<table>
<thead>
<tr>
<th>Company</th>
<th>LDEO</th>
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<tbody>
<tr>
<td>Vessel</td>
<td>Marcus G. Langseth</td>
</tr>
<tr>
<td>Client</td>
<td>NSF</td>
</tr>
<tr>
<td>Project</td>
<td>MGL1305</td>
</tr>
<tr>
<td>Area</td>
<td>Mid - Atlantic Ridge</td>
</tr>
<tr>
<td>Start Date</td>
<td>09 April 2013</td>
</tr>
</tbody>
</table>
R/V Marcus G. Langseth - Towing Offsets

NRP - Nav Reference Point
COS - Centre of Source
CNG - Centre of Near Group (Trace # 636)
CMP - Common Mid-Point
MSL - Mean Sea Level

<table>
<thead>
<tr>
<th>Distance</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>NRP-Stern</td>
<td>29.5m</td>
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<tr>
<td>NRP-COS</td>
<td>215m</td>
</tr>
<tr>
<td>NRP-CNG</td>
<td>423m</td>
</tr>
<tr>
<td>COS-CNG</td>
<td>208m</td>
</tr>
<tr>
<td>NRP-CMP</td>
<td>319m</td>
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</tbody>
</table>

All measurements in meters
R/V Marcus G. Langseth "tow" configuration

R/V Marcus Langseth
1 x 8100
4 Gunstrings

NOT to Scale
Sonardyne HGPS Transceiver 7887
Pressure Sensor
Depth Sensor

12 m

Guns1-2
Gun3
40 cu in.
Guns4-5
Gun6
90 cu in.
Gun7
120 cu in.
Gun8
60 cu in.
Gun9-10
220 cu in. each

360 cu in. each

Array total volume (without spares) is 6600 cubic inches.
Total volume per string (without spare) 1650 cubic inches.
Gun clusters have 0.75m between guns and hang 0.95m from center of hanger
Single guns hang from hanger 1.15m

All gun volumes, numbering, locations, and offsets were inspected and verified by Chief Source Mechanic.
Note: All Echosounders are used in Spectra with 6.6m ship’s draft correction applied.

<table>
<thead>
<tr>
<th></th>
<th>STBD PORT (X)</th>
<th>FORE/AFT (Y)</th>
<th>UP/DOWN (Z)</th>
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<tbody>
<tr>
<td>NRP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>V1G1</td>
<td>0.00</td>
<td>0.00</td>
<td>-16.90</td>
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<tr>
<td>V1G2</td>
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<td>V1G3</td>
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<td>-16.90</td>
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<tr>
<td>V1R1</td>
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<td>0.00</td>
<td>-16.90</td>
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<td>EM122</td>
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<td>MRU</td>
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<td>-14.16</td>
<td>-4.30</td>
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<tr>
<td>BGM</td>
<td>4.40</td>
<td>-13.10</td>
<td>-3.49</td>
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</tbody>
</table>
R/V Marcus G. Langseth - Acoustic Offsets
Digicourse Digirange Acoustics

All measurements in meters
DT = Depth Transducer
A = Acoustic
P = Pressure Sensor - located in front of gun's 1 & 2

Center of Source 1 & 2

Spare Gun

Cluster Guns are mounted 1m apart. Ring 1 cluster 9 & 10 mounted horizontally. Rings 2, 3, & 4 all clusters mounted vertically.

All measurements in meters
Lead-in:
Outer = 505m
Inner = 465m

R/V Marcus G. Langseth - Streamer Front End

Radial Head Stretch RVIM
STU
Active Cable Section # 10

30 m
0.4 m
37.5 m
75 m
37.5 m

CNG is
75m from head of section
Spectra timing for r/v Marcus G. Langseth