WWW.GLOBALDYNAMICS.CA	TOWING CONFIGURATION REPORT	
	VESSEL:	SEISMIC EXPLORER
	SERIAL #:	Sample
	DATE:	*May 14, 2012*

SEISMIC EXPLORER: 4 x 125 x 6000 for Shallow Water Operations

Revision 0.0 - Sample Report

SUMMARY:

This sample report presents a representative 4 cable array (4 x 125 x 6000), with standard dual sources. The lead-in cables have been rigged with 1 support float each, such that they can be towed into water depths as shallow as 10 to 15 metres. The umbilicals have not yet been rigged for water depths of less than 25 to 30 metres, and would need either secondary support floats deployed as well, or a much shorter layback for the sources in order to operate in water depths of only 10 to 15 metres.

Representative inputs have been used for all gear used in the attached models, as itemized in the list provided in the upper left hand corner of the attached worksheet. Depending upon prospect requirements, additional models are often provided in reports such as this in order to help evaluate different rigging options or gear selections that may be better suited to achieving project objectives.

As can be seen in the attached worksheet, charts are provided in plan and elevation views for a speed through the water of 4.5 knots, and various summary tables are also included to present cable tensions, payouts and catenary sags, as well as layback, offsets and other parameters of interest. A table is also presented at the bottom of the worksheet that provides a breakdown of how much drag each array component contributes to the overall towing burden placed upon the seismic vessel. This sample report contains only a single output set at 4.5 knots, but typically, additional output sets ranging from 3 to 5 knots are included to illustrate how the configuration is impacted by changes in tow speed, especially when towing in shallow water.

The cost for towing configuration reports will vary according to how complex the array is (number of cables for example and whether or not shallow water rigging is required), and whether only a single model is required, or if multiple options or configurations are requested in order to optimize performance or evaluate gear and/or rigging scenarios. Usually the cost for a very first model is somewhat higher in order to cover the effort required to gather all pertinent inputs for the vessel and all of its gear, and to establish a first ground-truth or baseline model for the vessel that can serve as a benchmark moving forward. The best means of establishing accuracy and reliability of the models is ongoing communication and feedback with the crew of the vessel to establish an initial ground-truth deployment, and monitor performance over time.

Prices quoted for individual models generally include;

a) an allowance for responding to questions and comments from the client, including any minor revisions to the model.
b) an allowance for direct support to the vessel, if required, to address any problems or concerns that arise during the actual deployment or early stages of entering production.

The models presented in this sample report are all based on the assumption of flat calm seas, zero sea currents, and a straight vessel heading at a constant speed through the water. If conditions dictate, dynamic models can also readily be provided to include any of the aforementioned variables. For example, it can be quite instructive to run dynamic models to monitor cable sags during line changes in the presence of sea currents when the vessel is expected to be turning in shallow water. Other dynamic models that have been run in the past include;

a) line change optimizations,
b) coordination of line changes when two or more vessels are working together (Wide Azimuth for example),
c) monitoring cable tensions during tight turns,
d) analyzing line changes when operating near obstructions in the presence of sea currents,
e) investigating the impact of layered sea currents, which can be important if cable sags are deep enough to penetrate multiple current layers.

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TOWING CONFIGURATION RESULTS FOR THE

SEISMIC EXPLORER

FOR DISCUSSION PURPOSES ONLY

DATE:	May 14, 2012
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AUTHOR:	Dan Martin

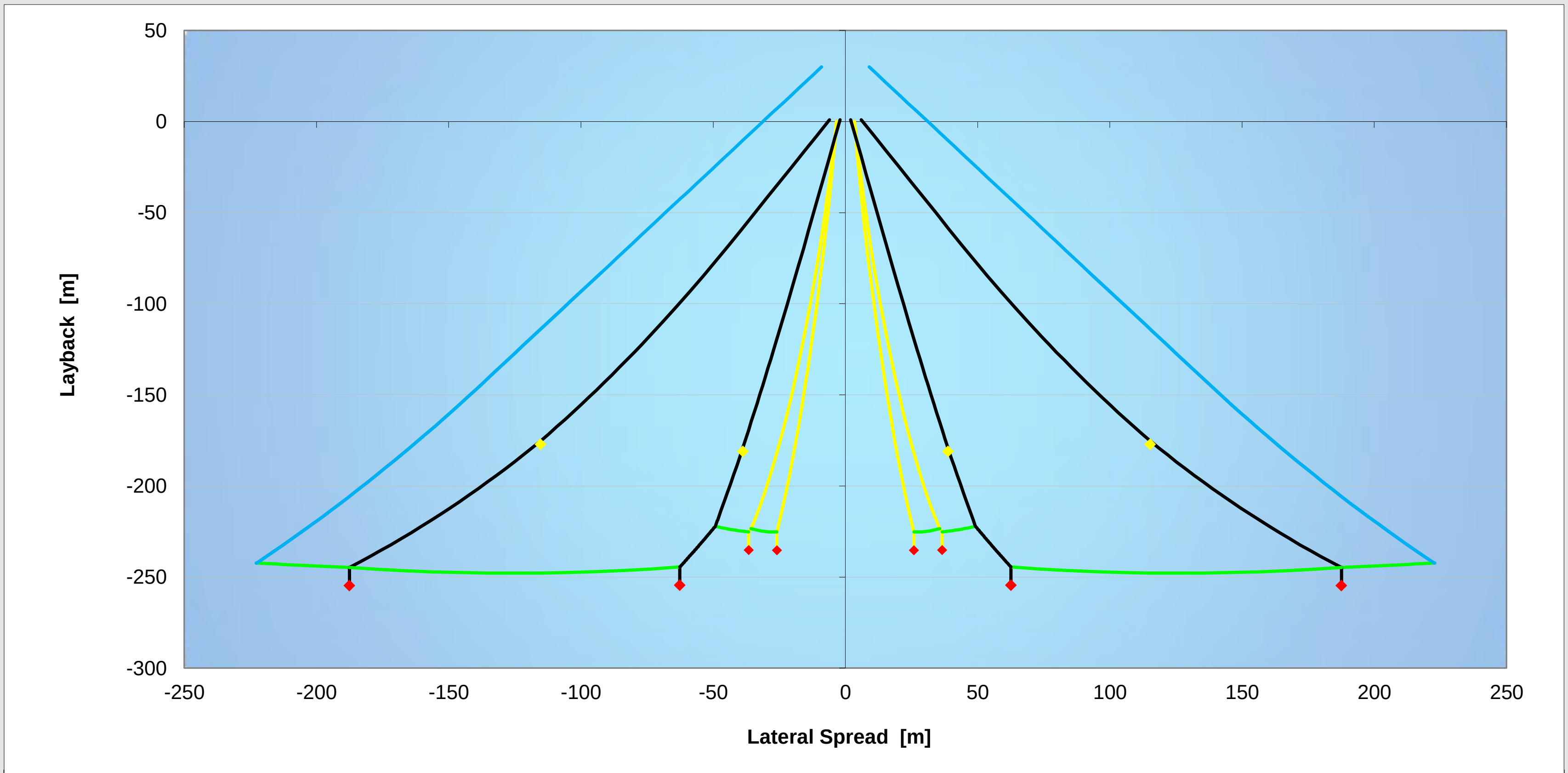
Description of Gear:

- 4 cable deployment with generic vanes and nominal bridles.
- 28mm tow ropes with hairy faired overbraiding.
- Low drag fairings on all separation ropes and spur lines.
- 28mm diameter, hairy faired lead-ins.
- Standard dual sources of 2 subarrays each, deployed from lead-ins 2 & 3 via sliders.
- Lead-ins rigged for shallow water operations using one secondary support float per lead-in.
- 6m deep streamers and 5m deep guns with 10m subarray separations.

Summary of Results:

Array Size:	4 x 125 x 6000	
Tow Speed:	4.5	[knots]
Layback:	245	[metres]
Towing Burden:	20.8	[tonnes]
Total Spread:	375	[metres]
NRP/COS Offset:	284	[metres]
NRP/CNG Offset:	345	[metres]
CNG/COS Offset:	60	[metres]

PLAN VIEW



MAIN TOW ROPE (BARE)

TOW ROPE (BRAIDED / HAIRY FAIRED)

LEAD-IN CABLES (HAIRY FAIRED)

LEAD-IN CABLES (WITH SOLID FAIRING)

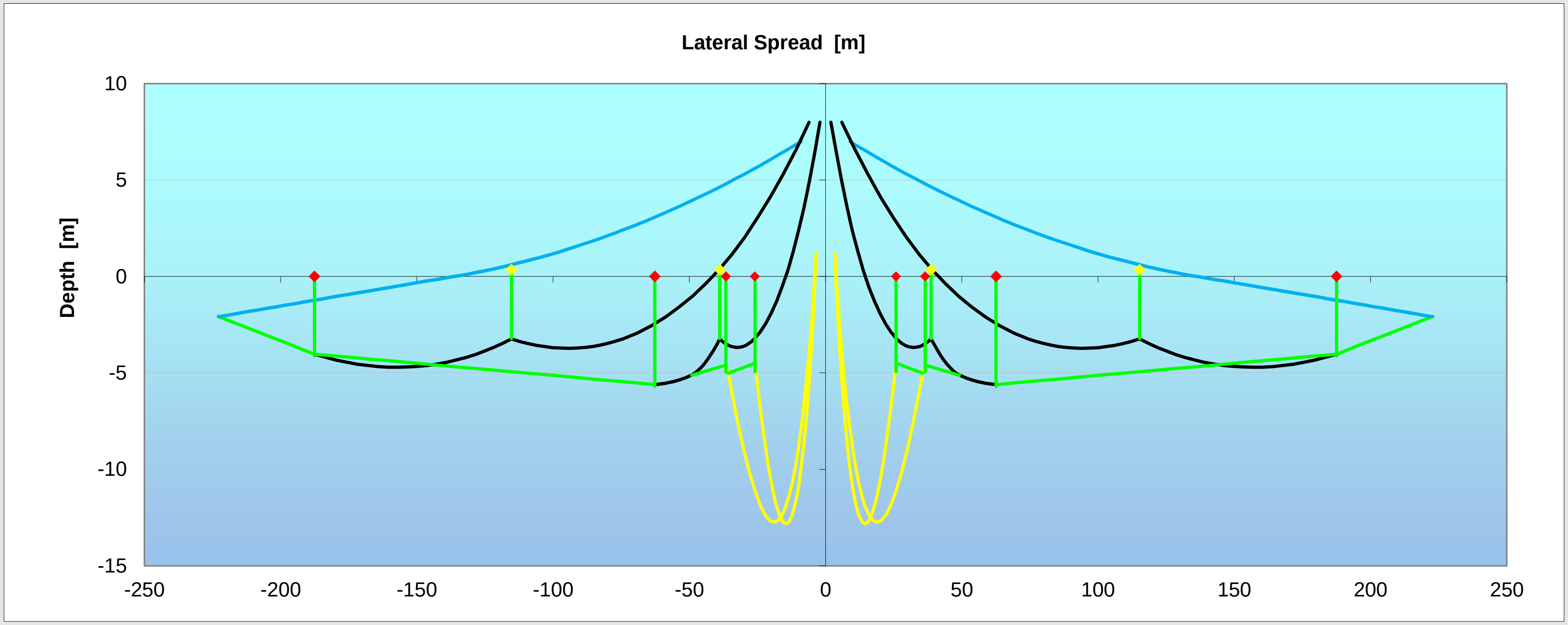
UMBILICALS

SEP ROPES & TAGLINES

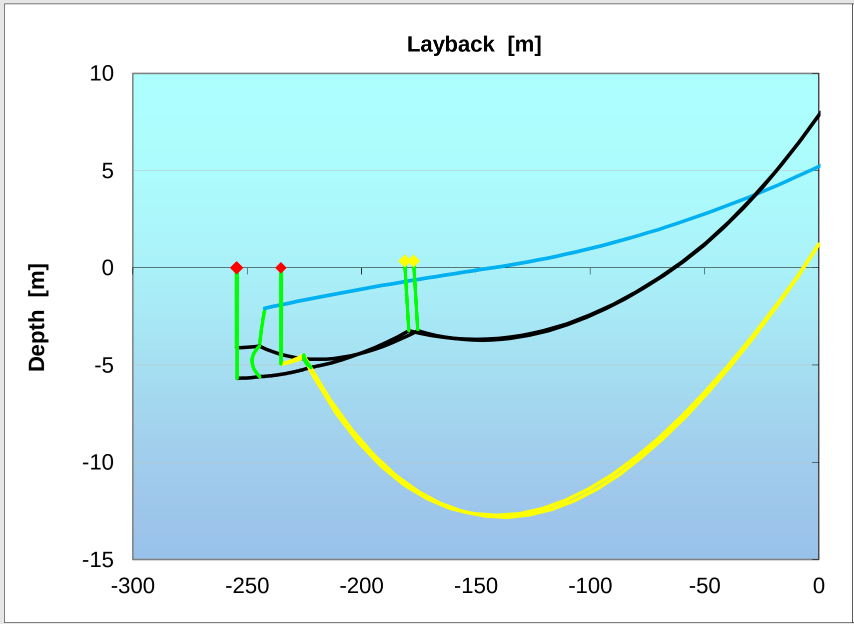
PRIMARY FLOATS

SECONDARY FLOATS

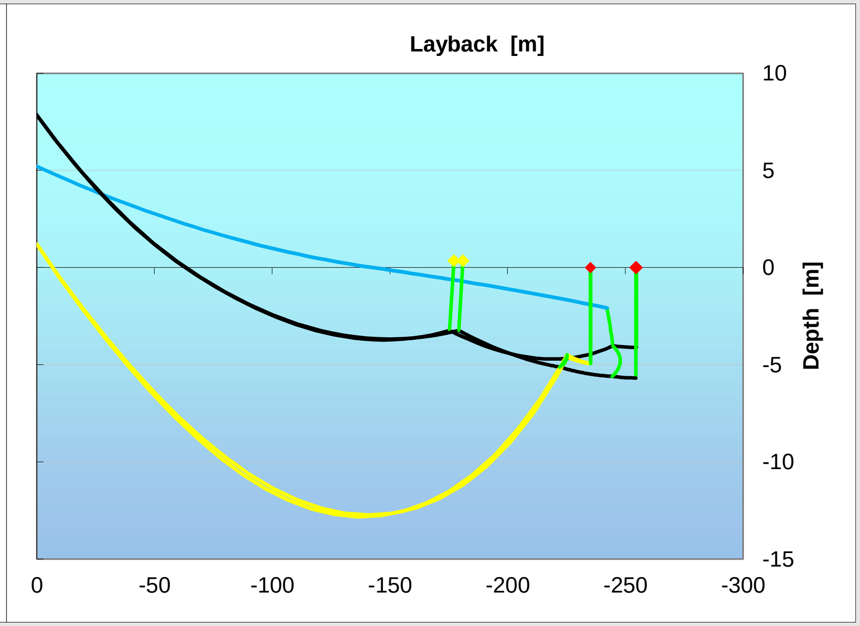
ELEVATION VIEW - FROM TAIL BUOYS, LOOKING FORWARD TO STERN OF VESSEL



ELEVATION VIEW - PORT SIDE



ELEVATION VIEW - STARBOARD SIDE



WWW.GLOBALDYNAMICS.CA	TOWING CONFIGURATION RESULTS FOR THE **SEISMIC EXPLORER** FOR DISCUSSION PURPOSES ONLY	DATE:	May 14, 2012
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		AUTHOR:	Dan Martin

STREAMER DEPTH:	6	[metres]	NRP-to-STERN:	40	[metres]	NRP-to-COS:	284	[metres]
SOURCE DEPTH:	5	[metres]	STERN-to-B/R's:	245	[metres]	NRP-to-CNG:	345	[metres]
SUBARRAY SEPARATIONS:	10	[metres]	B/R's-to-CNG:	60	[metres]	COS-to-CNG:	60	[metres]

	Tension @ Stern [kNewtons] (see Note 1)	Payout [metres] (See Note 2)	Worst Case Sag [metres] (See Note 3)	Weight Burden on Primary Head Float [kgs]
Port Tow Rope:	45.2	344	2.1	78
Lead-In #1:	24.9	318	4.7	64
Lead-In #2:	20.6	264	5.6	116
Umbilical #1:	12.5	239	12.7	-
Umbilical #2:	12.2	238	12.8	-

	Tension @ Stern [kNewtons] (see Note 1)	Payout [metres] (See Note 2)	Worst Case Sag [metres] (See Note 3)	Weight Burden on Primary Head Float [kgs]
Starboard Tow Rope:	45.2	344	2.1	78
Lead-In #4:	24.9	318	4.7	64
Lead-In #3:	20.6	264	5.6	116
Umbilical #4:	12.5	239	12.7	-
Umbilical #3:	12.2	238	12.8	-

NOTES:

1) All tensions are referenced to the stern tow points, for a speed through the water of 4.5 [knots].
2) All lead-in payouts are referenced from stern fairleader to OTL termination. Tow rope payouts are from overboarding sheave to vane crucifix (including the lever arm). Umbilical payouts are from stern to Bell housings.
3) All worst case sags refer to the deepest part of the cable's catenary, for a speed through the water of 4.5 [knots].

	Tension [kNewtons]	Length [metres]
Port Vane Tether:	28.0	35
Separation Rope [1-2]:	9.8	125
Main Port Gun Tagline:	5.1	13
Subarray Tagline [1-2]:	1.9	10

	Tension [kNewtons]	Length [metres]
Starboard Vane Tether:	28.0	35
Separation Rope [3-4]:	9.8	125
Main Starboard Gun Tagline:	5.1	13
Subarray Tagline [3-4]:	1.9	10

DRAG CONTRIBUTION BY

	[kNewtons]	[%]
Paravanes:	56.9	28%
Streamers:	45.4	22%
Lead-Ins:	25.1	12%
Sources:	51.6	25%
Tow Ropes:	11.0	5%
Separation Ropes:	4.1	2%
Floats:	8.1	4%
Vane Tethers:	1.7	1%
TOTAL:	203.9	100%