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UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF TEXAS  
HOUSTON DIVISION

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

JURY TRIAL

Volume 7

Morning Session

BEFORE THE HONORABLE KEITH P. ELLISON  
UNITED STATES DISTRICT JUDGE

**APPEARANCES:**

**FOR THE PLAINTIFF:**

Lee L. Kaplan  
**SMYSER, KAPLAN & VESELKA, LLP**  
700 Louisiana, Suite 2300  
Houston, Texas 77002  
713.221.2300

Gregg F. LoCascio  
**KIRKLAND & ELLIS LLP**  
655 Fifteenth Street Northwest  
Washington, DC 20005  
202.879.5290

Sarah Tsou  
Timothy K. Gilman  
**KIRKLAND & ELLIS LLP**  
Citigroup Center  
153 East 53rd Street  
New York, New York 10022  
212.446.6435

**TRUE COPY I CERTIFY  
ATTEST:**

By Shelia Logel Clerk of Court  
Deputy Clerk

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,  
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.

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  
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.

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  
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  
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?

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.

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.

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?

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  
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?

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  
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?

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.

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

11:07:08

15 really means irregularities and where you put -- where the  
16 cable -- are you repeatable are increasing the noise and  
17 they use repeatability.

18 If your old survey is kind of all over the  
19 place, you don't quite know where it is, you can't

11:07:27

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.

24 **Q.** So having a straighter or more well behaved array in  
11:07:46 25 the first survey makes it easier to review?