q. So did you consider the analysis provided by Dr. Shubert with respect to the limitations that you have not addressed in your declaration?

A. I was aware of them certainly. I read his declaration and I've read his deposition. And so I was aware that he may have addressed others of the claims that I have not addressed in my declaration.

Q. Did you have any disagreements with Dr. Shubert's analysis of the claims or limitations that you do not address in your declarations?

A. I don't -- since they don't appear in my declaration, I can say that maybe I disagreed with some of his conclusions, but I focused on what I have in my -- as those claims and my analysis ended up in the final report.

Q. But as of right now, you can't think of any

particular disagreements that you had with the analysis provided by Dr. Shubert of claims and limitations that you have not addressed in your declarations?

MR. STAVINOHA: Object to form.

THE WITNESS: Correct. That's correct. My total focus has been on preparing for this deposition is what's in my declarations. So the other stuff I'm -- I don't recall.

BY MS. OLIVER:

Q. Thank you.

Were there any limitations or other dependent claims that you had addressed in a preliminary form but then decided not to address in the final version of your declarations?

MR. STAVINOHA: Caution you, Dr. Hilbert, not to reveal any communications with counsel. But you can answer the question to the extent you can do it without doing that.

THE WITNESS: Well, to the extent I reviewed all of the claims and, as I just said a moment ago, the petition had claims or addressed claims that are not in my final declarations, we discussed, generally speaking, claims. And in the process of those discussions, it was decided that the final product that both declarations that I have here, those are the declarations that I felt

I had strong opinions on and ended up in the declarations.

BY MS. OLIVER:

Q. And what you've said just now about which limitations and claims were addressed versus not addressed, that testimony applies with respect to both declarations; is that correct?

A. Yes, that's correct.

Q. For the limitations and claims that you have addressed in both of your declarations, did you develop the arguments on the alleged nonobviousness of the challenged claims in both of your declarations?

MR. STAVINOHA: Form.

THE WITNESS: Repeat the question one more time, please.

BY MS. OLIVER:

Q. Sure. I'm sorry.

For the limitations and claims that you have addressed in both of your declarations, did you develop the arguments on the alleged nonobviousness of those limitations and claims?

MR. STAVINOHA: Form.

THE WITNESS: Yes, I developed those arguments. I came to the opinions that I share in this report, these declarations.

BY MS. OLIVER:

Q. Did Dr. Hallai help you develop those opinions?

A. I would say not. As I said, he reviewed those for technical content and to some extent editorial to make things clear. But I was the -- the primary person that came up with those opinions.

Q. Did Dr. Hallai suggest any other arguments that were not ultimately included in your declarations?

A. I don't believe so.

Q. Let's look at -- again, at your '022 declaration. And let's take a look at paragraph 31. 3-1.

A. Yes. I'm there.

Q. Thank you.

Do you see in this paragraph your statement that objective evidence of nonobviousness, also referred to as secondary considerations of nonobviousness, should be considered when evaluating whether a claimed invention would have been obvious?

A. Yes, I see that.

Q. Did you consider any secondary considerations evidence when reaching your opinions on the obviousness of the challenged claims?

A. No, I believe in both of these declarations, we do not address or had not come to opinions on secondary

considerations or secondary indicia.

Q. Are you aware that the patent owner has argued that the claims are nonobvious based on secondary considerations evidence?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: I don't recall that specifically. I did not address that in my declarations.

BY MS. OLIVER:

Q. So just to confirm, you have not considered anything about secondary considerations?

A. Not at this time.

Q. Thank you.

All right. Let's continue discussing your '022 declaration.

And just for reference, for the most part today, I'm going to refer to the '022 declaration based on our conversation that they're generally substantively the same between the '506 and '022 declarations. Is that okay?

A. I understand that and that's fine with me.

Q. Thanks. Easier not to jump between files.

Let's turn to paragraph 37 of your declaration.

A. Paragraph 37?

Q. Yes.

A. Correct? Okay.

Q. Correct.
A. Yes, I'm there.
Q. Do you see that in this paragraph you discussed the Target Path 104 with respect to Figure 1 of the '022 patent?
A. Yes, I see that.
Q. What is your understanding of the term "target path" as described in the '022 patent?
A. My understanding, of course, there's the definition in the middle of paragraph, Target Path 104 may -- quote, may be defined by a well-planned seismic data and/or other information suitable for delineating the path through the formation 102, unquote. But the target path is a well plan -- is a planned path developed by an engineer, drilling engineer, or petroleum engineer that is termed the target path or I'll call the well plan.
Q. Is the target path along an intended target of the bore hole -- bottom hole assembly?
A. Yes, ask that question again, please.
Q. Yeah. I'm sorry.
Is the target path along an intended target of the bottom hole assembly?
MR. STAVINOHA: Objection. Form.
THE WITNESS: The target path is a hypothetical

predrilled path. And the intention, of course, by the drilling engineer and others involved in that process is for the bottom hole assembly to trail along that path, that target path.

BY MS. OLIVER:

Q. And where did the target path -- scratch that. Let me try again.

Where is the target path intended to be directed to?

A. Ultimately, the target path is to a formation, a geologic formation that has the assets to be developed by the operator, the drilling engineer, and the operator that has high trocar bonds, oil and gas, water, within that formation. Or more than one formation but certainly a formation that holds oil and gas reserves. That's the target.

Q. So the target path intersects a target; is that correct?

A. The target path, as I said before, is a preplanned hypothetical path that is intended and the objective of that intention is to intersect a geological formation that has the oil and gas reserves.

Q. So a target path might have multiple targets on it within a formation?

A. Within a formation, one given formation, it

depends -- well, I don't know that I would characterize that as multiple targets. That path may intersect a length of the geological formation, the target, whether it's a horizontal well, if it's a horizontal well, it will be in the path for -- it will be in the formation for a longer distance to recover more oil and gas reserves. It intersects it at a vertical angle, and it's a shorter path within the formation. But I would consider those both the targets and not multiple targets within a formation. It would be in one formation.

Q. Can you just help me understand how a person of skill in the art understands the term "formation"?

A. "Formation" is -- a person of skill in the art, a POSITA, would understand in this context that a formation is a geological stratigraphic unit within the earth in general. And it may or may not hold oil and gas reserves.

In this particular context, it target -- the target is a geological form, formation, which holds oil and gas reserves. That's how I believe that a POSITA would understand that.

Q. So does the formation just represent one layer of the earth?

A. A geological formation being specific would be one layer. That's correct.

Q. So if you had multiple layers in the earth, you would have multiple formations?

A. Yes. There are instances in petroleum engineering where a producer will drill through multiple formations holding oil and gas reserves and produce oil and gas from each of those formations. And they're separate layers.

Q. And what is the purpose of doing that?

A. To recover more oil and gas reserves.

Q. So in that circumstance where you're drilling into multiple formations, would you have multiple targets?

MR. STAVINOHA: Object to form.

THE WITNESS: If you are, you would have multiple formations which are target formations and one could refer to that as multiple target formations, multiple targets, yes, I will -- that would be fine. There's multiple target formations.

MS. OLIVER: I'd like to talk to you more about this topic, but I realize we've been going for about an hour and I promised you I'd give us breaks about every hour. So is now a good time to take a ten-minute break?

THE WITNESS: That's fine with me.

MS. OLIVER: We'll go off the record and we'll be back on the record -- it's 11:03, let's say 11:13?

THE WITNESS: Fine with me.
MS. OLIVER: Thank you so much. Appreciate it.
THE WITNESS: Thank you.
(A recess was taken.)
BY MS. OLIVER:
Q. Dr. Hilbert, during the break, did you speak with counsel about the substance of your testimony?
A. No.
Q. Thank you.
Okay. I'd like to return to our discussion about the target path that's discussed in the '022 patent.
So you mentioned earlier that the oil and gas reserves that are trying to be obtained are located in a formation; correct?
A. That's correct.
Q. And I just want to make sure I'm using the correct terminology. So is the location in the earth where the oil and gas reserves are located called a formation?
A. Generally, yes.
Q. There's not like a smaller subset of a formation where the reserves are located?
MR. STAVINOHA: Objection. Form.
MS. OLIVER: I can rephrase that.

BY MS. OLIVER:

Q. Is there a different name specifically for the location within a formation where the reserves are located?

A. There can be other names for them like horizon. Some petroleum engineers, geologists, and operators refer to a formation as a horizon. That's just terminology that's used.

But within a formation, I don't want to go off into a dissertation about geology, but the rock formations are heterogenous and the porosity and the formation character of the rock is not continuous and the same all over the formation. So based on seismic data and other data from other wells in the area, you can determine that for a given formation, there will be spots of higher productivity and other locations of lower productivity. So it's not the same in the entire formation. It varies.

Q. I see. Okay.

So when a person of skill in the art is looking at a target formation, is that an XYZ coordinate precise location?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Generally speaking, in the context of petroleum engineering, as I indicated before,

if you're drilling a vertical well only, that could be determined by an XYZ coordinate in the earth. If you are specifying a horizontal well or designing a horizontal well, it might be at the same depth along that path. But that will, of course, have different XY coordinates because it's along a line. And so it depends. But that's the description of what it means to depend.

BY MS. OLIVER:

Q. So would it be more accurate, then, to refer to a target formation as a zone?

A. I don't think that I would say it's accurate. But I would say it's -- it's similar to horizon formation, a zone is also referred to an area of volume of rock that has a -- oil and gas reserves, a zone, I've heard used, horizon, zone, formation. All the same.

Q. So what volume of rock are we talking about here?

Let me rephrase that.

What volume of rock would typically be encompassed by a target formation?

MR. STAVINOHA: Beyond the scope.

Counsel, is this related to a particular opinion that he's offered in his declaration?

MS. OLIVER: This is related to the

understanding of a target path.

THE WITNESS: A zone would constitute a volume of rock within the formation. Hypothetically, it can -- it can range over a wide range of volumes. As I said, it may not be continuous. It may be cut by faults. And become discontinuous. So to try to define a volume would not be useful. It's more identified by the reservoir engineers, petroleum engineers.

BY MS. OLIVER:

Q. So just to be clear, a hydrocarbon target is not just a single point in the ground; correct?

A. Generally speaking, hypothetically, it's not a single point. But the purpose of the target path, the drilling plan, is to make as much contact with the formation, the well bore, as possible so you can produce as much as you possibly can.

Q. Is there any advantage to having the target path hit a certain portion of a hydrocarbon target versus another portion?

A. The role of a reservoir engineer is to define, identify for drilling engineers where those targets may be. And that's based on other data like seismic data as we just talked about in the '022 declaration and in the patent. They refer to those target plans and the target formation.

Q. So when planning a path to obtain oil and gas reserves, the preplanned target path would intersect the hydrocarbon target; correct?

A. That's the objective. The objective of the well plan target path to meet that well plan objective is to -- is to meet that target zone, if you will, using that target formation, target zone, target horizon. And produce oil and gas from that target.

Q. And in the case of a multiple formation set of target hydrocarbons, would the preplanned target path intersect each of the target hydrocarbons?

MR. STAVINOHA: Objection. Form.

THE WITNESS: That would be the objective.

BY MS. OLIVER:

Q. So could we look at Figure 1 of the '022 patent?

A. If you can point me to the page. I believe I'm there, but just to be consistent, let me know the page you're looking at.

Q. Sure. Sure.

This is Exhibit 1001, and it's the label page 3 of 21 is at the bottom.

A. Hold on one second. Are you referring to my declaration or the patent itself?

Q. I'm sorry, just the patent itself.

A. And this is Exhibit 1001 is the '022 patent?
Q. Correct.
A. And we're looking at Figure 1?
Q. Yes.
A. I have it.
Q. Thank you.
So do you recall that reference number 102 in this Figure 1 is referred to as the formation?
A. Yes, I believe that's correct. Yes. But let me -- let's -- let me just -- if you don't mind, can I look at the hard copy --
Q. Yes.
A. -- that I have in front of me.
Just make sure that the reference number 102, I want to be sure that I characterize -- the one -- the '022 patent refers to 102 as the formation.
Q. So in Figure 1, the entire box is reference 102; correct?
A. That's correct.
Q. Does that mean that oil and gas reserves are available in this entire box?
A. I don't think that the specification of the patent states that. And a POSITA would know that the -- as I said before, the rock is heterogenous so there could be more oil in one place than another. There's no

scale on this figure.

So, you know, as we know from -- or as I know as a POSITA working in this area, oil and gas wells can be 1,000 feet underground to 30,000 feet underground. And so to make these sort of hypothetical figures, it's not to scale at all. And it's highly distorted. But the 102 is a formation. There's no specificity in the patent itself about where the oil and gas is within this area in this volume of rock.

Q. So do you recall that reference number 104 in Figure 1 is referred to as the target path?

A. Yes, that's what's referred to in the patent, the '022 patent.

Q. Where does the bore hole of the Target Path 104 begin?

A. It is not shown in the figure. Of course I'm assuming, and that's my assumption, that it's going from left to right. So it enters this block of formation 102 on the left and continues on horizontally approximately horizontally 104, the dashed line to the right. But the origin of the well bore would be at the surface.

Q. Okay.

A. Of the earth. Surface of the earth.

Q. If you could keep this Figure 1 accessible but then also look at paragraph 37 of your declaration.

A. Yes, hold on one second. I will -- let's do this: Let me look at the hard copy of my declaration. And what paragraph?

Q. 37.

A. 37.

Yes, I'm at 37.

Q. Do you see in the middle of paragraph 37 your statement that says -- that starts with, "In addition to Target Path 104, Figure 1 depicts"?

A. Yes, I see that.

Q. The rest of that statement says, Figure 1 depicts Paths 108, 110, 112, 114, 116, and 118, all of which are possible convergence paths from a Point 106 representing a current or future bottom hole assembly BHA location to the Target Path 104.

Did I read that correctly?

A. Yes, you read that correctly.

Q. Is Point 106 illustrated in Figure 1 of the '022 patent?

A. No, it's not visible.

Q. What is your understanding of where Point 106 is?

A. My understanding of 106 is at the left-hand -- you see all of the paths, 108 to 118. And to the left-hand side of Figure 1, they all meet at essentially

the same location. And that, to me, is Point 106. And I think a POSITA would understand that's what is meant.

Q. So are Paths 108 through 118 in Figure 1 each called a convergence path because they converge with that Target Path 104?

MR. STAVINOHA: Objection. Form.

THE WITNESS: I can't get -- I can't get into the mind of the patent writers, but I would say that that is true that each of those paths, the objective of each of those paths is to get at or near the planned Path 104. And so each of these may be getting near Path 104, and it's called convergence path in my opinion because they are trying, not necessarily in order, in any specific order, but attempting to develop well bore paths or drill paths that get near Path 104, near or on 104.

BY MS. OLIVER:

Q. Will you look at the next paragraph of your testimony here. It's paragraph 38.

A. Yes, I'm looking at it.

Q. Do you see the sentence in the middle that starts with "For example, if the bore hole is being drilled and the BHA is off of the target path"?

A. Yes, I see that.

Q. What does "off of the target path" mean?

A. It's at or near the Target Path 104.

Q. The rest of that sentence says, "If the bore hole is being drilled and the BHA is off of the target path, a cost comparison may be used to determine the best convergence path in terms of cost."

Did I read that portion of the sentence correctly?

A. Yes, you did.

Q. Is it your understanding that each of the paths in Figure 108 through 118 has an associated cost?

MR. STAVINOHA: Object to form.

THE WITNESS: Yes, each of those paths would have some cost.

BY MS. OLIVER:

Q. I just want to come back briefly to the first portion of that same sentence regarding off of the target path.

I believe you just answered a minute ago in response to the question what does off of the target path mean, you stated that it's at or near the Target Path 104. If a path is at the target path, is it off of the target path?

MR. STAVINOHA: Form.

THE WITNESS: In the context of the patent, when I say at or near, there is a margin of error that

these paths are at the end of each of those paths, they may be in a margin of error to the Target Path 104. So at or near means within a region of the path, of the Target Path 104. That's what I mean by -- "off" is a term that I interpret to mean close to or on the path. Off -- off doesn't necessarily mean that it's separated from 104. It's at or near 104.

BY MS. OLIVER:

Q. I would like to talk a little bit more about the cost of the path in Figure 1. So would you please turn to the '022 patent itself. And would you look at Column 3.

A. Yes, I'm at Column 3.

Q. And would you look at line 23, please.

A. Yes, I see that.

Q. And do you see the first sentence starting at line 23 that says the process of calculating the cost of a path may involve identifying any of a number of different types of cost such as a distance cost, a sliding cost, a curvature cost, a time cost -- I'm sorry. Scratch this, I read the wrong portion. This is not --

A. That's what I was just going to -- I was just going to say I'm not seeing what you're reading.

Q. I think you're going to tell me that I did not

read that correctly.

Okay. Let's actually look at line 23 this time.

Okay. This says, By calculating a monetary value, e.g., a value in the United States dollars for a particular segment of a path, e.g., a unit of measure such as a foot, and adding up all of the segments for the path, a cost can be identified for a particular path.

Did I read that correctly this time?

A. Yes, you read that correctly.

Q. So is it your understanding from this passage that the total cost of a particular path is obtained by adding up the respective cost of each segment of the path?

A. That's what that -- that's what that sentence states. In my -- in my understanding.

With focus on the word "a cost can be identified," there are many types of costs associated in the patent specification, but for this sentence here, it does say, as you read it, for a particular segment and adding up all of those segments on the path, a cost can be identified for each particular path.

Q. Okay.

A. Yes.

Q. Let's look -- return briefly to your '022 declaration and look at paragraph 39.

A. Yes, I'm at paragraph 39.

Q. And in this paragraph, you discuss Figure 3 of the '022 patent; correct?

A. Yes.

Q. So in the second sentence of paragraph 39, you state that the method 300 may be used to identify multiple possible convergence paths, narrow the identified paths to a single best path based on cost and select that path as the path to be used.

Did I read that correctly?

A. Yes, you read that correctly.

Q. So is it your understanding that the objective of Figure 3 from the patent is to determine the best path as the path that meets the cost parameters?

A. One second. Let me read that again.

MR. STAVINOHA: Lynette, I had an objection to form to that last question. I don't know if you caught that.

THE STENOGRAPHER: It was not audible.

MR. STAVINOHA: I will be louder next time.

THE STENOGRAPHER: Thank you.

THE WITNESS: Sorry. In the sentence itself and as per the patent and per the Figure -- Figure 3, it

selects the path based on cost. It says it's not clear when we say that path is used, that path, I think at the end, our foot selected path, that path is the one that is produced from that flow chart based on those costs. But there are other -- as you see in the other boxes of Figure 3, there are other criteria for selecting a path. But ultimately, cost is used as a selection process.

BY MS. OLIVER:

Q. So then let's turn to the next paragraph in your declaration, paragraph 40.

A. Yes.

Q. And in this paragraph, you're discussing Figure 4 of the '022 patent?

A. Yes.

Q. And do you see in Figure 4, which you've reproduced in your declaration -- sorry. Scratch that.

Do you see in Figure 4 of the '022 patent that the total cost for paths is identified in Set 410?

A. Yes, I see that.

Q. And is it your understanding from Figure 4 that the total cost of a path is always based on three particular costs, specifically the offset cost, the curvature cost, and the time cost?

A. That's one embodiment in the specifications. There could be other criteria, other cost criteria, and

other criteria in general. And Figure 4 in that embodiment, it does list offset cost, curvature cost, and time cost. But in my opinion, there are other criteria to base the selection of the paths.

Q. So in some circumstances, then, could an embodiment exist where not all three of these costs that are shown in Figure 4 are used?

A. Yes. That is to say the claims identify that claim limitations include at least one of those costs so there could be more or less than those three identified in Figure 4.

Q. Let's talk about a later portion of your declaration now. Would you please turn to paragraph 56 of your declaration.

A. 5-6?

Q. Yes. And this is section 5F of your declaration; correct?

A. I see it. I'm there.

Q. Thank you.

So do you see that you have construed two terms in the '022 patent?

A. Yes, that's correct.

Q. Would you please identify which terms that you have construed in this '022 declaration?

A. Yes, I can. Number 1, calculating by the

computer system an offset distance for drilling by the BHA each of the geometric convergence paths connecting the bottom hole assembly location to the target drilling path.

And No. 2 on page 43, determining by the computer system a drill path curvature associated with drilling each of the geometric convergence paths by the bottom hole assembly.

Those two terms, I have construed.

Q. And are those the same terms that you construed in the '506 declaration?

A. I believe so, but let me check for thoroughness.

I think the structure of my report is essentially the same, maybe not the same pages but should be essentially the same.

Yes.

Q. So looking again at your '022 declaration in paragraph 57.

A. Yes.

Q. You have specifically construed the term "offset distance"; is that correct?

A. Correct.

Q. And you have construed "offset distance" to mean an offset distance of a geometric convergence path

relative to the target drilling path; is that right?

A. Let me see. I hesitate to go on memory.

I'm looking at paragraph 57 in the first sentence, should be construed to mean an offset distance of a geometric convergence path relative to the target drilling path consistent with the ordinary meaning of the phrase in light of the specifications of the '022 patent. That's my -- that's what I have construed.

Q. I would like to briefly talk about Exhibit 2012, which I shared with you earlier. This is the claim construction order from the district court litigation.

Would you mind pulling that up and letting me know whenever you have it.

A. Exhibit 2012.

Yes, I have it. I have pulled it up.

Q. And would you look at pages 10 and 11 starting at page 10.

A. Yes, I'm at page 10.

Q. Do you see the top of page 10, the first line says, "The parties' positions"?

A. Yes, I see that.

Q. And do you see that underneath that header on page 10, "The Court discusses the '022 and the '506 patents"?

A. Yes, I believe I see that.
Q. And if you will look at the sentence that is -- starts on page 10 but then goes on to page 11, do you see that sentence?
A. It begins with H&P responds?
Q. The next sentence right after that one. It begins with "For support."
A. Yes.
Q. And that sentence says, "For support, H&P points to the declaration of its expert, Dr. Hilbert"; correct?
A. Yes. I see that.
Q. Are you the same Dr. Hilbert that's being referred to in that sentence?
A. Yes, that's correct.
Q. And did you submit a declaration in the District Court proceedings about claim construction?
A. Yes, it's been quite a while, but I remember that I had submitted a declaration in that matter.
Q. And in the declaration in the District Court case, did you construe the terms "offset distance" and "drill path curvature"?
A. Honestly, I can't recall, but I'm fairly certain I did not. Fairly certain.
Q. But you are construing those two terms in this

case; correct?

A. In the IPR, yes.

Q. Why did you not construe those terms in the District Court litigation but you are construing them in the IPRs?

A. Because of the nature of the specifications in the '506 and '022 patents, I believed that it was important to further construe or to construe those two terms.

Q. And how was that different than the need to construe those terms in the District Court proceedings?

A. I can't recall specifically what led me to that decision. But of course, the IPRs came later. In the process of reviewing those patents, I believe those two terms in particular were important to responding to the petitions.

Q. So were you the one that decided which terms to construe in the District Court litigation?

MR. STAVINOHA: I'm going to counsel the witness not to reveal the content of any discussions with counsel.

You can answer to the extent you're able to do it without revealing the substance of your communications with counsel. But otherwise, I'd instruct you not to answer.

THE WITNESS: Please ask the question again.
BY MS. OLIVER:
Q. Sure.
Were you the one that decided which terms to construe in the District Court litigation?
A. I can't recall the details of that process. As I sit here right now. And I'm being perfectly honest about that. I don't recall that. You know, these are two different processes, and at the time that the declarations and the construction was done back in 2021 or so, I can't recall the details of that process, except that I recall the IPRs because they're more recent. And it seemed like those were important terms to me at that point in time.
Q. So were you the one that decided which terms to construe in the IPRs?
MR. STAVINOHA: Same caution, Dr. Hilbert. You can answer to the extent it doesn't reveal communications with counsel.
THE WITNESS: Yes, I believed that those two terms were important to my analysis of the petitions and the claims in the matter.
BY MS. OLIVER:
Q. Would you look at your '022 declaration again. And this should be on the same page, page 39.

A. Page 39, yes. Oops, wait. Let me get to page 39.

Okay. I'm at page 39.

Q. Do you see Footnote 1 on page 39?

A. Yes, I see it.

Q. Do you see the second sentence of Footnote 1 that says, "The District Court construed the terms disputed by the parties to have their ordinary meaning"?

A. Yes, I see that.

Q. And now let's look at the top of this same page, paragraph 56 of your declaration.

A. Yes, I see that.

Q. You state in paragraph 56 that you have interpreted the claims in accordance with the ordinary and customary meaning as understood by one of ordinary skill in the art; is that correct?

A. Yes, you read that correctly.

Q. Did you also construe the terms in the District Court litigation according to their plain and ordinary meaning?

MR. STAVINOHA: Objection. Relevance.

THE WITNESS: I believe so. I believe so. I mean, as I said before, that was some time ago, but I believe that would be correct. That's the way that I viewed it.

BY MS. OLIVER:

Q. So why did you believe it was necessary in the IPRs to provide a specific construction of these two terms when you were construing the terms according to the plain and ordinary meaning?

A. In the petitions, I believe that those two terms needed to be construed as I did in light of the content of the petitions, Dr. Shubert's declaration, and in reading claims at the heart of these matters themselves. And believed that, in my opinion, I needed to further define them or construe them at the time that I was writing these IPR declarations.

Q. Let's turn a couple pages later in your declaration to paragraph 62.

A. I'm at paragraph 6-2, 62.

Q. And in this section, you are discussing the term "drill path curvature"; is that correct?

A. That's correct.

Q. And at the end of this paragraph 62, you state that the term drill path curvature in Limitations 1.3 and 13.3 should be construed to mean an overall curvature of a given geometric convergence path; is that right?

A. That's correct. You read that correctly.

Q. Would you please explain what "overall

curvature" means.

A. In the specifications of the '022 patent and the '506 patent, it uses, for example, overall curvature to mean, for example, average curvature. So while a drill path might have many twists and turns, the overall average would be different than individual twists and turns in a given path so the overall curvature, as I understand the '506 and '022 patents, look at the overall curvature but also maximum or peak curvatures, dogleg severity, which is also a curvature, but overall curvature is also considered. So they have defined several curvatures, one is the overall curvature and the specification uses, as an example, average curvature.

Q. So I just want to be clear on one point: In paragraph 62, you say an overall curve in that sentence that we just discussed; right?

A. That's correct.

Q. Can you keep a thumb on that page and then flip over to the end of paragraph 65, this is kind of located --

A. I see paragraph 65. I have it.

Q. So toward the top of page 47, you say that a POSITA would have understood that the claimed drill path curvature is the curvature of the convergence path as a whole; is that right?

A. Yes, in the context of the limitations, that's what I referred to, that a POSITA would understand in the context of the limitations the patent writers are referring -- would have understood that the claimed drill path curvature is the curvature of the convergence path as a whole.

Q. Just to be clear, when you say "as a whole," you mean the same thing as you meant when you said overall curvature?

A. Yes.

Q. Is overall curvature a term of art that is commonly used in the oil and gas industry?

A. I believe so.

Q. So since that's a term of art in the industry in your opinion, how would someone calculate the overall curvature of a path that has multiple curves?

A. I didn't perform that analysis specifically in this declaration or in these declarations. I was guided by the response guided -- I was responding to the arguments put forth in the petitions, IPR petitions, and in reading the '506 and '022 patents came upon several terms for curvature and specifically the overall curvature or the average curvature. And I did not make an analysis of precisely how to calculate that. And I -- you would not be able to find that in my

declaration. I did not perform an analysis nor have I defined mathematically how to calculate that. That hasn't -- that analysis has not been performed yet.

Q. But you said the term "overall curvature" is a term of art?

A. It can be -- a term of art in looking at an actual drill path curvature, there are doglegs, there are bends, et cetera, that can be characterized by curvature as they have done in the '022 and '506 patents. But an overall curvature would be the overall curvature of a path or a selected path in a drill -- in a drilled path.

Q. So you said that the term "overall curvature" is commonly used in the industry; correct?

A. I believe so, yes.

Q. What unit of measurement would overall curvature be measured in?

A. Curvature is measured in the change in angle of the path at two points divided by the length of the path between those two points. And so those units would be angular measurement divide by length.

Q. So since overall curvature is commonly used in the industry in your opinion, how would a POSITA in the industry calculate overall curvature?

A. For example, the angles tangent to the ends of

the path calculated by the length of that path. So you would get a change in angle divided by the length of the path. And there are many ways to do that and I haven't performed an analysis of how that's done for the purposes of this declaration.

But in the -- in the patents themselves, they refer to overall curvature as, for example, average curvature. And so I have not performed an analysis of how to calculate that specifically, average curvature.

Q. So is your understanding of the term "overall curvature" based on how that term is used specifically in the '022 and '506 patent?

A. I have specific focus on the '022 and '506 patents and have construed what that means in the context of those specifications. But I recognize that knowing what I know as a POSITA about how a well is drilled physically and how one calculates things, I recognize that there is an overall curvature.

Q. So outside of the context of the '022 and '506 patents, is there a standard way to calculate overall curvature in the industry?

MR. STAVINOHA: Object to form.

THE WITNESS: There's no -- there's no standard, I believe. There -- there are many papers written about curvature, dogleg curvature, drilling

horizontal wells, drilling vertical wells and -- and different engineers and scientists may approximate and calculate the curvature over a given path differently.

The overall idea of overall curvature is known, well known. But the -- calculating it may vary from place to place, from engineer to engineer. So I don't believe there is a standard way of doing it. There are approximations that people commonly use.

BY MS. OLIVER:

Q. So in the context of the '022 and '506 patents, the only example that were given of how to calculate overall curvature is the average curvature; is that right?

A. In the specifications of those patents, there are other examples of -- and I believe that's also in my declaration, of determining the peak curvature, dogleg curvature, and how that may vary using a concept of a window of looking at different lengths of the drill path and assessing what those values are.

Q. So specifically focusing on overall curvature and how it's used in the '022 and '506 patents, are there any examples of how overall curvature is calculated other than the example of an average curvature?

A. May I search through my --

Q. Of course. Take your time.

A. -- declaration, and I may ask if I can search through the '022 patent itself.

I'm looking for a specific area, specific to my declaration.

Yes, I'm on page 49 of my '022 declaration. Paragraph 68. And if one reads down to the bottom of paragraph 68, quote, in Step 606, the peak curvature of the path is identified, dot, dot, dot, using a defined window, for example, a window spanning a defined number of feet to identify dogleg severity.

And I interpret that to mean that they, in the process of that system or method 600, Figure 6, the patent writers specify looking at various curvatures by looking at a window to focus or enlarge the length of that path. So they can -- the smaller -- the smaller it is, if you've got -- if that path is very squiggly, the smaller that window captures one of those squiggles as a dogleg severity. If you enlarge that, then you would be able to get a different value of curvature, as they explain in -- at or about Column 11, lines 30 to 35, and further, Column 11, 36 to 40, and so forth.

Q. So is it your position, then, that peak curvature is the same thing as overall curvature?

A. In the context of these patents, by -- well,

no, I think the straightforward answer is no, peak curvature is not overall curvature. It depends on the circumstances and the specific example, an exemplary drill path may have -- may be squiggly as I, you know, term it. And focusing on one of those squiggles will give you one curvature. Then if you open -- which would be associated with one arc of that curve.

And then if you opened that, you may get many squiggles and you would be looking at the peak of all of those little squiggles, and then if you opened that further, you would have an overall curvature which is termed in the -- or as an example in the patent average of that window length.

Q. So is peak curvature an example of overall curvature?

A. I don't believe so. If you had -- if you had constant curvature in a window, peak would be the same as the overall, for example, hypothetically. But in general, no. The peak would be different than the overall curvature.

Let me specify or correct.

It would have the same units because curvature is curvature, change in angle over change in length. But it would not be the same values necessarily.

Q. So in a hypothetical situation where the window

for the peak curvature is the entire path from beginning to end, would the peak curvature be the same as the overall curvature?

A. Hypothetically, I think one could envision some circumstance in which it would be identical, only numerically. But that is not the intent, of course. But that's a -- hypothetically, you could have, for example -- if the window has one arc in it, then the peak curvature may be the same as the overall curvature because it's only got one arc. It's only got one dogleg or curve in that window. And then that peak would be the same as the overall, which would be the same as the dogleg by just focusing on one curve -- curve section.

Q. Okay.

MS. OLIVER: So I see the clock and I'm trying to be mindful of our break. We've been going for another hour. Is now a good time for you to take another ten-minute break?

THE WITNESS: Sure.

MS. OLIVER: So it's 12:14. Let's go off the record and we will come back on the record at 12:24. Does that work?

THE WITNESS: Is that fine?

MR. STAVINOHA: That work for you?

THE WITNESS: Yes, works for me.

MR. STAVINOHA: All right. Sounds good.

(A recess was taken.)

BY MS. OLIVER:

Q. Welcome back, Dr. Hilbert.

A. Thank you.

Q. During the break, did you speak with counsel about the substance of your testimony?

A. No, we had no conversation like that.

Q. Let's go back to paragraph 62 of your declaration, the very end of that paragraph.

A. Page 44?

Yes, I'm there.

Q. So in this paragraph, you provide your construction of the term "drill path curvature" as meaning an overall curvature of a given geometric convergence path; correct?

A. Yes. That's correct.

Q. Just to confirm that I understand correctly, what is your understanding of what overall curvature means?

MR. STAVINOHA: Objection. Asked and answered.

THE WITNESS: Per the definition or the construction that I have suggested, and I construe it to mean the overall curvature of the entire path not just a point within it, but the overall curvature. And one

example would be the average curvature over that path. But that's the entire path is what that comes down to.

BY MS. OLIVER:

Q. Let's consider a hypothetical example.

So let's say that a path has two curves, and the first curve has a curvature of 10 degrees, and the second curve has a curvature of 20 degrees. Would the average curvature of that path as a whole be 15 degrees?

MR. STAVINOHA: Objection. Form.

THE WITNESS: I haven't performed that analysis. I don't want to pull out pencil and paper and do that math. That's -- that, I think what you are doing, is an arithmetic average of those two values. But that assumes that both are constant arcs with no line in between, straight line in between them connecting them. It would be looking like an S, two curves of each S. And I don't know that that would be the same as the overall curvature because I've performed no analysis of what they mean, what the patent writers mean and within the bounds of the intrinsic evidence what it means by an average.

An overall curvature is an average, an overall curvature is the overall curvature of the overall path, convergence path specifically. But how that average is calculated or how that overall is calculated, I don't

know. I'm not prepared to address that. I haven't performed the analysis. Except as what I read in the intrinsic evidence in the specification.

BY MS. OLIVER:

Q. So a person of skill in the art reading the specification of the '022 patent would not understand how to calculate an overall curvature?

MR. STAVINOHA: Objection. Mischaracterizes testimony.

THE WITNESS: No, that's not what I meant.

A person of skill in the art would know how to go about potentially developing a method to calculate overall curvature. But I think that could vary -- a method for doing that could vary from engineer to engineer.

I can think of, as I said before in my previous testimony here, a couple of ways to interpret average, a couple of ways to compute an average over the distance or window. But I don't know -- there is an average specified by the patent writers. But they had not implemented a calculation procedure. And so one would be left to calculate that themselves.

BY MS. OLIVER:

Q. Dr. Hilbert, I'm going to share in the chat window a new exhibit that you have not seen. So give me

just one minute.

Okay. I just sent it. Let me know when you have that open.

A. Yes, I have it.

MR. STAVINOHA: For the record, I'm going to go ahead and object to this new exhibit based on relevance, hearsay, authenticity.

MS. OLIVER: Sure.

And I will start by offering the exhibit up, which is -- this is marked as Exhibit B as a deposition exhibit. This is an annotated copy of Figure 1 of the '022 patent, the annotations have been added by petitioner's counsel.

(Exhibit B marked for identification.)

BY MS. OLIVER:

Q. Dr. Hilbert, do you recognize the number at the top of this document referring to the patent number as 9,865,022?

A. Yes, I recognize that.

Q. And that's the '022 patent number; correct?

A. That's correct.

Q. And other than all of the annotations added in color, do you recognize the rest of what is in this document as Figure 1?

A. Other than the color annotations, I recognize

that as being Figure 1 of the '022 patent.

What I'm trying to do here is to rotate it. But I think we can -- if I can't figure it out, I can -- I can speak to it or testify to it if necessary.

Q. Please take your time to figure out how to rotate it. I can't read things sideways, so I don't expect you to.

A. Oh, here we go. That was easy. Okay.

Yes, I have rotated it. So -- in landscape.

Q. Great.

I will just say, again, that all of the annotations in color have been added by petitioner's counsel. Do you understand that?

A. Yes, I understand that.

Q. Typically, Dr. Hilbert, this is something what we would just present to you in person at a deposition. But since this is a remote context, we have to do this a little bit differently. Just so you understand.

A. That's fine. I understand.

Q. So looking at this Exhibit B, do you see Path 118, which has been circled in purple?

A. Yes, I see that.

Q. How many curves are in Path 118?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: In my opinion, the rendering that

I'm looking at with the long dashes indicates two curves. Or two sections that are curved.

BY MS. OLIVER:

Q. And where are those curves located on Figure -- excuse me, where are those curves located on Path 118?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: Generally speaking, one to the left and one to the right.

BY MS. OLIVER:

Q. Is the first curve located in Path 118 at the location where we have added in purple the number 118-B?

MR. STAVINOHA: Objection. Form. Beyond the scope.

THE WITNESS: That portion appears to have some curve from 118-B.

BY MS. OLIVER:

Q. And is the second section of curvature in Path 118 located at what we have marked in purple as 118-C?

MR. STAVINOHA: Form. Beyond the scope.

THE WITNESS: That would also appear to be a curve segment or section or arc.

BY MS. OLIVER:

Q. Do you see Path 108, which has been circled in red?

A. Yes, I do.
Q. How many curves are there in Path 108?
MR. STAVINOHA: Objection. Form, beyond the scope.
THE WITNESS: It would appear that there is one curved portion, an arc.
BY MS. OLIVER:
Q. And is that one curve located at what we've marked in red as 108-B?
A. B, as in bear, or B, as in Brun, yes. There's a curved section at or near the annotation 108-B.
Q. So how would a person of skill in the art measure the overall curvature for Path 118?
MR. STAVINOHA: Objection. Beyond the scope.
THE WITNESS: I've not performed that analysis. It's -- in the specification of the patent, it gives, for example, the overall curvature, being the average curvature of that path, 118, for example. And I -- as I testified earlier, I've not performed an analysis to determine what average -- how you would calculate that average. But it would be the average, the overall curvature would be, for example, the average curvature of that entire path.
There are two curves in it. I don't know, there are many ways of attempting to approximate an

overall curvature or calculate an overall curvature. And I haven't performed that analysis. But you would -- given that path, 118, there would be a number that would represent an overall curvature that may or may not be the same as the other curves drawn in that path, hypothetically.

BY MS. OLIVER:

Q. So would one way to calculate the average curvature of Path 118 be to take the average of the curvature of 118-B and 118-C?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: I don't know. I haven't performed that analysis to see if that -- if that would make sense to me. It might to another engineer, but that -- there are other ways to do that and I haven't performed that analysis to see which of those makes sense.

BY MS. OLIVER:

Q. So let's take a look at Path 108 in this figure.

A. Yes, I see that.

Q. Would the average curvature of Path 108 be the curvature of 108-B's curve?

MR. STAVINOHA: Beyond the scope.

THE WITNESS: I don't know. I haven't

performed that analysis. There would be many ways to compute or calculate that, and I haven't developed an opinion in my declaration or declarations on how to do that, how one would calculate that. So I can't say -- I don't have an opinion on whether the curvature at 108-B would be the overall curvature.

BY MS. OLIVER:

Q. Does the '022 patent explain how to calculate an average curvature?

A. The specifications, as I testified earlier, have a -- Columns 8 -- or Columns 11, I think it's of the '022 patent, refers to a procedure for using a window. And so they don't provide a -- I can understand that there is that specification that they use for the window for looking at the peak curvature and an overall curvature and a dogleg severity. They provide those examples in the embodiments in the specifications. That would be one way to do it. But I don't -- I don't know what goes into calculating that from the window.

Q. So looking again at Exhibit B, the annotated version of Figure 1, would the peak curvature of Path 108 be the curvature of the curve at 108-B?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: I don't know. I don't think I can -- it depends -- it depends on if that arc is a arc

of constant radius or if it's broken up into several arcs that have different radii of curvature. And so I can't speak to whether what would be in that rendering the peak curvature. Because it may change from point to point on that arc as it's not clear and it's not in the -- in the patent specification, it doesn't say that that is a curve of constant curvature or if it has a variable curvature.

BY MS. OLIVER:

Q. So in a hypothetical example where a path has one curve and that curve is an arc of constant radius, would the curvature of that curve be the peak curvature of that path?

MR. STAVINOHA: Objection. Form, beyond the scope.

THE WITNESS: I haven't performed that analysis. And -- and it would depend on the -- as demonstrated or proposed in the specification, it would depend on the length of that window, whether -- whether that is the peak curvature, if it was a constant curvature, I -- it would be just based on this little hypothetical situation. Of course, if it's a circle connected to two lines, an arc of a circle has constant curvature. But I can't tell that from this figure. And depending on what that window size, I think the

curvature, the overall curvature may change, the peak curvature may change, depending on that window. But, for example, a circle has a constant curvature. That's about all you can say from this.

BY MS. OLIVER:

Q. Again, looking at Exhibit B, which is the annotated version of Figure 1, do you see Path 114?

A. Yes, I do.

Q. Does Path 114 contain any curves?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: It does not -- it does not appear to, but it could be a very large arc, but it appears to be a straight line. I don't -- I do not believe that -- in the specification to the patent, let me -- let me do this. I look -- I don't know that they specify in the patent that it's a straight line or not. But if I may have a moment to look for 114.

BY MS. OLIVER:

Q. Sure.

A. One of the nice things, of course, is that this is searchable. And we don't have to spend all day reading it. This won't take long, I don't believe. It will take as long as I need.

As I recall in the patent, having looked through here this time, I don't see in this

specification that it is defined as a straight line. But it appears that it may be a straight line maybe. I'll go back to that figure. Okay.

Q. So assuming that Path 114 is a straight line, would the overall curvature of that straight line path be zero?

MR. STAVINOHA: Beyond the scope.

THE WITNESS: By definition, a straight line has no curvature. And if it's a straight line, then it would have zero curvature hypothetically.

BY MS. OLIVER:

Q. Let's move back to the '022 patent itself. And would you mind looking at Figure 1 of the '022 patent.

A. Figure 1 of the '022 patent, yes, I'm there.

Q. And this is the same figure we've just been discussing in Exhibit B but without the annotations; correct?

A. That's correct.

Q. You mentioned earlier today that one possible way that someone might calculate an overall curvature is to look at the very beginning point of a path and the very end point of a path; is that correct?

A. That could be.

Q. How would you measure the degrees from the beginning of a path to the end of a path?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: I haven't performed that analyses, that analysis for these patents. The specifications don't -- don't limit it to a method about how you would do that. But it would be the -- generally, from the beginning point to the end point.

Is that somebody's alarm going off or I thought I heard a siren.

BY MS. OLIVER:

Q. I'm sorry, that's the police driving by outside my office. I apologize.

A. The curvature is defined mathematically speaking, not within the specification of the patent, but mathematically speaking, the change in direction or change in angular direction of the path at -- between two points. And you calculate, you could calculate the -- what I was speaking to today, was calculating the change in angle between those two points or across those two points and dividing by the length path, generally speaking.

In practice, there would be data that would tell you the inclination and azimuth measured at those two locations and you would calculate that change in angle and divide it by the length of the path. That's one method, and there may be many other methods to do

so.

Q. Let's look at Figure 4 of the '022 patent.

A. Yes.

Q. Do you see that Step 406 in Figure 4 says identify curvature cost?

A. Yes.

Q. Is overall curvature the same thing as curvature cost?

A. I don't know. I don't believe it is. There's a cost associated with a curvature. It doesn't specify right there. I believe in the specifications in the description of 406, they might provide that. You can point me to that, that would be fine. But it doesn't say so there. It's -- curvature would be different than curvature cost, numerically.

Q. And just briefly, then, let's look at Column 10 of the '022 patent. And let's look at line 62.

A. Column 10, line 62.

Q. And this may have been what you're referring to.

Do you see the sentence that starts with "The curvature cost addresses"?

A. I'm in the '022. Line 52?

Q. 62. I'm sorry.

A. 62.

Okay. And you read "The curvature cost addresses"?

Q. Yes.

A. Yes, I see that.

Q. Would you mind -- would you mind reading starting with that sentence through the end of that column for the record?

A. "The curvature cost addresses the costs associated with curves in the path. Such costs" -- oh, I'm sorry, to the end of the paragraph?

Q. Yes, please.

A. "Such costs include reaming, casing requirements, the impact of friction on later well segments and similar costs. Curvature costs may be viewed as a mixture of friction, impact, steerage issues, and launch penalty."

Q. Is that what you were referring to or thinking of when -- scratch that.

Is this what you were referring to when you said that curvature cost considers other factors?

A. Yes. My own personal knowledge as a POSITA and, of course, the description in the specification here.

Q. Thank you.

So I would like to next turn to paragraph 57 of

your declaration. And this is on page 39 if that's helpful.

A. Okay.

Q. Would you -- this is -- scratch that, sorry.

In this paragraph, you're addressing your understanding of the term "offset distance"; correct?

A. That's correct.

Q. And you state in the first sentence of this paragraph that offset distance should be construed to mean an offset distance of a geometric convergence path relative to the target drilling path; is that right?

A. That's correct. That's what I wrote.

Q. Is it your opinion that a path has only one offset distance?

A. Yes, it is.

Q. Where is that idea reflected in the construction that we just read?

A. My use of the words "an offset distance."

(Stenographer interruption/technical difficulty.)

(A lunch recess was taken.)

BY MS. OLIVER:

Q. Welcome back, Dr. Hilbert.

A. Thank you.

Q. During the lunch break, did you speak with

counsel about the substance of your testimony?
A. No, I did not.
Q. Thank you.
So before the break, we were talking about the term "offset distance"; right?
A. I recall that, yes.
Q. And you stated that your conception of the term "offset distance" means that there can be only one offset distance for each path; is that right?
A. That's -- that's correct.
Q. So let's turn to the '022 patent if you will. And let's look at Column 13.
A. All right. I'm at -- I'm at Column 13.
Q. If you look at line 25, do you see that this is the limitation that we've been discussing?
A. Yes. I believe that is.
Q. And do you see it says, "calculating by the computer system an offset distance:?
A. Yes, I see that phrase.
Q. Is your opinion that a path can have only one offset distance based on the use of the word "an" in this limitation?
A. Yes. And my review of this specification, but in particular, yes, an offset distance; correct.
Q. Can we turn back to Column 3 of the '022

patent?

A. Yes. I'm there.

Q. And let's look at line 2 through 5.

A. Yes.

Q. Do you see the sentence beginning with, "for example, from a distance"?

A. Yes.

Q. Would you please read that sentence for the record.

A. "For example, from a distance perspective, Path 108 has a greater length than Path 116. And much of that length is farther from the Target Path 104 from the target path of 110."

Q. Thank you.

So by saying that much of the length of a path is farther away, does that suggest that different portions of a path may have different offset distances?

A. I haven't analyzed the specifications of the patent to determine that precisely. What I can say is that the -- since I haven't done any analysis on that, I can't say that there was a thought process that there were points calculated, and in the end, there's only one -- in the end of whatever that analysis is, there's only one offset distance. That's the way that I viewed that.

Q. So can you explain to me how a person of skill in the art would calculate an offset distance for a path?

A. I would only be able to do that hypothetically. But in my opinions, I believe that I express that the offset distance is the distance between the convergence path and the target path. It may be that it's one -- it's an offset distance. So it's the distance from the end point, I think, in my opinion, the end of the path to the target point, the point at which you are trying to achieve getting close to or at the target path.

Q. Dr. Hilbert, I'm going to share another new exhibit with you that you have not seen before. So give me one minute and I'll put that in the chat window.

A. Okay.

Q. I just sent it. Let me know whenever you have that open.

A. Actually, I see two new things I think that are there. No, that's one -- must be my deposition. The one from you must be Deposition Exhibit A.

(Exhibit A marked for identification.)

THE WITNESS: Let's see.

Yes, I see it.

BY MS. OLIVER:

Q. This is an annotated copy of Figure 1 of the

'022 patent which has been marked as Exhibit A for purposes of this deposition. And the annotations have been added by petitioner's counsel.

MR. STAVINOHA: I'm going to object to this on relevance, authenticity, hearsay.

BY MS. OLIVER:

Q. Dr. Hilbert, do you see at the top of that file the patent number U.S. 9,865,022?

A. Yes, I do.

Q. And do you understand that's the patent number of the '022 patent?

A. Yes, I do. It is.

Q. And other than the annotations that have been added in red, do you recognize the rest of Figure 1 as being Figure 1 of the '022 patent?

A. Yes, I do.

Q. And you understand the annotations added in red have been added by petitioner's counsel?

A. Yes, I understand that, that you represent that.

Q. Do you see reference number 104 that's been circled in red?

A. Yes, I do.

Q. And that represents the target path; correct?

A. That's correct. As we -- as I testified

earlier today.

Q. And do you see that Target Path 104 has been annotated with A2 through G2?

A. Yes, I do see that.

Q. All right. And do you see Path 108 that's also been circled in red?

A. Yes, I do.

Q. And you also see that Path 108 has been annotated with A1 through G1?

A. Yes, I understand that you're representing that those -- those red numbers are associated with Path 108.

Q. Looking at this annotated version of Figure 1, would you please explain how to calculate the offset distance of Path 108?

MR. STAVINOHA: Objection. Beyond the scope.

THE WITNESS: I haven't analyzed how a proposed calculation method for determining offset distance. I interpret or construe as I've shown before or talked about before, there is one offset distance between each of the convergence paths and the Target Path 104. I do not know and I'm not prepared to explain the calculation method for how that distance is precisely calculated, just beyond -- beyond the scope of the work that I did for my declaration. But in my opinion, it is one -- it's one offset distance corresponding to some as yet

undetermined points on the car point or characterizing the convergence paths to the target path.

BY MS. OLIVER:

Q. Is offset distance a standard calculation in the industry?

MR. STAVINOHA: Objection. Form.

THE WITNESS: It's a term that I -- in my opinion, a POSITA would understand. It is not a standard, that is to say the American Petroleum Institute and other books one might have on well design, for example, may define it differently. But I don't think there's any standard way to do it. It's left up to the interpretation of the POSITA or the engineer.

BY MS. OLIVER:

Q. So there's no typical way in the industry to calculate offset distance?

A. Not to my knowledge. It depends on the objective in this -- in this particular case, the objective is to find the distance between the convergence paths and the target path. And so depending on how you want to do that, you could come up with a number that represents that. But I don't believe that there is any, quote/unquote, standard method to do that.

Q. Does the '022 patent describe how to calculate offset distance?

A. Not specifically in my recollections of reading it and in my declaration is there a specification on how to do that. It's merely that it's from the convergence path to the target path.

Q. So looking at this annotated version of the Figure 1 that we have as Exhibit A, is there an offset distance from what we have marked as A-1 to A-2?

MR. STAVINOHA: Scope.

THE WITNESS: One would only hypothetically and, for example, say that there is a distance between the Points A-1 and A-2. But I don't know that we are showing a precise location of where A-1 is nor where A-2 is.

BY MS. OLIVER:

Q. I'm sorry, I'm not sure I understood that.

So is A-1 in this annotated figure a point on Path 108?

A. I don't know what was in the head of the people who put those on there. But if you say that it's a point on Path 104 by definition, there's no -- there's just the A2 is standing out there in space by itself but not pointing to a distinct point on the path.

Q. So let's assume that A1 is a distinct point on Path 108 and that A-2 is a distinct point on Path 104. Is that okay?

A. Hypothetically, we can accept that hypothesis.
Q. Okay.
A. Or assumption that there are points that it's representing.
Q. So would the distance between A-1 and A-2 in that hypothetical represent a distance between Path 108 and Path 104?
A. It could have a length, yes. A length connecting two points so it would have a length.
Q. And let's assume that E-1 is also on Path 108 as a distinct point and that E-2 is a distinct point on Path 104 as a hypothetical. Is that okay?
A. Hypothetically, there could be points that you would assume on Path 108 and Path 104 that are on those paths and the coordinates of those would be on those paths.
Q. And would the distance between E-1 and E-2 be less than the distance between A-1 and A-2?
MR. STAVINOHA: Objection. Beyond the scope.
THE WITNESS: Only if you assume that all of those lines are in two-dimensional space on a flat plane of paper. Bearing in mind that it could be three dimensions going into or out of the page. And so then it would -- it would be impossible to tell from this rendering which is longer relative to each other.

BY MS. OLIVER:

Q. But it would be possible that the length of E-1 to E-2 is less than A-1 to A-2?

A. If it's defined as in the same plane, that's possible to make that interpretation. But it's impossible given that I know that drilling paths are generally three dimensional and have another component coming out of the paper. So to make that analysis requires many assumptions that I can't make because of the -- because of that rendering. It's a very, very hypothetical situation.

Q. So in a three-dimensional example, is it possible to have a set of points on one path -- let me start that over.

In a three-dimensional example, is it possible to have a point on a first path and a corresponding point on a second path where the distance between those two points is longer than a second point on the first path and a second corresponding point on the second path?

MR. STAVINOHA: Objection. Form. Beyond the scope.

THE WITNESS: Hypothetically and theoretically, yes.

BY MS. OLIVER:

Q. So is an offset distance measured in length?

A. Distance is generally defined as a length. So I interpret it as a length; although, I don't think that the claims limit it to a length. I mean, as we discussed in some of these other associated costs, the cost of an offset length, the cost of curvature, et cetera, that there could be other definitions for offset. But if you specify offset length or offset distance, you would be thinking of a length in some measurement of length and units of length.

Q. So since it's possible for two paths to have sections that have different lengths between the two paths, how would you calculate an offset distance in that circumstance?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Describe what you mean by "sections."

BY MS. OLIVER:

Q. Sure.

So we can take the example that we were discussing earlier. So if you can look at this annotated version of Figure 1 and look at Paths 104 and 108 and assume these are in a three-dimensional space to account for the situation you were referring to, you

stated earlier that in the three-dimensional context, it would be possible for the distance between A-1 and A-2, for example, to be longer than the distance between E-1 and E-2; correct?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Hypothetically, I stated that before if it's in two dimension and giving a set of assumptions, that could be true.

BY MS. OLIVER:

Q. And that could be true in three dimensions as well?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Based on the previous assumption describing sections as you have described them, yes, you could -- that would be true. That could be true.

BY MS. OLIVER:

Q. And so in that circumstance where that could be true, how would you calculate the offset distance between those two paths?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Hypothetically, each of those lengths would be different and you could compare those two lengths.

BY MS. OLIVER:

Q. And which one of those two lengths would be the

offset distance?

A. In my opinion that I've discussed previously, that we don't calculate multiple offset distances. You have one offset distance that you have defined for the procedure and the specifications although there's not really a procedure for doing that as I've discussed before. But while theoretically and hypothetically, you can compare two -- two points to two points on the target path and on the hypothetical convergence path. One would have to convert that in some way. I don't know.

But you -- in the end, you have just one offset number. And how that offset number is calculated, I'm not prepared to opine on because I've not done that analysis. All I know from my analysis of the patent is that it's one number characterizing the offset distance between the con- -- a convergence path or paths and Target 104.

Q. Would you please help me understand how you would convert the offset distance to be just one number?

A. No, I can't in this deposition. I haven't performed that analysis so I haven't, say, made an example showing how that would be calculated. I simply haven't done that. All I'm doing within this declaration is responding to the arguments of the

petition.

Q. So you are construing the term "offset distance" as just one offset distance for each path; correct?

A. That's correct.

Q. Are you able to explain how you can determine the one offset distance?

A. Regardless of how you characterize it, I don't -- I haven't performed an analysis to determine how I would want to, say, calculate it. But regardless of how it's calculated, it's just one offset distance characterizing that path to the Target Path 104. And I can't, as I sit here today, explain to you how I would do that. Because I have not done that analysis.

Q. Well, let's look at the '022 patent a little further, then.

Would you look at Figure 5-A, please, of the '022 patent.

A. Yes. I will bring it up.

Figure 5-A. Yes.

Q. Do you see Step 508 in Figure 5-A?

A. Box 508?

Q. Yes.

A. Yes.

Q. Do you see it says "identify distance of

segment from target path"?

A. Yes, I see that.

Q. Can you explain how that identification of the distance is performed?

A. An explanation would only be exemplary. Hypothetical, the specification does not prescribe a detailed methodology for that. But there is a paragraph for Box 508 that discusses breaking down or breaking down a path into segments of length and then identifying a -- for 508, identify distance of segment from target path. It does not specify precisely how to do that. It just says that for each of those segments, there's an offset. Didn't say offset distance but there is a distance for each of those segments to the path, target path.

Q. Does Figure 5 refer to an overall offset distance?

MR. STAVINOHA: Object to form.

THE WITNESS: No, it doesn't read that in Figure 5. There's no -- there are no words saying overall offset distance in Figure 5A.

BY MS. OLIVER:

Q. Is there anything in the '022 patent or '506 patent specifications that explains how to calculate an offset distance of a path as a whole?

A. I don't believe that there is any description of -- the two words "overall offset distance" -- the three words, excuse me, "overall offset distance," I don't believe appears. We can look. And you can show me if there is, but I don't believe -- similar to overall curvature, I don't believe that there is an overall offset distance that I can remember as I sit here right now.

Q. Let's turn to Column 13 of the '022 patent, please.

A. Yes, I'm there.

Q. Let's look at lines 25 through 28.

A. Yes. I'm there.

Q. This is the same limitation that came -- contains the term "offset distance" that we've been discussing?

A. That's correct.

Q. Do you see the language in this limitation that says "connecting the BHA location to the target drilling path"?

A. Yes, I do.

Q. What does that language modify in this limitation?

A. One second. The offset distance. It's telling you --

Q. And why --
A. -- from where to where.
Q. Why does that modify an offset distance?
A. It's telling you that there is an offset distance. And that offset distance connecting the bottom hole assembly location to the target drilling path is the way that I read it.
Q. Why wouldn't that language beginning with the word "connecting" modify the word "geometric convergence path"?
A. Well, I guess it's -- I consider it to be -- I consider it to be describing the offset distance, which is a characteristic of the distance between bottom hole location, which is on the drilling path, or the convergence path, and the target path. So, yes, in some respect, I would agree that it's modifying convergence path, but an offset path is really that one distance. And I'm saying that it's -- they're then showing what that distance is connecting. So in a sense, yes, part of that is the convergence path.
Q. I understand. Thank you.
Okay. Let's turn back to your '022 declaration. Let's look at paragraph 105.
A. Almost there.
Okay. 105 is at the top of the page on

page 79.

Q. Do you see the first sentence in paragraph 105 that says, "A POSITA would not have been motivated to modify Pirovolou to minimize deviation from geologic targets because there is no deviation to minimize"?

A. Yes, I do. I see that. You read it correctly.

Q. Is that conclusion based on your reasoning from two sentences later that says, "Each of the possible trajectory calculated in Pirovolou begins from the same position and ends at the target"?

A. Yes. That's correct.

Q. You have read Pirovolou in its entirety; correct?

A. Yes, I recall that I did.

Q. And you are comfortable testifying about what Pirovolou discloses?

A. As comfortable as I can be, yes.

Q. Is it your position that Pirovolou's paths always intersects the target?

A. In Pirovolou, he discusses two points, A and T. There are other places in Pirovolou where he discusses an intermediate point, I believe it is, B, as in "Brun." So A to B unspecified and T could be points on those paths. But his analysis, or at least my opinion of his analysis, he is going from a Point A to, for example, a

Point T. But there could also be an intermediary -- intermediate Point B.

Q. And your position is that Pirovolou's paths always intersect the target, whether that's B or T?

MR. STAVINOHA: Object to form.

THE WITNESS: I would have to take a look at Pirovolou's patent to recall what his definition of that intermediate point is. But his solutions, in my opinion, or paths that he describes go from a point to another predetermined point, whether that's Point B or Point T.

BY MS. OLIVER:

Q. So let's look again at paragraph 105 in your declaration. The last sentence before Figure 3, do you see that?

A. Yes.

Q. And do you see it says, "As seen below, each of optional Trajectory 28 and 30 in Figure 3 below intersects the Target T"?

A. Yes, I see that.

Q. So is your conclusion that there is no deviation to minimize based on this reasoning that the paths always intersect the Target T?

A. Yes. That's my conclusion.

Q. Would you mind pulling up Pirovolou for just a

minute? We have not looked at it today. It is --

A. That's -- go ahead.

Q. It is Exhibit 1006.

A. Okay. I have it. Yes.

Q. Would you look at paragraph 36.

A. Yes, I'm there.

Q. Do you see the sentence in the middle of the paragraph starting with "as illustrated in this example"?

A. I see that.

Q. Would you mind reading that sentence for the record.

A. Yes.

"As illustrated in this example, the Trajectory 28 may have been a traditionally selected and planned path and may have resulted in Well Bore 2 failing to strike Target T due to the drilling limitation of the particular installation."

Q. Do you understand that sentence to mean that, in some examples, Trajectory 28 may not strike the Target T?

A. If it's a trajectory, yes. He's describing that there may be, hypothetically or exemplary, a Trajectory 28 being drilled that fails to strike the Target T.

Q. Let's turn to paragraph 110 of your declaration.
A. 110.
Q. Are you there?
A. Yes, I'm here.
Q. Do you see where you have emphasized the phrase "total measured depth of all of the well trajectories" in this paragraph?
A. Yes, I see that.
Q. What would "measured depth" mean to a person of skill in the art?
A. The length of drill pipe between two points. Generally, the total measured depth on the length of drill pipe from the surface, where the drill bit or bottom hull assembly is at that time. So it is the length of drill pipe as opposed to a vertical depth which is just the depth below the surface as a straight line rather than a drilling path.
Q. Do you see the sentence in paragraph 110 of your declaration in the middle of the paragraph that starts with "Thus, a POSITA would have viewed"?
A. Yes, I see the beginning of that sentence.
Q. And do you see the following sentence that says, "Pirovolou's method, however, already takes depth into account"?

A. Yes, I see that.
Q. And immediately after that sentence, you have quoted a portion of Pirovolou's paragraph 31; is that correct?
A. Yes, that's correct.
Q. And that quoted portion of Pirovolou's paragraph 31 refers to depth; correct?
A. And we're speaking of the -- within -- within the parenthesis?
Q. Yes. That's correct.
A. Drilling conditions and formation characteristics may include data related to formation evaluation, properties, comma, drilling measurements, comma, such as depth, et cetera. But yes, such as depth; correct.
Q. So what type of depth measurement is it referring to -- is Pirovolou referring to in that sentence?
A. I would have to refer to Pirovolou's -- we would need to go to that specific sentence in Pirovolou rather than me guessing.
Q. Sure. We can do that.
A. There's obvious -- there -- go ahead.
Q. I was going to say if it's easier for you, we can turn to paragraph 31 of Pirovolou.

A. Yeah, I think we -- well, clearly, still up but let me grab it.

Paragraph which did you say?

Q. It's paragraph 31.

A. 31. Okay. Hold on one second and I will find that.

Yes, paragraph 31.

It does not specify which depth he is speaking. It merely says such as depth, drilling conditions, and formation characteristics may include data related to the formation of valuation properties, drilling measurements such as depth, temperature, drilling fluid pressure, drilling fluid density and drilling fluid flow, rate of penetration and a number of others.

It does not specify in that sentence whether he is speaking of total measured depth or vertical depth.

MS. OLIVER: I don't have a lot of questions left to cover. But I know that we're approaching about an hour. So maybe let's go ahead and take a break if that's okay with you. And then we can come back and hopefully wrap things up.

THE WITNESS: Certainly.

MS. OLIVER: Let's take a ten-minute break. It's 2:36 Eastern. Let's be back at 2:46 Eastern.

(A recess was taken.)

BY MS. OLIVER:

Q. Welcome back, Dr. Hilbert.

A. Thank you.

Q. During the break, did you speak with counsel about the substance of your testimony?

A. No.

Q. Thank you.

Okay. Let's turn to paragraph 112 of your declaration.

A. Yes, I see it.

Q. And in the first sentence of paragraph 112, you conclude that a POSITA would not have had a reasonable expectation of success in making the combination; correct?

A. That's correct. That's what it reads.

Q. And is that because, as you say in the next sentence, Budiman describes a complex optimization model involving optimizing an objective function?

A. That's correct.

Q. Can you explain what an "objective function" is?

A. An optimization theory? It's a mathematical method, a function is developed having a number of parameters or variables that describe the state in general of a system. In this case, the drill pipe and

the drilling process.

And then you perform essentially approximations of that function or that function itself and taking partial derivatives of that function to optimize the solution to that function given prescribed conditions which are called constraints.

And so that's what an objective function is, describe the state of the system and then you try and find the optimal solution from that objective function by a mathematical process of taking partial derivatives, according to constraints, solving it according to constraints.

Q. So are objective functions commonly used to solve optimization problems such as minimizing costs?

A. Reasonably often. It is a mathematical technique. Optimization is a broad category of mathematical subjects. And optimization theory can be used for optimizing cost or optimizing strength of a material or many other things. Optimizing a certain desired result.

Q. So what makes Budiman's use of an objective function so complex as you say in paragraph 112?

A. Well, in Budiman, he has many parameters that go into that objective function. Some of those parameters in particular, or embodiments as I understand

reading Budiman, may be based on probability and the statistics of data or it would be called a stochastic method to characterize uncertainties.

So while a POSITA might understand the use of an objective function and the use of optimization theory, trying to determine, from reading Budiman, how that might apply to or present a motivation to combine or modify Pirovolou, I think, in my opinion, would be difficult and would lack a reasonable expectation of success from reading his patent.

Q. I see.

So would you look at Budiman, if you will. That's Exhibit 1005.

A. I have it up on my screen.

Q. Would you look at the bottom of Column 4 beginning with the sentence that says "these uncertainties."

A. I see that, yes, at the bottom. It begins with "these uncertainties."

Q. I'm going to read the sentence, make sure I just read it correctly.

"These uncertainties and the well trajectory evolve over time and can be considered directly within an optimization model which may include a Markov decision process-based model otherwise known as a

stochastic dynamic programming model, SDP."

Did I read that correctly?

A. You read that correctly.

Q. Is this what you were referring to a minute ago when you said "stochastic"?

A. Yes, that's correct.

Q. Okay.

A. That's where I was referring to stochastic.

Q. I just wanted to make sure I understood that word.

In your opinion, would a person of ordinary skill in the art know how to compare distances between points on two paths?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Repeat the question, please.

BY MS. OLIVER:

Q. Sure.

In your opinion, would a person of ordinary skill in the art understand how to compare distances between points on two paths?

MR. STAVINOHA: Objection. Form.

THE WITNESS: Well, we don't -- you haven't defined in general what path is. But I would expect a POSITA or somebody skilled in the art that has a mechanical engineering or petroleum engineering to have

taken a course which teaches them how to calculate distances between points. And whether those are on two different curves or paths, as we will call it, would be something that I would expect somebody to know how to do if they have that degree, bachelor's degree in math -- in mechanical and petroleum engineering.

BY MS. OLIVER:

Q. So let's take a look for a minute at Exhibit 1014, which I shared with you earlier today.

A. Yes, I have it up.

Q. Would you look at page 213. And if you're looking at the PDF version, that's PDF page 44.

A. Okay. I'll go there.

Page 44, yes, I see it.

Q. Are you familiar with this Exhibit 1014?

A. Generally, yes. Of course, I have reviewed this document before. But, yes, I'm familiar with Landmark and some of their products.

Q. Are you familiar with the software that's discussed in this user guide?

A. Generally, yes.

Q. Is that software something that someone planning a well path would have used to assist with their well path planning?

A. I believe so.

Q. Would someone using that software have relied on this user guide to understand how to use that software?

A. I'm sorry. Ask that question again.

Q. Would someone using the Landmark software have relied on this user guide in Exhibit 1014 to understand how to use the software?

A. I believe so. If I interpret your question correctly, if an engineer is using the software and he has a question in his mind about how to use the software, he goes to the user guide. So, yes, this would be used to assist a person using the software to use it effectively and correctly.

Q. So looking at page 213 of this document that we just pulled up --

A. Yes.

Q. -- do you see that -- I'm sorry.

A. Yes, I see it.

Q. Do you see that the title of this page is "Viewing A Proximity Report"?

A. Yes, I see that.

Q. And do you agree that this proximity report measures the distance between two well paths?

A. From reviewing the document, that's my understanding, yes.

Q. Let's switch now back to your '022 declaration. I'm sorry to make you jump around.

A. '022. No, that's fine. However you want to do this.

Okay. I'm there.

Q. Can we look at paragraph 123 of your declaration.

A. Yes, I will get there.

Okay. I'm there.

Q. Do you see Figure 1-B from Budiman that you have included in this paragraph?

A. Yes, I do.

Q. And do you see the variable called "drilling time" in Figure 1B?

A. Yes, I do.

Q. And do you see the arrow pointing from "drilling time" to "cost" in Figure 1-B?

A. Yes, I do.

Q. So is it your understanding that the arrow means that drilling time influences the cost of drilling a well?

A. Yes, it's not the only thing that -- that drives the cost of drilling a well. Drilling time is one of -- as you can see in this spider chart, I'll call it a spider chart, is one of many, many parameters or

many, many influences on the cost. But drilling time is one of them.

Q. So based on your experience in the industry, how does drilling time influence the cost of drilling a well?

A. The -- for example, the rig -- an operator most frequently rents the rig from a rig company, and that is rented or leased at an hourly rate so the longer you're drilling, the higher the cost to rent that rig would be an example of how drilling time would influence the cost.

Q. Let's return to the Budiman patent if you will, Exhibit 1005.

A. Yes, I'm there. It's open.

Q. Would you please look at Column 6 starting at line 2.

A. I'm looking at it.

Q. Do you see the sentence beginning with "each time one"?

A. Yes, I do.

Q. Would you mind reading that sentence and the sentence right after it for the record.

A. Yes.

"Each time one or more parameters is changed, new candidate solution is generated and an objective

score is calculated. Objective score may be cost, stability of success, total time to drill the well, et cetera."

Q. Thank you.

Do those two sentences mean that the total time to drill the well is being calculated?

A. I don't know that I can say definitively that it's being calculated -- repeat the question one more time, please, make sure I answer the correct question.

Q. Sure.

Do those two sentences that you just read mean that the total time to drill the well is being calculated?

A. In my understanding, Budiman is, as we discussed a moment ago, constructing this objective function in which time may -- drilling time may be one of the variables in that objective function. And so that objective function and the variables within it are constrained to meet certain parameters, like curvature, more time, more costs, or rate of penetration or -- or operating time of pumps, et cetera, et cetera. So those many, many parameters are in.

Subject to those constraints, one of the objective scores within that set of constraints may be cost. So to me, it's not -- that's -- that's part of

overall structure of the function -- governing function. But it's not calculating -- it may not be, in my opinion, calculating the time for each of the -- of a drill path. It just comes out with a cost based on those constraints.

I don't think Budiman says that he's calculating the cost of each and every path. It's just an output from his system, his method using that stochastic dynamic method of the objective function.

The result of that objective function is a path that can meet cost constraints and a number of other constraints.

Q. So looking at those two sentences that you read in Column 6, lines 2 through 6, what does the word "objective score" mean?

A. I don't know. I would have to search this patent again to remind myself if he defines "objective score." That wasn't part of my analysis.

I am certainly aware of people having scores to -- to rank certain values of variables. But I don't know exactly what he means by "objective score." We would have to look. If you can -- if you would like to direct me to an area that defines it, I don't recall. But I think I understand what he's getting at generally.

Q. Let me just direct you to Column 2 of Budiman

starting at line 18.

A. Column 2, line 18.

Yes, I see that.

Q. And would you just -- this is a long paragraph. So would you just take a moment to read lines 2 -- sorry -- Column 2, lines 18 through 31, and let me know when you're finished.

A. Okay. I've read that.

Q. So do you see in that paragraph, there are three concepts: One, a decision -- excuse me, one, decision variables; two, constraint equations; and three, an objective function?

A. Yes, I read that.

Q. Can you help me understand where the total time to drill the well fits into those buckets?

MR. STAVINOHA: Objection. Form.

THE WITNESS: One of the decision variables in Item 1 might be time, drilling time, or total drilling time in theory. For drilling the path that he is trying to solve for.

Time may appear in the constraint equations. It may constrain the amount of time that you want to drill. And of course, the objective function may have -- may be dependent upon a time, such as drilling time. So time would be in there in some form or

another -- in some form if the user decides to use drilling time as one of the variables to solve for and constrain.

BY MS. OLIVER:

Q. And so where does the concept of an objective score that we saw in Column 6, where did that fit into the concept of decision variables, constraint equations, and then objective function?

MR. STAVINOHA: Form.

THE WITNESS: I don't recall, as I sit here right now, seeing the objective score defined in here. I would only be speculating if I said I did.

BY MS. OLIVER:

Q. Let's just return briefly to Column 6.

So do you agree with me in Column 6, line 4, that Budiman says an objective score is calculated?

A. Yes, I agree that that's what it reads. It reads at line 4, an objective score is calculated.

Q. And do you agree that the following sentence says, The objective score may be cost, probability of success, total time to drill the well, et cetera?

A. Yes, you read that correctly.

Q. So the total time to drill the well is -- can be an objective score?

A. Yes, that would be my understanding of the

sentence. It would be one of many objective scores, but total time to drill the well could be one.

Q. Okay.

MS. OLIVER: Clarke, I think that may be all the questions I have. Would it be okay if I have just about five minutes to look through my notes and make sure I've not missed anything?

MR. STAVINOHA: Sure.

MS. OLIVER: Let's go off the record now at 3:13 Eastern and we will come back by 3:18.

(A recess was taken.)

MS. OLIVER: Let's go back on the record.

I'm finished with my set of questions so at this time, I have nothing else to ask.

THE WITNESS: Thank you.

MR. STAVINOHA: If you will give us about 15 minutes, let me take a look at my notes and we will see if we have any questions for Dr. Hilbert.

MR. BOWSER: That sounds good. So what time is that, 3:34 Eastern?

MR. STAVINOHA: Let's say 3:35 Eastern.

MR. BOWSER: All right. See you then. Thank you.

(A recess was taken.)

MR. STAVINOHA: All right. We are ready to go

back on the record whenever everyone else is.

MS. OLIVER: We are ready.

MR. STAVINOHA: Dr. Hilbert, thank you for your time today. We have no further questions. We can go off the record.

THE WITNESS: Thank you.

THE STENOGRAPHER: I just have to ask if there are any other pertinent matters or stipulations that you need on the record?

MR. STAVINOHA: We will reserve the right to read and sign. Other than that, no stipulations from us.

THE STENOGRAPHER: Thank you.

(Discussion held off record.)

FURTHER EXAMINATION

BY MS. OLIVER:

Q. Dr. Hilbert, when I came on the record earlier on my first session, I forgot to ask if you had spoken with counsel about your testimony during the break earlier today.

A. No, we did not.

MS. OLIVER: All right. Thank you very much.

I also want to say thank you very much for your time today. It's been a pleasure talking to you.

THE WITNESS: Thank you very much.

MS. OLIVER: Thanks. We can go off the record.

- - -

(Deposition was concluded at 2:37 p.m.)

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DEPONENT'S CHANGES OR CORRECTIONS

Note: If you are adding to your testimony, print the exact words you want to add. If you are deleting from your testimony, print the exact words you want to delete. Specify with "Add" or "Delete" and sign this form.

DEPOSITION OF: **L. BRUN HILBERT, JR., Ph.D., P.E.**

CASE: **NABORS DRILLING V MOTIVE DRILLING**

DATE OF DEPOSITION: **JANUARY 6, 2023**

PAGE	LINE	CHANGE/ADD/DELETE/REASON
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Deponent's Signature _____**Date**_____

Declaration Under Penalty of Perjury

I, L. BRUN HILBERT, JR., Ph.D., P.E., the witness herein, declare under penalty of perjury that I have read the foregoing in its entirety; and that the testimony contained therein, as corrected by me, is a true and accurate transcription of my testimony elicited at said time and place.

Executed this _____ day of _____ 20__, at _____, _____.

(city) (state)

_____

L. BRUN HILBERT, JR., Ph.D., P.E.

State of California)
) ss
County of San Diego)

I, LYNETTE M. NELSON, CSR No. 11585, RPR, CRR, CCRR, CRG, duly licensed and qualified in and for the State of California, do hereby certify that there came before me on the 6TH day of JANUARY, 2023, via remote videoconference technology, the following named person, to-wit L. BRUN HILBERT, JR., Ph.D., P.E., who was duly sworn to testify the truth, the whole truth, and nothing but the truth of knowledge touching and concerning the matters in controversy in this case; and that he was thereupon examined under oath and his examination reduced to typewriting under my supervision; that the deposition is a true record of the testimony given by the witness.

I further certify that pursuant to FRCP Rule 30(e)(1) that the signature of the deponent:

(X) Was requested by the deponent or a party before the completion of the deposition;

( ) was not requested by the deponent of a party before the completion of the deposition.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the

parties to the action in which this deposition is taken, and further that I am not a relative, employee of any attorney or counsel employed by the parties hereto, or financially interested in the action.

CERTIFIED TO BY ME on this 12TH day of JANUARY, 2023.

LYNETTE M. NELSON,
CSR No. 11585, RPR, CRR, CCRR,
CRG, REALTIME SYSTEMS ADMIN.

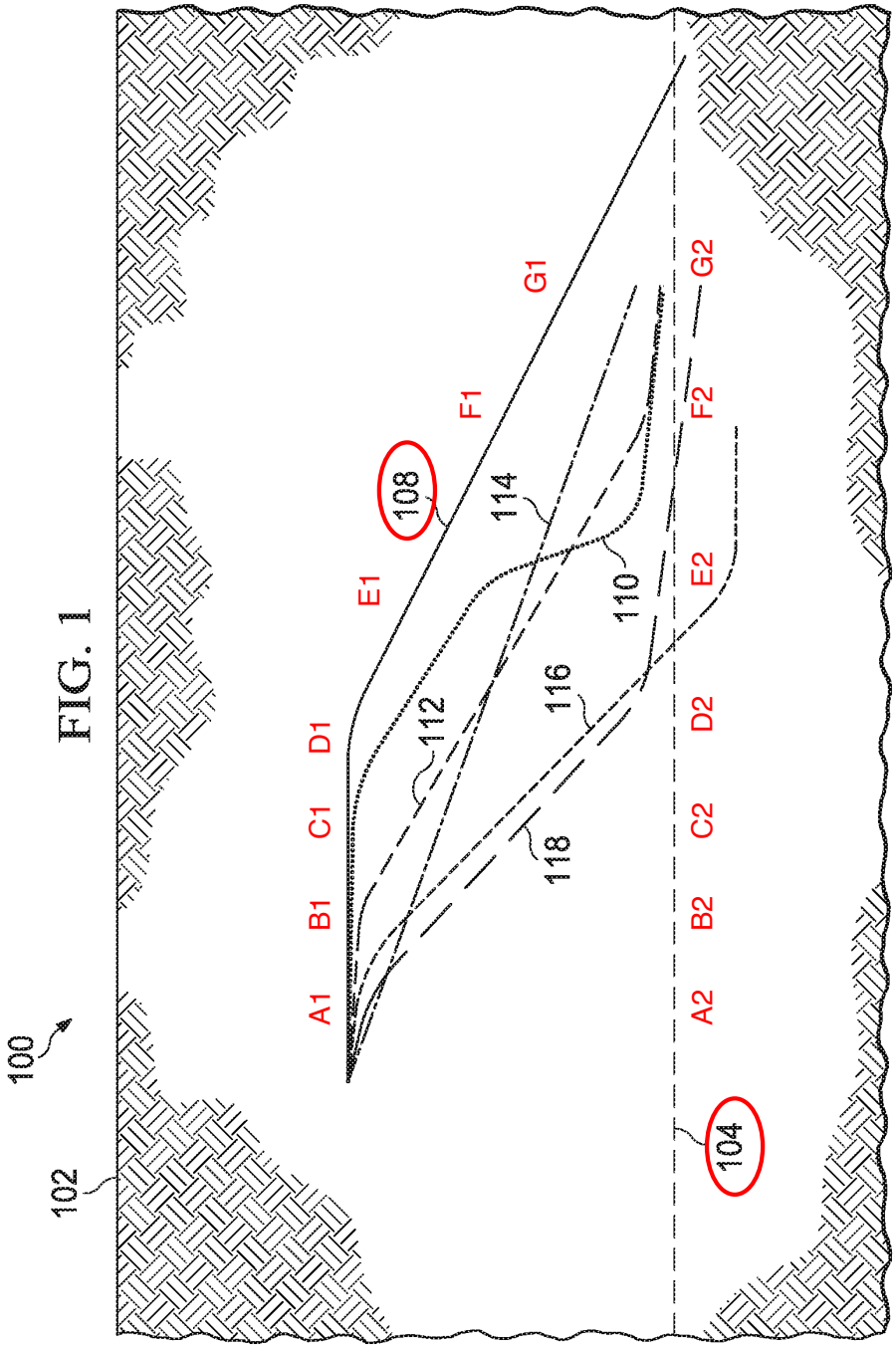

FIG. 1

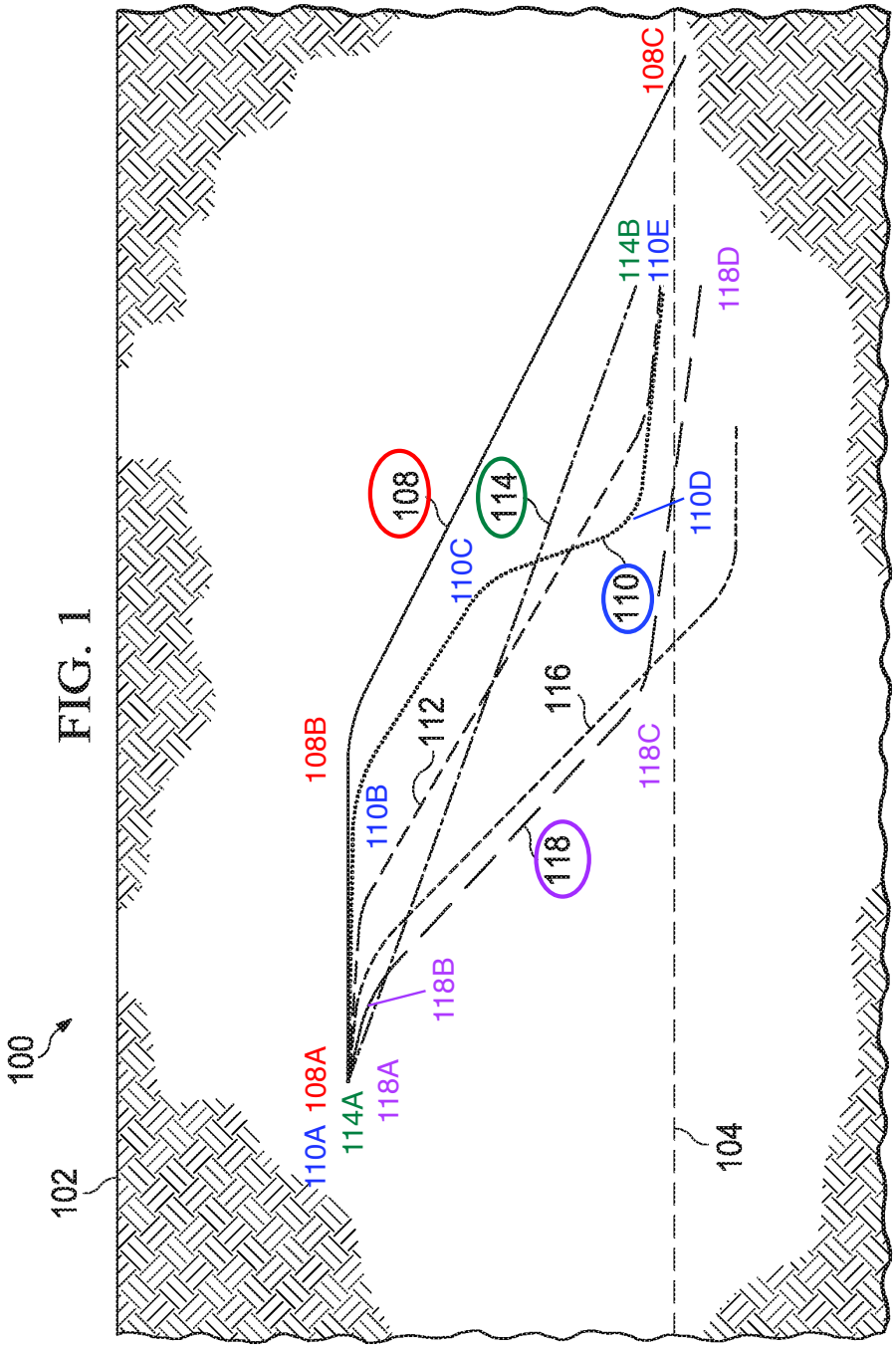

FIG. 1

1/6/2023 HILBERT
EXHIBIT
B