

# Damages Summary

Sims  
DEMO001

**Lost Profits: \$159.1 Million**

**Reasonable Royalties: \$101.9 Million**

RS-1

# Lost Profits Analysis

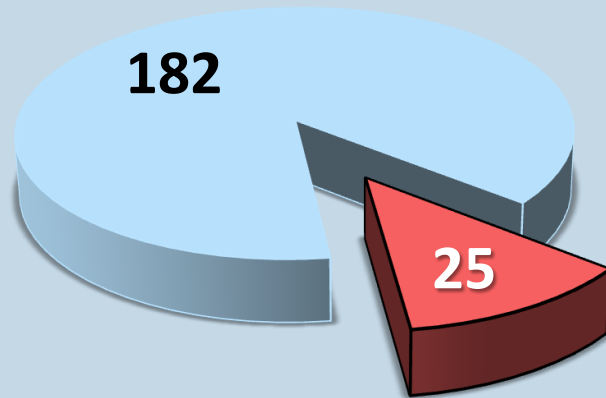
RS-2

- **Lost Profits are profits WesternGeco was prevented from making because ION supplied its infringing DigiFIN systems for WesternGeco's competitors to use**
- **If ION's infringing DigiFIN systems had not been used by WesternGeco's competitors, WesternGeco would have won additional surveys and would have earned revenues and profits on those surveys**

# Lost Profits On 25 Surveys

Sims  
DEMO004

207 Total Surveys Using DigiFIN Systems: \$3.0 Billion Revenue



Surveys WesternGeco  
Would Have Won

Revenue on 25 Surveys:	\$319,334,996
WesternGeco Cost:	- \$160,261,436
<b>WesternGeco Lost Profits:</b>	<b>\$159,073,560</b>

RS-4

# Lost Profits Factors

Sims  
DEMO005

- **Demand for patented product**
- **Availability of acceptable, non-infringing alternatives**
- **Capacity to meet demand**
- **Quantification of lost profits**

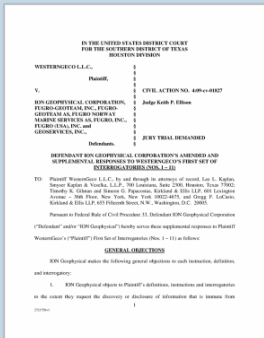
RS-5

# ION Admits Demand For Lateral Steering Systems

Sims  
DEMO006

Subject to these objections, there is a market for marine seismic surveys using laterally steerable streamers in the U.S. because there are several entities, including WesternGeco, ION Geophysical, Fugro, PGS, and Polarcus that sell products or services to supply that market. In addition, there is a submarket for 4D surveys within the more general market because to service the submarket, a product or service must not only be capable of laterally steering the marine seismic streamers, but also be able to, within a certain degree of precision, reproduce a first survey some time (or several times) after the reference survey is completed. ION Geophysical sells devices that and services that compete in these markets.

ION's Am. Resp. To WesternGeco Interrog. No.10



PTX197

RS-6

# Oil Companies Demand Lateral Steering Systems

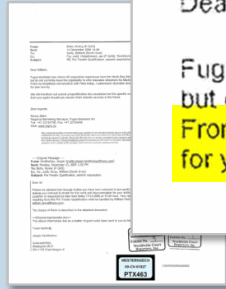
Sims  
DEMO007

**From:** Bohn, Ronny (F-GAS)  
**Sent:** 14 December 2004 14:08  
**To:** Ginty, William (South Arne)  
**Cc:** Fur, Judit; Helgebostad, Jan (F-GAS); 'Kirchheiner, Jesper'  
**Subject:** RE: Pre Tender Qualification, seismic acquisition

Dear William,

Fugro-Geoteam has recent 4D acquisition experience from the North Sea (Norsk Hydro among others), but do not currently have the capability to offer steerable streamers for Marine Seismic Surveys.

From my telephone conversation with Hess today, I understand steerable streamers are an absolute requirement for your survey.



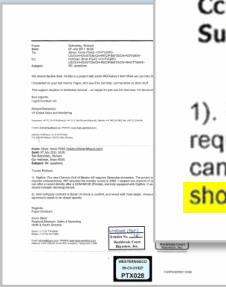
PTX463

PTX463 at FGRPROD000368662 (Dec. 14, 2004)

**From:** Stiver, Kevin FGAS [mailto:KStiver@fugro.com]  
**Sent:** 07 July 2011 16:01  
**To:** Bottomley, Richard  
**Cc:** Hottman, Brian FGAS  
**Subject:** RE: questions

\* \* \*

1). Digifins: The new Chevron Gulf of Mexico 4D requires Steerable streamers. The project is only 240 Sq Km, and requires undershooting. WG acquired the monitor survey in 2005. I suspect our chances of award are slim, unless we can offer a vessel directly after a GOM MC3D (Florida), and fully equipped with Digifins. If we cannot offer Digifins, we should consider declining the bid.




PTX028

PTX028 at FGRPROD115592 (July 7, 2011)

RS-7

# Oil Companies Demand Lateral Steering Systems

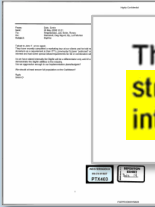
Sims  
DEMO008



Steerable streamers are a requirement from Tullow

PTX388

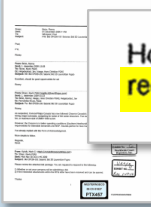
PTX388 at FGRPROD137977  
(Dec. 19, 2008)



They have recently completed a marketing tour at our clients and he told me that Maersk now will put steerable streamers as a requirement in their ITT's, previously it's been "preferred" only. And also Chevron showed great interest and had some special ideas/requirements for 4D in combination with steerable streamers.

PTX403

PTX403 at FGRPROD159603  
(May 29, 2008)



However, the Conoco is in better operating conditions (Southern Newfoundland), preference for 12 streamers, and requirements for Steerable streamers and MVP. Sounds perfect for Geo Caribbean or similar C-Class vessel.

PTX457

PTX457 at FGRPROD325902  
(Dec. 1, 2009)



I understand the Apache surveys will be full DigiFin as this is always their expectation.

PTX380

PTX380 at FGRPROD000128418  
(Nov. 2, 2010)

RS-8



# Defendants Recognized The Demand For Lateral Steering Systems

Sims  
DEMO009

- 1. Steerable streamers add definable value for both for Oilcos and seismic contractors
- 2. The use of steerable streamers is increasing year on year and becoming a requirement for many surveys

PTX245 at ION731205

HIGHLY CONFIDENTIAL INFORMATION - SUBJECT TO PROTECTIVE ORDER

### Outline of the situation

- COSL Technology Decision
  - Sercel Nautilus and SeaProNav
  - DigiCOURSE Birds, Acoustics & FINs along with integrated Orca command and control.
- COSL Purchasing Decision
  - How much leverage does the perception of a competitive offering give COSL in lowering ION pricing
    - Depends on our ability to successfully argue the viability or otherwise of a decision to go with ION vs Sercel.
- Who will the audience be?
  - Decision makers in COSL
  - Influencers in COSL
  - Oil Company Influencers in CNOC

**ion**

WESTERNGECO  
IN2014007  
PTX245

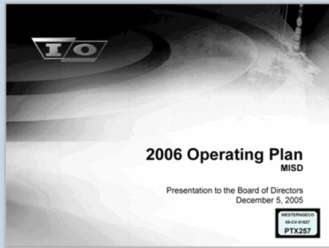
ION731205

PTX245

RS-9

# Defendants Recognized The Demand And Targeted WesternGeco's "Proprietary Market"

Sims  
DEMO010

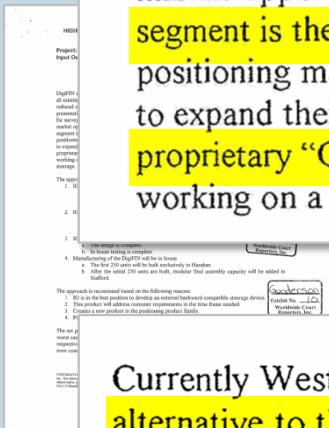


PTX257

Oil Companies and Contractors are hungry for a competitive Q-fin (steerable streamer) offering and realize that we're in the best position to deliver

PTX 257 at ION865867  
(Dec. 5, 2005)

market opportunities and requirements. The compelling reason for IO to enter into this market segment is the value that this device will bring to the existing marine seismic fleet. The overall positioning market is forecast to grow for the next few years. DigiFIN will allow existing customers to expand their offerings. By using DigiFIN existing customers will be able to compete in the proprietary "Q" marine systems market space. Time to market is critical since Sercel is known to be working on a Bird device. Sercel's device will most likely have the capability to perform lateral



PTX006

PTX 006 at ION016360  
(Aug. 3, 2006)

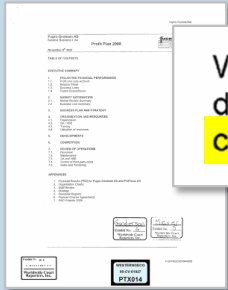
Currently Western-Geco has a backlog for their "Q" vessels. Today the oil companies have no alternative to their "Q" vessels. The DigiFIN opens the door to all 3D vessels, 62 as of today, to compete in the market space that the Western-Geco has created.

PTX006 at ION016366  
(Aug. 3, 2006)

RS-10

# Defendants Recognized The Demand And Targeted WesternGeco's "Proprietary Market"

Sims  
DEMO011



PTX014

WesternGeco is focusing on getting premium rates for their Q-vessels and seems successful in doing so. Some of this advantage will be reduced when steerable are expected to become commercially available in late 2007.

PTX014 at FGRPROD1844928



**Paul Winspear**  
Managing  
Director

Q. Okay. And so as of 2007, Fugro's view was WesternGeco was able to command premium rates from customers and get some jobs because of factors that included its ability at that time to be the one that could offer lateral steering, right?

A. **Correct.**

\* \* \*

Q. And so prior to November '07, WesternGeco had an advantage that included being able to offer steerable streamers in a proprietary way, right?

A. **Yeah. Their advantage was the Q-Marine which incorporated the Q-Fin.**

Winspear 30(b)(6) Tr. at 66:23-67:3, 67:18-22

RS-11

# Defendants Recognized The Demand And Targeted WesternGeco's "Proprietary Market"

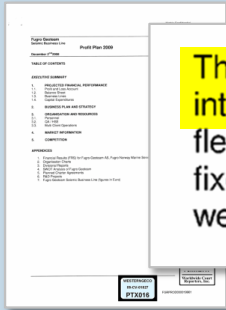
Sims  
DEMO012



PTX014

- **Digifin tangle avoidance / streamer steering system** on Celtic, Caribbean, Barents, Seisquest, Natuna and Caribbean. Streamer steering is getting increasingly necessary, primarily for 4D. Systems for this are now commercially available. We are planning a limited system on Atlantic end 2007. The main reason for this is not 4D work or infill limitation, but tangle avoidance during operation. If this is a success we plan to deploy this on all vessels where it is technically feasible.

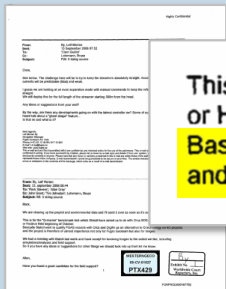
PTX014 at FGRPROD1044920



PTX016

The steer-able streamer technology (Digifins) has proven to be very effective and the client interest and support is strong. We are currently also introducing array steering in our 3D fleet. We will continue to monitor the technology developments for in-sea equipment and fixed equipment to allow for quick moves if/when necessary to secure to our inventory, and we remain in close contact with all the key equipment suppliers.

PTX016 at FGRPROD19974



PTX429

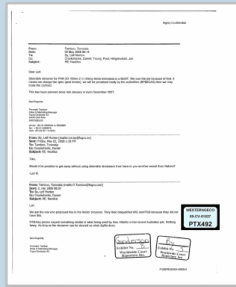
This is for the "Q-marine" benchmark test which Statoil have asked us to do with Orca SOS and Digifin on the Norne or Heidrun field beginning of October. Basically Statoil want to qualify FGAS vessels with Orca and Digifin as an alternative to Q technology on 4D projects and the project is therefore of utmost importance not only for Fugro Geoteam but also for longeo.

PTX429 at FGRPROD187792

RS-12

# Survey Providers Win Jobs Because They Have Lateral Steering Systems

Sims  
DEMO013



PTX492

**From:** Tambun, Toronata  
**Sent:** 02 May 2008 06:14  
**To:** By, Leif Morten  
**Cc:** Crookshanks, Daniel; Young, Paul; Helgebostad, Jan  
**Subject:** RE: Nautilus

Dear Leif,

Steerable streamer for PAN 3D 185km 2 in Udang Block Indonesia is a MUST. We won the job because of that. It means we change the spec (post tender), we will be penalized badly by the authorities (BPMIGAS) then we may loose the contract.

\* \* \*

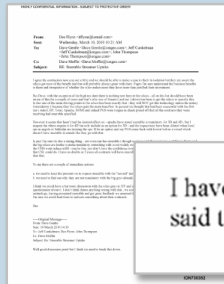
**From:** By, Leif Morten [mailto:l.m.by@fugro.no]  
**Sent:** Friday, May 02, 2008 1:10 PM  
**To:** Tambun, Toronata  
**Cc:** Crookshanks, Daniel  
**Subject:** RE: Nautilus

Toto,

Would it be possible to get away without using steerable streamers if we have to you another vessel than Natuna?

-Leif M.

PTX492 at FGRPROD1488244 (May 2, 2008)



PTX903

I have had this thrown at me twice (once by CGGV and once by FGAS). In both cases, their marketing manager stood up and said that's fine, but we would not have won the job without steering capabilities. The discussion stopped right then and there.

PTX903 at ION730353 (Mar. 10, 2008)

RS-13

# ION's Sales Reflect Demand

Sims  
DEMO014

## ION DigiFIN Units Sold

Total

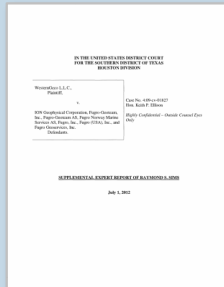
3,955

	2007	2008	2009	2010	2011	Total
<b>ION DigiFIN Units Sold</b>	184	943	1,449	1,020	359	<b>3,955</b>
ION DigiFIN Revenue	\$1,955,100	\$14,882,431	\$22,916,390	\$18,650,899	\$6,663,991	\$65,068,811
ION DigiFIN Discounts	(107,531)	(506,003)	(710,408)	(2,499,220)	(932,151)	(4,755,313)
<b>ION DigiFIN Net Revenue</b>	\$1,847,569	\$14,376,428	\$22,205,982	\$16,151,679	\$5,731,840	<b>\$60,313,498</b>
ION DigiFIN Cost of Goods Sold	758,531	4,048,216	6,439,055	4,684,155	1,662,293	17,592,251
ION DigiFIN Gross Profit	\$1,089,038	\$10,328,212	\$15,766,927	\$11,467,524	\$4,069,546	\$42,721,247
Operating Expenses						
Research and Development	\$191,811	\$1,178,084	\$2,823,382	\$1,663,480	\$753,084	\$6,609,839
Sales Expense	37,916	277,287	630,531	662,791	290,371	1,898,895
General and Administrative	33,697	268,660	645,215	480,744	202,068	1,630,384
Total Operating Expenses	\$263,423	\$1,724,032	\$4,099,127	\$2,807,014	\$1,245,523	\$10,139,119
Operating Profit	\$825,614	\$8,604,181	\$11,667,800	\$8,660,510	\$2,824,024	\$32,582,128

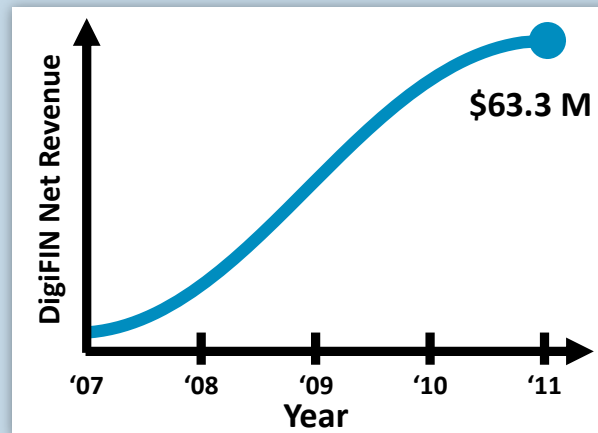
## ION DigiFIN Net Revenue

Sims Supplemental Report at Ex. 9.15

**\$60,313,498**



Sims Supplemental Report



**Lateral Controller  
Additional \$3.0 Million**

RS-14

# Revenue From Surveys Using DigiFin Reflects Demand

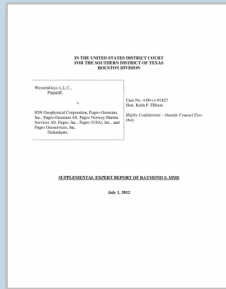
Sims  
DEMO015

**207 Surveys Using DigiFIN Systems Generating \$3.0 Billion in Revenue**

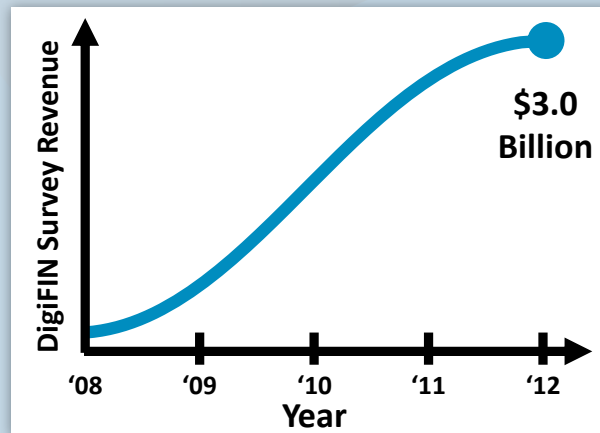
Beginning of Damages Period: *Date of First Infringement* <sup>(1)</sup>

	2006	2007	2008	2009	2010	2011	2012	Total
Revenue from Accused Surveys (A)	\$0	\$0	\$138,344,525	\$394,817,576	\$769,704,946	\$1,087,397,718	\$646,823,457	<b>\$3,037,088,223</b>

Sims Supplemental Report at Ex. 5.2S



Sims Supplemental Report



RS-15

# Revenue From Fugro Surveys Using DigiFIN Reflects Demand

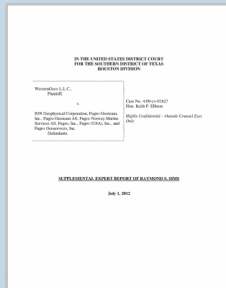
Sims  
DEMO016

## 106 Fugro Surveys Generating \$1.4 Billion in Revenue

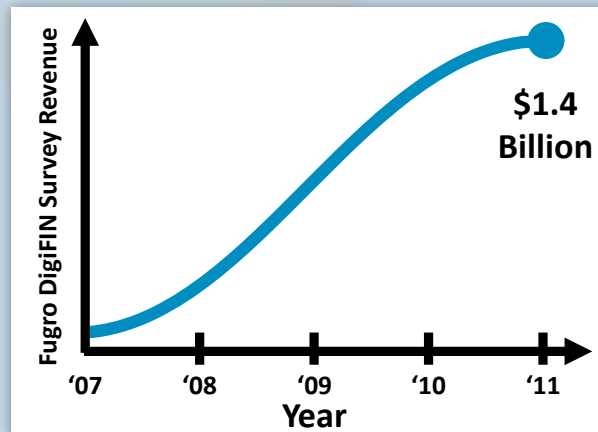
Beginning of Damages Period: Date of First Infringement <sup>(1)</sup>

	2006	2007	2008	2009	2010	2011	2012	Total
Revenue from Accused Surveys [A]	\$0	\$0	\$138,344,525	\$280,419,576	\$404,859,799	\$440,059,878	\$142,223,457	<b>\$1,405,907,236</b>

Sims Supplemental Report at Ex. 6.2S



Sims Supplemental Report



RS-16



# WesternGeco's Q Surveys Reflect Demand

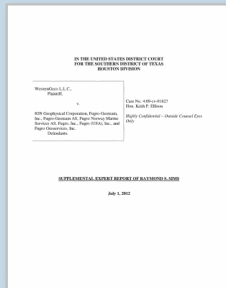
Sims  
DEMO017

## \$2.7 Billion in Revenue from 2006-2011

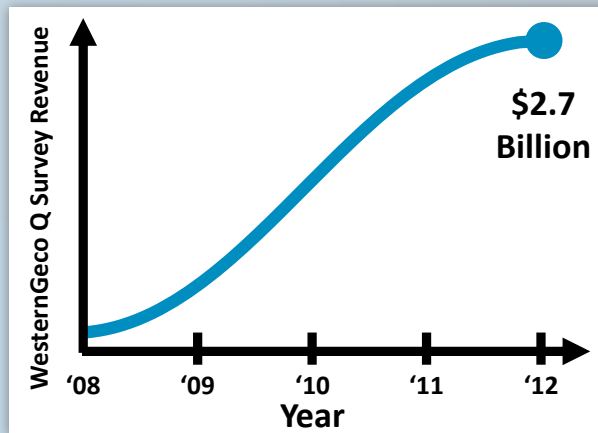
(in thousands)

	2006	2007	2008	2009	2010	2011	Total
	[A]	[B]	[C]	[D]	[E]	[F]	[G]
<b>Revenue</b>							
Service Revenue	\$424,803	\$566,212	\$566,423	\$219,712	\$362,613	\$561,913	<b>\$2,701,676</b>
Product Sales	54,223	107,649	212,682	176,863	217,116	186,252	<b>954,785</b>
Total Revenue	\$479,026	\$673,861	\$779,105	\$396,575	\$579,728	\$748,165	<b>\$3,656,461</b>

Sims Supplemental Report at Ex. 8.3S



Sims Supplemental  
Report



RS-17

# Lost Profits Factors

Sims  
DEMO018



**Demand for patented technology was strong**

RS-18

# No Acceptable Non-Infringing Alternatives Available

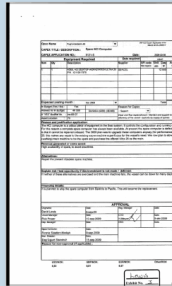
Sims  
DEMO019

**An acceptable non-infringing alternative would be a lateral steering system that provides the unique benefits of the patented steering system without infringing the Bittleston or Zajac Patents**


RS-19

# Fugro Said There Were No Alternatives

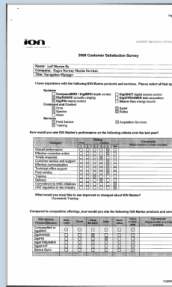
Sims  
DEMO020



PTX313

Opco Name		Fugro Finance AG		081125 Capex Application FNV Macro rel DLL0906xx			
CAPEX TITLE / DESCRIPTION.: Additional DigiFins to Pool + Origin							
CAPEX APPLICATION NO.: 9113-C				Date: 2009-06-15			
Equipment Required				Date required: 2009-06-15			
Item	Qty	Description	Supplier	SFI code Not Applic	Unit Cost USD	Amount USD	Amount NOK
1	76	DigiFins for pool (including collars) ALS (Barents) Type	ION		12 075	917 700	5 433 702
* * *							
Alternatives:							
None							

PTX313 at FGRPROD021483



PTX920

**2009 Customer Satisfaction Survey**

<b>Name:</b> Leif Morten By
<b>Company:</b> Fugro Norway Marine Services
<b>Title:</b> Navigation Manager

\* \* \*

If **DigiFIN** was no longer available, what would you replace it with?  
Comments Good question. **No real alterantives around at this time.**

PTX920 at FGRPROD73709,73713

RS-20

# Fugro Admits eBird Is Not An Acceptable Non-Infringing Alternative

Sims  
DEMO021



**Leif Morten By**  
Navigation  
Manager

**FUGRO**

Q. (BY MR. GILMAN) Has Fugro ever purchased eBird units?

A. **No, we haven't.**

Q. Has Fugro ever discussed the eBird?

A. **No, we haven't.**

Q. Are you aware if eBird is commercially available today?

A. **It is commercially available today, but there is -- there is an issue there with the connector to the streamer.**

Q. What do you mean there is an issue with the connector with eBird?

A. **It's not commercially available to fit the Sentinel streamer.**

7/12/2012 By Tr. at 176: 8-21

RS-21

# ION Says eBird Is Not An Acceptable Non-Infringing Alternative

Sims  
DEMO022

**From:** Mike Burnham <Mike.Burnham@iongeo.com>  
**Sent:** Friday, October 30, 2009 8:51 AM  
**To:** Dave Gentle <Dave.Gentle@iongeo.com>; Kevin Sweetman <Kevin.Sweetman@iongeo.com>; Dave Moffat <Dave.Moffat@iongeo.com>  
**Cc:** Jeff Cunkelman <Jeff.Cunkelman@iongeo.com>; John Thompson <John.Thompson@iongeo.com>; Clem Guillot <Clem.Guillot@iongeo.com>  
**Subject:** RE: Kongsberg Press release

I can tell you that there were not any good comments from any of Vidar's people involved in the initial tests here in the GOM. I have not gotten the details yet but the test period was shortened significantly and they destroyed the cable that was being used for testing.

Mike

PTX233 at ION673078 (October 30, 2009)

Kongsberg has been working on a combined depth and steerage device in conjunction with PGS over the last several years. This year at SEG they displayed their "Ebird". While developed with guidance from PGS, Kongsberg is the sole owner of the IP and intends to market this device as a solution for cables other than PGS. They have no high level control system and only offer "drivers" for contractors to develop their own control system. Their device is an inline device that is rigidly mounted to the streamers. Any twisting by the streamers will be imparted to the device and vice versa. The PGS operations group that has tested 12 of the devices had nothing good to say about them and did acknowledge that the device caused cable damage from the twisting. PGS is scheduled to test a vessels worth of the devices on the Atlantic at the same time as this update.

PTX250 at ION783248-49 (Nov. 18, 2009) RS-22

WESTERNGECO Exhibit 2123, pg. 22  
PGS v. WESTERNGECO  
IPR2014-01477

# ION Says eBird Was Not Commercially Available At End Of 2011

Sims  
DEMO023



**David Gentle**  
Director of Sales

**ion**

**A. Well, eBird is not a device that's commercially available at the moment. Well it's not -- it's not commercially proven yet.**

Q. What do you mean by not commercially available?

**A. It hasn't been sold to -- to anybody yet.**

Q. And what do you mean by not commercially proven?

**A. To my knowledge, it hasn't been employed on a commercial survey to date.**

Q. As far as you are aware, no eBird units have been sold?

**A. As far as I am aware that's correct, yes.**

10/27/2011 Gentle Tr. at 62:25-63:14

RS-23

# ION Says Nautilus Was Not Commercially Viable In Early 2010

Sims  
DEMO024



**David Gentle**  
Director of Sales

**ion**

- A. **My recollection is that the beginning of 2010, Nautilus still wasn't seen as commercially viable. And eBird to my knowledge still isn't commercially viable.**

10/27/2011 Gentle Tr. at 282:16-19

RS-24



# Fugro Admits Nautilus Is Not An Acceptable Non-Infringing Alternative

Sims  
DEMO025



Leif Morten By  
Navigation  
Manager

**FUGRO**

Q: (BY MR. GILMAN) The Nautilus device destroyed some of the streamers that you were testing on the device?

A: Yeah, that's what happened

Q: (BY MR. GILMAN) You went back to Sercel and demanded money to replace the streamers that Nautilus had destroyed?

A: I believe we did, yes.

7/12/2012 By Tr. at 158:1-3, 6-10

Q: Would you consider that evaluation of Nautilus a failure?

A: That was a complete failure.

7/12/2012 By Tr. at 59:9-11

Q: (BY MR. GILMAN) You're not purchasing any Nautilus units or eBird units in substitution for the DigiFIN units, are you?

A: We are not – not doing that, no.

7/12/2012 By Tr. at 158:16-21

RS-25

# Fugro Admits Nautilus Is Not An Acceptable Non-Infringing Alternative

Sims  
DEMO026

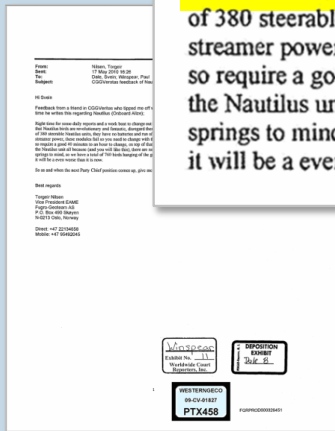
**From:** Nilsen, Torgeir  
**Sent:** 17 May 2010 16:26  
**To:** Dale, Svein; Winspear, Paul  
**Subject:** CGGVerotas feedback of Nautilus

Hi Svein

Feedback from a friend in CGGVeritas who tipped me off with a very good Coxswain CGG won't hire. At the same time he writes this regarding Nautilus (Onboard Alize);

Right time for some daily reports and a work boat to change out 8 of the failed Nautilus birds, if you hear rumors in the industry that Nautilus birds are revolutionary and fantastic, disregard them as the system is [REDACTED] we have 12 x 8km streamers with a total of 380 steerable Nautilus units, they have no batteries and run of streamer power, well actually they require a module to run of the streamer power, these modules fail so you need to change with the work boat, they are exactly the same as the telemetry modules so require a good 40 minutes to an hour to change, on top of that you have a Digicourse bird (with batteries of course) ahead of the Nautilus unit all because (and you will like this), there are no compasses on the Nautilus birds, the words "[REDACTED]" springs to mind, so we have a total of 760 birds hanging of the gear all waiting until we head into shallow waters and fishing gear, it will be a even worse than it is now.

PTX458 at FGRPROD326451



PTX458

RS-26

# Lost Profits Factors

Sims  
DEMO027

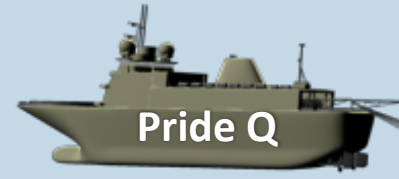
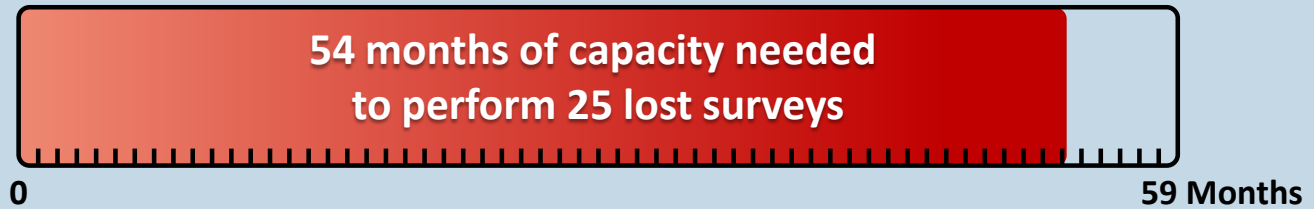
- ✓ **Demand for patented technology was strong**
- ✓ **There were no acceptable, non-infringing alternatives to the patented technology**

RS-27

# WesternGeco Had Access To More Than 59 Months Of Available Vessel Capacity

Sims  
DEMO028

## Extra Vessel Capacity



RS-28

# WesternGeco Had Access To More Than 59 Months Of Available Vessel Capacity

Sims  
DEMO029

**Cost of Extra Vessel Capacity= \$19.2M Amortized**



Boat	Cost To Add Capacity	Capacity Added
Cook	\$36M / \$19.2M amortized (add Q equip)	15 Months
Tasman	\$0 (already equipped)	13 Months
Pride	\$0 (do not convert to conventional)	20 Months
Searcher	\$0 (do not convert to conventional)	9 Months
Topaz	\$0 (do not convert to conventional)	2 Months
Various Boats	\$0 (accelerate conversion to Q)	As Needed
Charters	\$1.5M / month	As Needed

RS-29

# Lost Profits Factors

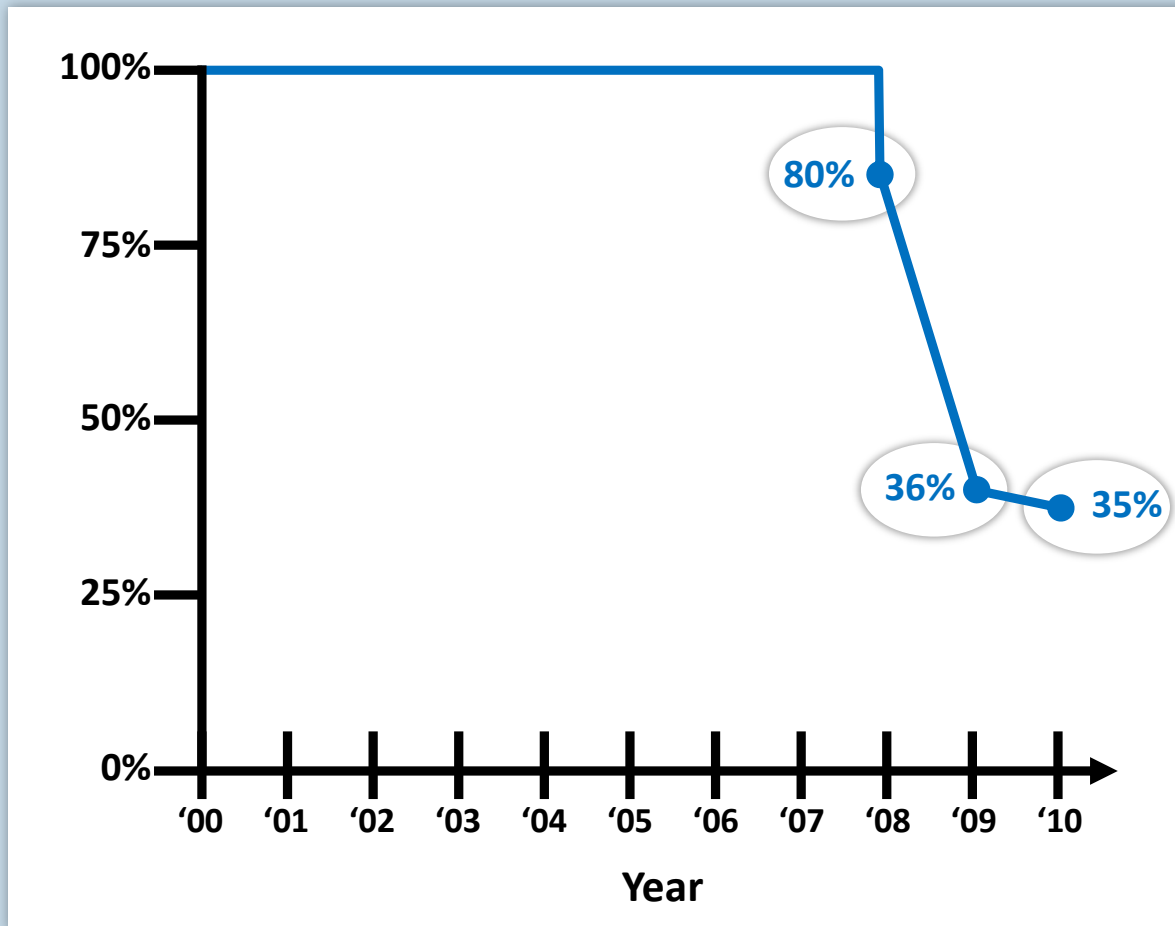
Sims  
DEMO030

- ✓ **Demand for patented technology was strong**
- ✓ **There were no acceptable, non-infringing alternatives to the patented technology**
- ✓ **WesternGeco had available capacity to conduct additional surveys**

RS-30

# WesternGeco Lateral Steering Survey Market Share

Sims  
DEMO031

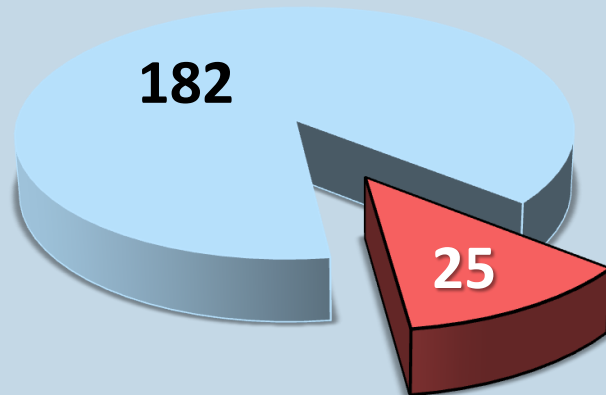


RS-31

# WesternGeco Lost Profits On 25 Surveys

Sims  
DEMO032

207 Total Surveys Using DigiFIN Systems: \$3.0 Billion Revenue



Surveys WesternGeco  
Would Have Won

Revenue on 25 Surveys:	\$319,334,996
WesternGeco Cost:	- \$160,261,436
<b>WesternGeco Lost Profits:</b>	<b>\$159,073,560</b>

RS-32



# Damages Summary

Sims  
DEMO001A

**Lost Profits: \$159.1 Million**

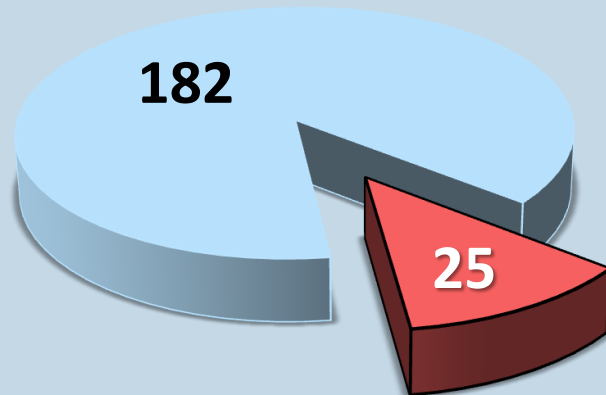
**Reasonable Royalties: \$101.1 Million**

RS-1

# WesternGeco Lost Profits On 25 Surveys

Sims  
DEMO032

207 Total Surveys Using DigiFIN Systems: \$3.0 Billion Revenue



Surveys WesternGeco  
Would Have Won

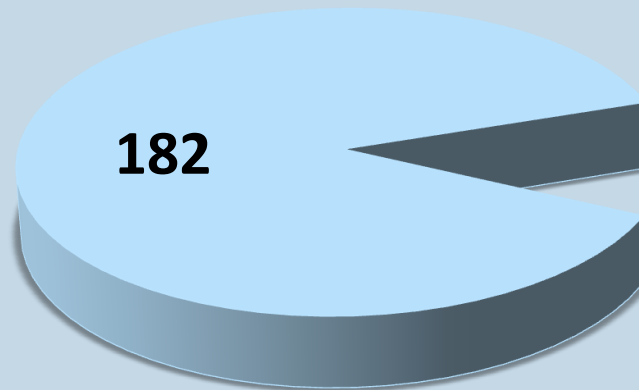
Revenue on 25 Surveys:	\$319,334,996
WesternGeco Cost:	- \$160,261,436
<b>WesternGeco Lost Profits:</b>	<b>\$159,073,560</b>

RS-32

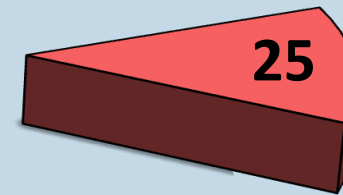
# WesternGeco Lost Surveys Due To ION's and Fugro's Infringement

Sims  
DEMO033

1. 4D Surveys for Statoil, Total, and BP (6)
2. All Apache Surveys done by Fugro (9)
3. Other Surveys that required Lateral Steering (10)



207 Total Surveys using  
DigiFIN Systems









Lost Surveys

RS-33

# 4D Surveys For Statoil, Total, And BP

Sims  
DEMO034

Survey	Winning Contractor	Revenue
Statoil Norway 4D 	Polarcus	\$6,100,000
Statoil Norway 4D 	PGS	\$11,800,000
Statoil Norway 4D 	PGS	\$13,000,000
Total Angola 4D 	PGS	\$15,808,540
Total Nigeria 4D 	Polarcus	\$7,249,300
BP Angola 4D 	PGS	\$18,000,000

RS-34

# Lateral Steering Is Vital For 4D

Sims  
DEMO035



PTX094

**Q-Marine streamer steering is vital in 4D projects**

PTX094 at WG38742  
(2003)

# Lateral Steering Is Vital For 4D

Sims  
DEMO036



**Paul Winspear**

Managing  
Director

**FUGRO**

- Q. Does this indicate another example, this one September of 2011, of a customer requiring lateral steering technology of the sort that's at issue in this case?
- A. **Hopefully, this reinforces my earlier testimony that it is typically 4D surveys where we see an absolute requirement specified in these terms. But, yes, I absolutely agree that for this 4D survey, it's clear that steerable bids are required.**

Winspear 30(b)(6) Tr. at 195:20-196:3



**Kevin Stiver**

U.S. Regional Mgr.  
Sales & Marketing

**FUGRO**

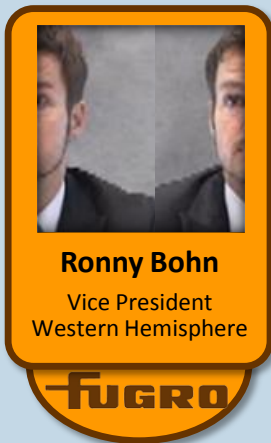
- Q. **Is the capability to steer streamers laterally a typical requirement for 4D surveys?**
- A. **Yes, it is.**

Stiver Tr. at 203:11-14

RS-36

# Lateral Steering Is Required For 4D By Statoil

Sims  
DEMO037



Q. It's your understanding that clients believe lateral steering is important for 4D surveys?

A. **Yes.**

\* \* \*

Q. If lateral steering -- so lateral steering was important for customers for 4D?

A. **It's important for Statoil for 4D.**

Bohn Tr. at 25: 18-20, 29: 5-7

RS-37

# Lateral Steering Is Required For 4D By Statoil

Sims  
DEMO038



**Ken Williamson**

Sr. Vice President  
Geo Ventures Group

**ion**

- Q. While you were at WesternGeco, Statoil was one of the oil companies that you were aware of that would always prefer a contractor that could provide lateral steering?
- A. For – for 4D surveys.

Williamson Tr. at 105:1-5

RS-38



# 4D Surveys For Statoil, Total, And BP

Sims  
DEMO039

Statoil Norway 4D

Statoil Norway 4D

Statoil Norway 4D

Total Angola 4D

Total Nigeria 4D

BP Angola 4D

## 3.17 Appendix 17 - Source and Streamer control

Company has good experience utilizing source and streamer steering systems in all seismic data acquisition, and Tenderer is therefore encouraged to offer lateral source and streamer control technology for all seismic work. However, for 4D work like the Statfjord Nord 4D survey Company requires steerable streamers

- a) Tenderer shall provide information on its respective system.
- b) The nominal along streamer distance between lateral control units shall be specified for steerable streamers.

PTX473 at FGRPROD59961



PTX473



RS-39

# 4D Surveys For Statoil, Total, And BP

Sims  
DEMO040

Statoil Norway 4D

Statoil Norway 4D

Statoil Norway 4D

**Total Angola 4D**

Total Nigeria 4D

BP Angola 4D

- Firm program **PAZFLOR**:
  - Firm single vessel program:
    - Conventional streamer 4D baseline acquisition over PAZFLOR development areas (Perpetua, Hortencia, Zinia, Acacia) for a total Full Fold surface of 730 km<sup>2</sup> approximately - Refer to FIGURE 2: PAZFLOR firm program of this Exhibit. This survey will be used as a baseline for the future 4D monitors that will be acquired over the PAZFLOR field. In order to minimize future repeatability noise, shot positions shall fit as much as possible to the pre-plotted theoretical positions. Streamer steering devices are compulsory in order to reduce as much as possible streamer feathering and optimize receiver repeatability. This program shall include acquisition of "dead head" lines acquired toward obstructions.

PTX680 at FGRPROD1125928

- Cable steering is compulsory in order to minimize feathering.

PTX680 at FGRPROD1125934

- (4) Refer to FIGURE 6: Fan mode geometry for "Fan mode acquisition mode". Steerable streamers are compulsory to operate that technique. That technique shall reduce infill rate.

PTX680 at FGRPROD1125939



PTX680



RS-40

# 4D Surveys For Statoil, Total, And BP

Sims  
DEMO041

- Statoil Norway 4D
- Statoil Norway 4D
- Statoil Norway 4D
- Total Angola 4D
- Total Nigeria 4D**
- BP Angola 4D

## 2.2 Acquisition spread

	Large configuration 8 to 12 x 5000m	Reduced configuration 4 x 2700m
	*	*
Steerable steamers	Highly preferred	Highly preferred

PTX655 at FGRPROD547926

The programme of SERVICES of the 4D Akpo Monitor 1 SURVEY consists of:

- **Single cable boat programme (8 to 12 x 5000m large configuration):** that is to repeat the 1998/99 3D OPL-246 single vessel baseline survey away from Akpo surface installations
- **Dual vessel programme (4 x 2700m reduced configuration):** that is to repeat the 2009 baseline Akpo survey in the vicinity of the surface installations.

PTX655 at FGRPROD547921



PTX655

### Near Trace (Streamer Positioning):

Average Crossline deviation from navigation plan	+/- 10m
Maximum Crossline deviation from navigation plan	+/- 15m
Average Inline deviation from navigation plan	+/- 2m
Maximum Inline deviation from navigation plan	+/- 3m

\* \* \*

-  $\Delta$ receiver (m): difference between receiver center positions of binned traces from the base & the monitor

PTX680 at FGRPROD000547923 **RS-41**

# 4D Surveys For Statoil, Total, And BP

Sims  
DEMO042

Statoil Norway 4D

Statoil Norway 4D

Statoil Norway 4D

Total Angola 4D

Total Nigeria 4D

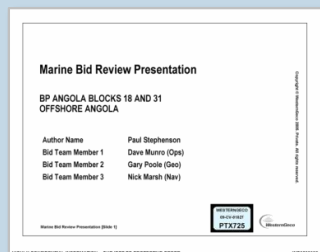
**BP Angola 4D**

**All of the BP Angola surveys are either 4D or considered baseline 4D surveys.  
BP is expressing a strong interest in acquiring a superior data set as below:**

PTX725 at WG508689

*"CONTRACTOR is requested to include in their tender provision for the highest precision of streamer positioning (along the entire streamer length) of which they are capable of and to describe how such precision will be attained and what precision can be expected."*

PTX725 at WG508689












PTX725



RS-42

# Apache Surveys

Sims  
DEMO043

Survey	Winning Contractor	Revenue
Apache Australia 	Fugro	\$25,606,935
Apache Australia 	Fugro	\$0
Apache Australia 	Fugro	\$5,524,622
Apache Australia 	Fugro	\$5,521,875
Apache Australia 	Fugro	\$2,757,978
Apache Australia 	Fugro	\$2,296,051
Apache Australia 	Fugro	\$2,282,745
Apache Australia 	Fugro	\$1,572,427
Apache Kenya 	Fugro	\$15,751,316

RS-43

# Apache Surveys

Sims  
DEMO044



PTX7 Intelligent Acquisition - Marine Streamer Steering Video



Dave Monk  
Director of Geophysics, Apache Corporation

RS-44

# Apache Surveys

Sims  
DEMO045



PTX380

I understand the Apache surveys will be full DigiFin as this is always their expectation.

PTX380 at FGRPROD128418  
(Nov. 2, 2010)

However it seems that hasn't had the desired effect yet - apache have stated steerable is mandatory for 3D and 4D, but I



PTX903

PTX903 at ION730352  
(Mar. 10, 2010)

**Proposals offering streamer lengths ( $\geq 6,500$  meters &  $\geq 5,000$  meters) and number of streamers (fully steerable) of 4 or more will be considered.**

PTX543 at WG92900



PTX543

1. A method for steering of the streamers will be considered as a prerequisite, bidders are asked to present a detailed description of how they would intend on accomplishing this. Bidders should also detail their ability to acquire data through the turns, acquisition specifications specific to this method will comprise part of the final contract if requested by Apache.











PTX543 at WG92908  
(February 3, 2010)



RS-45

# Other Surveys That Required Lateral Steering Systems

Sims  
DEMO046

Survey		Winning Contractor	Revenue
ConocoPhillips Australia		CGGV	\$24,500,000
Tullow French Guiana		Fugro	\$25,580,935
Tullow Ivory Coast		Fugro	\$7,634,967
Anadarko Ivory Coast		Fugro	\$6,188,252
ExxonMobil Angola		PGS	\$10,000,000
Petronas Malaysia		CGGV	\$13,000,000
Statoil Alaska		Fugro	\$21,206,982
BP Australia		PGS	\$45,000,000
Eni Togo		Fugro	\$15,475,820
TGS-NOPEC Australia		Fugro	\$17,476,250

RS-46



# Surveys That Required Lateral Steering Systems

Sims  
DEMO047

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

**Steerable Streamers**

Streamers must utilize lateral streamer control devices starting after the first depth bird and continuing to as close to the tail buoy as possible. Company must approve proposed streamer configuration.

PTX742 at WG694419



PTX742



10.2.7 BIRDS/DEPTH SENSORS		
Birds/Depth Sensors		
Specification	Tolerances/Spec	If Tolerance/Spec exceeded. Out-of-Spec Classification / Comments
47. Birds/Depth Sensors	Except for the first 500 m, nominal interval <math>\leq 400</math> meters. Spacing may be >400 but <math>\leq 800</math> meters for no more than 24 hrs during a period of time that conditions, weather and light, are acceptable for a safe in-water cable repair. Repair must be done at first possible time.	If >800m assign as Bad Shot, work is not to continue, correct problem
48. Depth Control / Steering Bird Distribution	Depth control and steering control birds will be distributed along the full length of the streamer. Depth birds will be located every 600 m. Steerable birds will be located in between each depth bird every 600 m. Depth and steerable bird interval will never exceed 400 m.	Work is not to continue or start.

PTX742 at WG694502

RS-47

# Surveys That Required Lateral Steering Systems

Sims  
DEMO048

ConocoPhillips Australia

**Tullow French Guiana**

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

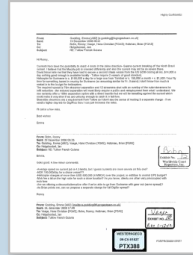
Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

PTX388



From: Godding, Emma [ABZ] [e.godding@fugrogeoteam.co.uk]  
Sent: 19 December 2008 09:41  
To: Bohn, Ronny; Vaage, Hans Christian [FGAS]; Hottman, Brian [FGAS]  
Cc: Helgebostad, Jan  
Subject: RE: **Tullow French Guiana**

\* \* \*

**The required spread is 75m streamer separation** and 12 streamers shot with an overlap of the outer streamers for infill reduction - the reduced separation will most likely require a pull in and redeployment from what I understand. We can certainly offer a 100m separation option with a direct transfer but we will be transiting against the current which could make it very slow if we are unlucky enough to catch it in full flow.

**Sleeable streamers are a requirement from Tullow** so I don't see the sense of making it a separate charge - if we need a higher dayrate for DigiFins then I can just increase the rates.

PTX388 at FGRPROD137977



Ronny Bohn

- Q. **Is it consistent with your recollection that for this job, Tullow required steerable streamers?**
- A. **Yes, from what I can see here and from what we looked at previously today, yes, they wanted steerable streamers.**

Bohn Tr. At 171:9-13



PTX682

Deployment of **lateral streamer control systems.**

PTX682 at FGRPROD1451809

RS-48

# Surveys That Required Lateral Steering Systems

Sims  
DEMO049

ConocoPhillips Australia

Tullow French Guiana

**Tullow Ivory Coast**

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

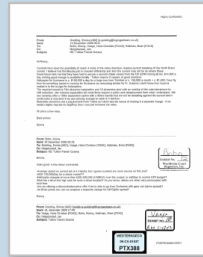
Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

PTX388



**From:** Godding, Emma [ABZ] [e.godding@fugrogeoteam.co.uk]  
**Sent:** 19 December 2008 09:41  
**To:** Bohn, Ronny; Vaage, Hans Christian [FGAS]; Hottman, Brian [FGAS]  
**Cc:** Helgebostad, Jan  
**Subject:** RE: Tullow French Guiana

\* \* \*

Steerable streamers are a requirement from Tullow

PTX388 at FGRPROD137977  
(Dec. 19, 2008 Tullow French Guiana)

## 6.4 Additional Requirements (as required by COMPANY)

COMPANY at its option may require one or more of the following additional technologies.

1. Lateral Streamer control systems
2. Steerable sources
3. Asynchronous recording and source cycle time or continuous recording acquisition system

### 6.4.1 Deployment of lateral streamer control systems

This may be either a partial (last two thirds of streamer length) or full spread deployment. This would be primarily to maintain streamer separation. COMPANY may also require the systems to be used to affect fan-mode shooting over the prospect. Other than this, it would not be expected to be used to steer against natural feather

PTX822 at WG710870



PTX822

RS-49

# Surveys That Required Lateral Steering Systems

Sims  
DEMO050

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

**Anadarko Ivory Coast**

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

CRM Id	Client	Country	Required	Won
1-PIE76E	Anadarko	COTE d'IVOIRE	Requested Steerable solid preferred	Fugro Carribean

PTX544



RS-50

# Surveys That Required Lateral Steering Systems

Sims  
DEMO051

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

**ExxonMobil Angola**

Petronas Malaysia

Statoil Alaska

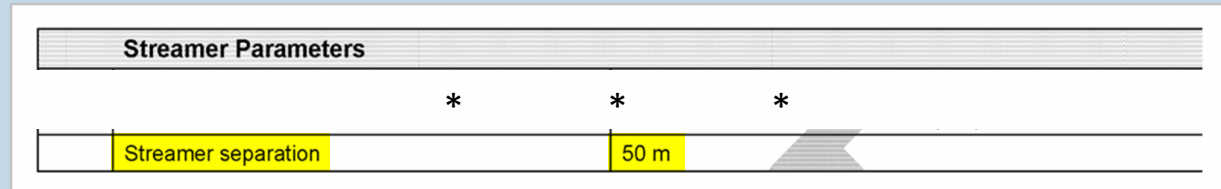
BP Australia

Eni Togo

TGS-NOPEC Australia

Base Programs	Area of Operations	Survey Type	Approximate Size (Full Fold)	Bin Size	Water Depth
Kizomba C - Base Program	AREA 1	4D - Monitor 1 10 to 12 streamers steered on 8	156 km <sup>2</sup>	6.25 m inline by 12.5 m cross-line	600 m to 800 m
Bavuca	AREA 2	High Effort 3D 10 to 12 streamers steered on 8	208 km <sup>2</sup>	6.25 m inline by 12.5 m cross-line	800 m to 1300 m

PTX834 at WG931735



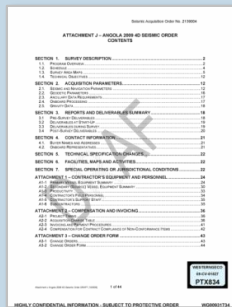
PTX834 at WG931747

## Steering Instructions

All 4D Surveys: Steering to include component of obtaining maximum repeatability of baseline source and receiver locations

Kizomba C 4D: Prime lines are TBD; oblique on straight line pre-plots

PTX834 at WG931748



PTX834

RS-51

# Surveys That Required Lateral Steering

Sims  
DEMO052

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

**Petronas Malaysia**

Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

### 3. Cost estimate for survey based on the following planned parameters (see Note):

- 3.1 **3D time lapse with undershoot (Dulang)**

Programme size	: Approximately 320 sq km FF
Streamer Type	: Non-fluid filled streamer & Steerable
Streamer length	: 6000 m
Streamer	: 8 (one streamer overlap on either side)
Streamer depth	: 5 meters
Streamer separation	: 75 m
Source	: ~2,000 cu in/ ~3000 cu in (please quo for both options of source array)
SP interval	: 18.75 m flip-flop
Group interval	: 12.5 m
Record length	: 7 or 8 sec
Bin Size	: 6.25 m x 18.75 m
Source	: 2 (each vessel)
Source depth	: 4 meters
No. of additional source vessel	: 1
Fold	: 80
Vessel requirement	: on or before 10 <sup>th</sup> June 2010



PTX650

PTX650 at FGRPROD000453802



RS-52

# Surveys That Required Lateral Steering Systems

Sims  
DEMO053

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

**Statoil Alaska**

BP Australia

Eni Togo

TGS-NOPEC Australia



**Kevin Stiver**  
U.S. Regional Mgr.

Q. Okay. You can confirm that for the Statoil project in the Chukchi Sea that GEO CELTIC with DigiFIN did perform fan mode during that survey?

A. **Yes.**

Q. Is it your understanding that fan mode can only be achieved using DigiFIN or lateral steering devices?

A. **That's my understanding, yes.**

Stiver Tr. At 167:19-168:-2

## Fan Mode

- Now possible due to the incorporation of DigiFIN units.
- The goal is to obtain desired linear increased separations from the front to the tail of streamers.
- The increased separations will improve coverage optimization, hence reduce infill.
- Enables enhanced streamer control during recovery, deployment and streamer work by workboat.
- Beneficial in conjunction with Fresnel Zone Binning (FZB).

PTX359 at FGRPROD at 115102



RS-53

# Surveys That Required Lateral Steering Systems

Sims  
DEMO054

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

**BP Australia**

Eni Togo

TGS-NOPEC Australia

- (c) The tender specifies steerable cables. The intention is to acquire using a controlled fan-shaped spread in order to reduce infill programme costs. Solid cables are highly desirable.

PTX485 at FGRPROD1122516

Steerable streamers

In order to 'fan' the spread and control feather, reducing infill

PTX485 at FGRPROD1122528

## 4.2.4 Active Streamer Steering

Each streamer shall be equipped with an active steering system capable of changing streamer feather by 3 degrees while increasing noise levels on adjacent receiver groups by less than 5 microbars (through normal production filters). The active streamer steering system shall be fully interfaced with the Integrated Navigation System (INS) and as a minimum be capable of operating in the following modes:

- matching the feather of all streamers to a single reference streamer
- fanning out far offset separations relative to near offsets
- steering all streamers towards a target feather (zero, constant feather or varying feather along a line)

PTX485 at FGRPROD1122545



PTX485



RS-54



# Surveys That Required Lateral Steering

Sims  
DEMO055

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

300m along each cable. In case of only compasses are used, one (or two, depending on the cable length) acoustic mid network(s) will check the cross distances between cables in the middle of the spread.

In case of steerable streamers are available, this system will be preferred and streamers positioning will be performed by only acoustic system. Adequate apparatus will be located along each cable equally spaced at about 400m in order to try steering streamers as close as possible to the pre-plot position.

\* \* \*

The acquisition rates shall include the steerable streamer systems when is an available provision.

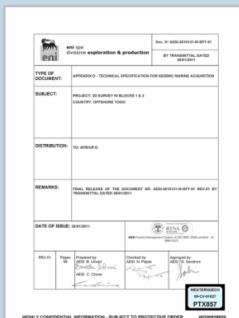
PTX857 at WG939683

## 4. MINIMUM TECHNICAL REQUIREMENT

The following will be grounds for exclusion from the tender process, any Tenders not complying with the following Minimum Technical Requirements shall be rejected before a full evaluation:

- 8 Cables minimum (10 preferred) Solid streamers - 8000m length - 100m streamers separation;
- Steering remote control for minimum last  $\frac{3}{4}$  cable length (e.g.: from 2000m to 8000m);
- Contractor shall provide seismic technologies/equipments not older than 5 years.

PTX857 at WG939612



PTX857



PTX852



RS-55

# Surveys That Required Lateral Steering

Sims  
DEMO056

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

BP Australia

Eni Togo

**TGS-NOPEC Australia**

CRM Id	Client	Country	Required	Won	Steering Method
1-VAND7H	TGS Mary Rose Extension, NWS	Australia	Steerable streamers required		Fan mode shooting

PTX544



The Vessel shall utilize steerable streamer technology in conducting the survey(s), including the use of fan mode if requested by the COMPANY.

PTX945 at WG00930568

RS-56

# Surveys That Required Lateral Steering

Sims  
DEMO057

ConocoPhillips Australia

Tullow French Guiana

Tullow Ivory Coast

Anadarko Ivory Coast

ExxonMobil Angola

Petronas Malaysia

Statoil Alaska

BP Australia

Eni Togo

TGS-NOPEC Australia

- Q. What's your understanding of what fan mode acquisition is?
- A. **It's that you are – that you are increasing your streamer separation in the last part of the streamer.**
- Q. Okay. And does – is steerable – is the ability to steer streamers required to perform fan mode acquisition?
- A. **Yes** \* \* \*
- Q. Without any kind of laterally steerable bird, you would not be able to perform fan mode acquisition?
- A. **To my knowledge that is correct**

Vaage Tr. At 51:6-13, 52:1-3



Hans Christian Vaage  
President  
Fugro Geoteam, Inc.

FUGRO

## Fan Mode

- Now possible due to the incorporation of DigiFIN units.
- The goal is to obtain desired linear increased separations from the front to the tail of streamers.
- The increased separations will improve coverage optimization, hence reduce infill.
- Enables enhanced streamer control during recovery, deployment and streamer work by workboat.
- Beneficial in conjunction with Fresnel Zone Binning (FZB).

Highly Confidential



PTX359 at FGRPROD115102

RS-57

# Lost Profits

Sims  
DEMO058

**Lost Sales Revenue**

**-**

**Cost Of Making  
Lost Sales**

**=**

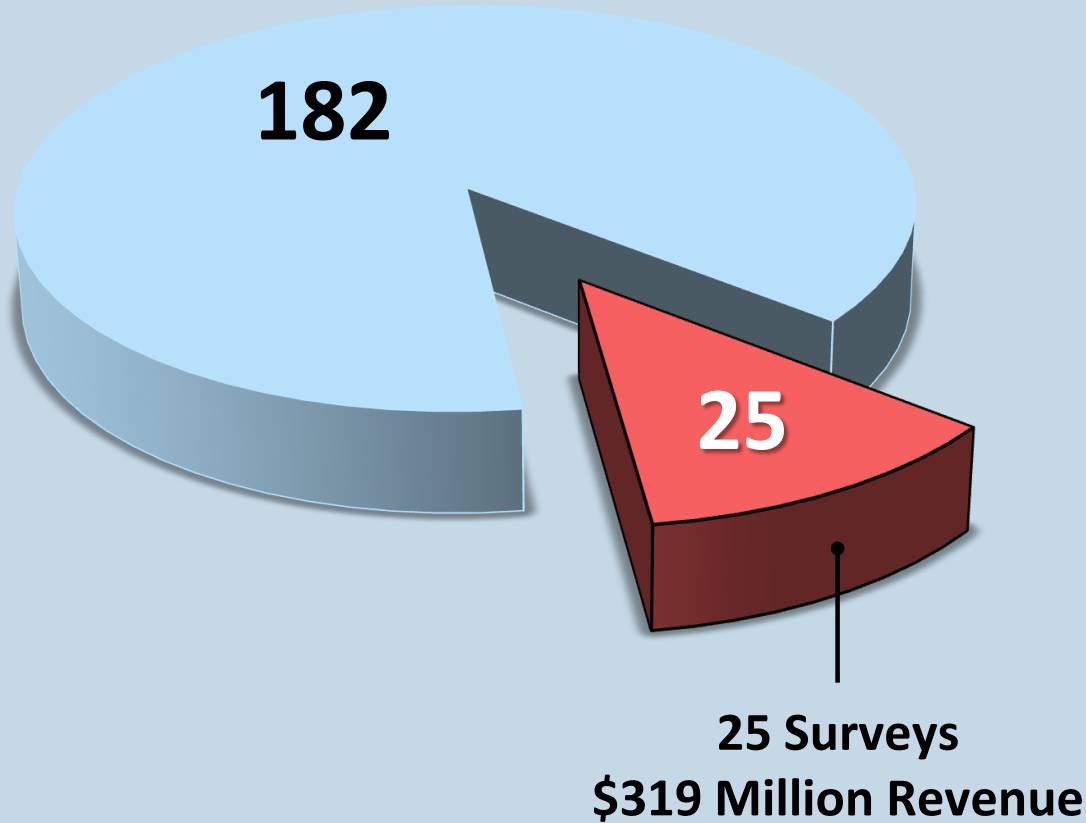
**Lost Profits**

RS-58

# Lost Sales Revenue

Sims  
DEMO059

207 Surveys Using DigiFIN



RS-59

# Lost Profits

Sims  
DEMO060

**\$319 Million**

**—**

**Cost Of Making  
Lost Sales**

**=**

**Lost Profits**

RS-60

# Cost Of Making Lost Sales

Sims  
DEMO061

- **Cost of performing 25 more surveys from 2009-2012**
  - Costs that vary directly with number of surveys
  - \$141.0 Million
- **Incremental cost of adding/accelerating capacity**
  - Cost of depreciation of new equipment
  - \$19.2 Million
- **Total cost: \$160.2 Million**

RS-61

# Lost Profits

Sims  
DEMO062

**\$319.3 Million**

—

**\$160.2 Million**

=

**\$159.1 Million**

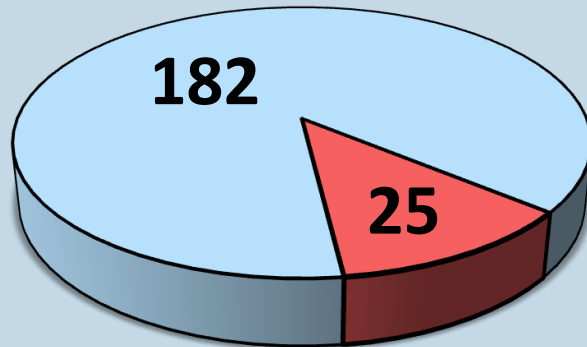
RS-62



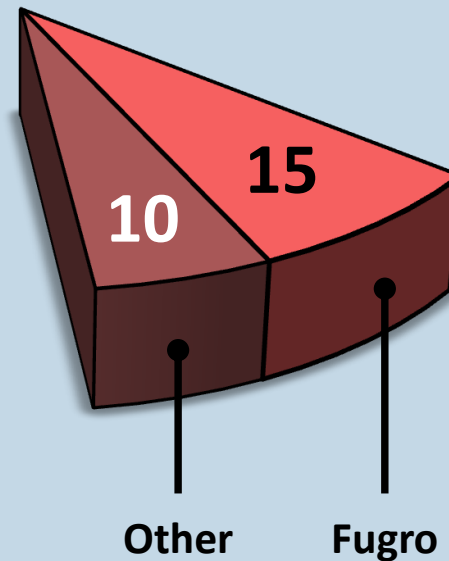
# Lost Profits Summary

Sims  
DEMO063

## 207 Total Surveys Using DigiFIN Systems



## 25 Lost Profits Surveys

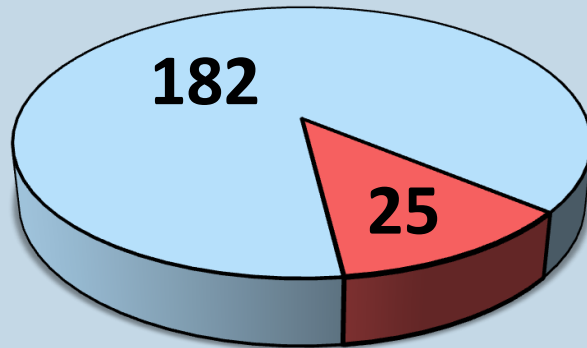


RS-63

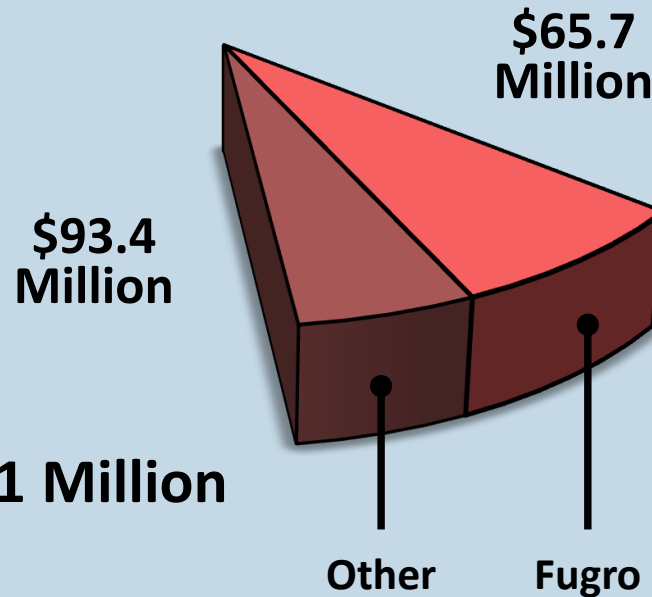
# Lost Profits Summary

Sims  
DEMO064

207 Total Surveys Using  
DigiFIN Systems



25 Lost Profits Surveys



Total Lost Profits = \$159.1 Million

RS-64

# Reasonable Royalty

RS-65

# Reasonable Royalties

Sims  
DEMO066



**\$14.9 Million**



**\$87 Million**

**Total**

**\$ 101.9 Million**

RS-66

# What Is a Reasonable Royalty?

Sims

DEMO067

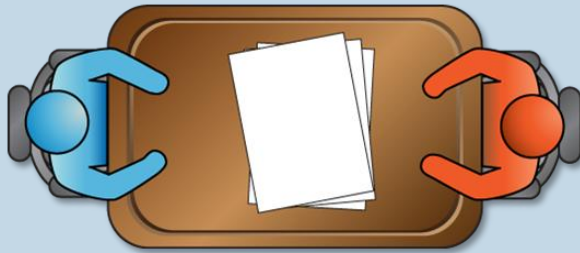
**A reasonable royalty is the amount of money that the owner of the patents (WesternGeco) and the infringer (ION/Fugro) would have agreed to had they negotiated a license agreement before infringement**

RS-67

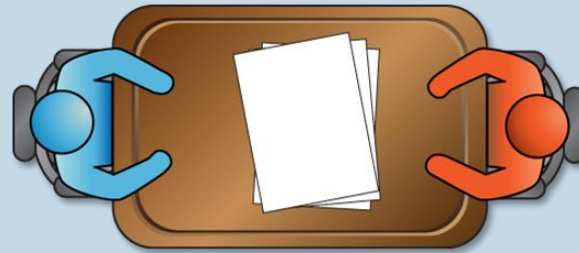
# Hypothetical Negotiation

Sims  
DEMO068

WesternGeco And ION



WesternGeco And Fugro



RS-68

# Hypothetical Negotiation

Sims  
DEMO069



- Parties would know patent is valid and infringed
- Full and complete information, present and future
- Must reach an agreement

RS-69

## Objective:

1. Determine the profit premium or value contributed by the patented technology to the licensees (ION/Fugro)
2. Determine how that value should be shared between WesternGeco and the infringers



# Calculating The Value Of The Patented Technology

Sims  
DEMO071

- **Identify the benefits of the patented technology**
- **Quantify the value of the benefits of the patented technology**

RS-71

# Benefits Of Using The Patented Technology

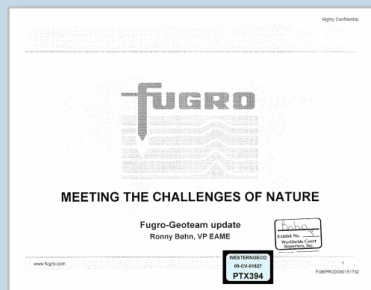
Sims  
DEMO072



## Lateral Streamer Steering Benefits

- Feather matching
- Feather reduction
- Infill reduction
- Line change efficiency
- Elimination of “trouser” effect
- Faster and safer deployment/recovery
- Safer workboat operations
- Uniform cross-line spacing
- Enables reduced cross-line spacing
- Mitigates risk in obstructed areas
- Mitigates risk of cable entanglement
- Denser streamer depth sampling

PTX394 at FGRPROD151743

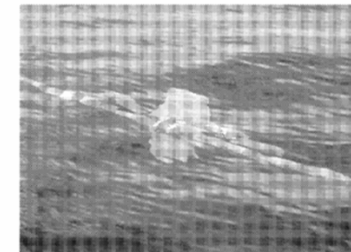


PTX394



## Intelligent Acquisition Technologies Steerable Streamers

- Steerable streamer technology
  - Enable 2-5 degrees feather correction
  - Provided as part of WesternGeco Q
  - Now also field proven ION developed DigiFIN – available to all Contractors
- Provide significant benefits
  - Reduce 3D / 4D infill - huge savings
  - Provide stable streamer separations
  - Improve 4D repeatability
  - Reduce risk of tangle
  - Safer obstruction close passes
  - Better turns
  - Faster deployment



DigiFIN Lateral Streamer Control

PTX902 at ION707589

RS-72

# Benefits Of Using The Patented Technology

Sims  
DEMO073

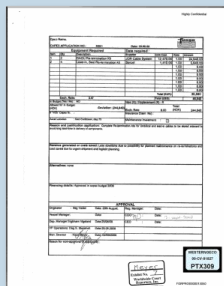
## Reason and justification application:

The digifins have proved to give significant added value to the client due to reduced infill, and shorter line turns. For 4D applications it will improve repeatability. For FGAS it will in addition to making us more competitive by having a technology edge, we will reduce the risk of tangling. Each tangle has normally a cost of USD 5-15 mill incl. lost production.

## Revenue generated or costs saved:

Yes, on turnkey projects we will reduce infill with 10% based on experience, this will increase revenue per day on these projects with 8-10%. On dynamic rate models, the average dayrate will typically increase with 8-10% for a full spread.

PTX309 at FGRPROD13056



PTX309

RS-73

# Quantifiable Benefits Of Using The Patented Technology

Sims  
DEMO074

- Feather matching
- Feather reduction
- **Infill reduction**
- **Line change efficiency**
- Elimination of “trouser” effect
- **Faster and safer deployment/recovery**
- Safer workboat operation
- Uniform cross-line spacing
- Enable reduced cross-line spacing
- Mitigates risk in obstructed areas
- Mitigates risk of cable entanglement
- Denser streamer depth sampling

RS-74

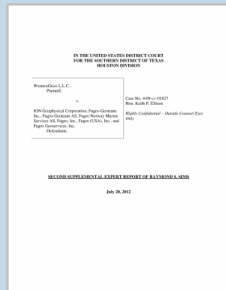
# Quantifiable Benefits Of Using The Patented Technology

Sims  
DEMO075

Value = 19.9%-21.8% of Total Survey Revenue

	<u>Mean</u>	<u>Median</u>
Value as a Percentage of Total Survey Revenue of:		
Time Saved on Streamer Deployment	[A] 0.3%	0.3%
Infill Reduction	[B] 8.3%	8.7%
Faster Line Changes	[C] 13.1%	10.8%
Value of Quantifiable Benefits as a Percentage of Total Survey Revenue	[D] <b>21.8%</b>	<b>19.9%</b>

Sims Second Supplemental Report at Ex 7.1S



Sims 2<sup>nd</sup>  
Supplemental Report

RS-75

# Expected Infill

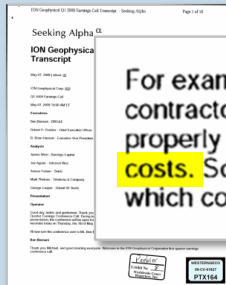
Sims  
DEMO076



PTX375

Most conventional marine 3D seismic surveys are acquired with infill to ensure adequate subsurface seismic reflection coverage in areas where seismic surveys may have been affected by adverse currents, sub-optimal streamer feather angle matching or source/streamer separations. For a typical 3D seismic survey, infill shooting may be as much as 25% or more of the total cost of prime seismic acquisition. By combining the use of an alternative method for assessing subsurface coverage with the use of the latest lateral control steerable streamer systems, infill can be significantly reduced to at least single digit figures.

PTX375 at FGRPROD000126967



PTX164

For example, our Intelligent Acquisition technologies are able to significantly reduce infill or the re-shootings that most contractors must do when the streamer cable separates behind the vessel and have insufficient cross line spacing to properly sample the subsurface. In many marine surveys, the cost of infill can account for 30% of the total acquisition costs. So far, we are seeing reductions of 20% to 50% in infill on vessels using our Intelligent Acquisition technologies, which could save the oil and gas companies 5% to 15% on their acquisition bill.

PTX164 at 3

RS-76

# Infill Reduction

Sims  
DEMO077



**Jeff Cunkleman**  
Vice President of  
Product Marketing

**ion**

- Q. With regard to the oil companies, which are the most important benefits?
- A. **Their most important is reduced in-fill, and that's a direct impact of their cost reduction.**

Cunkleman Tr. at 111:18-21

- Q. In any ION Marketing material or promotional material, have you put forward quantitative analyses of the savings or benefits of reduced in-fill?
- A. **Yes, we have.**
- Q. **And what quantitative values have you associated with reduced in-fill?**
- A. **Well, we've talked about, you know, reducing in-fill 20 to 30 percent. And then if you look at a typical survey and the cost of the survey, you can calculate a -- a dollar, a Euro amount.**

Cunkleman Tr. at 118:5-14

RS-77

# Infill Reduction

Sims  
DEMO078

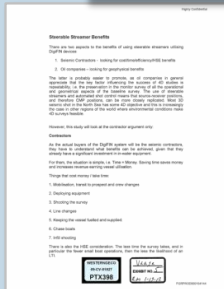
## Estimating Steerable Streamer Effects

How could DigiFin steerable streamers have affected the performance of this survey?

\* \* \*

The combination of these two effects **reduces the infill percentage from 15% to 8%**. Noting that the percentage time spent acquiring the infill in this case is  $\sim 1.5 \times$  the infill percentage, this implies that the infill time percentage drops from 22% to  $\sim 12\%$ . For this case **this represents a saving of 4.8 days due to reduced infill.**

PTX398 at FGRPROD000154147



PTX398

RS-78



# Infill Reduction

Sims  
DEMO079

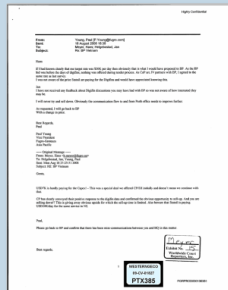
----- Original Message -----

From: Helgebostad, Jan <[j.helgebostad@fugro.no](mailto:j.helgebostad@fugro.no)>  
To: Flentri, Jaap  
Cc: Young, Paul  
Sent: Mon Aug 18 20:42:04 2008  
Subject: RE: BP Vietnam

Jaap

Are you the PM for the BP survey in Vietnam, I understand that BP have ordered full spread of Digifins, please be aware that we need to charge an extra USD 20.000 per day for this. Total survey costs will still be reduced due to lower infill (StatoilHydro experienced 50% reduction) and shorter line turns, 15 -20 min per turn reduction experienced. StatoilHydro compares the benefit of solid streamers with Digifins to the benefit of Q-technology so we should not give it away for free.

PTX385 at FGRPROD136383



PTX385

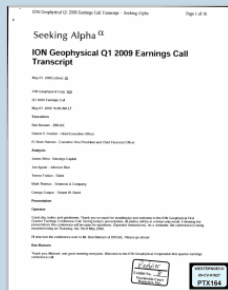
RS-79

# Infill Reduction

Sims  
DEMO080

For example, our Intelligent Acquisition technologies are able to significantly reduce infill or the re-shootings that most contractors must do when the streamer cable separates behind the vessel and have insufficient cross line spacing to properly sample the subsurface. In many marine surveys, the cost of infill can account for 30% of the total acquisition costs. So far, we are seeing reductions of 20% to 50% in infill on vessels using our Intelligent Acquisition technologies, which could save the oil and gas companies 5% to 15% on their acquisition bill.

PTX164 at 3

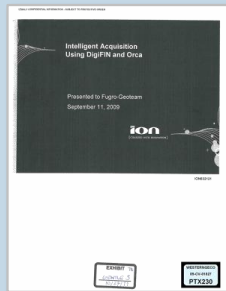


PTX164

RS-80

# Infill Reduction

Sims  
DEMO081



PTX230

- Goal: Reduce 12-15% expected infill due to difficult to predict currents
- Solution: Automated vessel steering to perfectly align near offsets and streamer steering to feather match far offsets
- Result: Outstanding coverage without unnecessary overlap or elective infill
  - Acquired almost 4X less infill than expected (4% vs 15%)
  - Potential cost savings: > \$1M

PTX230 at ION632146



PTX386

As discussed, we have used these units with great success on several major projects to date, both with 4 units per streamer and with fully populated streamers. From our trials of fully populated spreads, you maybe interested to know that we have improved turn times by approximately 15-20 mins per turn, and we see between 30% to 50% less infill than compared to a standard spread with no steerable units.

PTX386 at FGRPROD136876

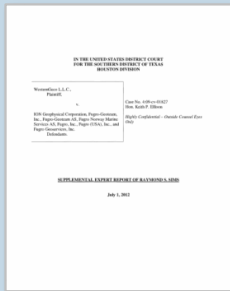
RS-81

# Value Of Infill Reduction As A Percentage Of Total Survey Revenue

Sims  
DEMO082

	Mean	Median
Infill Reduction	[A] 41.7%	43.7%
Cost of Infill as a Percentage of Total Survey Revenue	[B] 20.0%	20.0%
<b>Value of Infill Reduction as a Percentage of Total Survey Revenue</b>	[C] <b>8.3%</b>	<b>8.7%</b>

Sims Supplemental Report at Ex. 7.35



Sims Supplemental  
Report

RS-82

# Line Change Efficiency (Faster Turns)

Sims  
DEMO083



**Kevin Sweetman**

Sales Manager and  
Director of I/O  
Marine Systems  
Limited

**ion**

Q. So you're familiar with a client that used ORCA and positioning systems together and there was a quantifiable benefit that they perceived?

A. **We believe there was a quantifiable benefit, yes.**

Q. And how do you know there was a benefit?

A. **The turn appeared to be faster.**

\*

\*

\*

Q. Do you recall **how many minutes were saved per turn?**

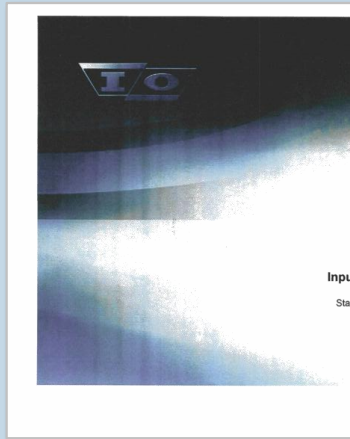
A. **I believe it was in the area of ten minutes.**

Sweetman Tr. at 70:14-20, 70:25-71:2

RS-83

# Line Change Efficiency (Faster Turns)

Sims  
DEMO084



PTX214

**Towed Streamer 4D  
Streamer Steering : DigiFIN – Operational Benefits**


Reduced line change time  
through active streamer  
“straightening”

**Savings : 10 minutes per line change**

**\$6.4M per year in added value\***

\* Based on  
5 sq.km. per hour  
\$3k per sq.km.  
8 line changes per day

CONFIDENTIAL INFORMATION SUBJECT TO PROTECTIVE ORDER



PTX214 at ION15213

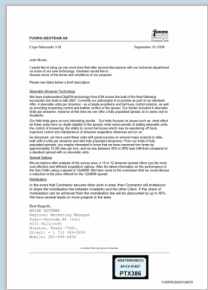
RS-84

# Line Change Efficiency (Faster Turns)

Sims  
DEMO085

As discussed, we have used these units with great success on several major projects to date, both with 4 units per streamer and with fully populated streamers. From our trials of fully populated spreads, you may be interested to know that we have improved turn times by approximately 15-20 mins per turn, and we see between 30% to 50% less infill than compared to a standard spread with no steerable units.

PTX386 at FGRPROD136876



PTX386

RS-85

# Line Change Efficiency (Faster Turns)

Sims  
DEMO086

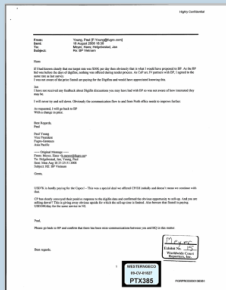
----- Original Message -----

From: Helgebostad, Jan <[j.helgebostad@fugro.no](mailto:j.helgebostad@fugro.no)>  
To: Flentri, Jaap  
Cc: Young, Paul  
Sent: Mon Aug 18 20:42:04 2008  
Subject: RE: BP Vietnam

Jaap

Are you the PM for the BP survey in Vietnam, I understand that BP have ordered full spread of Digifins, please be aware that we need to charge an extra USD 20.000 per day for this. Total survey costs will still be reduced due to lower infill (StatoilHydro experienced 50% reduction) and shorter line turns, 15 -20 min per turn reduction experienced. StatoilHydro compares the benefit of solid streamers with Digifins to the benefit of Q-technology so we should not give it away for free.

PTX385 at FGRPROD136383



PTX385

RS-86



# Value Of Line Change Efficiency (Faster Turns) As A Percentage Of Total Survey Revenue

Sims  
DEMO087

**WesternGeco, L.L.C. v. ION Geophysical Corporation, et al.**  
**Second Supplemental Exhibit 7.4S**  
**Value of Faster Line Changes as a Percentage of Total Survey Revenue**

	Mean	Median
Time Saved Per Line Change By Using DigiFIN (Minutes)	[A] 12.1	10.0
Line Changes per Day	[B] 8.0	8.0
Time Saved on Line Changes per Day By Using DigiFIN (Hours)	[C] 1.6	1.3
Average Square Kilometers Surveyed Per Hour	[D] 5.0	5.0
Survey Area (Sq. Km.) Decreased per Day by Using DigiFIN	[E] 8.1	6.7
Cost per Square Kilometer	[F] \$3,000	\$3,000
Average Savings per Day By Using DigiFIN	[G] \$24,167	\$20,000
Average Survey Revenue per Day	[H] 184,527	184,527
<b>Value of Faster Line Changes as a Percentage of Total Survey Revenue</b>	[I] <b>13.1%</b>	<b>10.8%</b>

Sims 2nd Supplemental Report at 7.4S



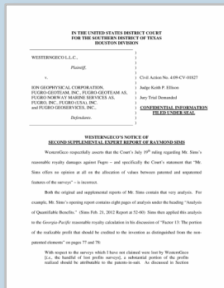


# Value Of Time Saved On Streamer Deployment As A Percentage Of Total Survey Revenue

Sims  
DEMO089

Time Saved on Streamer Deployment per Survey (Days)	[A]	1
Cost of Crew per Day	[B]	\$50,000
Cost Saved on Streamer Deployment per Survey	[C]	\$50,000
Average Revenue per Survey	[D]	\$15,262,388
<b>Value of Time Saved on Streamer Deployment as a Percentage of Total Survey Revenue</b>	[E]	<b>0.3%</b>

Sims 2nd Supplemental Report at Ex 7.2S



Sims 2<sup>nd</sup>  
Supplemental Report

RS-89

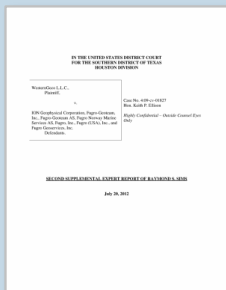
# Value Of Quantifiable Benefits Of Lateral Steering Systems

Sims  
DEMO090

Value = 19.9%-21.8% of Total Survey Revenue

	<u>Mean</u>	<u>Median</u>
Value as a Percentage of Total Survey Revenue of:		
Time Saved on Streamer Deployment	[A] 0.3%	0.3%
Infill Reduction	[B] 8.3%	8.7%
Faster Line Changes	[C] 13.1%	10.8%
Value of Quantifiable Benefits as a Percentage of Total Survey Revenue	[D] <b>21.8%</b>	<b>19.9%</b>

Sims Second Supplemental Report at Ex 7.1S



Sims 2<sup>nd</sup>  
Supplemental Report

RS-90

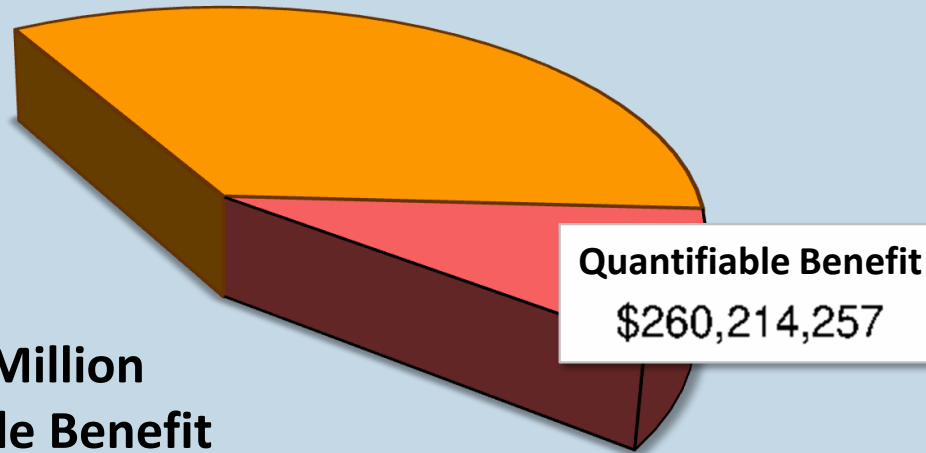
# Quantifiable Benefit - Fugro

Sims  
DEMO091

20.8% Of Quantifiable Benefits

91 Fugro Reasonable Royalty Surveys

\$1.25 Billion Revenue



\$260.2 Million  
Quantifiable Benefit

Beginning of Damages Period: Date of First Infringement <sup>(1)</sup>

	2006	2007	2008	2009	2010	2011	2012	Total
Revenue From All Accused Fugro Surveys	[A] \$0	\$0	\$138,344,525	\$280,419,576	\$404,859,799	\$440,059,878	\$142,223,457	\$1,405,907,236
Lost Revenue From Fugro Surveys Claimed as Lost Sales	[B] 0	0	0	25,606,935	60,611,136	35,431,519	33,227,566	154,877,156
Revenue From Accused Fugro Surveys Not Claimed as Lost Sales	[C] \$0	\$0	\$138,344,525	\$254,812,641	\$344,248,663	\$404,628,360	\$108,995,891	\$1,251,030,080
Value of Quantifiable Benefits Apportioned to Total Survey Revenue	[D] 20.8%	20.8%	20.8%	20.8%	20.8%	20.8%	20.8%	N/A
Value of Quantifiable Benefits of DigiFIN to Fugro	[E] \$0	\$0	\$28,775,661	\$53,001,029	\$71,603,722	\$84,162,699	\$22,671,145	\$260,214,257

Sims 2nd Supplemental Report at Ex 17.0

RS-91

# Value Of Quantifiable Benefits - Fugro

Sims  
DEMO092

**Total Quantifiable Benefits  
from Fugro's use of Infringing  
DigiFIN Systems** **\$260.2 Million**

**Cost of Infringing DigiFIN Systems** **\$27.9 Million**

---

**Net Contribution  
of DigiFIN Systems** **\$232.3 Million**

RS-92

# Value Of Quantifiable Benefits - Fugro

Sims  
DEMO093

**Net Contribution  
of DigiFIN Systems** **\$232.3 Million**

**Fugro's Expected Normal Profit  
on \$260.2 Million (23.4%)** **\$60.9 Million**

---

**Difference between Net  
Contribution of DigiFIN Systems  
and Expected Normal Profit** **\$171.4 Million**

**Premium as a % of  
Total Quantifiable Benefits** **65.9%**

RS-93

# Value Of Patented Invention To ION

Sims  
DEMO094

**Profit Margin on  
DigiFIN Systems** **54.0%**

**Profit Margin on rest  
of ION's MISD Business** **27.4%**

---

**Premium Profit  
on DigiFIN Systems Alone** **26.6%**

RS-94



# Premium Profit On DigiFIN Systems Alone

Sims  
DEMO095

## DigiFIN System Sales (Non-Fugro)

- DigiFIN Birds **\$40.3 Million**
- Lateral Controller **\$2.0 Million**

---

**Total** **\$42.3 Million**

**Premium Profit Margin** **26.6%**

---

**Premium Profit** **\$11.3 Million**

RS-95



# Profit Premium From Selling Infringing DigiFIN Systems

Sims  
DEMO097

**Premium Profit from selling Infringing DigiFIN Systems** **\$29.9 Million**

**Sales Revenue from Infringing DigiFIN Systems** **÷ \$42.3 Million**

---

**Premium Profit Contribution as % of DigiFIN System Revenue** **70.6%**

RS-97

# Profit Premium Of Patented Inventions

Sims  
DEMO098

**Profit Premium  
Contribution to Fugro**

**65.9% of  
Quantifiable Benefits**

**Profit Premium  
Contribution to ION**

**70.6% of DigiFIN  
System Revenue**

RS-98

# How Should The Parties Share The Profit Premiums?

RS-99

# Georgia-Pacific Analysis

Sims  
DEMO100

Factor	Impact
GP#1: Established royalty rate for patent	
GP#2: ION/Fugro licenses for comparable patents	
GP#3: Type of license	
GP#4: Willingness to license	
GP#5: Competitive relationship	
GP#6: Convoyed sales	
GP#7: Term of the license	
GP#8: Commercial success	
GP#9: Advantages over old methods	
GP#10: Benefits of using the patent	
GP#11: Extent of the use of the patent	
GP#12: Customary industry rates	
GP#13: Profit credited to the patent	

RS-100

# Georgia-Pacific Analysis

Sims  
DEMO101

Factor	Impact
GP#1: Established royalty rate for patent	↔
GP#2: ION/Fugro licenses for comparable patents	↔
GP#3: Type of license	
GP#4: Willingness to license	
GP#5: Competitive relationship	
GP#6: Convoyed sales	
GP#7: Term of the license	
GP#8: Commercial success	
GP#9: Advantages over old methods	
GP#10: Benefits of using the patent	
GP#11: Extent of the use of the patent	
GP#12: Customary industry rates	↔
GP#13: Profit credited to the patent	

## Actual or Customary Rates

- No established royalty rate
- No industry standard rate
- Fugro contemplated a royalty rate based on sharing benefits

RS-101

# Georgia-Pacific Analysis

Sims  
DEMO102

Factor	Impact
GP#1: Established royalty rate for patent	↔
GP#2: ION/Fugro licenses for comparable patents	↔
GP#3: Type of license	↘
GP#4: Willingness to license	↗
GP#5: Competitive relationship	↑
GP#6: Convoyed sales	
GP#7: Term of the license	↔
GP#8: Commercial success	
GP#9: Advantages over old methods	
GP#10: Benefits of using the patent	
GP#11: Extent of the use of the patent	
GP#12: Customary industry rates	↔
GP#13: Profit credited to the patent	

## Terms & Conditions

- Non-exclusive license
- WesternGeco doesn't license its patented technology
- DigiFIN would be used to compete directly with WesternGeco

RS-102



# Georgia-Pacific Analysis

Sims  
DEMO103

Factor	Impact
GP#1: Established royalty rate for patent	↔
GP#2: ION/Fugro licenses for comparable patents	↔
GP#3: Type of license	↘
GP#4: Willingness to license	↗
GP#5: Competitive relationship	↑
GP#6: Convoyed sales	↔
GP#7: Term of the license	↔
GP#8: Commercial success	↑
GP#9: Advantages over old methods	↑
GP#10: Benefits of using the patent	↑
GP#11: Extent of the use of the patent	↑
GP#12: Customary industry rates	↔
GP#13: Profit credited to the patent	↔

## Value / Benefits of Patents

- **DigiFIN systems drive sales of other products**
- **DigiFIN systems are very successful**  
- \$63 million sales 54% profit margin
- **DigiFIN systems used in 207 surveys – \$3 billion revenue**
- **Patents provide many benefits when conducting surveys**  
- Valued at 19.9-21.8% of survey revenue
- **WesternGeco Lateral Steering Systems very successful –**  
- \$2.7 billion revenue

RS-103

# Georgia-Pacific Analysis - Summary

Sims  
DEMO104

Factor	Impact
GP#1: Established royalty rate for patent	↔
GP#2: ION/Fugro licenses for comparable patents	↔
GP#3: Type of license	↘
GP#4: Willingness to license	↗
GP#5: Competitive relationship	↑
GP#6: Convoyed sales	↔
GP#7: Term of the license	↔
GP#8: Commercial success	↑
GP#9: Advantages over old methods	↑
GP#10: Benefits of using the patent	↑
GP#11: Extent of the use of the patent	↑
GP#12: Customary industry rates	↔
GP#13: Profit credited to the patent	↔

**On balance, these factors favor the licensor (WesternGeco) and would have an upward influence on the royalty rate**

RS-104

# Royalty Conclusion - Fugro

Sims  
DEMO105

**Profit Premium  
Contributed By Patents**

**65.9% of Quantifiable Benefits  
from Fugro's use of Infringing  
DigiFIN Systems**

**Benefit Sharing**

**50%**

---

**Royalty for Fugro's  
Use Of The Patents**

**33.0% of Quantifiable Benefits  
from Fugro's use of Infringing  
DigiFIN Systems**

RS-105

# Royalty Conclusion - ION

Sims  
DEMO106

**Premium Profit from selling  
Infringing DigiFIN Systems**

**70.6% of DigiFIN  
System Revenue**

**Benefit Sharing**

**x 50%**

---

**Reasonable Royalty for  
ION's Use Of The Patents**

**35.3% of DigiFIN  
System Revenues**

RS-106