

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3 WEATHERFORD INTERNATIONAL, LLC,
4 WEATHERFORD/LAMB, INC.,
5 WEATHERFORD US, LP and WEATHERFORD
6 ARTIFICIAL LIFT SYSTEMS, LLC

7 Petitioners

8
9 v.

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11 PACKERS PLUS ENERGY SERVICES, INC.,
12 Patent Owner

13
14
15 Case IPR2016-01517

16 Patent 7,134,505

17 Case IPR2016-01509

18 Patent 7,861,774

19 Case IPR2016-01514

20 Patent 7,543,634
21
22

23 **CERTIFIED**
24 **TRANSCRIPT**
25

WEATHERFORD INTERNATIONAL, LLC: VIKRAM RAO

<p style="text-align: right;">Page 2</p> <p>1 ORAL VIDEOTAPED DEPOSITION OF</p> <p>2 VIKRAM RAO</p> <p>3 April 27, 2017</p> <p>4</p> <p>5 ORAL VIDEOTAPED DEPOSITION OF VIKRAM RAO,</p> <p>6 produced as a witness at the instance of the</p> <p>7 Respondent and duly sworn, was taken in the</p> <p>8 above-styled and numbered cause on the 27th day of</p> <p>9 April, 2017, from 9:38 a.m. to 12:50 p.m., before</p> <p>10</p> <p>11 Laurie Carlisle, Certified Shorthand Reporter in and</p> <p>12</p> <p>13 for the State of Texas, reported by computerized</p> <p>14</p> <p>15 machine shorthand at the offices of Heim Payne &</p> <p>16</p> <p>17 Chorush LLP, 1111 Bagby, Suite 2100, Houston, Texas,</p> <p>18</p> <p>19 pursuant to the Federal Rules of Civil Procedure and</p> <p>20</p> <p>21 the provisions stated on the record or attached</p> <p>22</p> <p>23 hereto.</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 4</p> <p>1</p> <p>2 INDEX</p> <p>3</p> <p>4 VIKRAM RAO</p> <p>5 Examination by Mr. Hamad5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10 EXHIBITS</p> <p>11</p> <p>12 Exhibit 1 Copy of deposition of Ali Daneshy 52</p> <p>13</p> <p>14 Exhibit 2 Declaration of Vikram Rao 56</p> <p>15</p> <p>16 Exhibit 3 U.S. Patent 7,861,774 77</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 3</p> <p>1 APPEARANCES</p> <p>2</p> <p>3 FOR PETITIONER:</p> <p>4</p> <p>5 MR. JASON M. SHAPIRO</p> <p>6 Edell, Shapiro & Finnan, LLC</p> <p>7 9801 Washingtonian Boulevard, Suite 750</p> <p>8 Gaithersburg, Maryland 20878</p> <p>9 Telephone: 301.424.3640</p> <p>10 E-mail: js@usiplaw.com</p> <p>11</p> <p>12 MR. DOUGLAS WILSON</p> <p>13 Heim Payne & Chorush LLP</p> <p>14 9442 Capital of Texas Highway North</p> <p>15 Plaza One, Suite 500-146</p> <p>16 Austin, Texas 78759</p> <p>17 Telephone: 512.343.3622</p> <p>18 E-mail: dwilson@hpccllp.com</p> <p>19</p> <p>20 FOR RAPID COMPLETIONS:</p> <p>21</p> <p>22 MR. HAMAD HAMAD</p> <p>23 Caldwell Cassady Curry</p> <p>24 2101 Cedar Springs Road, Suite 1000</p> <p>25 Dallas, Texas 75201</p> <p>Telephone: 214.888.4853</p> <p>E-mail: hhamad@caldwellcc.com</p> <p>ALSO PRESENT:</p> <p>Mr. David Morris</p> <p>Mr. Ryan Ligon, Videographer</p>	<p style="text-align: right;">Page 5</p> <p>1 THE VIDEOGRAPHER: We're on the</p> <p>2 record. Today is April 27, 2017. The time is</p> <p>3 9:38 a.m. Beginning the deposition of Vikram Rao.</p> <p>4 Will the attorneys present please state their names</p> <p>5 for the record.</p> <p>6 MR. HAMAD: Hamad Hamad on behalf of</p> <p>7 Rapid Completions.</p> <p>8 MR. SHAPIRO: Jason Shapiro on behalf</p> <p>9 of Petitioner, and with me today is David Morris,</p> <p>10 in-house counsel for Weatherford, and Doug Wilson,</p> <p>11 Weatherford's litigation counsel. Also on the phone</p> <p>12 is my associate, Mark DeBoy of Edell, Shapiro &</p> <p>13 Finnan.</p> <p>14 VIKRAM RAO,</p> <p>15 having been first duly sworn, testified as follows:</p> <p>16 EXAMINATION</p> <p>17 Q. (By Mr. Hamad) Good morning, sir. Could</p> <p>18 you please state your full name for the record.</p> <p>19 A. Yes. Vikram Rao.</p> <p>20 Q. And that's Dr. Rao?</p> <p>21 A. That is Dr. Rao.</p> <p>22 Q. Dr. Rao, do you understand that you're</p> <p>23 under oath today?</p> <p>24 A. I do.</p> <p>25 Q. Is there any reason you can't give full,</p>

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1 complete and accurate testimony?
2 A. No.
3 Q. For the sake of the court reporter, can we
4 try to agree not to talk over each other?
5 A. Right.
6 Q. Also for the sake of the reporter, can you
7 please provide verbal responses instead of head
8 shakes or "uh-huhs" or "huh-uhs"?
9 A. Got it.
10 Q. If you need a break, please let me know and
11 we'll try to get to a stopping point. For example,
12 if there's a question pending, I'll ask that you
13 answer the question before we break. Is that okay?
14 A. Sure.
15 Q. And if you don't understand a question, can
16 you please let me know?
17 A. Sure.
18 Q. If you answer a question, I'll assume that
19 you understood. Is that fair?
20 A. Got it.
21 Q. At any point during the deposition if you
22 remember additional information or need to clarify or
23 correct a previous answer, please let me know and
24 we'll try to do it right then when it's fresh on your
25 mind. Is that okay?

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1 A. Got it.
2 Q. Dr. Rao, you were hired by Weatherford to
3 opine on the patents at issue in this proceeding,
4 correct?
5 A. I was -- I am, yes.
6 Q. Approximately when were you hired?
7 A. Spring of last year, somewhere there.
8 Q. Spring of 2016?
9 A. Yeah, 2016.
10 Q. Dr. Rao, have you been deposed before?
11 A. In other proceedings?
12 Q. Yes, sir.
13 A. Yes.
14 Q. What proceedings were those?
15 A. They were all intellectual property related
16 proceedings.
17 Q. Do you remember the names of the cases or
18 proceedings?
19 A. Not particularly. In every case I acted on
20 behalf of my company, which would have been
21 Sperry-Sun, Dresser Industries or Halliburton.
22 Q. So in these other intellectual property
23 matters, you were deposed on behalf of either
24 Sperry-Sun or Halliburton?
25 A. Or the entity may not have been Sperry-Sun.

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1 Might have been Baroid Corporation.
2 Q. I'm sorry. Could you spell that last one
3 for the record?
4 A. Yeah. So it's Baroid, B-A-R-O-I-D,
5 Corporation.
6 Q. Thank you. Approximately how many times
7 have you been previously deposed?
8 A. Possibly somewhere in the neighborhood of
9 three or four times.
10 Q. Have you given sworn testimony at a hearing
11 that might not have been in a deposition?
12 A. Yes.
13 Q. About how many times is that?
14 A. Two or three times.
15 Q. Do you remember those matters?
16 A. Yes. The last one was in Canada a couple
17 of months ago.
18 Q. And what was that proceeding?
19 A. It was an intellectual property proceeding.
20 Q. Do you remember the name of the proceeding?
21 A. Yes. It's actually the counterpart
22 litigation to this one in Canada.
23 Q. So the counterpart proceeding between Rapid
24 and Weatherford in Canada?
25 A. And a number of other defendants, yes. I

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1 call it a counterpart. The Canadian patent was
2 extremely similar to the '774.
3 Q. Going back to the matters where you had
4 been previously deposed, approximately when did those
5 occur?
6 A. They would have occurred in the period
7 starting around late 1980s through the '90s. I think
8 that's about right, yes.
9 Q. Do you remember approximately when your
10 last deposition was?
11 A. Not really. Somewhere in the '90s. I'm
12 trying to remember which case. In the '90s, I
13 believe.
14 Q. Dr. Rao, can you please describe your
15 experience in the oil and gas industry?
16 A. Yes. So I started out -- in the oil and
17 gas industry I started out in NL Industries in 1979
18 as a part of a group that developed disruptive
19 technologies called drilling systems technology. And
20 that went on for a few years, and then I -- I was
21 responsible for one of those
22 measurement-while-drilling systems, and then when we
23 were done developing it, it and the other ancillary
24 systems, I was picked to launch it in the field. So
25 I launched all our initial MWD offerings in the

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1 field, marketing operations and all of the associated
 2 matters to do a commercial launch, including setting
 3 up district field operations in various places
 4 including Aberdeen and Norway.
 5 And then when we successfully launched
 6 it commercially, we created a company to commercially
 7 launch it, and it's called Sperry-Sun. Actually,
 8 Sperry-Sun as an entity existed before and was
 9 purchased as a launch vehicle for the measurement
 10 while drilling, which I will use an acronym MWD, and
 11 I was then vice president of variously -- either
 12 technology or business development at Sperry-Sun.
 13 Sperry-Sun was then -- well,
 14 Sperry-Sun and its parent, Baroid, was bought by
 15 Dresser in 1994 or thereabouts. I continued in
 16 similar positions in the executive management team of
 17 Sperry-Sun, and then -- and so basically they didn't
 18 mess with us. We were just a division of Dresser.
 19 And then Halliburton bought Dresser in 1990 -- late
 20 '98. When that happened I assumed new positions with
 21 Halliburton. Those shifted into other areas. I was
 22 vice president of something called integrated
 23 technology products, which was products and services
 24 that transcended division lines. And then I was
 25 responsible for the reservoir engineering group, and

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1 I was responsible for the ventures arm, which was the
 2 arm that took positions in small startups and then in
 3 some cases bought them, in some cases did joint
 4 ventures. So -- and most of these were in the
 5 fields -- as it turns out in the fields of
 6 completions, mostly.
 7 And then, over time, I assumed more
 8 responsibility and ended my career with Halliburton
 9 as senior VP and chief technology officer of
 10 Halliburton. Happy to expand on any portion thereof.
 11 **Q. Thank you. In your answer you said most of**
 12 **these were in the field of completions. Were you**
 13 **referring to the startups that were acquired while**
 14 **you were in charge of Dresser's venture arm?**
 15 MR. SHAPIRO: Objection, form.
 16 A. Would you repeat the question?
 17 **Q. Sure. In your answer you said: As it**
 18 **turns out in the fields of completion mostly, and I**
 19 **think you said most of these were in the fields -- as**
 20 **it turns out in the fields of completions mostly. I**
 21 **was trying to figure out what you were referring to.**
 22 A. I was referring to the startups in those
 23 cases.
 24 **Q. To be clear, the startups that were**
 25 **acquired by Dresser happened to be in the field of**

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1 **completions?**
 2 A. Either acquired or joint ventured or taking
 3 positions in. And then I was directly involved -- as
 4 is fairly common in a ventures group, the ventures
 5 group main person then sits on the boards of these
 6 companies and, as you might know, when it's small
 7 companies, the boards are very hands-on. So I had a
 8 very hands-on experience with these companies.
 9 **Q. You said you ended your career with**
 10 **Halliburton as senior VP and chief technology**
 11 **officer. Is that right?**
 12 A. That is correct.
 13 **Q. What were your roles at Halliburton?**
 14 A. So it started out leading those three areas
 15 that I spoke of, which is integrated technology
 16 products, reservoir group, and so the reservoir group
 17 I can expand a little bit is Halliburton and
 18 Schlumberger were the only service companies that did
 19 something fairly unique, which is called integrated
 20 offerings. They performed services and sometimes got
 21 paid in results. Not sometimes. They got paid in
 22 results. And sometimes in oil or in some other way.
 23 Other service companies didn't do that. So to do --
 24 accomplish something like that, we needed a strong
 25 reservoir group. So the reservoir group -- reservoir

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1 engineering group of that integrated services
 2 offering reported to me.
 3 Sometime thereafter, the VP of
 4 technology left, and I took over all of the portfolio
 5 of technology of Halliburton. And at that point just
 6 about anything that involved technology reported to
 7 me, and sometime in the middle of 2005 or so, I
 8 decided that our intellectual property needed some
 9 attention. So I started the intellectual asset
 10 management group. I hired Annie Cullotta,
 11 C-U-L-L-O-T-T-A, to head up the group. And so we
 12 created the intellectual asset management group.
 13 In that capacity we basically improved
 14 the portfolio of the company to be more cost
 15 effective and more impactful. I had a personal hand
 16 in it, of course, but I had a principle that the top
 17 ten moneymakers in our portfolio, I would lay my
 18 hands on it from the time of filing until the final
 19 office action until issuance, in order to be sure
 20 that -- well, I was a layperson, but I still wanted
 21 to be sure that it was a good property.
 22 And then basically a CTO in major
 23 corporations is a bit different in each corporation.
 24 My approach was to truly understand what the clients'
 25 needs were and to serve them. I had research

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1 directors in various places, in Carrollton, in Duncan,
 2 Oklahoma, in Houston and Cheltenham, England and so
 3 forth, and they reported to me. All the developments
 4 that merited my attention, and I gave them some
 5 criteria, were then made known to me, and I kept my
 6 hands on them.

7 Mostly I had an absolute stricture.
 8 If there was a problem in the field of significance,
 9 I had to be informed about it, and then I made myself
 10 familiar with it. So that sort of thing. CTOs are
 11 all a little different in how they operate. I
 12 operated in that way.

13 **Q. While at Halliburton, were you involved in**
 14 **the development of new technologies?**

15 A. Well, yes. That's what the job was
 16 basically, serving the client, and if the client
 17 needed new technology, we developed it.

18 **Q. While at Halliburton, were you involved in**
 19 **the development of new completion technologies?**

20 A. Yes. So aside from -- as I said, the
 21 startups that we undertook, the ones that we paid
 22 special interest to, were two joint ventures with
 23 Shell. One was called Enventure. Enventure is E-N
 24 then the word venture, all one word. I think it was
 25 called Enventure Global Technologies. And then the

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1 other was called Well Dynamics. And Well Dynamics
 2 was loosely characterized as intelligent completions,
 3 also known as smart completions. And Enventure was a
 4 very new technology of something called expandable
 5 tubulars. In fact, I had a couple of patents with
 6 Enventure in the space of zonal isolation in
 7 horizontal wells. But, yeah, so those were in
 8 completions.

9 Also, I would say one of the most
 10 interesting things we did was the expandable liner
 11 hangar, which I would have to say revolutionized
 12 liner hangars. So, yeah, it turns out the reason for
 13 that, why the emphasis in completions, is because we
 14 identified, even back in the '90s in Sperry-Sun, that
 15 in horizontal wells, drilling had overtaken
 16 completions. So drilling advances in horizontal
 17 wells were substantial. Completion advances were
 18 lacking. And I carried that knowledge forward in
 19 Halliburton. We agreed in management that that was
 20 the case. So we had more of an emphasis on
 21 completions and then on stimulation, as it turns out,
 22 because of the advent of shale oil and gas.

23 And so that's why the emphasis was
 24 more -- my emphasis was more on completions and
 25 stimulation than on drilling because that's where the

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1 need was.

2 **Q. Dr. Rao, approximately when did you retire**
 3 **from Halliburton?**

4 A. April of 2008. I followed my wife to North
 5 Carolina. She took a job in North Carolina, and I
 6 hung it up.

7 **Q. Now do you consult with companies in the**
 8 **oil and gas field?**

9 A. Yes, I do. In fact, mostly in the oil and
 10 gas field. So right now I consult with Biota -- in
 11 fact, I was their acting CTO until we found a real
 12 one which -- actually, it's in my book, a chapter in
 13 my book. It's directed to using DNA analysis for
 14 improving the productivity of horizontal --
 15 horizontally fractured reservoirs.

16 I also consult for Eastman Chemicals.
 17 I can't talk much about that -- well, I can't talk
 18 much about any of these in depth -- where they're
 19 developing technologies for the more effective
 20 conductivity of fractured conduit. So conductivity
 21 is where you improve the permeability basically. And
 22 so there is some new technology, and I'm helping them
 23 with that. I work for BioLargo, which is developing
 24 new technologies in cleanup of water. And let's see
 25 who -- well, you get the picture. I'm very much --

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1 and I work for venture capitalists and Norwegian
 2 venture capitalists investing in new technologies in
 3 upstream.

4 **Q. Dr. Rao, as part of your consulting work,**
 5 **do you advise companies on how to complete wells?**

6 A. Well, this is -- a completion is -- yes.
 7 Yes. The completion is a part of -- completion is a
 8 funny word. Stimulation in some parlance includes --
 9 is included in completions. Now, you can complete a
 10 well without stimulating it; but yes, mostly the
 11 completions that I'm directly involved with end up
 12 with stimulation.

13 **Q. Just to make sure we're on the same page --**

14 A. Yes.

15 **Q. -- do I understand you correctly that**
 16 **you're saying in some scenarios you can complete a**
 17 **well without stimulating, but in most cases that**
 18 **you're involved with, you're doing both completion**
 19 **and stimulation?**

20 A. Correct.

21 MR. SHAPIRO: Objection, form.

22 A. In most of the technologies that I am
 23 assisting in, the completions involved -- also
 24 involve stimulation.

25 **Q. Do you design frac jobs for wells for**

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