

1 UNITED STATES DISTRICT COURT
2 SOUTHERN DISTRICT OF TEXAS
3 HOUSTON DIVISION

4 WESTERNGECO LLC * 09-CV-1827
5 VS. * Houston, Texas
6 ION GEOPHYSICAL * 7:35 a.m.
7 CORPORATION, FUGRO * July 31, 2012
8 GEOTEAM, INC., ET AL *

9 JURY TRIAL

10 Volume 7

11 Morning Session

12 BEFORE THE HONORABLE KEITH P. ELLISON
13 UNITED STATES DISTRICT JUDGE

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1 in your opinion?

2 **A.** Well, the biggest role is to be able to repeat
3 exactly what you did last time, as well as close that
4 hole. Because if a 4D is a tool to manage an oil field,
11:02:03 5 that's really what it is, it's a tool to manage an oil
6 I'll field.

7 And if you've got this big hole where the
8 oil field is -- a big hole in the data where your oil
9 field is, you can't use it very effectively.

11:02:15 10 **Q.** Let's turn to PTX 398. What is this document? Did
11 you consider this document?

12 **A.** Yes, ma'am.

13 **Q.** What is it?

14 **A.** This is a document talking about steerable streamer
11:02:31 15 benefits, and they list who is --

16 **Q.** I know it's small, but I think the bottom it says --
17 it's coming from Fugro's files, but is this an ION
18 document?

19 **A.** That is my understanding.

11:02:50 20 **Q.** Now, what is -- does part of the document show on
21 Page 144?

22 **A.** Well, basically, you know, it says there are two
23 benefits to using steerable streamers utilizing DigiFIN
24 devices. And the two aspects to the benefits are seismic
11:03:11 25 contractors are looking for cost and time efficiency as

1 well as, you know, the HSE benefit is clearly not sending
2 out some guy in a little Zodiac back-to-back. And the
3 oil companies are looking for geophysical benefits. And I
4 think this confirms my opinion of both of the benefits
11:03:33 5 that I concluded with -- they're agreeing with my
6 conclusions here.

7 **Q.** And the next section on this page, does that address
8 your opinions regarding the need for lateral steering for
9 4D?

11:03:45 10 **A.** Yes. It is widely known among the oil companies that
11 the steerability is important there. So they do know that
12 it's a key factor in influencing the success of 4D's
13 repeatability.

14 That's why we use the word repeatability.
11:04:10 15 I mean, if you put your receiver here on where I'm
16 sitting, and or back at the back door I actually haven't
17 repeated it. If the receiver is in a different place
18 you're not repeating it. And the whole term is
19 repeatability through the industry.

11:04:28 20 **Q.** That last part of the page -- of the section I should
21 say, it says, "Most 3D seismic shot in North Sea has some
22 4D objective. And this is increasingly the case in other
23 regions of the world where environmental conditions make
24 4D surveys feasible." Do you agree with that statement?

11:04:45 25 **A.** Yes, I do. Having worked I was -- I was manager of

1 subsurface technology for Kerr-McGee for the North Sea and
2 that involved geophysics and reservoir simulation, which
3 is part of reservoir management.

4 And when I was over there, it was really
11:05:06 5 clear that the fields were being shot with the idea that
6 we're going to use 4D down the road. And so, it is
7 becoming widespread around the world.

8 **Q.** So in the North Sea, even if it's a 3D survey, the
9 idea is it could very well be a 4D down the road?

11:05:29 10 **A.** Yes. I don't think you can count any 3D. If I go
11 get a survey, I may not tell the contractor that it's
12 going to be used in 4D because he doesn't necessarily need
13 to know at this time. And -- but I may -- and I may not
14 know because I don't know whether I'm going to be able to
11:05:49 15 sell it to my management, hey, let's go spend another
16 \$5 million again. So sometimes it's tough to get that
17 money.

18 **Q.** Can lateral steering play a role in that first survey
19 if you think it might be repeated down the road?

11:06:02 20 **A.** I think if you have an inclination or even an inkling
21 down that it might be 4D down the road, you ought to use
22 lateral steering.

23 **Q.** Why is that?

24 **A.** So that you'll know where your cables and shots were.
11:06:15 25 Without the lateral steering you really don't know quite

1 where everything is. I mean, you kind of have a close
2 approximation, but the error bar is very, very big, and
3 you need that knowledge reduced down so that you can put
4 your cables back where they were.

11:06:31

5 Q. Let's turn together to PTX 214.

6 A. 214.

7 Q. I believe we've seen this before, but let's look at
8 Page 209. And this is that ION presentation saying,
9 "Irregularities of streamer shape increase 4D noise, and
10 reduce repeatability."

11:06:55

11 A. Yes, ma'am.

12 Q. What does this mean to you?

13 A. This is an ION document and this is basically them
14 saying that irregularities and streamer shape, which
15 really means irregularities and where you put -- where the
16 cable -- are you repeatable are increasing the noise and
17 they use repeatability.

11:07:08

18 If your old survey is kind of all over the
19 place, you don't quite know where it is, you can't
20 quite -- you can't ever repeat it when you go back. So
21 basically they're saying that by having a straight
22 streamer or at least a well behaved set of streamers, you
23 can reduce that noise out of the 4D signal.

11:07:27

24 Q. So having a straighter or more well behaved array in
25 the first survey makes it easier to review?

11:07:46