

In the Matter Of:

PROFAC HOLDING CORPORATION v

HALLIBURTON ENERGY SERVICES

DR. MICHAEL NIKOLAOU

June 06, 2024



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1 UNITED STATES PATENT AND TRADEMARK OFFICE

2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3 IPR2023-01319 Patent No. 7,841,394

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6 PROFAC HOLDING CORPORATION AND U.S. WELL

7 SERVICES, LLC,

8 Petitioners,

9 -VS-

10 HALLIBURTON ENERGY SERVICES, INC.,

11 Patent Owner.

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15 REMOTE TESTIMONY OF DR. MICHAEL NIKOLAOU

16 JUNE 6, 2024 - 10:00 A.M. ET

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22 JOB NO. 2024-944727

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JUNE 6, 2024
10:00 A.M. ET

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

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1 MICHAEL NIKOLAOU, Affirmed, Testifies as

2 Follows:

3

4 EXAMINATION

5 BY CHAD C. WALTERS:

6 Q Good morning, Dr. Nikolaou. How
7 are you?

8 A Great. Thank you.

9 Q You are here today to testify in
10 IPR 2023-01319 concerning the '394
11 patent; is that correct?

12 A That's correct.

13 Q Okay.

14 You have been deposed before?

15 A Yes, I have.

16 Q About how many times?

17 A Definitely single digit number.
18 Less than ten, fewer than ten.

19 Q You have given deposition
20 testimony in PTAB proceedings, correct?

21 A PTAB -- could you explain this
22 to me?

1 Q Patent Trial and Appeal Board.

2 A Yes.

3 Q So I will just ask, I know I
4 have deposed you before but just like
5 before, I will just ask that you wait
6 until I finish and answer -- excuse me,
7 you wait until I finish a question before
8 answering.

9 A That's perfectly fine.

10 Q And just be sure that all your
11 answers are audible so that they can be
12 transcribed by the court reporter.

13 A Very good.

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

16 A I reviewed my declaration as
17 well as documents that are cited in this
18 declaration and I had discussions with
19 people at Winston & Strawn.

20 Q Did you review any other
21 documents other than documents that are
22 cited in your declaration?

1 A No.

2 CHAD C. WALTERS: Could we go
3 off the record just one second?

4 SCOTT BORDER: Sure.

5 (Whereupon a Recess Commenced
6 at 10:00 and Testimony Recommenced
7 at 10:01.)

8 BY CHAD C. WALTERS:

9 Q Back on the record.

10 You said you met with attorneys
11 at Winston & Strawn?

12 A Yes, online.

13 Q Online. When did you meet?

14 A Yes. When? Yesterday.

15 Q For about how long?

16 A A few hours.

17 Q That is the only meeting you had
18 to prepare for today's deposition?

19 A Yes, along with previews, very
20 short communications to prepare about
21 this meeting, when we set the dates and
22 all that to finalize the meeting for this

1 deposition.

2 Q Who was at the meeting from
3 Winston & Strawn?

4 A Scott Border and Matt Hopkins.

5 Q Anyone else?

6 A No.

7 Q Okay. I would like to turn to
8 your declaration, Exhibit 1003 in this
9 IPR, specifically paragraphs 2 and 3.

10 A Are you sharing your screen or
11 should I open the declaration myself?

12 Q I am happy for you to open the
13 declaration yourself.

14 A Okay.

15 Q I understand that you have
16 access on your computer to exhibits that
17 have been used in this IPR that have been
18 filed in the IPR; is that fair?

19 A Yes. Yes. That's absolutely
20 correct so let me make sure that I open
21 this.

22 Q And the exhibits that you have

1 access to are clean copies without any
2 notes; is that right?

3 A That's right. Yes. I put them
4 all in the folder to make sure all of
5 them are clean.

6 Q Where are you located today?

7 A I am in Houston, Texas at home.
8 There is construction downstairs actually
9 so I am temporarily using my daughter's
10 room as my office.

11 Q You have your declaration up?

12 A Yes.

13 Q Okay.

14 So paragraphs 2 and 3 list
15 materials that you considered in forming
16 your opinion for this declaration,
17 Exhibit 1003; is that fair?

18 A Yes indeed.

19 Q Did you rely on anything else
20 other than the materials identified in
21 paragraph 2 in forming your opinion?

22 A Well, my general knowledge of

1 the subject which covers years of
2 experience, reading a number of books,
3 papers, and all that but those were not
4 cited explicitly in the declaration.
5 Therefore, I would say paragraph 2 which
6 has a description of those is a fairly
7 good collection of items that I used to
8 form my opinion and write this
9 declaration.

10 Q Turn to Exhibit 1004 which is
11 your CV. Can you pull that up?

12 A Exhibit 1004, my CV, yes. I am
13 there.

14 Q You identify a number of -- in
15 the professional experience section, you
16 identify a number of academic positions.

17 A Hm-hm.

18 Q And then you identify one piece
19 of industry experience; is that right?

20 A Hm-hm, yes.

21 Q And that industry experience was
22 that Union Pacific Resources?

1 A That is a position that I had in
2 summer of '91 full-time.

3 Other experience in industry
4 includes consulting which I describe
5 later on.

6 Q What did you do for Union
7 Pacific Resources?

8 A Union Pacific had the natural
9 gas plant in Bryan, Texas and at the time
10 they were doing two things.

11 One, was to modernize the
12 technology they were using in that plant.
13 Natural gas plants are very common around
14 production sites. There are hundreds of
15 those, I would say, in the US. They
16 clean the gas as it comes out of the
17 ground so they can send it through
18 pipelines to various destinations.

19 So what I did there was, A, help
20 a little bit with the design of some
21 improvements and modifications they were
22 doing at the time.

1 And, B, later on through a
2 consulting project with Bryan Research &
3 Engineering, I helped develop an
4 automatic control system for that plant.

5 Q There was no drilling going on
6 at this plant?

7 A At this plant, no. No, there
8 wasn't.

9 Q And you were there one summer?

10 A Yes, that's correct.

11 Q Your other industry experience
12 is through consulting engagements; is
13 that fair?

14 A That is correct, yes.

15 Q Do you have significant
16 experience with drilling operations?

17 A Yes -- through my -- I would say
18 perhaps -- I'm sorry to interrupt.

19 I was just saying that perhaps
20 my most hands-on experience with drilling
21 operations was with Noble Drilling.
22 Noble is an umbrella company -- has Noble

1 Drilling Energy and so forth, but at the
2 time it was early 2000 we were developing
3 an automated horizontal drilling system
4 and I was helping this project as a
5 consultant.

6 Actually, that became very
7 successful. A small company was
8 eventually formed called Sliders --
9 Slider was bought eventually by
10 Schlumberger.

11 If you go to slb.com today, you
12 will see the product with the same name,
13 Slider along with some details about how
14 it works.

15 Q Is it fair to say most of your
16 industry experience is on the drilling
17 side as opposed to the fracturing or
18 production operations side?

19 A On the fracturing side I have
20 had experience on the research side
21 through a number of publications about
22 how to do the fracturing, how to do

1 certain calculations in automated way
2 using various techniques. But in terms
3 of actually helping do the fracturing, I
4 haven't been present at the location.

5 Q Have you ever been to a
6 producing well?

7 A Producing well, yes.

8 Q A well that's actually in the
9 production stage?

10 A I am trying to think -- I
11 believe so but that was quite sometime
12 ago.

13 My role wasn't central there.
14 Again, I was helping with automation
15 aspects of production operations so that
16 we could improve efficiency and safety.

17 Q Where was this well?

18 A That was actually an
19 experimental well in Norway where the
20 drilling was done and the assessment of
21 production would be made so that people
22 could develop various technologies.

1 Q Were you there for the drilling
2 of that well?

3 A The well was drilled, like I
4 said, an experimental well and it was
5 onshore. Norway's wells are all
6 offshore. That was for -- the well was
7 for the Research Institute of Stavanger.

8 Stavanger is the Houston of
9 Norway so to speak and they used that
10 well at the actual scale so that they
11 could draw conclusions about what happens
12 when you implement various technologies
13 in actual offshore wells which are out at
14 sea, either platform involving different
15 conditions but the essence of the
16 experimental well was the same.

17 Q When was this?

18 A When was this; between late --
19 no, let me think. 2007 through 2017,
20 something like that. Those were the
21 dates.

22 Q Were you there?

1 A There where?

2 Q At the producing well in Norway,
3 the experimental well.

4 A At the experimental well, yes.
5 Yes.

6 Q How long were you there?

7 A A number of days on occasion
8 depending on what kinds of experiments we
9 had to conduct, depending on the
10 technology being developed.

11 Again, my contribution was
12 mostly on the drilling side as they said.
13 The operation was -- the actual
14 production was for a different group.

15 Q Did it have any involvement in
16 the production operations at the
17 experimental well in Norway?

18 A A production operations, no.

19 Q How many -- how many visits did
20 you make to the well?

21 A A number of them. I don't
22 remember.

1 Q I am just curious because you
2 gave a wide range of dates between 2007
3 and 2017.

4 A Hm-hm. 2015, something like
5 that. It was 8 to 10 years. I am trying
6 to remember and that was always in June,
7 not always but every summer during that
8 period since 2007 -- from 2007 until
9 2015, I believe, or so.

10 I would spend June in Bergen, in
11 Stavanger, working with that institute to
12 develop technologies mainly for drilling
13 and I would interact with people in
14 production as well.

15 Q Other than this experimental
16 well in Norway where you were focused on
17 the drilling side, have you ever been to
18 any other well in the production stage?

19 A A well in the production stage,
20 no, not that I can remember.

21 Q You have never been to an
22 offshore well in the production stage?

1 A No. No.

2 Q Have you ever been to an
3 offshore well at all?

4 A Offshore well, no. You mean at
5 the platform, no, I have never visited a
6 platform.

7 Q Have you ever been to a
8 hydraulic fracturing site?

9 A At the time of the fracturing,
10 no.

11 Q I would like to turn to
12 paragraph 4 of your declaration.

13 A Yes, sir. I am there.

14 Q In this paragraph you state your
15 understanding of a POSITA for this IPR in
16 this patent; is that fair?

17 A Correct.

18 Q And in that -- in the middle of
19 that definition of a POSITA, you state
20 that one would have had at least a
21 bachelor of science in chemical
22 engineering, mechanical engineering,

1 materials science or metallurgical
2 engineering or an equivalent field and at
3 least two years of academic or industry
4 experience in the oil and gas industry
5 including experience with process control
6 systems.

7 Do you see that?

8 A Yes.

9 Q Why process control systems?

10 A Process control -- you mean why
11 would that be relevant to this
12 declaration?

13 Q Yes.

14 A Because the system looked at, in
15 this patent, is a system that involves
16 centralized -- centralized control of
17 various elements that would be a nice
18 piece of background for somebody to have
19 to understand how commands are passed
20 around in a system which involves several
21 components interconnected and they all
22 need to work in harmony.

1 Q Does the '394 patent describe
2 how commands are passed around in various
3 components?

4 A The '394 patent -- excuse me,
5 can you repeat the question?

6 Q Sure.

7 Does the '394 patent describe
8 how various commands are passed around to
9 various components?

10 A I will have to check again in
11 detail to see to what extent they provide
12 specific information on this.

13 Q Okay. Go ahead if you would
14 like to. It's Exhibit 1001.

15 A Very good. Give me just one
16 second.

17 So paragraph, I'm sorry, column
18 3 or 4 in the patent talks, for example,
19 in line 50 that this information can be
20 transmitted to a controller or control
21 area tanks.

22 Further down in line 65, it

1 talks about tanks that can have level
2 control systems.

3 Further down in column 4, line
4 10, there is a valve metering control
5 system.

6 Line 14 talks about fluid stream
7 can be controlled via adjustable
8 calibrated, et cetera, et cetera.

9 So there are several places
10 where this issue is mentioned in the
11 patent and that's why I thought that it
12 would be a good element in one's
13 background to understand how controls
14 work for these systems.

15 Q Are you familiar with the
16 Crossley reference Exhibit 1005, correct?

17 A Correct.

18 Q Does the Crossley reference
19 relate to process control systems?

20 A It does. Yeah, that I can tell.

21 Q In what way?

22 A In that there is reference to

1 how information is exchanged between
2 various elements and how that can help
3 control the process.

4 In fact, if I may open the
5 Crossley -- what exhibit was that that
6 you referred to again?

7 Q It's 1005.

8 A 1005. So even in the abstract
9 it says in operations control system,
10 there is reference to that early on.

11 Then further down there's quite
12 a bit of discussion about the how
13 information may ask to control various
14 things from lines to fluids flowing and
15 so forth.

16 Q You are familiar with the Albers
17 reference, 1006?

18 A Yes, it is one of the two
19 central references in my declaration.

20 Q Does the Albers reference refer
21 to process control systems?

22 A Let me see to what extent it

1 explicitly refers to that.

2 Albers' declaration -- I mean,
3 the patent is about fracturing. Give me
4 just one second, please. (Reviewing.)

5 So even in the abstract it
6 refers to monitoring and flow control
7 equipment. And then other places in the
8 patent where the issue of control comes
9 up.

10 For example, let me find one,
11 column 2, line 41, it refers to
12 monitoring and control equipment.
13 Monitor and control equipment further
14 down. And there are other references to
15 control further down in the patent.

16 Q I would like to turn back to
17 your declaration and specifically the
18 steps of oil and gas extraction. And you
19 walk through some of these steps starting
20 at in Section 4 of your declaration
21 entitled, Background of the Technology,
22 which starts at paragraph 28.

1 A Section 4 of my declaration,
2 yes, in paragraph 28. Give me just one
3 second. (Reviewing.)

4 28, yes, sir, I am there.

5 Q So is it fair to say the first
6 step in oil and gas extraction is
7 drilling which you describe in paragraphs
8 29 and 30 of your declaration?

9 A Yeah, assuming where you wanted
10 to do that after an exploration phase
11 which is another story but, yes, assuming
12 you made the decision that this is where
13 I want to produce, you start with
14 drilling a well, correct.

15 Q How would you describe the
16 drilling stage?

17 A How would I describe how
18 drilling is done or what is the role of
19 drilling? Could you be a little bit more
20 specific?

21 Q Sure. What goes on in the
22 drilling step?

1 A Oh yes. So in the drilling
2 step, the -- a site is selected and then
3 equipment is brought in place so that the
4 well can be drilled using a technology
5 that these days is fairly advanced. And
6 in all likelihood it will involve a
7 vertical and directional part of the
8 well.

9 There is equipment of the
10 surface. There is a derrick, along with
11 things that essentially turn the drill
12 stream. That's a sequence of pipes,
13 metal pipes, threaded to each other.

14 At at bottom there's a drill bit
15 that is rotated so it can chew on the
16 rock. The mud picks up the cuttings --
17 the mud flowing through the drill stream
18 picks up the cutting and lifts them to
19 the surface at the same time lubricates,
20 it cools off the drill stream, and that
21 in a nutshell is the basic operation.

22 Q When drilling is completed and

1 before the next stage, is the drilling
2 equipment removed from the site?

3 A The drilling equipment is
4 removed from -- from the specific spot so
5 things can be done to the well to
6 complete the well.

7 Q What do you mean remove from the
8 specific spot?

9 A Well, there's a hole in the
10 ground for which the drill stream goes.
11 That has -- the stream thing that turns
12 all that has to be removed so the
13 completion equipment can be put in place
14 so that the well can be completed.

15 Q As the well moves through
16 various other stages, such as completion
17 and fracturing and production, does the
18 drilling equipment remain on site?

19 A Again -- on site, in the
20 vicinity, depending on how much you will
21 need the equipment or whether you
22 anticipate using it for a nearby well or

1 using it to continue and so forth.

2 You realize that the well is
3 drilled in stages. So you may drill and
4 complete drill -- for example, drill in
5 case, continue drilling in case and so
6 forth.

7 SCOTT BORDER: Sorry, Mike,
8 could you adjust your camera
9 perhaps for the benefit of the
10 court reporter and I guess for my
11 own sanity, we were sort of
12 staring at the ceiling for a
13 moment.

14 THE WITNESS: Yes, I am
15 sorry.

16 SCOTT BORDER: Great. Thank
17 you.

18 CHAD C. WALTERS: Thanks.

19 SCOTT BORDER: No problem.

20 BY CHAD C. WALTERS:

21 Q So in your experience it's
22 common for drilling equipment to remain

1 at a well-site during the completion,
2 fracturing and production stages?

3 A I haven't dealt with that
4 decision to that level of detail to be
5 honest with you.

6 Q Do you know if it's common for
7 drilling equipment to remain at the site
8 during the completion, fracturing and
9 production stages?

10 A Well, if that equipment is to be
11 used again, yes. If not, then it's a
12 decision that people make according to
13 resources they have available, according
14 to how easy it is to move the equipment
15 and so forth.

16 Q Would you consider it expensive
17 to keep the drilling equipment at the
18 site unused during the completion,
19 fracturing and production phases?

20 SCOTT BORDER: Objection.
21 Outside the scope.

22 THE WITNESS: It depends on a

1 number of factors. I haven't

2 looked into that.

3 BY CHAD C. WALTERS:

4 Q So you don't know if it would be
5 expensive to keep the drilling equipment
6 at the site unused during the completion,
7 fracturing and production phases?

8 SCOTT BORDER: Same
9 objection.

10 THE WITNESS: I can check for
11 a specific situation given enough
12 information to assess whether this
13 would make sense or not but this
14 wasn't central for this analysis
15 so I didn't look into that.

16 BY CHAD C. WALTERS:

17 Q Okay.

18 The next phase of the drilling
19 process is the casing or cementing or
20 completion stage; is that fair?

21 A Yes.

22 Q Okay.

1 And you described casing at
2 paragraph 31 of your declaration?

3 A Indeed.

4 Q What is casing?

5 A Well, when you build the well,
6 you make a hole in the ground so that
7 hole is compacted dirt or rocks. So to
8 prevent that from collapsing when you
9 start doing other things to the well, you
10 put metal casing so that it can be there
11 in place and hold that well in good
12 shape.

13 Q Is this particular equipment
14 needed for casing?

15 A Yes.

16 Q What equipment?

17 A Depends on how you do the casing
18 and I will have to look it up to see what
19 particular options may exist today in
20 this technology.

21 Q Can you give me an example of
22 what equipment would be used for casing?

1 A Equipment that would lower the
2 metal casing to the ground and put it in
3 place.

4 Q Is -- once the casing process is
5 complete at the well, is it typical to
6 remove the casing equipment from the site
7 before proceeding to the fracturing or
8 production stages?

9 A Again, this is an issue of
10 available resources, economics,
11 scheduling and planning. Those are
12 decisions that I didn't look into in
13 detail for this analysis.

14 Q Do you know if the casing
15 equipment is typically kept at the site
16 or removed at the site before proceeding
17 to the fracturing or production stages?

18 A I would have to look at this
19 case by case. No pun intended here.

20 Q I am talking about a typical
21 well.

22 A In a typical -- well, again,

1 it's an issue of planning and scheduling.

2 Planning refers to what actions
3 you want to do.

4 Scheduling is what equipment.
5 This is a matter that there are experts
6 for and they would optimize the planning
7 and scheduling of the whole operation so
8 you can have the most benefit with a
9 minimum cost.

10 Q Is it common for the casing
11 equipment to remain at the site once the
12 well is cased and before proceeding to
13 the fracturing or production stages?

14 A Again, I would have to do --
15 transfer this on a case-by-case basis.
16 It depends on a number of factors.

17 Q Have you ever been to a
18 well-site where the casing equipment
19 remained at the site during the
20 fracturing and production stages?

21 A I haven't been at a site when
22 casing was actually performed -- done to

1 the well.

2 Q You never been to a site where a
3 well -- where fracturing was occurring,
4 correct?

5 A The actual operation of
6 fracturing, no.

7 Q In the experimental well in
8 Norway during -- strike that.

9 After the casing step, the next
10 stage for oil and gas extraction is the
11 stimulation or fracturing stage; is that
12 fair?

13 A Hm-hm.

14 BY CHAD C. WALTERS:

15 Q You described that at paragraphs
16 32 to 37 of your declaration?

17 A 32 through 37 indeed.

18 Q Fracturing requires large scale
19 equipment and massive amounts of fluid
20 components; is that right?

21 A Yes.

22 Q What is the large scale

1 equipment required by fracturing?

2 A The main idea of fracturing is
3 that you have to inject large quantities
4 of water plus other things, that's the
5 fracturing fluid, into the well and
6 pressurize it. So you need basically
7 very strong pumps that will make sure
8 that fluid is indeed injected to the well
9 and the pressure can be raised to the
10 point that the rock can fracture, and
11 water then can be removed from the well
12 so that the next step can commence.

13 Q You mentioned very strong pumps.
14 Is there any other large scale
15 equipment required by fracturing?

16 A Yes, there is -- well, the pumps
17 do the moving of the fluids. The fluids
18 somehow have to be prepared.

19 Basically, like I said, it's
20 water with other things. The other
21 things may be chemical additives, may be
22 sand which is the proppant that will keep

1 the fractures open. So of all these have
2 to be prepared at the surface and these
3 are large quantities, like I said, of
4 fluids so they have to be facilities that
5 can be used to prepare the fluids to do
6 the blending and eventually the injection
7 and pumping of the fluid into the well.

8 Q Do you think we need a mixer to
9 prepare the fracturing fluid?

10 A A mixer, yeah, to -- I mean, you
11 need to mix the water with the additives
12 and the sand and everything that goes
13 into the fracturing fluid.

14 Q You also need blenders?

15 A Yeah, blenders or mixers. There
16 are various terms used for that but the
17 idea, again, as I said, is to put
18 together -- to put into the water the
19 additional elements that are necessary
20 for various properties of the fracturing
21 fluid.

22 Q You need tanks as well?

1 A Yes.

2 Q You would need a manifold to
3 direct the fracturing fluids to a
4 wellbore?

5 A You would need a way, yes, to
6 make a connection between the well --
7 fluid connection between the well and the
8 source of these fluids indeed.

9 Q Do you know the footprint
10 required for the fracturing equipment at
11 the well-site?

12 A Footprint in terms of square
13 footage?

14 Q Yes or size.

15 A Off the top of my head, no, I
16 don't remember that number.

17 Q Can you take a guess?

18 A No, but it's -- I would have to
19 look it up and think a little bit about
20 it but it's an area that would be needed
21 to put the tanks and the pumps and the
22 equipment that connects it.

1 Q Can you think of the smallest
2 area that might be needed for that?

3 A Again, I would have to look this
4 up to see specifics. But, again, it is
5 the area that would be taken for the
6 number of pumps required, the fluid
7 containers.

8 And then like I said, each job
9 is -- fracturing job is different, so I
10 would have to look at specifics to have a
11 specific idea.

12 Q Is it considered a large area?

13 A Consider a large area required
14 for putting the fracture equipment you
15 mean?

16 Q Yes.

17 A Well, it depends on what you
18 call large.

19 Q Okay. Okay.

20 Fracturing is performed at high
21 pressure; is that right?

22 A That's correct, yes.

1 Q What type of pressures are we
2 talking about to perform hydraulic
3 fracturing?

4 A It's thousands of PSI and it
5 depends on a number of things.

6 The basic idea is that you
7 pressurize the water as you inject it
8 enough to fracture the rock but for the
9 fracture to remain within the bounds that
10 you want. And there's a certain
11 technology used there on how to actually
12 do that well.

13 Q How many thousands of PSI?

14 A It depends on the rock. It
15 depends on the stresses in the rock, the
16 kind of rock. It depends on a number of
17 things.

18 Q As high as 15,000 PSI?

19 A I don't remember off the top of
20 my head but that number doesn't sound
21 unreasonable.

22 Q What would be the low estimate

1 of a range of PSI needed for hydraulic
2 fracturing?

3 A Again, it's in the range of
4 thousands of PSI but specific, I would
5 have to look it up. I would have to
6 Google it basically.

7 Q You don't know off the top of
8 your head?

9 A Off the top of my head, I can
10 remember that it's thousands of PSI. It
11 varies from rock-to-rock from
12 stress-to-stress, from kind of fracture
13 to kind of fracture and all that. There
14 are various factors there that are
15 important.

16 Beyond that, what is important
17 is the principle that says pressure has
18 to be high enough to fracture the rock
19 but not too high so the fracture won't
20 escape to areas that you don't want.

21 Q It requires a high fluid
22 injection rate and a large volume of

1 stimulation fluids; is that fair?

2 A The large volume is typically
3 correct, yes. Those are operations that
4 require a lot of water.

5 The rate varies. And in fact,
6 there is -- there is technology described
7 in textbooks and various other sources on
8 how actually you do the pumping, how the
9 pressure increases and that it stabilizes
10 as the fracture starts being formed and
11 propagates. And then shutting the pumps
12 and the pressure starts dropping and all
13 that.

14 So it's a fairly nicely
15 described operation which has
16 qualitatively the pattern I just
17 described and quantitatively the numbers
18 vary depending on the particular
19 situation.

20 Q -- range?

21 A I'm sorry, a range of what?

22 Q The rate -- injection rate.

1 A Injection rate, I don't remember
2 off the top of my head.

3 Q Could it be as high as
4 100 barrels a minute?

5 A Again, I would have to look this
6 up. I don't remember.

7 Q You don't know if it could be as
8 high as 100 barrels a minute?

9 A I don't remember off the top of
10 my head. I would have to look it up.

11 Q Fracturing requires high
12 horsepower pumps; is that right?

13 A That's correct, yes.

14 Q What kind of horsepower are we
15 talking about?

16 A I don't remember, again, off the
17 top of my head but I can tell that those
18 are massive pumps that require a lot of
19 power. That's as much as I remember off
20 the top of my head.

21 Q So you characterize them as
22 high.

1 So what would be high in your
2 mind?

3 A High, it wouldn't be like a pump
4 that you would meet at say a distillation
5 column that would have to pump fluid in
6 the refinery tower so that it can go from
7 the bottom to the top or things like
8 that. Those are much bigger.

9 Q Can you give me a horsepower
10 range that will be required of a high
11 horsepower pump for fracturing?

12 A I don't remember off the top of
13 my head.

14 Q Can you give me a minimum
15 number?

16 A I cannot give that either.
17 It -- I would have to look it up.

18 Q Okay.

19 Once fracturing of the well is
20 completed and before moving to the
21 production stage, is the fracturing
22 equipment typically removed from the

1 well-site?

2 A Again, this is a decision
3 related to planning and scheduling so it
4 depends on how that equipment will be
5 used in another job. There may be a job
6 nearby, job elsewhere.

7 There may -- it's -- it's an
8 issue about allocating resources so it's
9 a planning and scheduling issue.

10 Q Would it be costly to keep
11 fracturing equipment unused at the
12 well-site during production operations?

13 SCOTT BORDER: Objection.
14 Outside the scope.

15 THE WITNESS: That depends on
16 the situation and it's a planning
17 and scheduling decision.

18 It can be influenced --
19 affected by a number of factors.

20 BY CHAD C. WALTERS:

21 Q In what situation would it not
22 be costly to keep fracturing equipment

1 unused at the well-site during production
2 operations?

3 SCOTT BORDER: Same
4 objection.

5 THE WITNESS: Again, it
6 depends on the situation.

7 That's not something I looked
8 into in very much detail for this
9 declaration.

10 BY CHAD C. WALTERS:

11 Q Have you ever been at a well
12 bearing production operations where the
13 fracturing equipment remained at the
14 site?

15 SCOTT BORDER: Same
16 objection.

17 THE WITNESS: I haven't been
18 at a well during actual production
19 operations so I cannot have an
20 opinion on that.

21 BY CHAD C. WALTERS:

22 Q What are the differences between

1 onshore and offshore fracturing?

2 A Differences in terms of on how
3 you actually do the fracturing or what is
4 the function of the fracturing or -- can
5 you be a bit more specific or is it all
6 of the above?

7 Q All of the above?

8 A All of the above, okay.

9 So in terms of how you do the
10 fracturing, obviously offshore there is a
11 sizable amount of water. There is the
12 sea above the ground, the rock where the
13 well is drilled. So somehow the
14 connection between the surface facilities
15 at the surface of the sea would have to
16 communicate with the equipment through
17 the water and down to the rock so that's
18 an obvious difference.

19 And in terms of function,
20 fracturing has a basic function which is
21 to improve the productivity of a well by
22 creating pathways for the fluids, oil and

1 gas that this, to travel to a well
2 through the rock easily and then to the
3 surface through the well.

4 In land wells, fracturing can be
5 done on both vertical and horizontal
6 wells. So overwhelmingly these days, I
7 would say fracturing is done on
8 horizontal or directional wells in low
9 permeability rocks, mostly shales which
10 is an essential element actually.
11 Otherwise production cannot proceed at
12 reasonable rates without fracturing.

13 In offshore wells, those wells
14 are usually in rocks that are a different
15 nature so fracturing is important but it
16 is not as critical as it is for low
17 permeability, support unconventional
18 wells and shales and such rocks offshore.

19 Q Does fracturing use different
20 equipment onshore versus the fracturing
21 equipment used offshore?

22 A The fracturing itself in the

1 well is done in the same way. It's only
2 that the connection between the well and
3 the surface may have -- not -- will have
4 the additional distance to traverse from
5 the bottom of the sea to the top in
6 offshore wells.

7 Q So offshore fracturing uses the
8 same equipment as onshore fracturing?

9 A It's the same idea, yes. Same
10 technology.

11 Q Does it use the same equipment?

12 A Equipment -- again, differences
13 in the equipment would have to do with
14 how the well is connected to the surface.
15 So in offshore, you will have to account
16 for the sea water. In onshore, there is
17 no need to do.

18 Q Is that the only difference in
19 equipment that would be used in offshore
20 fracturing versus onshore fracturing?

21 A That would be the main
22 difference. The fracturing part, how you

1 actually pressurize the well, how you
2 initiate the fracture, how you let the
3 fracture propagate by pressurizing the
4 fluid in the well and all that, the idea
5 is the same.

6 Q Does onshore fracturing
7 typically use trucks and trailers?

8 A Yes.

9 Q Does offshore fracturing
10 typically use trucks and trailers?

11 A Well, to be honest with you, I
12 would have to look that up but it's a
13 different situation where you're on a
14 platform so it wouldn't make much sense
15 to do fracturing by using a truck on a
16 platform. But what the truck helps with
17 is to have the equipment that is actually
18 used, it carries the equipment around, it
19 carries the pump, it carries the
20 material, it helps with mixing and all
21 these things.

22 Q Fracturing step, we move to oil

1 and gas production --

2 A Hm-hm.

3 Q -- is that fair?

4 SCOTT BORDER: Objection.

5 Form.

6 THE WITNESS: Yes.

7 BY CHAD C. WALTERS:

8 Q Your technology background
9 section does not address the production
10 step; is that right?

11 A Because production wasn't
12 central in this discussion. It is
13 mentioned in '394 that some of the lines
14 used there could be used for the
15 fracturing fluids and for production
16 fluids from the well to the surface, but
17 the main issue addressed was fracturing
18 so that's why I concentrated on that.

19 Q You don't think production
20 operations is relevant to the '394 patent
21 in this IPR?

22 A Production operations is

1 mentioned to the extent that a line can
2 be used also to carry production fluids
3 from the well to the surface.

4 Q Does -- do production operations
5 use different equipment than stimulation
6 operations?

7 SCOTT BORDER: Objection.
8 Form.

9 THE WITNESS: Can you be more
10 specific?

11 I mean, those are two
12 different activities in sequence
13 and related to each other, but
14 what you use to fracture a well
15 may have no bearing on what you
16 would need to produce from that
17 well, but I would need more
18 specifics to offer a more focused
19 answer to this.

20 BY CHAD C. WALTERS:

21 Q Is it fair to say production
22 operations use different equipment than

1 stimulation operations?

2 A There is equipment in fracturing
3 that would have no use -- no serious use
4 for production operations.

5 For example, pumps that
6 pressurize the production -- the
7 fracturing fluid into the well are not
8 going to be needed for production.

9 Production may need other pumps,
10 such as electric submersible pumps that
11 you throw into the well to help lift the
12 fluid -- the oil, that is, to the top.
13 But that's a different pump for a
14 different job, different configuration,
15 different function and all that.

16 Q Production operations typically
17 use different pumps than fracturing
18 operations?

19 A Yes.

20 SCOTT BORDER: Objection,
21 foundation.

22 BY CHAD C. WALTERS:

1 Q What equipment is used for
2 production operations?

3 A Well, that's -- it depends. It
4 depends on how you do the production,
5 whether it's oil or gas, gas -- it's a
6 number of things.

7 Q Can you give me examples?

8 A Sure. You just let -- you just
9 let the fluid go through the central pipe
10 that goes from the bottom to the top of
11 the well. The pressure of the reservoir
12 pushes the fluids up, and the fluids are
13 connected -- delivered to the top which
14 is connected to the equipment downstream
15 from there, separators for fluids, say
16 liquids, gases, and then separators for
17 oil and water, and maybe additional
18 equipment further down.

19 Q You characterized hydraulic
20 fracturing as requiring large scale
21 equipment.

22 Would you characterize

1 production operations as requiring large
2 scale equipment?

3 A It's a large scale operation but
4 again, this is an old past term.

5 Could you be more specific as to
6 what kind of equipment you are referring
7 to for large scale?

8 For example, if I may give you
9 an example of what I mean, a platform is
10 needed for production operations. Okay.
11 That's very large scale equipment. So
12 you need the -- the platform you put it
13 there and you use it for various things,
14 including production operations so, yes,
15 that's large scale.

16 Q Production operations are
17 typically at much lower pressures than
18 pressures for fracture stimulation
19 operations; is that right?

20 A Pressure where? There is a long
21 well that goes from top to the bottom and
22 the pressure varies quite a lot there.

1 Actually, it depends on the depth of the
2 well. There's the hydrostatic pressure.
3 There's friction that needs to be
4 overcome.

5 Can you be a bit more specific?

6 Q Sure.

7 What about the pressures of the
8 pumps required?

9 A During production?

10 Q During production versus
11 stimulation?

12 A Pressure is required from the
13 pumps during production. If there is a
14 pump, that would be a pump at the bottom
15 of the well which would help pump fluids
16 from the bottom to the top so it would
17 have to overcome the hydrostatic pressure
18 from the bottom to the top.

19 Q You would use the same high
20 pressure pumps for production operations
21 as in fracturing?

22 A Well, that's -- operation

1 pumps -- I mean, the operation of pumps
2 for production in the design of these
3 pumps and all that is based on similar
4 principles of pushing a fluid in one
5 direction but they have different design.

6 You know the principles are
7 applied differently so that you have a
8 different design that is suitable for the
9 purpose.

10 For fracturing, you have large
11 pumps at the top which pressurize fluid
12 at the top and send it downward to the
13 well for production. It's pressure --
14 it's a pump at the bottom which provides
15 pressure at the bottom to the fluid for
16 the fluid to be lifted and reach the top.

17 Q Are horsepower pumps used for
18 production operations versus those for
19 stimulation operations?

20 SCOTT BORDER: Objection.

21 Form.

22 THE WITNESS: They would

1 typically be different.

2 BY CHAD C. WALTERS:

3 Q Would they be lower?

4 A For production?

5 Q Yes.

6 A I would say they would typically
7 be lower but, again, I have to look up
8 the numbers to see how high they can go
9 and all these different parameters that
10 affect the operation of the pumps in
11 these two configurations -- production
12 versus drilling and stimulation.

13 Q Are production chemicals
14 typically used in much lower volumes and
15 rates than fracture stimulation fluids?

16 A Again, that depends on what
17 additional chemicals are used, either for
18 production or for stimulation.

19 Q Can you think of a scenario
20 where production chemicals would be used
21 in higher volumes and rates than fracture
22 stimulation fluids?

1 A It depends. There are so many
2 things that one can look at here so --
3 you realize that the chemicals used in
4 the slurries for fracturing.

5 Most of those are actually
6 proprietary information. Although it's
7 common knowledge of the principles that
8 guide this selection of these chemicals.

9 Companies have their own secret
10 sources. Each one of them suitable for a
11 particular location, or for a particular
12 kind of well, particular kind of job and
13 so forth.

14 Same for production. There may
15 be chemicals that are proprietary but --
16 and there are general principles that
17 people understand.

18 For example, adding additives in
19 production to prevent hydrate formation.
20 That's common knowledge.

21 Now, how is that done, what kind
22 of additive you put -- to what quantities

1 and to what extent, it depends on the job
2 and the production site and the
3 particular company, the technology used
4 and so forth. So there is a wide range
5 of these things.

6 Q Do you consider yourself an
7 expert in fracturing and production
8 operations; is that fair?

9 A Yes.

10 Q Okay.

11 Can you envision a scenario
12 where production chemicals would be used
13 in a higher volume and rate than fracture
14 stimulation fluids?

15 SCOTT BORDER: Objection.
16 Form.

17 THE WITNESS: I will have to
18 research that.

19 This is not something I
20 looked into in preparing this
21 declaration. And it's something
22 that needs careful consideration

1 of the sources so I can see the
2 whole range of these numbers.

3 BY CHAD C. WALTERS:

4 Q Do you think it's possible at a
5 producing well that production chemicals
6 would be used in higher volumes and rates
7 than the fracture stimulation fluids at
8 that well?

9 SCOTT BORDER: Objection.

10 Form.

11 THE WITNESS: I will have to
12 research that looking at standard
13 sources so I can have a more
14 informed opinion.

15 BY CHAD C. WALTERS:

16 Q You don't know if it's possible
17 or not?

18 SCOTT BORDER: Objection,
19 foundation. Form.

20 THE WITNESS: I will have to
21 look up the sources again to see
22 what is the full range of values

1 that one has to consider.

2 CHAD C. WALTERS: Okay.

3 We have been going about an
4 hour so do you want to take a
5 break, maybe a ten-minute break?

6 THE WITNESS: Sure.

7 CHAD C. WALTERS: And Dr.
8 Nikolaou, we had a deposition
9 before but I think you are aware
10 of the rules, to not discuss the
11 substance of your testimony with
12 your counsel during breaks.

13 THE WITNESS: Yes,
14 absolutely.

15 CHAD C. WALTERS: Okay.

16 (Whereupon a Recess Commenced
17 at 10:58 and Testimony Recommenced
18 at 11:10.)

19 BY CHAD C. WALTERS:

20 Q Welcome back, Dr. Nikolaou.

21 I would like to turn to the
22 Crossley reference which is Exhibit 1005.

1 A Yes.

2 Q Do you have it up?

3 A Yes.

4 Q Okay. Great. The title of
5 Crossley is System and Vessel for
6 Supporting Offshore Fields.

7 Do you see that?

8 A Yes. On the cover page, yes.

9 Q On that same page in the
10 abstract, it describes the reference as,
11 "A system for supporting multiple
12 well-site, offshore, hydrocarbon-bearing
13 fields. Each well-site has one or more
14 wells."

15 A Yes.

16 Q Okay.

17 And then in paragraph 2, it
18 states that "Embodiments of the present
19 invention generally relate to a system
20 for supporting a plurality of
21 hydrocarbon-bearing wells, including
22 systems for providing production

1 operations in multiple well-site,
2 offshore fields."

3 A Correct.

4 Q These disclosures relate to
5 production operations; is that fair?

6 A The Crossley patent, you mean?

7 Q Yes.

8 A Yes.

9 Q Does Crossley system perform
10 well-stimulation?

11 A No.

12 Q Okay.

13 Crossley does not relate to
14 drilling operations; does it?

15 A Does not relate -- well, it --
16 it's related to a well that has been
17 drilled.

18 That operation has been
19 completed so the only thing that may be
20 done is perhaps to make modifications in
21 those drilled wells but Crossley focuses
22 on essential unit that oversees

1 production operations.

2 Q So in the system of Crossley,
3 the drilling of the well has been
4 completed, right?

5 A Yes, that assumes that you have
6 wells that have been drilled and the
7 concern is with a simultaneous control of
8 the production --

9 (Reporter Clarification.)

10 THE WITNESS: -- operations.

11 BY CHAD C. WALTERS:

12 Q You would not characterize
13 Crossley as directed to solving problems
14 in drilling operations; would you?

15 A Drilling operations are indeed
16 not the focus of Crossley.

17 Q Okay.

18 I would like to turn to the
19 Albers reference which is Exhibit 1006.

20 A Yes.

21 Q The title of Albers is Method
22 for Fracture Stimulating Wellbores.

1 Is that right?

2 A Yes, indeed. The cover page.

3 Q And in the abstract the first
4 sentence of the abstract it states,
5 "Disclosed is a method for fracture
6 stimulating wellbores using gaseous
7 nitrogen and/or liquid carbon dioxide
8 combined with a partially dehydrated
9 proppant."

10 Do you see that?

11 A Yes.

12 Q And then turning to column 1,
13 lines 63 to 65 -- actually, lines 65 to
14 67.

15 A Yes.

16 Q It states, "This invention
17 relates to a method for fracture
18 stimulating wellbores using gaseous
19 nitrogen and/or liquid carbon dioxide
20 combined with substantially dehydrated
21 proppant."

22 Do you see that?

1 A Indeed, yes.

2 Q Is it fair to say that Albers is
3 directed to onshore well-stimulation?

4 SCOTT BORDER: Objection.
5 Form.

6 THE WITNESS: I have to check
7 to see if there is specific
8 reference to that but his main
9 concern is how you do the
10 stimulation regardless of the
11 particular configuration onshore
12 or offshore.

13 BY CHAD C. WALTERS:

14 Q Albers does not relate to
15 drilling operations, correct?

16 A Drilling, well, it's -- the
17 focus is stimulation.

18 Q And you wouldn't characterize
19 Albers as directed to solving problems
20 and drilling operations, correct?

21 A His focus is on stimulation.

22 Q So is the answer to my question

1 yes?

2 A The question was whether Albers
3 is concerned with drilling.

4 Q I will read my question again.

5 You would not characterize
6 Albers as directed to solving problems
7 with drilling operations, correct?

8 A Correct. He does not directly
9 address drilling operations per se.

10 Q And Albers does not relate to
11 production operations; is that right?

12 A Not directly. Again, this is
13 something that you do before production
14 to stimulate the well.

15 Q There's no mention of production
16 in Albers; is that right?

17 A Well, the word is in the file
18 but the focus is not production.

19 There's reference of production
20 fluids or stimulating the production of
21 oil and gas in column 1, for example, but
22 the focus is on how you do the

1 stimulation.

2 Q I would like to turn to column
3 4, line 16 to 20.

4 A 16 to 20. Yes, sir.

5 Q There are a couple of sentences
6 that state, "The specific number of
7 trucks, trailers, tanks is illustrative
8 in nature and is not meant to be limiting
9 one of skill in the art will appreciate
10 that additional trucks, trailers, tanks
11 can be used to meet these specific
12 requirements of a particular job design."

13 Do you see that?

14 A Yes, I do.

15 Q What are trucks, trailers and
16 tanks used for in onshore fracturing?

17 A Well, it's described in this
18 pattern actually. And in fact -- let's
19 see, there are probably pictures of that,
20 but in general those carry the equipment
21 that is needed to perform the operations
22 that we have been discussing for the

1 fracturing job.

2 For example, mixing various
3 components to prepare the fracturing
4 fluid or pumping the fracturing fluid
5 into the well and the like.

6 Q Is it important that the
7 fracturing equipment be portable?

8 A Again, it's an issue of
9 convenience and how actually the
10 fracturing equipment is moved around and
11 how you minimize the cost of moving the
12 equipment from place to place is subject
13 to technology that has been under
14 development for quite some time.

15 So is it important that this
16 equipment should be portable? It will
17 be -- the equipment will be portable
18 because once you finish the job, then you
19 can do anything you want with that
20 equipment.

21 As I explained previously, it's
22 a matter of planning and scheduling of

1 how you use the equipment for the purpose
2 in a cost effective way.

3 Q Is it common to use trucks,
4 trailers or tanks -- strike that.

5 Is it common to use trucks and
6 trailers and tanks in fracturing sites so
7 that the fracturing equipment can be
8 moved around?

9 A That's how you move the
10 equipment around. That's one way to do
11 that, yes.

12 Q Is it common to use trucks,
13 trailers and tanks in fracturing sites?

14 A It is quite common, yes.

15 Q In your opinion that the claims
16 of the '394 patent are not patentable or
17 invalid.

18 You rely on a combination of
19 references for each claim; is that right?

20 A That is correct.

21 Q You don't have an opinion that
22 any single reference discloses each

1 limitation of any single claim?

2 A I haven't found one.

3 Q Okay. I would like to turn back
4 to your declaration, Exhibit 1003.

5 A Yes, I am there.

6 Q Specifically let me ask a
7 question.

8 Crossley describes a vessel 150
9 with an operations control system 180; is
10 that right?

11 You can look at your confirm --
12 at your paragraph 50 of your declaration.

13 A (Reviewing.) Yes.

14 Q I would like to ask some
15 questions about your combination of
16 Crossley and Albers.

17 A Yes.

18 Q So I will just ask that question
19 again.

20 Crossley describes a vessel 150
21 that includes an operations control
22 system 180?

1 A In paragraph 50 down in line 6
2 that's what -- 7, rather --

3 Q That's what you say about --
4 (Simultaneous Crosstalk.)
5 I'm sorry.

6 A Yeah.

7 Q That's what you say about
8 Crossley, correct?

9 A Yeah.

10 Q And your combination relies on
11 Albers' equipment to be the claimed well
12 treatment operations factory that
13 manufactures the first and second
14 well-stimulation fluids of the claims; is
15 that right?

16 A Excuse me, I had to cough and I
17 missed the question. Could you repeat
18 it?

19 Q Sure. Why don't we move to
20 paragraph 67 of your declaration.

21 A Certainly, 67. Yes, sir.

22 Q I guess on the previous page at

1 paragraph 64, you include Limitation [1A]
2 which requires a well treatment
3 operations factory which manufactures and
4 pumps a well-stimulation fluid.

5 Do you see that?

6 A Yes, sir.

7 Q So moving to paragraph 67, your
8 combination of Crossley and Albers relies
9 on Albers' equipment to be the well
10 treatment operations factory that
11 manufactures the first and second
12 well-stimulation fluids of the claims --

13 A Yes.

14 Q -- is that right?

15 A Yes.

16 SCOTT BORDER: Objection.

17 Form.

18 BY CHAD C. WALTERS:

19 Q And going back to paragraph 48
20 of your declaration, you describe and
21 illustrate that combination; is that
22 fair?

1 A Page 29 of the declaration, yes.

2 Q Yes, paragraph 48.

3 A Hm-hm. Correct.

4 Q And in that paragraph you state
5 that, In the Crossley system is modified
6 by Albers, Albers' fractures stimulation
7 -- excuse me -- fracture-stimulating
8 equipment and associated dynamic fluid
9 manufacturing and optimized oil
10 well-stimulation fluid techniques, would
11 be implemented on Crossley's vessel
12 150 -- depicted below in annotated Figure
13 1 of Crossley with an excerpt --

14 (Simultaneous Crosstalk.)

15 A Are you on paragraph 68 or --

16 Q Paragraph 48.

17 A 48. (Reviewing.)

18 Yes, go ahead, please.

19 Q Okay.

20 You described the manner in
21 which Albers' fracture-stimulating
22 equipment would be implemented on

1 Crossley's vessel 150?

2 A Yes.

3 Q Okay.

4 And you include annotated
5 illustration of that at the end of
6 paragraph 48?

7 A Yes, on page 29.

8 Q So in your combination,
9 everything from Figure 1 of Albers would
10 be included on Crossley's vessel; is that
11 right?

12 A This would be an example of
13 equipment that one could use to actually
14 perform stimulation with a simultaneous
15 control from a central facility which is
16 the main theme of Crossley.

17 So Crossley lands the -- teaches
18 the centralized control of operations.

19 Albers teaches the fracturing of
20 the well. Combination of the two gives a
21 centralized simultaneous operation for
22 fracturing multiple wells.

1 Q Then in the illustration of your
2 combination, you have the equipment of
3 Albers Figure 1 on Crossley's vessel; is
4 that right?

5 A Yes.

6 Q I would like to turn to
7 column -- Albers reference, Exhibit 1006
8 at column 4.

9 A Yes, sir.

10 Q Starting at line 14, there's a
11 sentence that states, "All of the above
12 referenced equipment is of a conventional
13 nature and is commonly used in the
14 industry."

15 A Yes.

16 Q And that above referenced
17 equipment is describing the equipment of
18 Figure 1?

19 A Figure 1 -- you are referring to
20 Figure 1 of Albers?

21 Q Yes.

22 A Yeah.

1 Q You agree that that equipment is
2 conventional -- is of a conventional
3 nature and commonly used?

4 A Yeah, that's what Albers states.

5 Q Okay.

6 What is the footprint size of
7 that conventional equipment shown in
8 Figure 1 of Albers?

9 A I don't know for a fact what
10 that might be but there are trucks shown
11 there. And this is shown as an example.

12 And Albers states that his
13 purpose is to show the principle rather
14 than the particular number of trucks or
15 equipment needed or vessels needed for a
16 job. His concern is with the principle
17 how this is done and what kind of
18 equipment one would need.

19 Q Can you give me an estimate of
20 what footprint size might be given that
21 this is conventional equipment?

22 SCOTT BORDER: Objection.

1 Form.

2 THE WITNESS: I would have to
3 look it up to see what the area
4 would be for the trucks shown and
5 the vessels and so forth.

6 BY CHAD C. WALTERS:

7 Q Okay. I would like to move --
8 staying on Albers, looking at column 5,
9 lines 5 to 11.

10 A Lines 5 to 11. Yes, sir, I am
11 there.

12 Q Can you -- you can read this to
13 yourself, but can you read the sentence
14 that starts, "The high pressure" at
15 column -- at line 5 of column 5?

16 A (Reviewing.) Okay.

17 Q That sentence states, "That
18 slurry may be pumped at a pressure up to
19 a design maximum of 70,000 kilopascals."

20 Do you see that?

21 A Yes.

22 Q Do you know how much 70,000

1 kilopascals is in PSI?

2 A I have to do the conversion.

3 You want me to do it quickly.

4 Q Would it be fair to say it's
5 about 10,000 PSI?

6 A Off the top of my head, yes, but
7 I would use a web source to make sure I
8 don't make a mistake.

9 Q That's what I got when I did the
10 Google conversion.

11 A Okay. I trust that in good
12 faith. I trust that you didn't make a
13 mistake, neither did Google.

14 Q Sure.

15 You haven't provided any
16 evidence in your declaration that
17 Crossley's pumps or other equipment could
18 withstand pressures of up to 10,000 PSI;
19 have you?

20 A I don't believe I discussed that
21 issue at all what pressure these pumps
22 would be suitable for.

1 Q And you didn't provide any
2 evidence in your declaration that
3 Crossley's fluid delivery lines can
4 support the high volume and rates
5 required for stimulation fluids; did you?

6 A Regarding the volumes of these
7 fluids, I didn't discuss that either.

8 Q Or the fluid rates?

9 A The fluid rates, no, I didn't
10 discuss that.

11 Q Okay.

12 A I don't believe so.

13 Q I would like to go back to
14 paragraph 48 of your declaration.

15 A Paragraph 48, yes.

16 Q This is where you stated that
17 "Albers' fracture-stimulating equipment
18 and associated dynamic fluid
19 manufacturing and optimized oil
20 well-stimulation fluid techniques would
21 be implemented on Crossley's vessel 150."

22 Is that right?

1 A Correct.

2 Q You don't provide any
3 explanation in your declaration as to how
4 Albers' fracture stimulation equipment
5 and associated dynamic fluid
6 manufacturing and optimized oil
7 well-stimulation fluid techniques would
8 be implemented on the vessel; have you?

9 A How they would --
10 (Simultaneous Crosstalk.)

11 SCOTT BORDER: Objection.
12 Form.

13 THE WITNESS: You mean using
14 what technology or using what
15 resources or what techniques?

16 Can you be more specific.

17 BY CHAD C. WALTERS:

18 Q Any of those?

19 A To the extent that the equipment
20 described in Albers is standard, I didn't
21 discuss this because I would submit that
22 one would use whatever it takes to put

1 standard equipment on the spot.

2 Q You didn't identify what
3 resources or what techniques would be
4 used in order to implement Albers'
5 fracture stimulating --
6 fracture-stimulating equipment on
7 Crossley's vessel 150, correct?

8 A So the idea is that this is
9 standard equipment as Albers explains and
10 I didn't go to any more detail in the
11 sense standard equipment can be handled
12 in a standard way.

13 Q The control delivery system 158
14 of Crossley -- I referenced that because
15 at the end of paragraph 48 at the last
16 sentence of the text, it states that
17 "Albers equipment would be implemented on
18 Crossley's vessel 150 and in conjunction
19 with the control delivery system 158."

20 Do you see that?

21 A Yes.

22 Q Okay.

1 To answer my question about what
2 the control delivery system 158 is, you
3 can look at paragraph 60 of Crossley
4 Exhibit 1005, if you would like.

5 A Paragraph 60 of Crossley. Yes,
6 sir, I am there.

7 Q Is it fair to say that the
8 purpose of the control delivery system
9 158 of Crossley is to control subsea
10 equipment located at the subsea
11 well-sites 110, 120, 130?

12 SCOTT BORDER: Objection.
13 Form.

14 THE WITNESS: That's what is
15 stated in that paragraph, that the
16 ship 150 optionally also includes
17 a control delivery system.

18 BY CHAD C. WALTERS:

19 Q So your declaration though does
20 not explain how Albers'
21 fracture-stimulating equipment would
22 connect to Crossley's control delivery

1 system 158; is that right?

2 A Crossley's system contains two
3 communication elements.

4 One is -- that are related. One
5 is communication of signals. And the
6 other is communication in a fluid
7 connection.

8 Figure 4 actually shows how
9 things can be combined or how you can
10 consider a possibility for delivering, A,
11 signals and, B, fluids.

12 Fluids are shown in 428, 428
13 prime, 428 double prime in Figure 4 of
14 Crossley. So it's in this context --
15 particularly, the fluid connection that I
16 used as a capability that Crossley
17 teaches for a centralized fluid
18 connection and communication with the
19 wells.

20 Q Figure 4 describes a line
21 flowing from the vessel to the wells?

22 A Hm-hm.

1 Q Okay.

2 But in paragraph 48, you're
3 talking about connecting Crossley's --
4 excuse me, Albers' fracture-stimulating
5 equipment to Crossley's control delivery
6 system 158 which is on the vessel, I
7 believe; is that right?

8 SCOTT BORDER: Objection.

9 Form.

10 THE WITNESS: So you are
11 referring to my declaration again
12 in the figure on page 29?

13 BY CHAD C. WALTERS:

14 Q Yes. And the preceding text.

15 A Yes. The question again is what
16 again?

17 Q Sure.

18 So in the preceding text, you
19 state that, "Albers' fracture-stimulating
20 equipment would be implemented on
21 Crossley's vessel 150 and in conjunction
22 with the control delivery system 158?"

1 A Yes, the idea is that there is a
2 connection that can deliver fluids
3 downhole.

4 And the fluids that would have
5 to be delivered in a fracturing operation
6 would be the fluids needed for fracturing
7 which is why in the figure on page 29 of
8 my declaration I am showing the
9 fracturing-related equipment in that
10 insert in the figure replacing an element
11 of the Crossley configuration using the
12 Albers equipment.

13 Q You do not explain how Albers'
14 fractures stimulating equipment would
15 connect to Crossley's control delivery
16 system 158; is that right?

17 A I didn't go into that depth in
18 the sense that this is standard equipment
19 as Albers teaches so I didn't expound on
20 how standard equipment would be connected
21 to Crossley's configuration.

22 Q Can we turn to Albers again,

1 Exhibit 1006 specifically at column 5?

2 A Yes, sir.

3 Q Starting at line 63?

4 A Yes.

5 Q Is it fair to say that Albers
6 relates to stimulating coal bed methane
7 formations?

8 A (Reviewing.) That's what is
9 stated in that sentence.

10 In the next one, that the method
11 is particularly suited for this
12 application as the introduction of blah,
13 blah, blah and he continues on this.

14 Q And then reading on through
15 column 6, line 3, Albers discusses
16 introduction of water into these
17 formations.

18 A This is -- he says water
19 sensitive formation in the sense that
20 he's his standard fracturing equipment
21 with a particular twist that he describes
22 in the abstract using the nitrogen in how

1 to handle the water situation so he can
2 have that specific outcome for these
3 kinds of wells. But his fracturing
4 approach is fairly standard.

5 Q Was the industry stimulating
6 coal bed methane formations or other
7 water sensitive formations offshore as of
8 December 2005?

9 A I haven't spent much time on
10 coal bed methane formations to be honest
11 with you.

12 My main application was on
13 shales but the fracturing technology was
14 used for essentially on wells that needed
15 stimulation.

16 Q Is it fair to say you don't know
17 the answer to my question?

18 SCOTT BORDER: Objection,
19 foundation.

20 THE WITNESS: Again, I
21 haven't spent much time working on
22 coal bed methane formations and

1 their stimulation.

2 BY CHAD C. WALTERS:

3 Q So do you know if the industry
4 was stimulating coal bed methane
5 formations or other water sensitive
6 formations offshore as of December 2005?

7 A I would have to look that up.

8 Q Okay. I would like to go back
9 to your declaration, paragraph 60.

10 In paragraph 60, you discuss the
11 Lacy reference and the techniques of
12 Lacy.

13 A Yes.

14 Q You use that to support your
15 combination of Crossley and Albers?

16 A I am using that as corroborating
17 support, yes.

18 Q Okay.

19 So my question is, how would
20 Lacy's techniques be incorporated into
21 the combination with Crossley and Albers
22 to teach the claims?

1 SCOTT BORDER: Objection.

2 Outside the scope.

3 THE WITNESS: I am not sure I
4 can answer that question in a
5 meaningful way.

6 Lacy has a specific focus and
7 that would be relevant to the
8 centralized oil field operations
9 that Crossley teaches. So that's
10 as much as I can say about that.

11 If there is something more
12 specific, I would definitely be
13 happy to address it.

14 BY CHAD C. WALTERS:

15 Q Are you proposing to use Lacy's
16 techniques in the combination with
17 Crossley and Albers?

18 A So Lacy is concerned with a
19 particular configuration for vertical
20 fracture growth control. This is the
21 title of the patent.

22 And it has to do with

1 controlling fluid flow and having mixers
2 and having various elements that can
3 deliver the fluids to the well.

4 So this is just another
5 reference that explains the technology
6 for hydraulic fracturing was fairly well
7 developed and known already at that date.

8 I am using it --

9 (Simultaneous Crosstalk.)

10 I'm sorry --

11 Q Go ahead.

12 A I am using this as corroborating
13 evidence, not as a central element. But
14 in case there is any doubt, that
15 technology, you know, doing fracturing
16 was fairly well understood at the time of
17 Lacy's patent.

18 Q Looking at the next paragraph,
19 paragraph 61, you discuss the Tolman
20 reference.

21 A In my declaration?

22 Q Yes.

1 A Yes, sir. I am there.

2 Q You state that a "POSITA would
3 have been motivated to incorporate Albers
4 and Crossley based on the teachings of
5 Tolman."

6 A Yes.

7 Q And by Tolman, you are referring
8 to Exhibit 1008 which is a publication of
9 a patent application; is that right?

10 A Yes.

11 Q I would like to look at Tolman
12 for a bit.

13 A Okay. I have that reference
14 open.

15 Q Okay.

16 Is it fair to say that Tolman is
17 directed to stimulation treatment and not
18 production operations?

19 A Yes, the title of the patent is
20 "Method and Apparatus associated with
21 Stimulation Treatments for Wells."

22 Q There's no suggestion in Tolman

1 of using production equipment for
2 fracturing or vice-versa; is that right?

3 A I don't believe I saw anything
4 to that extent in Tolman.

5 Q Okay. Can we look at Figure 3
6 of Tolman.

7 It's also described in paragraph
8 40, if you would like to look at
9 paragraph 40 as well.

10 A (Reviewing.) Yes, sir.

11 Q I would like to focus on Step
12 320 of Figure 3 of Tolman?

13 A Figure 3 of Tolman, yes.

14 Q So this Step 320 states that you
15 would move the stimulation equipment
16 before proceeding with production
17 operations, correct?

18 A Yes. Hm-hm.

19 Q It's fair to say that fracturing
20 and production operations happen
21 sequentially?

22 A Production will follow

1 stimulations I describe.

2 Q You have never seen fracturing
3 and production equipment both in
4 operation at the same well-site, right?

5 A Fracturing and producing at the
6 same time, no.

7 Q Oil and gas production can last
8 quite a long time, is that fair, when you
9 reach the production phase of a well?

10 SCOTT BORDER: Objection.

11 Form.

12 THE WITNESS: What do you
13 mean does it take long to drill a
14 well and start production?

15 Or are you asking whether
16 after production commences, does
17 it take years for it to be
18 abandoned?

19 Which is it?

20 BY CHAD C. WALTERS:

21 Q Sure. My question probably
22 wasn't accurate.

1 I am talking about production
2 operations.

3 So once you start production
4 operations, that can last quite a long
5 time?

6 A That varies quite a lot
7 depending on the well and how production
8 is handled so you realize that production
9 proceeds initially using the internal
10 pressure of the reservoir. After some
11 time the reservoir may have to be
12 essentially forced to produce through
13 secondary or maybe tertiary recovery
14 techniques. And those varied depending
15 on whether you have a horizontal or a
16 vertical well, whether you have high
17 permeability or low permeability of
18 reservoir. There's a number of factors.

19 Shale oil or gas wells have
20 short production spans from primary
21 production. Conventional reservoirs may
22 have longer production spans from

1 primary, secondary or even tertiary
2 production.

3 So the short answer again, is
4 the production period for a well varies
5 and it varies quite a bit actually.

6 Q It can last as long as 15 to
7 30 years for an offshore well?

8 A With proper handling of the
9 well, yes, it can last a long time. Say
10 over a decade, yes.

11 Q Would you expect that the
12 fracture-stimulating equipment would
13 remain on an offshore vessel drilling
14 production operations?

15 A If it's not needed or
16 anticipated to be needed soon, there's no
17 reason for that equipment to stay there.

18 Q Would it make business sense to
19 keep the stimulating equipment on an
20 offshore vessel during production
21 operations?

22 A Again, that's a decision of

1 planning and scheduling, but typically I
2 would say one uses equipment for a
3 specific purpose. If the equipment is
4 not needed, there may be an incentive not
5 to use it anymore, and move it someplace
6 else where it can be more useful.

7 Q I am in a spot we might want to
8 take another short break if that makes
9 sense.

10 A Yeah.

11 CHAD C. WALTERS: 10 minutes.

12 THE WITNESS: Yeah, 11:02; is
13 that okay?

14 CHAD C. WALTERS: Sure.

15 (Whereupon a Recess Commenced
16 at 11:52 and Testimony Recommenced
17 at 12:02.)

18 BY CHAD C. WALTERS:

19 Q Claim 1 of the '394 patent, you
20 may want to pull up the claims for a
21 couple of questions.

22 "It requires flowing a first

1 stimulation fluid to the first well and
2 not to the second well and flowing a
3 second stimulation fluid to the second
4 well and not to the first well."

5 A Yes.

6 Q Independent Claims 24, 25, 26
7 and 27 have a similar requirement but
8 some of them require a pad or a plurality
9 of wells instead of a well.

10 A Yes.

11 Q See that?

12 A Yes.

13 Q What is your understanding of a
14 pad?

15 A A pad is a configuration that
16 essentially makes it more efficient to
17 have equipment in place for drilling or
18 stimulation without having to move every
19 single element one at a time but you move
20 them all on the pad.

21 So pad drilling was a major
22 development in technology for drilling

1 unconventional resources wells that
2 substantially reduced costs and improved
3 deficiency and effectiveness for these
4 drilling operations.

5 Q Pads exist offshore?

6 A Offshore you can think of a pad
7 but then it's -- it's of a different
8 nature because you have the platform
9 there and you have equipment at the
10 bottom of the sea and all that so it's a
11 different configuration.

12 Q Is it fair to say pads did not
13 exist offshore?

14 A I don't know if I would call
15 these pads, but the idea is, again, that
16 you have equipment accumulated there in a
17 small area. And so that's -- that is the
18 configuration that people use on a
19 platform.

20 Q When you say "I don't know if I
21 would call these pads," you wouldn't call
22 offshore platform a pad?

1 A Offshore platform, no, I would
2 not call it a pad for a number of
3 reasons, mainly because of size and
4 function. A pad is something that you
5 use typically for unconventional wells
6 onshore. Platform is something that you
7 use offshore. Although there is, again,
8 there are multiple pieces of equipment in
9 the same spot.

10 Q Turn back to the Crossley
11 reference, Exhibit 1005, specifically
12 paragraph 28.

13 A 28. (Reviewing.) Yes.

14 Q In the middle of that
15 paragraph --

16 A Yes.

17 Q -- there's a sentence that
18 starts, "The floating vessel may."

19 Do you see that?

20 A Crossley, paragraph 28?

21 Q Yes.

22 A Let me see if I have the right

1 document.

2 Q Just over halfway down the
3 paragraph.

4 A (Reviewing.) Yes, I'm sorry. I
5 was looking at the wrong place. Go
6 ahead, please.

7 Q Sure. So this sentence states,
8 "The floating vessel may have a surface
9 vessel control link selectively
10 connectible with the control module at
11 the first well-site and the control
12 module at a second well-site so that
13 control operations may be conducted for
14 both the first well-site and the second
15 well-site from either well-site."

16 Do you see that?

17 A Yes.

18 Q So is it fair to say that this
19 teaches that if you wanted to conduct
20 control operations at two well-sites, you
21 could connect a surface vessel control
22 link to the second well-site to conduct

1 operations at both the first and -- first
2 and second site?

3 SCOTT BORDER: Objection.
4 Form.

5 THE WITNESS: So are you just
6 repeating what this is saying or
7 are you asking something else?

8 I am reading this
9 literally --

10 BY CHAD C. WALTERS:

11 Q Yes.

12 A -- it says there is control to
13 the first well -- first well-site rather
14 and control of operations in the second
15 well-site.

16 BY CHAD C. WALTERS:

17 Q Yep.

18 So you would connect a surface
19 vessel control link so that you could
20 conduct operations at both the first and
21 the second well-site; is that fair?

22 A Yes.

1 Q This does not say that one
2 control operation would occur at the
3 first well-site while a second and
4 different operation would occur at the
5 second well-site; is that right?

6 A There is a second operation --
7 well, it says -- let me read again.
8 "Selectively connectible with a control
9 module at the first well-site and control
10 module at the second well-site so that
11 control operations may be conducted for
12 both the first well-site and the second
13 well-site from either well-site."

14 So I may not understood -- may
15 not have understood the essence of your
16 question.

17 Q Let me rephrase.

18 So you have a control link that
19 is connected to both the first and the
20 second well-sites?

21 A Yes.

22 Q And so what this is saying is

1 the control operation that goes to the
2 control link is sent to both the first
3 and second well-sites; is that fair?

4 A Yes.

5 Q So it does not say that one
6 control operation would occur at the
7 first well-site while a separate and
8 different control operation would occur
9 at the second well-site?

10 SCOTT BORDER: Objection.

11 Form.

12 THE WITNESS: In this
13 sentence it just explains that
14 there's a capability for a
15 centralized -- for control rather
16 of both sides in the configuration
17 that is discussed there.

18 BY CHAD C. WALTERS:

19 Q Okay. I would like to turn to
20 paragraph 36 of Crossley.

21 A Paragraph 36, yes.

22 Q And perhaps it would be easier

1 if you just read this paragraph on your
2 own.

3 A Yes. (Reviewing.) Okay.

4 Q Okay.

5 So in the middle of that
6 paragraph there's a sentence that states,
7 "This network enables control commands to
8 be sent from the surface vessel through
9 the surface vessel control link into a
10 control module associated with a first
11 offshore well-site, and then through the
12 inter well-site control network to each
13 control module associated with other
14 offshore well-sites."

15 Do you see that?

16 A Yes.

17 Q Okay.

18 Then it states from there, "The
19 control command is directed to a valve
20 pump, line or sensor."

21 Do you see that?

22 A Yes.

1 Q So this teaches that the same
2 control command is sent to each of the
3 well-sites; is that right?

4 A It doesn't say that it's the
5 same control command for all sites.

6 Q It does say, "The control
7 command is directed to a valve pump, line
8 or sensor."

9 A (Reviewing.) Well, it's the
10 control command for each recipient well.

11 Let me read it again.

12 (Reviewing.)

13 It says, "This network enables
14 control commands to be sent from the
15 surface vessel through the surface vessel
16 control link."

17 That's line 4 and 5 of paragraph
18 36 so he's talking about commands.

19 Q Sentence says, "The control
20 command is directed."

21 Do you see that?

22 A Well, it's for a valve, pump,

1 line or sensors. Each one of those,
2 there's the control command, yes.

3 Q Okay.

4 There's not disclosure in
5 Crossley that different control
6 operations are conducted at each
7 well-site at the same time; is that fair?

8 A As is stated here in this
9 particular paragraph, each valve, pump,
10 line or sensor, depending upon the
11 desired controlled function, receives a
12 control command. So he doesn't say that
13 all of them receive the same command.

14 Q It doesn't say that a control
15 command could be different for each
16 well-site either; does it?

17 A I don't believe it states that
18 this would be the same for all of them.
19 It says commands. It's on line 4. It
20 says, "Enables control commands."

21 It doesn't say a control command
22 is sent to all of them.

1 "This network enables control
2 commands." It's line 4.

3 Q Where does it say -- sure.

4 Where does it say that a
5 different control command would be sent
6 to each well-site?

7 A Well, it's sent -- it doesn't
8 use the word "different" but it says,
9 "This network enables control commands to
10 be sent there to these various elements."

11 So it's commands that that are
12 sent.

13 Q So you said it does not say that
14 a different command is sent to each site?

15 A It says, "control commands" and
16 those could be anything.

17 Q Okay.

18 The last sentence of that
19 paragraph states that "The inner
20 well-site control network thus provides a
21 communication link between well-sites and
22 may also include hydraulics, electrical

1 power and/or chemical distribution."

2 A Yes, sir.

3 Q Is it fair to say the control
4 command described in paragraph 36 could
5 include chemical distribution commands?

6 A The control network may be used
7 for chemical distribution, yes.

8 Q Okay.
9 What is a collection manifold?

10 A Are you referring now to
11 something else or in the same paragraph?

12 Q I'm sorry, not in the same
13 paragraph.

14 I specifically would like to ask
15 you about Crossley's collection
16 manifolds.

17 A Okay. I want to answer this
18 correctly.

19 I mean, in my mind a collection
20 manifold is for production, for
21 collection of production.

22 But are you referring to a

1 particular place in Crossley where the
2 term "collection manifold" is used so I
3 can answer that correctly?

4 Q I am not intending to but it is
5 used in paragraph 45, at least talks
6 about or introduces a tie-in to
7 collection manifold 115, 125, 135.

8 So my question is, what is the
9 purpose of Crossley's collection
10 manifolds?

11 A Crossley's -- again, which
12 exhibit to make sure I am in the right
13 one?

14 Q It's the same one we have been
15 looking at; 1005.

16 A Okay, 1005.

17 Again, what paragraph or what
18 place --

19 Q Paragraph 45.

20 A Paragraph 45. Give me just one
21 second. (Reviewing.)

22 Yeah, so in this context, the

1 collection manifold as explained in the
2 next sentence says, "Production fluids
3 from a well-site can be commingled for
4 unitary transportation to another
5 location."

6 So the collection manifold
7 collects fluids -- production fluids.

8 Q Okay. I would like to go back
9 to your declaration at paragraph 88.

10 In this paragraph you state
11 that, As shown above -- in the annotated
12 figure -- a POSITA would have understood
13 such a configuration would direct a first
14 stimulation fluid of Albers to flow to
15 the first well and not to the second
16 well. [As Read.]

17 Do you see that?

18 A Yes.

19 Q And then you have another
20 annotated figure following that
21 paragraph.

22 A On page 56, you mean?

1 Q Yes.

2 A Yes.

3 Q Exhibit page 57, yes.

4 A Page 57, yes.

5 Q Is it fair to say that -- so
6 here you're talking about flowing
7 stimulation fluid -- first fluid to one
8 well and not to the second well. And
9 then flowing a second stimulation fluid
10 to the second well and not to the first
11 well.

12 Right?

13 A Yeah.

14 Q That's not explicitly disclosed
15 in Crossley, correct?

16 A As far as transportation of
17 fluids is concerned, Crossley doesn't
18 talk about stimulation fluids. Here he
19 talks about delivery of fluids of --
20 different nature.

21 Q But Crossley doesn't talk about
22 delivering any type of fluid to one well

1 and not to the second well while at the
2 same time delivering another type of
3 fluid to the second well and not to the
4 first well?

5 A Crossley does talk about
6 delivering fluids through the control
7 network as we have already discussed.

8 He doesn't use that particular
9 language because he doesn't talk about
10 stimulation but he does talk about
11 delivery of fluids adjusted from a
12 central location.

13 Q I am not talking about
14 stimulation fluids. I am talking about
15 any type of fluids.

16 Crossley does not describe or
17 discuss flowing one type of fluid to one
18 well and not to another well while
19 flowing a second type of fluid to the
20 second well and not to the first well; is
21 that fair?

22 SCOTT BORDER: Objection.

1 Form.

2 THE WITNESS: Doesn't -- I
3 didn't recall whether he uses that
4 particular language but he talks
5 about controlling multiple wells
6 and having control of fluids,
7 transmission for multiple wells.

8 BY CHAD C. WALTERS:

9 Q Okay.

10 You start the paragraph by
11 saying, "A POSITA would have understood
12 that such a configuration would direct."

13 Right?

14 A Yes.

15 Q You are not citing to anything
16 in Crossley that actually disclosed
17 that --

18 SCOTT BORDER: Objection.

19 BY CHAD C. WALTERS:

20 Q -- that type of flow?

21 A I am -- in paragraph 88, I am
22 trying to make the connection between the

1 language used in the limitation of '394
2 and make that connection with things
3 described in Albers and Crossley.

4 So Albers is used to make the
5 connection -- I mean, the stimulation
6 fluids.

7 In Crossley it's used to explain
8 there's central control that can deliver
9 fluids to individual wells.

10 Q Crossley does not describe the
11 configuration of any valves and their
12 operation that would need to exist in
13 order to flow a first fluid to a first
14 well and not to a second well while
15 simultaneously flowing a second fluid to
16 the second well and not to the first
17 well; is that right?

18 SCOTT BORDER: Objection.

19 Form.

20 THE WITNESS: Crossley may
21 not use that specific language but
22 he certainly talks about valves

1 and he certainly talks about
2 delivering fluids at various wells
3 using central control.

4 BY CHAD C. WALTERS:

5 Q Does Crossley talk about
6 particular configuration or number or
7 type or placement of any of those valves?

8 SCOTT BORDER: Objection.
9 Form.

10 THE WITNESS: Which valves in
11 particular from '394 are you
12 referring to?

13 BY CHAD C. WALTERS:

14 Q I am not referring to any valves
15 of '394.

16 A So Crossley does talk about
17 valves in various places needed to
18 perform the standard function that the
19 valve performs.

20 Q Does Crossley talk about what
21 configuration of valves would be needed
22 to flow a first fluid to a first well and

1 not to a second well while flowing a
2 second well -- excuse me, a second fluid
3 to the second well and not to the first
4 well?

5 A Well, Crossley does talk about
6 controlling multiple wells and he does
7 talk about using valves to direct fluids
8 where needed.

9 Q Where does Crossley specifically
10 talk about the configuration of valves
11 that would be needed from my previous
12 question?

13 A So Crossley does talk about
14 valves -- so he's talking about valves in
15 paragraph 48.

16 And further down, paragraph 49,
17 "Directing communication powers and/or
18 fluids to subsea equipment. Control may
19 be transmitted to valves, trees, et
20 cetera."

21 So there are various places
22 where Crossley talks about valves.

1 Q Does Crossley describe any
2 configuration of any of its valves?

3 A Configuration of its valves, in
4 what way --

5 (Simultaneous Crosstalk.)

6 -- in anyplace?

7 Q In any way?

8 A He says where needed, he uses
9 the term "valves" several times in the
10 document to explain these valves where
11 they have a place, they can easily be put
12 there as a standard piece of equipment.

13 Q You don't discuss in your
14 declaration what valves would need to
15 exist in Crossley for a first fluid to
16 flow to a first well and not to a second
17 well while a second fluid would flow to
18 the second well and not to the first
19 well; do you?

20 SCOTT BORDER: Objection.

21 Form.

22 THE WITNESS: That is a

1 detail -- how you use valves to
2 direct flow, that's a detail for a
3 very standard piece of equipment
4 that is used for the purpose.

5 BY CHAD C. WALTERS:

6 Q And you don't talk about in your
7 declaration what control signals would be
8 sent to those valves to enable that fluid
9 flow, correct?

10 A That wasn't even the focus of
11 this discussion.

12 Q Why not?

13 A These valves -- the discussion
14 is whether you can have centralized
15 control of this operation which is why
16 the Crossley patent was used to indicate
17 that indeed centralized control of these
18 operations would be something that people
19 have considered before.

20 Q Do the valves need to receive
21 control signals?

22 A Valves need to be open or closed

1 depending on the situation so somehow
2 there has to be a signal sent to them to
3 let the valve do its function to the
4 extent the human cannot be there to
5 actually manually open or close that.

6 Q So earlier I asked you, you
7 don't talk about in your declaration what
8 control signals would be sent to those
9 valves to enable the fluid flow we have
10 been discussing, and you said that wasn't
11 even the focus of this discussion.

12 So that's what puzzled me.

13 A Well, what kind of signal is
14 sent to a valve wasn't the focus of that
15 discussion.

16 To the extent that a valve
17 actually can be -- various technologies,
18 it can be hydraulic valve. It can be
19 electric valve. It can receive signals
20 in many ways. This is not what we are
21 focusing on.

22 Q In both of these figures on just

1 before paragraph 88 and at the conclusion
2 of 88, you have highlighted --

3 A In my declaration?

4 Q Yes, in your declaration.

5 A Okay.

6 Q -- you have highlighted the same
7 control link 182 from the vessel to the
8 manifold.

9 Do you see that?

10 A On what page again?

11 Q Exhibit page 56 and 57 of your
12 declaration.

13 A Yes, I am highlighting again --
14 which one?

15 Q 182.

16 A 182, yes.

17 Q In both figures.

18 A 182 in both figures, yes.

19 (Reviewing.)

20 Yes, I see that.

21 Q That control link continues to
22 manifold 125 in the second figure which

1 is on exhibit page 57 of your

2 declaration.

3 Do you see that?

4 A I have it on page 56. The one
5 highlighted in green on 125?

6 Q Yes.

7 A Yeah, page 56, right.

8 Q Yes. So that same fluid that
9 comes down control link 182 would go to
10 both manifold 115 and manifold 125; is
11 that right?

12 A There will be a connection, yes,
13 between --

14 (Reporter Clarification.)

15 THE WITNESS: Between the
16 surface and 125 as shown in that
17 green line highlighted there.

18 BY CHAD C. WALTERS:

19 Q But the same fluid that comes
20 down 182 that goes to manifold 115 would
21 also go to manifold 125?

22 A There's an option -- there are

1 valves in 115 and 125 to direct fluids as
2 needed.

3 Q Is it possible that manifold 125
4 would get a different fluid than the
5 fluid coming down line 182 to manifold
6 115?

7 A 115 would get fluids that would
8 be used in that collection of wells and
9 manifold 125 would receive fluids that
10 would be needed in that collection of
11 wells.

12 So the first collection of wells
13 is numbered 10 in the lower left-hand
14 corner. The second collection of wells
15 is number 20 below that schematic. So
16 115 and 125, we have the ability to
17 receive whatever fluids they are supposed
18 to receive.

19 Q 125 would get the fluid that
20 flows down line 182; is that fair?

21 A Somehow -- somehow that fluid
22 would have to flow down 182 along with

1 whatever other fluids are needed to be
2 passed down to 115 and 125. And then a
3 decision would be made or a valve would
4 be activated to direct those fluids
5 accordingly, either to the wells -- to
6 each well, the collection number 10 or
7 each well collection number 20.

8 Q Manifold 115 would also receive
9 the fluid that flows down line 182; is
10 that right?

11 A That fluid would be directed
12 there, yes, and then it would have to be
13 passed down to each well according to the
14 decisions made.

15 Q I would like to turn to
16 paragraph 79 of your declaration.

17 A Yes sir.

18 Q This describes an alternative
19 theory that you have.

20 And at the last line of that
21 page, it mentions a flowline jumper 116.

22 Do you see that?

1 A Yes.

2 Q What is a flowline jumper?

3 A It's a connection line, a short
4 connection line, basically so that you
5 can connect one spot with another spot
6 and ensure continuous flow.

7 Q Just one second. I am trying to
8 pull up my color version and I will have
9 a color copy.

10 So in this paragraph -- it's 79
11 extending to the next page.

12 You state, "Alternatively
13 Crossley discloses that each well-site
14 includes a plurality of wells clustered
15 together. Accordingly, any of the other
16 wells at well-site 110, and their
17 connection through flowline jumper 116
18 and associated tree, would alternatively
19 disclose a second connection between a
20 second well and the well operations
21 factory."

22 Do you see that?

1 A Yes.

2 Q What is the second connection?

3 A What do you mean what is the
4 meaning of the term second connection or
5 what is the second connection?

6 Q No.

7 In this theory, what are you
8 relying on as the second connection
9 between a second well and a well
10 operations factory?

11 A Yeah. So the '394 patent
12 explains that you can deliver fluids to
13 the first well and then you can deliver
14 fluids separately to a second well.

15 And they explain, of course,
16 that they use first, second just as a
17 starting point in an operation that may
18 include third, fourth, fifth well and so
19 forth as they go further down in '394.

20 Now, in Crossley, as is
21 explained in the declaration further down
22 in paragraph 84, Crossley states that you

1 can have simultaneous control of
2 operations from the central surface
3 facility.

4 And then control lines, that's
5 in paragraph 84, one, two, three, four,
6 five, six, seven, eight -- eighth line,
7 paragraph 84, it states -- we claim
8 control lines also allowing for one or
9 more power lines or chemical delivery
10 lines to be delivered from the ocean
11 surface, downward to the cluster wells.

12 [As Read.]

13 And it continues to give details
14 about the many of these aspects of this
15 delivery.

16 So it's in this context that
17 first, second well or subsequent wells
18 may be accessed from the surface.

19 Q So my question is, what
20 connection in Crossley are you reading as
21 the second connection of limitation of
22 1(c)?

1 A So let me look at the
2 declaration again to be more specific.

3 So paragraph 85 states --
4 Crossley explains, "The floating vessel
5 may have a surface vessel control link
6 selectively connectible with the control
7 module at the first well-site and the
8 control module of the second well-site so
9 that control operations may be conducted
10 for both the first well-site and the
11 second well-site from either well-site."

12 Q This section that you are
13 discussing is referring to limitation
14 1 --

15 (Reporter Clarification.)

16 CHAD C. WALTERS: -- D as in
17 dog.

18 THE WITNESS: This is
19 relevant to this discussion about
20 accessing the first and second or
21 third well.

22 BY CHAD C. WALTERS:

1 Q That's not my question.

2 My question centers on
3 limitation 1(c) which appears on page 49
4 or exhibit page 50 of your declaration.

5 And that limitation states, "A
6 second connection between a second well
7 and the well operations factory."

8 A Yes. So there is connection
9 between a first and a second well I just
10 explained.

11 Q So in the theory where you're
12 looking at a single well-site and
13 multiple wells at the single well-site,
14 so you illustrate that in green and pink
15 and blue and yellow in the annotated
16 figure?

17 A Yeah. You're on page 57?

18 Q No.

19 A My declaration, right.

20 Q No. I am on page 51, exhibit
21 page 52.

22 A Oh yes, similar figure, yes.

1 Q Okay.

2 And the claim requires you to --
3 the claim requires a second connection
4 between a second well and the well
5 operations factory.

6 And in paragraph 79, you state,
7 "Accordingly, any of the other well-sites
8 at well-site 110 and their connection
9 through flowline jumper 116 and
10 associated tree would alternatively
11 disclose a second connection between a
12 second well and the well operations
13 factory."

14 And my question is very
15 specific. It is, what is -- what
16 satisfies the second connection there?

17 A Yeah, there --

18 Q Is it the flowline jumper 116?

19 Is it the flowline jumper 116
20 plus the control line 182, or is it
21 something else?

22 A Well, I will read again what I

1 have in paragraph 85, that uses
2 Exhibit 1005, "The floating vessel may
3 have a surface vessel control link
4 selectively connectible with a control
5 module at the first well-site and the
6 control module at the second well-site so
7 that control operations may be conducted
8 for both the first well-site and the
9 second well-site from either well-site."

10 So both are accessed and then
11 fluids may further be channeled down to
12 each well as desired.

13 Q The paragraph you just quoted
14 from does not use the word "second
15 connection," right?

16 A Yes.

17 Q But in paragraph 79, you state,
18 "Any of the other well-sites at well-site
19 110 and their connection through flowline
20 jumper 116 and associated tree, would
21 alternatively disclose a second
22 connection."

1 And so my question again is very
2 specific.

3 What is -- what satisfies the
4 second connection in that alternative
5 theory?

6 A So we are in paragraph 79 again?

7 Q Yes.

8 A So from 115 -- yes, 116

9 (Reading) -- yeah, so from 115, as
10 highlighted in the next page, you have
11 various lines highlighted in different
12 colors.

13 So each one is first -- let's
14 say purple is first, green is second,
15 blue is third and yellow is fourth.

16 Q What is the second connection?

17 A Take your numbering any way you
18 want. If you want to start from purple
19 this is one, then green is the second
20 connection.

21 Q So if green is the second
22 connection, what specific components are

1 part of that second connection?

2 Is it 116 alone or is it 116
3 plus 182?

4 SCOTT BORDER: Objection.
5 Form.

6 THE WITNESS: There is a
7 connection between that well and
8 the surface. Everything in
9 between is in that connection.

10 BY CHAD C. WALTERS:

11 Q So the second connection is 182
12 plus 116?

13 A 182 plus 116 allows connection
14 of that well with the surface.

15 Q And that is the second
16 connection?

17 A You can call it the second
18 connection. It's another connection.

19 Q I'm asking what you're calling
20 the second connection in your read of
21 Crossley onto the claim limitation?

22 A A second connection could be any

1 of the lines highlighted there in
2 different colors.

3 Q So the second connection, you
4 are saying it would be 116 plus 182 in
5 green?

6 A Again, that would be a
7 connection between the surface
8 centralized control of the surface and
9 that well, well 112, through the
10 highlighted line.

11 Q The fluid that comes down line
12 182 would go to each of the wells at
13 well-site 110?

14 A It would go wherever it would be
15 needed as indicated there in these lines.

16 Q Could the blue well get a
17 different fluid from 182 than the green
18 well?

19 A Crossley states those can be
20 handled per well.

21 Q Where does Crossley state that?

22 A In the paragraph I mention --

1 it's Exhibit 1005 -- paragraph 28 in the
2 end, "Control operations may be conducted
3 for both the first well-site and the
4 second well-site, from either well-site."

5 Q We are talking about one
6 well-site though, right, well-site --
7 well-site 110?

8 A Yeah, but what can be done in
9 two well-sites can also be done in one.

10 Q I would like to look at Figure 4
11 of Crossley.

12 Are you familiar with this
13 figure?

14 A Yes, sir. I am looking at it
15 right now.

16 Q What diameter would a POSITA
17 have understood line 420 to have?

18 SCOTT BORDER: Objection.
19 Outside the scope.

20 THE WITNESS: I haven't
21 thought about that.

22 BY CHAD C. WALTERS:

1 Q What is line 420?

2 A What is line 420? It's a line
3 that enables control from the surface to
4 everything underneath and it can
5 convey -- it can transmit signals and
6 fluids chemicals as described by
7 Crossley.

8 Q Can you give me an estimated
9 range of a diameter that a POSITA would
10 expect this line 420 to have?

11 SCOTT BORDER: Objection.
12 Form.

13 Objection. Outside the
14 scope.

15 THE WITNESS: I haven't
16 thought much about that. I would
17 have to research this a little
18 bit.

19 BY CHAD C. WALTERS:

20 Q What diameter would you expect
21 line 428 to have?

22 SCOTT BORDER: Same

1 objection.

2 THE WITNESS: I would have to
3 research that again.

4 BY CHAD C. WALTERS:

5 Q What about line 428 prime?

6 SCOTT BORDER: Same
7 objection.

8 THE WITNESS: Same answer. I
9 would have to research that.

10 BY CHAD C. WALTERS:

11 Q Can you give me an estimated
12 range of a diameter that a POSITA would
13 expect lines 428 or line 428 prime to
14 have?

15 SCOTT BORDER: Objection.
16 Outside the scope.

17 THE WITNESS: Again, I would
18 have to research that to give an
19 informed answer.

20 BY CHAD C. WALTERS:

21 Q Are we talking on order of
22 inches?

1 SCOTT BORDER: Same

2 objection.

3 THE WITNESS: Again, I would

4 have to research that.

5 BY CHAD C. WALTERS:

6 Q You have no idea without --

7 without being able to research it?

8 A Well, Figure 4 shows the

9 capability of delivering signals and

10 fluids, and it's an instance of how this

11 can be done.

12 So this capability is feasible

13 according to that configuration shown

14 there by Crossley and that's where I

15 would leave things.

16 Q What do you mean that's where

17 you would leave things?

18 A As far as estimating the size of

19 that line.

20 Q You don't know if it would be

21 beyond the order of inches of the

22 diameter of lines 428 and 428 prime

1 without having to do additional research?

2 A I would have to do some
3 additional research to have an informed
4 opinion and make sure that I don't use
5 arbitrary numbers.

6 Q Could it be on the order of
7 miles in diameter?

8 SCOTT BORDER: Objection.
9 Outside the scope.

10 THE WITNESS: Whether miles
11 in diameter, no, it would be
12 completely unrealistic.

13 BY CHAD C. WALTERS:

14 Q Could it be on the order of
15 yards in diameter?

16 SCOTT BORDER: Objection.
17 Outside the scope.

18 THE WITNESS: Again, now we
19 are getting into yards.

20 No. I would say my gut
21 feeling is no. It would be orders
22 of magnitude larger than what

1 would be reasonable.

2 BY CHAD C. WALTERS:

3 Q Could it be on the order of feet
4 in diameter?

5 SCOTT BORDER: Same
6 objection.

7 THE WITNESS: Now we are
8 getting into territory which needs
9 more careful consideration.

10 BY CHAD C. WALTERS:

11 Q So somewhere between inches and
12 feet; is that fair?

13 SCOTT BORDER: Objection.
14 Outside the scope.

15 THE WITNESS: I wouldn't
16 confine it to anything specific.

17 The main reason again being
18 that the Crossley shows this as an
19 example. It says here is an
20 example.

21 Let me see if I can read --
22 what is that thing -- the patent

1 (Reviewing.)

2 So it says in paragraph 50 of
3 Exhibit 1005 that an exemplary
4 integrated liner shown in Figure
5 4. So this is an example.

6 It shows this could be done
7 this way. It could be done
8 perhaps another way that might be
9 different in the specifics but
10 similar in the spirit of
11 delivering that control of the
12 signals and fluids.

13 BY CHAD C. WALTERS:

14 Q Would the diameter of lines 428
15 and 428 prime typically be different for
16 production operations versus stimulation
17 operations?

18 SCOTT BORDER: Objection.
19 Outside the scope.

20 THE WITNESS: Again, I would
21 have to know more specifics to
22 offer an informed opinion.

1 BY CHAD C. WALTERS:

2 Q What specifics do you need?

3 A Whatever is associated with the
4 production operation and the stimulation
5 operation, what those lines would be used
6 for.

7 Q Okay.

8 So you can't tell me as a POSITA
9 reading Crossley whether the diameter of
10 lines 428 and 428 prime would need to be
11 different for sending fracturing fluid
12 versus sending chemicals used in
13 production operations?

14 SCOTT BORDER: Objection,
15 form. Foundation.

16 THE WITNESS: Again, I would
17 have to know specifics. This
18 could be anything.

19 BY CHAD C. WALTERS:

20 Q They might be the same for both
21 stimulation operations and production
22 operations?

1 SCOTT BORDER: Objection.

2 Outside the scope.

3 THE WITNESS: I would need to

4 know specifics again.

5 BY CHAD C. WALTERS:

6 Q Are the requirements for
7 production operations and stimulation
8 operations different?

9 SCOTT BORDER: Objection.

10 Outside the scope.

11 THE WITNESS: Requirements
12 from what?

13 BY CHAD C. WALTERS:

14 Q In terms of size of fluid
15 flowlines?

16 SCOTT BORDER: Same
17 objection.

18 THE WITNESS: Size is
19 selected in a rational way to
20 accomplish a certain task so it
21 depends on the particular task,
22 particular design and so forth.

1 BY CHAD C. WALTERS:

2 Q Crossley shows that lines 428
3 and 428 prime flow together, correct?

4 A Let me get to that figure.
5 Remind me again, if you will, on what
6 page that is.

7 Q It's Figure 4.

8 A Figure 4, yes. I'm sorry, your
9 question was one more time, please.

10 Q Crossley shows that lines 428
11 and 428 prime flow together?

12 SCOTT BORDER: Objection.
13 Form.

14 THE WITNESS: It shows them
15 in the same basic line.

16 BY CHAD C. WALTERS:

17 Q Crossley does not show that line
18 428 goes to one well and line 428 prime
19 goes to another well; is that right?

20 A It basically shows that those
21 two lines have the capability of having
22 two separate flows.

1 Q But not two different wells?

2 A It doesn't -- it's not concerned
3 with that.

4 It simply wants -- this figure
5 simply wants to show capability of
6 delivering multiple fluids. In this case
7 they show three, 428, 428 prime, 428
8 double prime.

9 Q I would like to go to the text
10 of Crossley at paragraph 50.

11 A 50, yes, sir.

12 Q In this paragraph it discusses
13 428 -- excuse me, Figure 4 and
14 specifically lines 428 and 428 prime.

15 A Hm-hm.

16 Q At the top of the next page,
17 staying in paragraph 50, Crossley states
18 that, "Lines 428 and 428 prime are
19 preserved for the delivery of chemicals
20 such as hydrate inhibition fluids."

21 Do you see that?

22 A Yes.

1 Q So keeping that in mind, I would
2 also like to go back to paragraph 33.

3 A In Crossley?

4 Q Yes.

5 A Yes. Hm-hm.

6 Q And towards the bottom of that
7 paragraph, the second to last sentence --

8 A Hm-hm.

9 Q -- states, "Control operations
10 may further include the injection of
11 chemicals such as paraffin or wax
12 inhibitors into flowlines."

13 A Yes.

14 Q I would like to look at
15 paragraph 9.

16 A Paragraph 9, yes, sir.

17 Q Second to last sentence of that
18 paragraph states, "Such operation lines
19 may also provide electrical power,
20 hydraulic fluid or production chemicals."

21 Do you see that?

22 A Yes.

1 Q So each of these sections is
2 discussing production chemicals such as
3 hydrate paraffin or wax inhibitors?

4 A Hm-hm.

5 Q What is the purpose of
6 production chemicals such as hydrate
7 paraffin or wax inhibitors?

8 A Yeah, so when you produce
9 hydrocarbons, specifically when you
10 produce oil, there is a possibility that
11 you may have solids formed in the line
12 that carries these fluids, oil in
13 particular, from the bottom to the top.

14 What may happen is that the oil
15 comes out hot -- actually, the oil comes
16 out of the rock, I should say, at the
17 bottom. And as it goes up, it cools off.
18 So there is a chance that the flowlines
19 may plug because, A, because of lower
20 temperature you may have wax is formed,
21 or, B, if you have in those lines,
22 particularly if you are in low

1 temperatures, if you have the possibility
2 of hydrate formation -- hydrates are
3 methane trapped in water crystals
4 basically. So if you have that
5 possibility, your line will be plugged.

6 To prevent that, people inject
7 chemicals that prevent -- that make sure
8 that your flowline avoids this kind of
9 plugging, either rocks formation or
10 hydrate formation or anything that would
11 impede flow.

12 Q These production chemicals such
13 as hydrate paraffin wax inhibitors, they
14 are not used in stimulation operations;
15 are they?

16 A No.

17 Q Are they typically pumped at
18 much lower pressures and rates than
19 fracture stimulation fluids?

20 A Fracture stimulation fluids are
21 pumped at pressure high enough to
22 fracture the rock. There would be no

1 such need when you pump these chemicals
2 to production line.

3 So is the pressure lower, yes,
4 it will be typically lower.

5 Q Would the rates, the production
6 chemical rates, for these -- strike that.

7 Would the rates at which these
8 production chemicals were used be on the
9 order of quarts per day?

10 SCOTT BORDER: Objection.

11 Outside the scope.

12 THE WITNESS: I wouldn't
13 recall numbers off the top of my
14 head.

15 BY CHAD C. WALTERS:

16 Q Okay.

17 Would you be surprised if a
18 POSITA said that for production
19 operations, such as in Crossley, that
20 production chemical rates would be on the
21 order of quarts per day?

22 A Repeat that if you will again.

1 If the --

2 Q Sure. I am talking about the
3 production chemical rates -- strike that.

4 I am talking about the pumping
5 or use of production chemicals --

6 A Yes.

7 Q -- in production operations such
8 as Crossley.

9 A Yes.

10 Q Would you be surprised if a
11 POSITA said that that would be on the
12 order of quarts per day?

13 SCOTT BORDER: Objection.

14 Outside the scope.

15 THE WITNESS: I would have to
16 look at the numbers again, the
17 specific situation.

18 BY CHAD C. WALTERS:

19 Q You don't know if you would be
20 surprised or not?

21 A Again, I wouldn't remember --
22 recall specific numbers off the top of my

1 head.

2 Q Okay.

3 Would you be surprised if one
4 said that for -- strike that.

5 Would you be surprised that if a
6 POSITA said that for stimulation
7 operations, such as an Albers, that
8 stimulation fluid flow rates would be on
9 the order of barrels per minute?

10 SCOTT BORDER: Objection.

11 Outside the scope.

12 THE WITNESS: Again, I would
13 have to see specifics.

14 Are you asking me about
15 orders of magnitude or -- I am
16 trying to make sure I answer your
17 question in the best possible way.

18 BY CHAD C. WALTERS:

19 Q That's a fair point.

20 So are the rates for stimulation
21 fluid flow orders of magnitude different
22 than the rates you would expect for use

1 of production chemicals and production
2 operations?

3 SCOTT BORDER: Objection.
4 Outside the scope.

5 THE WITNESS: Overall,
6 production chemicals are injected
7 into the production line to
8 quantities that would be
9 sufficient to do the job.

10 Same thing for injection of
11 pumping of fluids in the
12 fracturing operation, that would
13 have to be enough to do the job.

14 So could those be different,
15 yeah, they could be different.

16 BY CHAD C. WALTERS:

17 Q Would the orders of magnitude be
18 different?

19 SCOTT BORDER: Objection.
20 Outside the scope.

21 THE WITNESS: It depends on
22 the situation.

1 I would have to know

2 specifics --

3 (Simultaneous Crosstalk.)

4 BY CHAD C. WALTERS:

5 Q You brought up the term -- I'm

6 sorry to --

7 A Go ahead.

8 Q You brought up the term "orders
9 of magnitude" and I take it you did it
10 for a certain reason.

11 So my question is, would a
12 POSITA expect that the rates at which
13 stimulation fluid would flow in a
14 stimulation operation be orders of
15 magnitude higher than the rates for flow
16 of production chemicals and production
17 operations?

18 A Overall, I can tell that
19 injection of stimulation fluids -- the
20 volume injected would be higher because
21 the stimulation fluid would have to fill
22 the well. So that stimulation fluid

1 fills the whole well.

2 Now, production fluid would have
3 to be pumped and the production needs to
4 continue. So the volume of the fluid
5 injected during production clearly
6 wouldn't fill the whole well.

7 Again, remember there's
8 production. So the production fluids are
9 filling the well.

10 Therefore, the volume of the
11 injection, the production-related
12 injection, would definitely be lower than
13 the volume of the stimulation fluid in
14 the well. Now, at what rates those would
15 be pumped? That's another question that
16 I have to look at more carefully.

17 It's one thing how much volume
18 of something you use, and it's another at
19 what rate you're pumping that volume.

20 Q So is it fair to say the volume
21 of stimulation fluids used for
22 stimulation operations is orders of

1 magnitude higher than the volume of
2 production chemicals used in production
3 operations?

4 SCOTT BORDER: Objection.
5 Outside the scope.

6 THE WITNESS: I would say --
7 I would say definitely higher,
8 yes.

9 So the volume of fluid used
10 in the stimulation in fracturing
11 would definitely be higher than
12 the volume of fluids injected
13 during production, yes.

14 Because in the first case
15 stimulation, the fluid fills the
16 whole well.

17 In the second -- and
18 fractures.

19 In the second case, the
20 chemicals injected are only part
21 of the fluid. The rest of the
22 fluid is the production.

1 BY CHAD C. WALTERS:

2 Q Got a couple of questions about
3 the claims.

4 SCOTT BORDER: Is this a good
5 time to break for lunch or is this
6 on the same topic?

7 CHAD C. WALTERS: It's just a
8 couple of -- I am trying to find a
9 good stopping point and I think I
10 have. If I got like five,
11 10 minutes top --

12 THE WITNESS: I'm perfectly
13 fine with that.

14 CHAD C. WALTERS: Okay.
15 Thank you.

16 BY CHAD C. WALTERS:

17 Q So Claim 1 of the '394 patent
18 requires the first stimulation fluid and
19 the second stimulation fluid to have
20 different compositions?

21 A Okay.

22 Q Claim 1 also has this well

1 treatment operations factory which

2 manufactures stimulation fluid?

3 A Indeed.

4 Q Would you agree that the well
5 treatment operations factory of Claim 1
6 must be capable of manufacturing two
7 different well-stimulation fluids?

8 A Yes, if two different fluids
9 need to be injected, yeah, they have to
10 be manufactured.

11 Q And turning to your declaration
12 at paragraph 67, I am talking about your
13 Crossley-Albers combination.

14 In your combination, the claimed
15 first and second stimulation fluids are
16 fluids manufactured using Albers'
17 fractures stimulation equipment; is that
18 right?

19 A Yes.

20 Q In order to simultaneously flow
21 the first and second stimulation fluids
22 as required by the claims, those fluids

1 would need to be manufactured

2 simultaneously; is that right?

3 A Makes sense.

4 SCOTT BORDER: Objection.

5 Outside the scope.

6 CHAD C. WALTERS: I am good
7 with a break now. I think it is a
8 good time.

9 SCOTT BORDER: Okay. Should
10 we do a little bit longer one so
11 people can get something to eat?

12 CHAD C. WALTERS: Absolutely.

13 THE WITNESS: Come back at 1?

14 CHAD C. WALTERS: That sounds
15 good to me.

16 THE WITNESS: Okay. Fair
17 enough.

18 SCOTT BORDER: One central.
19 All right.

20 (Whereupon a Recess Commenced
21 at 1:11 and Testimony Recommenced
22 at 2:01.)

1 BY CHAD C. WALTERS:

2 Q Welcome back, Dr. Nikolaou.

3 A Thank you.

4 Q So do you have Exhibit 1010
5 available? Also just --

6 (Simultaneous Crosstalk.)

7 I'm sorry. Go ahead.

8 A Yeah, were you saying --

9 Q I also just sent it in the chat.
10 I tried to e-mail it to the
11 court reporter last night. She may
12 already have it. It was quite large so I
13 got a bunch of e-mails bounced back so I
14 included it in the chat as well.

15 A Okay. Let me open the file.
16 Give me one second to open it on my big
17 screened computer. Okay.

18 It's file 394, space, 1010.pdf.
19 Right. It was in the chat.

20 Q Yes.

21 A Okay. And you also said open
22 which exhibit?

1 Q Just that one.

2 A That one. Okay.

3 Q That's Exhibit 1010.

4 A That's Exhibit 1010. Okay.

5 "The Fundamentals of Oil and Gas Industry
6 for Beginners."

7 Q Yes.

8 A Okay. Very good.

9 Q You are familiar with this
10 exhibit?

11 A Yes, we use that as a general
12 reference for basic ideas for the oil and
13 gas industry.

14 Q Okay. I would like to turn to
15 exhibit page 95.

16 When I refer to exhibit page, I
17 am referring to the exhibit label at the
18 bottom of the page so I think this is
19 actually page 86.

20 A Okay.

21 Q Would you agree production wells
22 commonly require maintenance in order to

1 continue the production of oil and gas
2 over several years?

3 A Yes.

4 Q And the purpose of maintenance
5 is to enhance the productive efficiency
6 of the well?

7 A To maintain or enhance, yes.

8 Q And there are wide range of
9 maintenance activities that may be
10 performed on the productive well?

11 A True.

12 Q In this section on exhibit page
13 95 is a section titled, "Maintenance of
14 the Well."

15 Do you see that?

16 A Yes, 4.4.

17 Q Is it fair to say that some
18 maintenance activities may be major
19 activities and some might be minor or
20 routine?

21 A Yes.

22 Q And turning to exhibit page

1 97 --

2 A Yes, I am here.

3 Q So at the top of this page, this
4 exhibit is talking about maintenance
5 activities. And there's a small section
6 called, "Pumping of the Well."

7 A Hm-hm.

8 Q And so it describes that one
9 minor maintenance activity might be
10 pumping hydrate and scale inhibitors.

11 A I am just reading that right now
12 (Reviewing.)

13 Okay.

14 Q Do you agree that a minor
15 maintenance activity would include
16 pumping hydrate and scale inhibitors?

17 A As described here, yes.

18 Q Okay.

19 Do you agree this is describing
20 the state of the art as of 2005?

21 A When this book published.

22 Q I think it was published after

1 2005?

2 A Okay. Then it's fair to say it
3 contains state of the art as of 2005.

4 Q The hydrate and scale
5 inhibitors, those prevent buildup and
6 ensure smooth flow of oil and gas to the
7 well?

8 A Hm-hm.

9 Q Would an example of a major
10 maintenance activity at a producing well
11 be to replace the production casing?

12 A Replacing the casing, yeah, it
13 would be -- of course, if there's major
14 or minor it may be relevant but it would
15 take substantial work, yes. I would
16 definitely accept that.

17 Q Okay. I would like to move to
18 page 102, exhibit page 102.

19 Is it fair to say that during
20 the productive life of a well, it's
21 possible that the formation loses its
22 permeability?

1 A It may lose its permeability,
2 yes, because of accumulation of debris
3 and other things, yes.

4 Q And when that happens, less oil
5 and gas is produced, right?

6 A Yeah, particularly in
7 combination with the pressure being
8 lowered.

9 Q Okay.

10 In order to increase the
11 permeability of the well at that stage,
12 reservoir stimulation is required?

13 A That's an option, yes.

14 Q And that is described on exhibit
15 page 102 of Exhibit 1010?

16 A Reservoir simulation -- it
17 actually says reservoir stimulation.

18 Is that a typo?

19 Q It may be.

20 A It's definitely a typo.

21 I am reading the third line. It
22 says, To improve its productivity are

1 called reservoir simulation -- they mean
2 stimulation. It's a common typo.

3 Let's agree to interpret this as
4 stimulation.

5 Q And moving to exhibit page
6 103 --

7 A Yes.

8 Q -- you see that reservoir
9 stimulation includes acid fracturing?

10 A That's one way to do stimulation
11 in rocks that are sensitive to acid such
12 as carbonation rocks.

13 Q Acid fracturing is simply
14 pumping 15 percent hydrochloric acid
15 solution into a wellbore?

16 A Yes. Well, I don't know about
17 the specifics because those may vary.

18 I guess in general you pumping
19 acid is strong enough to eat up the rock
20 and create those dendrites inside the
21 rocks for the hydrocarbons to flow out.

22 Q For acid fracturing, you

1 essentially need the 15 percent
2 hydrochloric acid solution in a pump; is
3 that fair?

4 A Yes, that's indicated there.
5 You need to deliver that solution
6 downhole basically.

7 Q Reservoir stimulation also
8 includes hydraulic fracturing?

9 A Correct.

10 Q And this involves pumping
11 liquid, usually water containing
12 chemicals and proppant down a wellbore at
13 a very high pressure?

14 A Yes.

15 Q You would agree hydraulic
16 fracturing is more complicated than acid
17 fracturing?

18 A Complicated. I will have to
19 think a little bit about that, but both
20 have their challenges.

21 In what way would you say
22 complicated?

1 For example, could it be that
2 may be less predictable and may need more
3 tweaking or involves additional -- one
4 involves additional equipment compared to
5 the other or is there something specific
6 you have in mind?

7 Q Sure.

8 As an example, hydraulic
9 fracturing certainly involves more
10 equipment than acid fracturing, right?

11 A Acid fracturing involves the
12 pumps that will pump the solution down,
13 mixing tanks for the solution to be
14 formed at the right acidity. And then
15 you have to make sure that it is
16 delivered where it is supposed to be
17 delivered and go from there.

18 The hydraulic fracturing, we
19 have the issue of creating a fracture,
20 creating again the slurry, pumping the
21 slurry down and through pressure to open
22 up the fractures.

1 Essentially the -- what the acid
2 does or acid fracturing, the increased
3 pressure does for hydraulic fracturing.

4 In both cases, they open up the
5 rock.

6 In acid fracturing, it's by
7 chemical means.

8 In hydraulic fracturing, it's by
9 mechanical means.

10 Q The hydraulic fracturing
11 requires more equipment than acid
12 fracturing?

13 A I would have to check that to be
14 perfectly honest with you.

15 Q Hydraulic fracturing requires
16 proppant, is that right?

17 A It does, yes. Yes.

18 Q It requires a high pressure
19 pump?

20 A It does.

21 Q It requires a blender?

22 A It does.

1 Q Those aren't required of acid
2 fracturing?

3 A The high pressure pump is not a
4 necessity because you don't rely on high
5 pressure to deliver this. Absolutely.
6 You just have to prepare the solution and
7 then send it downstream --

8 Q Okay.

9 A -- downhole rather.

10 Q Reservoir stimulation would also
11 include the fracture stimulation that's
12 disclosed in Albers that uses carbon
13 dioxide and hydrogen; is that fair?

14 A Yes.

15 Q So is it fair to say the
16 fracture stimulation of Albers is more
17 complicated than acid fracturing?

18 SCOTT BORDER: Objection.

19 Outside the scope.

20 THE WITNESS: I will have to
21 check all the details.

22 BY CHAD C. WALTERS:

1 Q Certainly requires more
2 equipment than acid fracturing?

3 A Yes.

4 SCOTT BORDER: Same
5 objection.

6 BY CHAD C. WALTERS:

7 Q Okay. I would like to turn back
8 to Crossley.

9 A Hm-hm.

10 Q We can look at Crossley perhaps
11 with your declaration or not. It's up to
12 you.

13 I want to -- you can figure out
14 what you would like to look at but do you
15 recall Crossley discloses both an
16 operations control system and an
17 intervention system?

18 A Yes, I do.

19 Q And you relied on Crossley's
20 operations control system 180 in your
21 invalidity analysis; is that right?

22 A Yeah, the control system that

1 can deliver signals and fluids.

2 Q You did not rely on Crossley's
3 intervention system; is that right?

4 A I didn't separate the two to be
5 honest with you because the system, as
6 explained in Crossley, could be used for
7 both. So intervention basically has to
8 do with the fact that there is already a
9 well that may have been producing and
10 then you need to do something to it
11 because it needs fixing or you -- there
12 is an incentive to improve production or
13 something of that nature.

14 Q Okay.

15 Can you look at the abstract of
16 Crossley on the first page, the title
17 page?

18 A Yes. (Reviewing.)

19 Q You see in the middle, three
20 lines down, there's a sentence that
21 starts, "The system also comprises two
22 separate systems. One, an operations

1 control system."

2 And then it says, "Two, an
3 intervention system."

4 A Hm-hm.

5 Q So Crossley itself separates the
6 systems, right?

7 SCOTT BORDER: Objection,
8 foundation.

9 THE WITNESS: The idea is
10 that for both one and two there
11 can be a central control that can
12 deliver the operations controller
13 interventions -- intervention
14 services with control from a
15 central location.

16 BY CHAD C. WALTERS:

17 Q But you would agree that
18 Crossley describes those two systems, the
19 operations control system and the
20 intervention system as separate systems?

21 A In the way it is formed -- as
22 stated in the abstract, yes, it's an

1 operations system that has the operations
2 control and intervention system that has
3 intervention services for workover and
4 maintenance.

5 Q You rely on the intervention
6 system in your invalidity analysis?

7 SCOTT BORDER: Objection.
8 Form.

9 THE WITNESS: Is there a
10 specific place in the declaration
11 where we discuss about
12 intervention that is a concern
13 or -- what exactly are you
14 suggesting here?

15 BY CHAD C. WALTERS:

16 Q I think you mentioned Crossley's
17 intervention system one time with respect
18 to a dependent claim.

19 But for the independent claims,
20 you have zero discussion of Crossley's
21 intervention system, such as what it is
22 or what it does.

1 My question is whether -- why
2 that was the case and whether you thought
3 that Crossley's intervention system was
4 not relevant to the claims of the '394
5 patent?

6 SCOTT BORDER: Objection.
7 Form.

8 THE WITNESS: Well, this is
9 because the operations control
10 system provides the idea of having
11 a central unit for control of
12 operations of multiple wells from
13 a central location.

14 That was the element that was
15 most relevant, particularly in
16 combination with Albers' teachings
17 about fracturing for the
18 discussion in the declaration.

19 BY CHAD C. WALTERS:

20 Q Crossley describes its
21 intervention system at paragraphs 53 to
22 56.

1 A 53 to 56, yes.

2 Q Do you have the Patent Owner
3 Preliminary Response available to you?

4 A Which exhibit would that be?

5 Q It's not an exhibit. It's Paper
6 number 6. If you don't have it, I could
7 link it in the chat.

8 A Yes, please.

9 Q Okay.

10 A Would you like me to open the
11 file?

12 Q Sure. Thank you.

13 A Yes, I have it in front of me.

14 Q I would like to look at page 9.

15 A Page 9, yes.

16 Q And this page, page 9 of the
17 Patent Owner Preliminary Response
18 includes an annotated figure that shows
19 Crossley's intervention system in red and
20 Crossley's operation control system in
21 blue.

22 A Hm-hm.

1 Q Do you agree that what is shown
2 in red is the intervention system?

3 A I will have to check again the
4 numbers but I can take your assertion
5 this is in indeed the intervention
6 system.

7 Q I just want to make sure you
8 agree with that.

9 Like I said, Crossley describes
10 the intervention system at paragraphs 53
11 to 56 so you're welcome to look at those
12 sections --

13 (Simultaneous Crosstalk.)

14 A Give me one second for a quick
15 check.

16 Q Sure.

17 A (Reviewing.)

18 Yeah. Okay, yeah, 170 is
19 clearly indicated to be the intervention
20 system, yes.

21 Q What is shown in blue on that
22 figure is the operations control

1 system --

2 (Simultaneous Crosstalk.)

3 A Yes.

4 Q Is that right?

5 A Yeah. Yes.

6 Q Looking at -- I would like to
7 turn to paragraph 37 of Crossley.

8 A (Reviewing.)

9 Q In the middle of this paragraph,
10 Crossley describes minor interventions.

11 Do you see that?

12 A Hm-hm. Yes.

13 Q One of the minor interventions
14 that Crossley identifies as an example
15 the injection of acid and other treating
16 fluids and the like.

17 A Yeah.

18 Q We discussed earlier with
19 respect to Exhibit 1010 that acid is used
20 in acid fracturing?

21 A Yes, acid is used in acid
22 fracturing. That's correct.

1 Q Which is a reservoir stimulation
2 process, correct?

3 A Correct.

4 Q Wouldn't a POSITA have
5 understood that Crossley's intervention
6 system would be used for reservoir
7 stimulation?

8 SCOTT BORDER: Objection.
9 Outside the scope.

10 THE WITNESS: I haven't
11 thought about that.

12 BY CHAD C. WALTERS:

13 Q Crossley's intervention system
14 would be used for acid fracturing,
15 correct? That's what Crossley says.

16 A For injection of acid in
17 general.

18 Q That's what is done in acid
19 fracturing?

20 A In acid fracturing you include
21 acid in what you inject, yes.

22 Q Acid fracturing is a type of

1 reservoir stimulation?

2 A It is indeed.

3 Q I would like to look at
4 paragraph 10 of Crossley.

5 A Yes.

6 Q The second sentence states, "The
7 intervention system is placed on board
8 the floating vessel for conducting
9 intervention services to an individual
10 well."

11 A Yes.

12 Q Why do you think Crossley
13 describes its intervention system as
14 conducting intervention services only to
15 an individual well?

16 SCOTT BORDER: Objection.

17 Outside the scope.

18 THE WITNESS: That is the
19 language he uses.

20 BY CHAD C. WALTERS:

21 Q Do you have any thoughts as to
22 why Crossley limits its intervention

1 system to a single well?

2 A That's how he chooses to explain
3 what the system does.

4 Q Any thoughts as to why Crossley
5 does not describe the intervention system
6 as applying to multiple wells --

7 SCOTT BORDER: Objection to
8 scope.

9 BY CHAD C. WALTERS:

10 Q -- at the time?

11 A I have not considered that.

12 Q I would like to turn back to
13 your declaration, specifically at
14 paragraph 132.

15 A Yes.

16 Q Let me ask one of my previous
17 questions earlier. I don't think
18 counsel -- I think I let my question
19 linger while he was objecting.

20 My question was, any thoughts as
21 to why Crossley does not describe the
22 intervention system as applying to

1 multiple wells at a time?

2 SCOTT BORDER: Objection.

3 Outside the scope.

4 THE WITNESS: I haven't
5 considered that.

6 Crossley basically says that
7 the intervention system can access
8 any single well.

9 I don't use my own language
10 but it's described specifically in
11 the passage we just looked at.

12 BY CHAD C. WALTERS:

13 Q Could it be the reason -- could
14 the reason that Crossley limits its
15 intervention system to an individual well
16 be because the production lines described
17 in the operations system that applied to
18 multiple well-sites would not have the
19 right configuration to be able to
20 withstand the higher rates and pressures
21 required of stimulation in an
22 intervention system?

1 SCOTT BORDER: Objection,
2 form. Outside the scope.

3 THE WITNESS: I haven't
4 considered that question.

5 BY CHAD C. WALTERS:

6 Q Does that sound like a
7 reasonable explanation?

8 SCOTT BORDER: Objection.
9 Outside the scope.

10 THE WITNESS: I will have to
11 think carefully about that.

12 BY CHAD C. WALTERS:

13 Q You can't say right now whether
14 that sounds like a reasonable or
15 unreasonable explanation?

16 SCOTT BORDER: Same
17 objection.

18 THE WITNESS: I will have to
19 think carefully before I offer an
20 informed opinion.

21 BY CHAD C. WALTERS:

22 Q Is there anything wrong with the

1 explanation technically?

2 SCOTT BORDER: Same

3 objection.

4 Sorry. Same objection.

5 THE WITNESS: Again, I would

6 have to make sure I have thought

7 about this before I answer.

8 BY CHAD C. WALTERS:

9 Q You can't give an answer,
10 correct?

11 A I'm sorry?

12 Q You cannot give me an answer to
13 the question; is that right?

14 A I have to think about this first
15 before I give an informed answer to that.

16 Q I would like to turn to
17 paragraph 132 of your declaration.

18 A 132. (Reviewing.) Yes.

19 Q Paragraph 132 is in the section
20 where you address Dependent Claim 11.

21 You see that?

22 A Paragraph 132 you said?

1 Q Yes.

2 A Yes, sir. I see that.

3 Q And Claim 11 depends on Claim
4 10?

5 A Yes.

6 Q My question is whether Claim 11
7 is describing fluid flowback?

8 A Let me go back and read Claim
9 11. Can I have a second?

10 Q Yeah. Sure. You might want to
11 read it in the context of Claim 10 as
12 well.

13 A Yes, so let me go to the patent
14 itself.

15 Q Your declaration actually on
16 those pages we were looking at in the
17 previous page show the language of Claims
18 10 and 11, if you want to look there too.

19 A Sure. (Reviewing.)

20 Yeah, so what about Claims 10
21 and 11 again?

22 Q So is it fair to say it's

1 talking about fluid flowback from the
2 well to the manifold?

3 A It's talking about flow to the
4 well -- sorry -- (Reviewing.) -- from
5 the first well, yes, to the manifold.

6 Q The only fluid that Crossley
7 describes as being flowed back --

8 A Hm-hm.

9 Q -- so from the well is
10 production fluid; is that right?

11 A Indeed, Crossley is not
12 concerning the stimulation explicitly.

13 Q Production fluid is not the same
14 as the stimulation fluid?

15 A Production fluid is mainly
16 hydrocarbons unless you have very high
17 water content.

18 So there are wells that may be
19 above 90 percent, 95 percent, 99 percent
20 even water, but the rest is hydrocarbon.
21 In general, that's a coincidence.

22 Overall, I would say that the

1 injection stimulation -- I mean,
2 fracturing fluids are designed to have
3 certain properties.

4 Production fluids are what they
5 are from the well, and the two have the
6 respective properties as I explained.

7 Q In paragraph 135, so we are
8 still talking about Claim 11, you state,
9 "A POSITA would also had been motivated
10 to modify the Crossley-Albers system to
11 include a flowback and reuse system to
12 accommodate flowback of stimulation
13 fluids."

14 Is that right?

15 A Yes.

16 Q And you rely on the Lehman
17 reference, Exhibit 1009 to support that
18 modification.

19 A First of all, I am relying on
20 the general idea of how hydraulic
21 fracturing works.

22 You inject the fluid and then

1 you pick it back up so that you can let
2 the hydrocarbons be produced in the
3 production line. So it's currently a
4 standard feature, you inject and then you
5 flow it back.

6 Q So you are not suggesting that
7 anything in particular from Lehman would
8 need to be used in Crossley's system to
9 add a flowback and reuse system?

10 SCOTT BORDER: Objection,
11 foundation.

12 THE WITNESS: So help me
13 understand again what you're
14 focusing on.

15 Are you referring to what
16 Lehman describes and we cite it in
17 the declaration or are you asking
18 in general whether flowback line
19 would be needed or whether we --
20 that would be conceived of by a
21 POSITA or any of the above?

22 BY CHAD C. WALTERS:

1 Q So I'm asking about your
2 particular combination that relies on
3 Crossley and Albers.

4 And with respect to this claim,
5 you relied on the Lehman reference,
6 Exhibit 1009.

7 And in response to my question a
8 few questions ago, you said you're
9 relying on the general idea of how
10 hydraulic fracturing works.

11 And what I am wondering is, in
12 paragraph 135 you state that a POSITA
13 would have been motivated to modify
14 Crossley-Albers system to include a
15 flowback and reuse system.

16 And my question is, is that
17 flowback and reuse system coming from
18 Lehman that you would add to
19 Crossley-Albers system?

20 A Lehman is as a corroborating
21 evidence, for example, use the passage at
22 the bottom of page -- paragraph 135.

1 During the fracturing treatment,
2 typically the well is shut in and then
3 reopened, whereupon at least part of the
4 fracturing fluid in the fracture is
5 forced out by the fracture closure
6 pressure.

7 So it's -- it's a fairly
8 standard step of hydraulic fracturing.

9 Mainly as I explained a moment
10 ago, you inject, you pressurize the
11 injected fluid. And then after that, you
12 pick back up whatever you can so that you
13 can leave space for the production
14 fluids.

15 Q Are you proposing to add any
16 particular component or equipment from
17 Lehman to the Crossley-Albers system so
18 that you would include a flowback and
19 reuse system?

20 SCOTT BORDER: Objection.
21 Form.

22 THE WITNESS: I am saying

1 that this -- the flowback part
2 would be in a standard part of how
3 hydraulic fracturing is done as
4 explained also in Albers --

5 (Simultaneous Crosstalk.)

6 Perhaps the element that
7 Lehman also uses is their reuse of
8 the water because that water
9 contains expensive chemicals and
10 other materials.

11 So paragraph 135 states that,
12 "POSITA would also had been
13 motivated to modify the
14 Crossley-Albers system to include
15 the flowback and reuse system
16 because it is well known in the
17 art that well-stimulation fluids
18 can be recovered and reused from a
19 prior" --

20 (Reporter Clarification.)

21 THE WITNESS: -- "from a
22 prior treatment."

1 BY CHAD C. WALTERS:

2 Q You don't describe the flowback
3 and reuse system that would be added to
4 Crossley-Albers system in your
5 declaration, right?

6 A I am saying that there would be
7 motivation to have such a system and that
8 would be well understood for the reasons
9 that are explained in 135, mainly to
10 reuse fracturing fluid.

11 Q And you don't talk about how one
12 would incorporate such a flowback and
13 reuse system into your Crossley-Albers
14 combination, right?

15 A I didn't go through that -- this
16 is a standard and there is enough
17 discussion of that in Lehman.

18 Q Can we look at Lehman
19 Exhibit 1009 a bit?

20 A Certainly. Okay. I am there.

21 Q Specifically paragraph 5.

22 A (Reviewing.) The paragraph that

1 starts, "The fracturing fluids utilized,"
2 et cetera?

3 Q Yes.

4 So in paragraph 5 at that
5 sentence it talks about using water-based
6 liquids as the fracturing fluid.

7 Do you see that?

8 A Hm-hm. Yes.

9 Q Okay. I would like to turn to
10 paragraph 79.

11 A Of Lehman as well?

12 Q Yes.

13 A Okay. 79. Yes.

14 Q Is it fair at paragraph 79
15 Lehman discusses a foam-based fracturing
16 fluid?

17 A Let me read that real quickly
18 (Reviewing.) Yes.

19 Q One reason Lehman wants to
20 recover its treatment fluids is because
21 they are expensive; is that right?

22 A Yes.

1 Q Okay. I would like to turn back
2 to Albers now, Exhibit 1006.

3 A Yes.

4 Q Specifically at column 1, line 6
5 to 12.

6 A 6 to 12, yes.

7 Q Here Albers is talking about,
8 like we just saw in Lehman, a water-based
9 fracturing fluid.

10 Do you see that?

11 A Yes.

12 Q Okay. This is in the background
13 section of Albers.

14 And staying in the background
15 section, if you go down to line 22,
16 Albers discusses that another prior art
17 technique involves using foam, using a
18 foam-based fracturing fluid.

19 Do you see that?

20 A Yes.

21 Q And in lines 37 to 38, Albers
22 states, "A more recent development

1 involves the use of gaseous nitrogen
2 alone as a fracturing agent."

3 Do you see that?

4 A Yes.

5 Q And then at lines 52, Albers
6 states that, "Although gaseous nitrogen
7 has many advantages over traditional
8 water-based and foam-based fracturing,
9 there exists a need for a gaseous
10 nitrogen fracturing technique that
11 includes a simultaneous placement of an
12 effective amount of profit within the
13 fracturing formation surrounding the
14 wellbore."

15 Do you see that?

16 A Yes.

17 Q It's fair to say Albers' system
18 uses a gaseous nitrogen fracturing
19 technique instead of the water or
20 foam-based techniques used in Lehman?

21 A Yes.

22 Q Okay. I would like to turn to

1 paragraph 113.

2 A (Reviewing.) Paragraph 113 --

3 Q I'm sorry, of your declaration.

4 Thank you.

5 A Sure. Yes.

6 Q This paragraph is in the context
7 of your analysis of Dependent Claim 6?

8 A Hm-hm. Yes.

9 Q And Claim 6 requires a power
10 unit operable to connect to the manifold,
11 pumping grid, blending unit, the proppant
12 storage system, the first well and the
13 second well.

14 Do you see that?

15 A Yes.

16 Q In paragraph 113 you rely on
17 Crossley's vessel and its power delivery
18 system for the power unit of Claim 6?

19 A Yes.

20 Q Crossley does not disclose a
21 blending unit or a proppant storage
22 system; does it?

1 A Crossley is not concerned with
2 fracturing operations, therefore, he
3 doesn't include the proppant system or
4 blending with proppant.

5 Q Would Crossley's power delivery
6 system have sufficient power to power
7 Crossley's components in addition to a
8 blending unit and a proppant storage
9 system?

10 A I would have to think about
11 that.

12 Q You don't know either way?

13 A Well, power systems are designed
14 to deliver the power required for a
15 certain operation and it's something
16 fairly standard. So how much that fairly
17 standard amount of power would be, I
18 would have to think about.

19 Q You didn't explain that in your
20 declaration, correct?

21 A Because it's fairly standard.

22 Q Okay. I would like to move to

1 paragraph 120 which discusses Dependent
2 Claim 8.

3 So Dependent Claim 8 states,
4 "Where in the well operations factory
5 comprises a chemical storage system where
6 in the chemical storage system is
7 operable to connect to the blending
8 unit."

9 Do you see that?

10 A Hm-hm.

11 Q You're relying on Albers' fluid
12 storage device for the chemical storage
13 system?

14 A (Reviewing.) Where are you
15 reading now?

16 Q Paragraph 120.

17 A What part of it?

18 Q The first sentence, it appears
19 to me, you're relying on Albers' fluid
20 storage devices for the claims chemical
21 storage system of Dependent Claim 8.

22 A Hm-hm. So provide fluids to the

1 blender. Okay.

2 Q Is it fair that the fluid
3 storage devices of Albers contain water
4 with chemicals mixed in?

5 A Let me check again to see the
6 full gamut of this.

7 Q You can look at the top of the
8 next page of your declaration.

9 A The next page is 69, Dependent
10 Claim 10?

11 Q Yes -- well, no, the page where
12 in the middle it addresses Claim 9 --

13 A (Reviewing.

14 Q So my question is about what
15 Albers' fluid storage device contains.

16 A I will have to check for a
17 moment into the specifics of Albers to
18 make sure I don't misspeak, but the basic
19 idea is that Albers injects -- he's using
20 chemicals and he delivers a fracturing
21 fluid with proppant so he needs to
22 somehow put together all that. And to do

1 that, he picks up materials from various
2 storage places and he blends them so that
3 he can deliver that fluid.

4 And I can look at Albers to see
5 details, if necessary.

6 Q At the top of this page, exhibit
7 page 69, page 68 at the bottom of the
8 page, you state, "Further, Albers
9 discloses that these stored fluids may be
10 various chemicals such as clay-stabilized
11 or gelled water, a methanol water or
12 hydrocarbon-based fluid."

13 Do you see that?

14 A Yes.

15 Q So my question was, Albers'
16 fluid storage device contains waters with
17 chemicals mixed in; is that right?

18 A Let me check again to see what
19 that particular -- (Reading) -- okay.

20 So I see that's stated in
21 Section 120 of my declaration. The
22 sentence before the last, that is

1 quoting, "The fluid storage device
2 contains an uncomplexed fluid," et
3 cetera, to the end of this sentence; is
4 that what you are referring to?

5 Q Yeah, so I will just reset here.

6 Dependent Claim 8 requires a
7 chemical storage system.

8 A Yes.

9 Q Okay. In paragraph 120 in the
10 first sentence, you rely on Albers' fluid
11 storage devices as the chemical storage
12 system.

13 Do you see that?

14 A Yes.

15 Q Okay.

16 And then as we just discussed,
17 the fluid storage devices of Albers
18 contain water with chemicals mixed in; is
19 that fair?

20 A Let me check with Albers again
21 to be 100 percent sure. That's what I
22 see in the declaration.

1 But to be a hundred percent sure

2 -- (Reviewing.)

3 Yes, it is fair.

4 Summary of the invention,
5 paragraph 2 in Albers, he says, "In the
6 first embodiment of the present
7 invention, a blender unit draws fluid
8 from a fluid storage device, draws
9 proppant from a sand trailer, and mixes
10 the two in a blender tub to form a
11 slurry."

12 He goes on to talk about storage
13 and blending further down. Yes.

14 Q So Albers' fluid storage device
15 that you are relying on in Claim 8 for
16 the chemical storage system contains
17 water with chemicals mixed in?

18 A Let me see what it contains.
19 (Reviewing.)

20 Yeah, so I see column 4, lines
21 54 and 55 in the first embodiment of the
22 method of the present invention. "The

1 fluid storage device contains an
2 uncomplexed fluid, which in this
3 embodiment is preferably clay-stabilizer
4 or gelled water but can be any suitable
5 fluid including a methanol water or a
6 hydrocarbon-based fluid."

7 Q Let me ask the question a
8 different way.

9 So for the chemical storage
10 system of Claim 8, you are not relying on
11 any separate storage system in Albers
12 that contains chemicals before they are
13 mixed with water?

14 A I don't believe I am even making
15 that distinction.

16 Q I'm asking about that
17 distinction.

18 It appears to me that for the
19 chemical storage system of Claim 8,
20 you're relying on Albers' fluid storage
21 devices, and Albers and you describe
22 those fluid storage devices as containing

1 water with chemicals mixed in. And so --

2 (Simultaneous Crosstalk.)

3 Go ahead.

4 A Yeah, Albers, again, mentions
5 these things just for completeness but he
6 explains, for example, 954, that can be
7 any suitable fluid.

8 Q In your declaration, you don't
9 point to any chemical storage system of
10 Albers that contains chemicals before
11 they are mixed with water to satisfy the
12 chemical storage system requirement for
13 Claim 8; is that fair?

14 A That, again, is an issue of
15 semantics. So is clay-stabilized or
16 gelled water, a chemical or not? It's
17 not just pure water.

18 Q I would -- I would surmise that
19 it's water -- it's chemicals mixed with
20 water.

21 A Okay. That's not unfair.

22 But again, I considered that

1 issue to be secondary importance of the
2 most since it certainly has to do with
3 how you prepare the fluid to inject, how
4 you store the materials needed for
5 preparing that fluid.

6 So that's a decision based on
7 whatever makes the most sense given the
8 fluids that you have to prepare.

9 It's in that spirit that Albers
10 explains how you prepare these fluids,
11 using whatever storage and blending
12 requirements needed.

13 Q I would like to turn to
14 paragraph 158 of your declaration.

15 A Based on these disclosures, et
16 cetera.

17 Q Yes. Yes.

18 And in this paragraph you
19 address Dependent Claim 16.

20 When you say based on these
21 disclosures in paragraph 158, are you
22 referring to the disclosures that you

1 quote in paragraph 157 just above it?

2 A Yeah.

3 Q You quote in paragraph 157 --

4 you quote -- you have quotes from

5 paragraph 44 -- and actually, I will

6 rephrase that.

7 In paragraph 157, you quote

8 paragraph 44 of Crossley twice. You see

9 that?

10 The sentence starts, "It is also

11 understood."

12 A Yes.

13 Q Okay.

14 That sentence says, "It is also

15 understood that one or more strings of

16 production tubing are provided in the

17 wellbore of each well, 112, 122, 132, to

18 provide a flow path for production fluids

19 from the wellhead."

20 A It says to the wellhead. Yes.

21 I see that.

22 Q Okay.

1 That sentence only discloses a
2 singular flow path from a well to the
3 manifold; is that fair?

4 A Let me see. (Reviewing.)

5 So it says, "One or more strings
6 of production tubing are provided in the
7 wellbore for each well to provide a flow
8 path for production fluids to the
9 wellhead." It gives numbers 112, 122,
10 132.

11 I need to go back and check all
12 these to refresh my memory. (Reviewing.)

13 Okay. Are you with me or --

14 Q I am here.

15 Are you -- I thought you were
16 checking --

17 (Simultaneous Crosstalk.)

18 A I'm sorry, my apologies. I
19 misunderstood.

20 Q Okay.

21 My question is, so this talks
22 about one or more strings provided in

1 each wellbore or in the wellbore of each
2 well --

3 A Hm-hm.

4 Q -- to provide a flow path for
5 production fluids. At one point -- the
6 quote is to the wellhead.

7 Do you see that?

8 A Hm-hm. Yeah.

9 Q Okay.

10 And then from the wellhead to
11 the manifolds is a jumper line --

12 A Yes.

13 Q -- flowline jumper?

14 A Hm-hm.

15 Q So my question is, these
16 disclosures only describe for each well a
17 singular flow path from the well to the
18 manifold?

19 A So each well has a jumper line
20 to the manifold. That's shown in Figure
21 1, yes.

22 Q And each well has a singular

1 flow path that includes one or more
2 strings of production tubing, correct?

3 A That's what is stated there.

4 Q So it's fair to say that these
5 disclosures only disclose a singular flow
6 path from the well to the manifold?

7 A Well, the flow path is the -- is
8 essentially what the tubing allows you to
9 deliver. Tubing may assess -- may access
10 rather -- different layers of the
11 reservoir from which you are going to
12 produce. So each one of those tubing
13 lines can essentially go to the top and
14 then from there through the jumper to the
15 main manifold -- to the manifold.

16 Q But these disclosures that you
17 quote only describe the strings of
18 production tubing as forming or providing
19 a flow path, so one flow path?

20 A Let me see the exact language
21 (Reviewing.)

22 It was in paragraph 44, right?

1 Q Yes.

2 A (Reviewing.) Yeah, it's to the
3 wellhead.

4 Q A singular flow path from the
5 well to the manifold.

6 A (Reviewing.)

7 Yes, as stated there, in
8 paragraph 44, there is no details given
9 but it says that one or more strings of
10 production tubing are provided in the
11 wellbore before each well to provide a
12 flow path for production to the wellhead.

13 That goes to the wellhead and
14 from that point on, there's no discussion
15 as to what happens in the jumper from
16 there to the manifold.

17 Q Flowline jumper is just a short
18 connection line, correct?

19 A That's correct, yes.

20 Q And it's fair to say that the
21 strings of production in each well only
22 extend to the wellhead, they do not

1 connect to the manifold directly based on
2 Crossley's disclosure?

3 A Yeah, Crossley clearly says here
4 there's a flow path for production fluids
5 to the wellhead.

6 Q And then a jumper line between
7 the wellhead and the manifold?

8 A He doesn't mention anything here
9 so here he leaves that open.

10 Q But in the figure, it describes
11 a jumper line between the wellhead and
12 the manifold?

13 A The jumper line, but he doesn't
14 show the multiple tubings in that figure
15 either.

16 He uses just general single
17 lines to indicate the well and the line.

18 There are multiple tubing in the
19 wellhead he doesn't show in that figure.

20 Q Crossley's collection manifold
21 is not located on a boat; is that fair?

22 A You are referring to that

1 manifold at the bottom, right?

2 Q Yes.

3 A Yes, at the bottom of the sea,
4 yes.

5 Q I would like to look at
6 paragraph 45 of Crossley.

7 A Yes. (Reviewing.)

8 Q This paragraph is describing the
9 flowline jumpers.

10 And it states that they -- "For
11 each respective well-site, they tie into
12 a collection manifold."

13 And it states, "In this way,
14 production fluids from a well-site can be
15 commingled for unitary transportation to
16 another location, such as a gathering
17 facility seen at 190 in Figure 5."

18 Do you see that?

19 A Let me go to Figure 5 also
20 (Reviewing.)

21 Yes.

22 Q Figure 5 of Crossley shows the

1 gathering facility at the surface?

2 A The 190, you mean?

3 Q Yes. That's what Crossley
4 describes is the gathering facility,
5 correct?

6 A Of the surface, yes.

7 Q And there's a single line going
8 up to the surface to the gathering
9 facility?

10 A You are referring to line 144,
11 right?

12 Q Yes.

13 A Yes, I see it.

14 Q So if one was going to relocate
15 the collection manifold to the boat, it
16 would require multiple flowlines going up
17 to the surface, correct?

18 A Repeat that, please. If one was
19 to do what with the boat?

20 Q Relocate the collection manifold
21 to the boat, it would require multiple
22 flowlines going up to the surface?

1 A You mean the collection manifold
2 say 115 in Figure 1?

3 Q Yes. Or 125.

4 A Or 125, yes, (Reviewing.)
5 I haven't thought about that.
6 It's logical the collection manifolds are
7 where they are, 115 and 125.

8 Q You wouldn't want to put them on
9 the boat?

10 A I haven't thought about that.

11 Q You haven't thought about
12 locating Crossley's manifold on a boat?

13 A That wasn't something that I
14 understood I had to look into.

15 Q Okay.

16 CHAD C. WALTERS: I think I
17 am done, but if we could take
18 5 minutes.

19 SCOTT BORDER: Sure.

20 THE WITNESS: Yeah,
21 certainly.

22 (Whereupon a Recess Commenced

1 at 3:14 and Testimony Recommenced

2 at 3:21.)

3 BY CHAD C. WALTERS:

4 Q Dr. Nikolaou, I have a couple
5 more questions.

6 A Go ahead, please.

7 Q In production operations, a site
8 typically has a manifold to deliver
9 production chemicals; is that fair?

10 A Well, there is delivery
11 production chemicals. You are referring
12 to an offshore platform that uses a
13 manifold to deliver those.

14 Q Offshore or onshore?

15 A It depends but that's a
16 possibility.

17 Q Okay.

18 And stimulation operations, you
19 typically have a manifold used to deliver
20 stimulation fluids?

21 A Yes, that's fair also.

22 Q Would a POSITA understand the

1 same manifold could be used for both
2 stimulation operations and production
3 operations?

4 A The role of manifold is
5 essentially to integrate the circuitry of
6 valves and pipes in a way that is
7 convenient in one place, easy to control,
8 easy to understand, check and all that so
9 that the flow is channeled correctly to
10 the right pipe at the right time.

11 So to the extent that need would
12 exist, either in production operations or
13 in fracturing operations, a manifold
14 could be used for the purpose -- anyplace
15 where it would make sense.

16 Q So would a POSITA understand
17 that you could use the same manifold for
18 both stimulation operations and
19 production operations?

20 A The same as -- the same actual
21 piece or the same design?

22 Q The same piece.

1 A The same piece. Well,
2 production equipment and fracturing
3 equipment are used for different purposes
4 so I don't know if that would be the best
5 use of equipment.

6 Q What about the same design?

7 A Same story. Although design is
8 usually for the purpose, so if one would
9 fit for both purposes, it may do the job.
10 But this again is fairly standard issue
11 that is addressed based on the particular
12 situation using standard guidelines.

13 CHAD D. WALTERS: I will pass
14 the witness. I don't have further
15 questions.

16 SCOTT BORDER: I don't have
17 any questions.

18 CHAD C. WALTERS: So I think
19 we are done.

20 Thank you for your time, Dr.
21 Nikolaou.

22 THE WITNESS: Thank you all

1 and thank you --

2 CHAD C. WALTERS: Just hold
3 on one second.

4 See if she has any questions
5 on references or anything and I
6 have just one comment, Dr.
7 Nikolaou.

8 THE REPORTER: I am good.

9 CHAD C. WALTERS: We are
10 good. Okay.

11 So I know we have another
12 deposition scheduled in July --

13 THE WITNESS: In July.

14 CHAD C. WALTERS: You are
15 going to be in Greece?

16 THE WITNESS: That's correct,
17 yes.

18 CHAD C. WALTERS: Okay.

19 So I am happy to work through
20 whatever schedule you have got. I
21 mean, schedule it early in the
22 morning, our time, so when you

1 figure out -- when you guys figure
2 out what makes sense for you guys.
3 Just let us know and we will work
4 something out here over the next
5 couple of weeks.

6 SCOTT BORDER: That's great,
7 Chad. Thanks.

8 THE WITNESS: I really
9 appreciate that.

10 The good coincidence is the
11 timing is favorable. It's 8 hours
12 difference -- actually, with East
13 Coast, it's 7 hours difference
14 which is even nicer. So 8 or
15 9:00 a.m. East Coast time is early
16 afternoon which is siesta time in
17 Greece. I can use that to do some
18 work. And by the time we are
19 done, everybody is going to be
20 ready to go out so I will go out
21 with them.

22 CHAD C. WALTERS: Sure. Let

1 us know what works and we
2 appreciate you being able to do it
3 then as well. I know it's not the
4 most convenient but it's certainly
5 helpful for us to push it to July.

6 THE WITNESS: I appreciate
7 your flexibility too.

8 (Concluded 3:25 p.m.)
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A C K N O W L E D G E M E N T

STATE OF _____

COUNTY OF _____

I, the undersigned, hereby
certify that I have read the transcript
of my testimony taken under oath in my
deposition; that the transcript is a true
and complete and correct record of my
testimony, and that the answers on the
record as given by me are true and
correct.

DR. MICHAEL NIKOLAOU

Signed and subscribed to before
me this _____ day of _____,
20__.

Notary Public

220

1 I, S. Arielle Santos, CSR, CLR, do
2 hereby certify:
3 That prior to being examined, the witness named
4 in the forgoing deposition, was by me duly
5 affirmed remotely under order SC of FL No.
6 AOSC20-23 Amendment 4 (II)(C)(2) to testify the
7 truth, the whole truth, and nothing but the
8 truth.

9 That said deposition was taken before me at the
10 time and place set forth and was taken down by
11 me in shorthand and thereafter reduced to
12 computerized transcription under my direction
13 and supervision, and I hereby certify the
14 foregoing deposition is a full, true and
15 correct transcript of my shorthand notes so
16 taken.

17 I further certify that I am neither counsel for
18 nor related to any party to said action nor in
19 anywise interested in the outcome thereof.

20

21 

22 S. Arielle Santos, CSR

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