

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley Lopez	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315001MCN1
SEQUENCE	1
DIRECTION	180.6

	SP#	FFID	Raw SegD
SOL	1027	1	NA
EOL	3130	2073	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	114.7			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 ci
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	21.5s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	1027	3130
Date MM/DD/YY	11/05/23	11/05/2023
Time UTC	05:10	20:04
Volume	40 in3	6000 in3
Wind	NE 11 kts	E 10 kts
Sea State	1.5 m	1 m
Water Depth	5090 m	8080 m

	Degraded/dead Channels
Dead	24,37,59,61,85,97,121,189,261,289,357,429,465,729,745,777,964,968,1069,1083
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone

General / Line Comments
When Orca started sending triggers, the gunlink controller could not fire and ramp-up was restarted.
First Orca SP: 1006. No shot fired or SEG D file created until SP 1027
Line started with ramp-up with only 3 arrays active (1,2,4) while finishing to deploy array3
Because of ramp-up configuration error, volume at end of ramp-up was only 1580in3. Last guns enabled manually
Because of Seal configuration error, the first 167 segd files did not include navigation headers. Shot point numbers were added to segd later.
Early end of line because of telemetry failures. Last FFID/SP 2073/3130 - Last Orca SP 3132

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

Time UTC	FILE	SP	Description
05:10	1	1027	SOL MGL2315001MCN1 - 1 gun 40 in3 - start of ramp-up
05:12		1031	Missed shot while manually changing line name in Seal acquisition
05:31	37	1064	End of timed ramp-up - 14 guns 1580 in3
05:41	55	1082	End of manual ramp-up - 25 guns 4410 in3 - Array3, S1G4 and S2G2 disabled
06:44		1195-1197	Shots missed while reconfiguring navigation input
06:45	168	1198	Fist shot with full navigation header
07:29	249	1279	Array 3 enabled - enabling first gun - 26 guns - 4530 in3
07:33	256	1286	Array 3 at full volume - 33 guns 6000 in3 - S1G4,S2G2,S3G7 disabled
13:47	1205	2235	Array 3 disabled to replace broken tow rope - 25 guns, 4410 in3
14:10	1264	2294	Array 3 back in position and enabled - 33 guns, 6000 in3
16:11	1579	2609	Telemetry failure - incomplete and missing traces. Seal acquisition stopped to troubleshoot
	1580-1584	2610-2614	~half traces missing
	1585-1590	2615-2620	empty files
16:16	1591	2621	Recording resumed
16:41	1641	2671	Stopped Acquisition for more troubleshooting
		2672-2680	Missed shot points
16:46	1642	2681	FGSP following streamer power cycle and recording gap
17:34	1753	2792	Telemetry break and Acquisition Gap
	1753-1760	2792-2799	Incomplete files - traces missing after trace 800
17:37	1761	2800	Invalid data
		2801-2818	Missed shots
17:45	1762	2819	FGSP following telemetry issue
18:54	1896	2953	Telemetry break and Acquisition Gap
	1896-1904	2953-2961	Incomplete files - traces missing after trace 800
	1905-1910	2962-2967	Invalid data or empty files
18:57	1911	2968	FGSP following break
19:47	2027	3084	Telemetry break and Acquisition Gap
	2027-2029	3084-3086	Incomplete files - traces missing after trace 850
	2030-2034	3087-3091	Empty files
19:50	2035	3092	FGSP following telemetry issue
19:52	2041	3098	Telemetry break - missing traces after trace 850
	2042-2050	3099-3107	Invalid data or empty files
19:56	2051	3108	FGSP following break
20:04	2073	3130	EOL MGL2315001MCN1 - 33 guns - 6000 in3
			Line aborted because of telemetry failures

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Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315002MCN2
SEQUENCE	2
DIRECTION	180.6

	SP#	FFID	Raw SegD
SOL	2302	2074	NA
EOL	5880	5651	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	114.7			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 ci
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	21.5s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	2302	5880
Date MM/DD/YY	11/06/23	11/07/23
Time UTC	16:37	16:19
Volume (cu in.)	6180 in3	5960 in3
Wind (kts)	E10 kts	E 5.4 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	5680 m	1856 m

	Degraded/dead Channels
Dead	13,24,37,59,61,85,97,121,189,261,289,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Continuation and partial reshoot of Sequence 1 which was aborted after multiple telemetry failures
Seal failed to record first shots at beginning of line because of incorrect LCI unit configuration. First Orca SP: 2293
FGSP @ 2302 - Guns 2-2 and 3-7 disabled
String 4 depth transducer and pressure transducer failed at SOL. Pressure correct at manifold
Gun 3-1 Intermittent timing issues SOL - EOL

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
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FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315003D4A1
SEQUENCE	3
DIRECTION	288.2

	SP#	FFID	Raw SegD
SOL	9875	5652	NA
EOL	10291	6064	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	114.7			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 ci
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	21.5s and 20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	9875	10291
Date MM/DD/YY	11/07/23	11/07/23
Time UTC	18:32	22:16
Volume (cu in.)	80 in3	2940 in3
Wind (kts)	E10 kts	S 18.4 kts
Sea State (m)	1.5 m	1 m
Water Depth (m)	1972 m	2492 m

	Degraded/dead Channels
Dead	13,24,37,59,61,85,97,121,189,261,289,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Line started early, ramping up during start of line
Only arrays 1 and 2 were used in the soft start as 3 and 4 are tangled.
Record length reduced from 21.5 to 20s. SP 9974-9977 lost during change. FSP@ 20s: 9978
Line ended after going off course to free the sources from the leadin and also to fix arrays 3 and 4
FFID 6065-6071 were recorded while gunlink in internal mode - invalid files, discarded

Abbreviations	
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BOT/EOT - Begin/End of Tape	SI - Seismic Interference
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NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

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Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315004D4A2
SEQUENCE	4
DIRECTION	288.2

	SP#	FFID	Raw SegD
SOL	10000	6072	NA
EOL	11870	7942	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	1000	11870
Date MM/DD/YY	11/08/23	11/08/23
Time UTC	03:19	14:42
Volume (cu in.)	6240 in3	6240 in3
Wind (kts)	N 12 kts	E 16 kts
Sea State (m)	1 m	1 m
Water Depth (m)	2110 m	4680 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start of line
Reshoot/continuation of Sequence 3 that was aborted after sources and lead-in got tangled

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
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FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]



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Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315005D4B1
SEQUENCE	5
DIRECTION	356.8

	SP#	FFID	Raw SegD
SOL	12044	7943	NA
EOL	14214	10112	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	12044	14214
Date MM/DD/YY	11/08/23	11/09/23
Time UTC	14:59	04:10
Volume (cu in.)	6240 in3	6240 in3
Wind (kts)	E 16 kts	E 16 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	4470 m	6100 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start of line
S2G2 disabled - 35 guns, 6240 in3
Loss of Compressor SP 12215 -12221 Disabled All Guns - Invalid SP 12215 -12221/FFID 8116-8120
Strike noise with moveout visible on QC screens @ Trace 290 SOL through EOL

Abbreviations	
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FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315006D4D31
SEQUENCE	6
DIRECTION	82.1

	SP#	FFID	Raw SegD
SOL	15027	10113	NA
EOL	17645	12730	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	15027	17645
Date MM/DD/YY	11/09/23	11/09/23
Time UTC	04:18	21:47
Volume (cu in.)	6240 in3	5880 in3
Wind (kts)	E 16 kts	E20 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6080 m	6445.7 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start of line
SOL: S2G2 disabled - 35 guns, 6240 in3
EOL: S2G2,S3G1 disabled, 34 guns, 5880 in3
Disabled String 2 for Recovery @ SP 17127 27 guns 4940 in3
FFID 12731 and 12732 were generated at end of line without navigation headers and were discarded

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315007D31
SEQUENCE	7
DIRECTION	175.3

	SP#	FFID	Raw SegD
SOL	18023	12733	NA
EOL	20900	15610	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	18023	20900
Date MM/DD/YY	11/09/23	11/10/23
Time UTC	21:53	15:58
Volume (cu in.)	5880 in3	4230 in3
Wind (kts)	E20 kts	E 22 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6445.7 m	2650 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start and end of line
SOL: S2G2 and S3G1 disabled - 34 guns, 5880 in3
EOL: S2G2, S3G1 and S4 disabled - 25 guns 4230 in3
FFID 15611 generated at end of line without navigation headers was discarded

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315009D3D22
SEQUENCE	9
DIRECTION	89.9

	SP#	FFID	Raw SegD
SOL	22042	15612	NA
EOL	22735	16305	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	22042	22735
Date MM/DD/YY	11/10/23	11/10/23
Time UTC	16:10	21:42
Volume (cu in.)	2940 in3	2940 in3
Wind (kts)	E 20 kts	E 19 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	2640 m	2643 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start and end of line
Gun 2-2 and arrays 3 and 4 disabled for entire line - 17 guns 2940 in3
The dog took sequence 8
FFID 16306 generated by Orca at end of line, no navigation header, discarded

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]



# Observers Log

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Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315010D21
SEQUENCE	10
DIRECTION	5.0

	SP#	FFID	Raw SegD
SOL	24042	16307	NA
EOL	27000	19261	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	24042	27000
Date MM/DD/YY	11/10/2023	11/11/23
Time UTC	21:55	16:52
Volume (cu in.)	2940 in3	6240 in3
Wind (kts)	E 19 kts	E21 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	2643 m	6486 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start and end of line
Gun 2-2 and arrays 3 and 4 disabled at start of line - 17 guns 2940 in3
Arrays 3 and 4 enabled after SP 24347 - full volume for rest of line: 35 guns, 6240 in3

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315011D2D11
SEQUENCE	11
DIRECTION	93.0

	SP#	FFID	Raw SegD
SOL	28077	19262	NA
EOL	29476	20661	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	24042	29476
Date MM/DD/YY	11/11/23	11/12/23
Time UTC	17:34	04:13
Volume (cu in.)	6240 in3	3300 in3
Wind (kts)	E21 kts	E 17 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6823 m	5780 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start and end of line
SOL: S2G2 disabled, 35 guns, 6240 in3
EOL: Arrays 1 and 2 disabled and onboard - 18 guns, 3300 in3

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315012D11
SEQUENCE	12
DIRECTION	185.0

	SP#	FFID	Raw SegD
SOL	30039	20662	NA
EOL	32351	22974	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	30039	32351
Date MM/DD/YY	11/12/23	11/12/23
Time UTC	04:27	19:39
Volume (cu in.)	3300 in3	6240 in3
Wind (kts)	E 22 kts	E23 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	5660 m	4061 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Strong noise turn at start and end of line
SOL: Arrays 1 and 2 disabled and onboard - 18 guns, 3300 in3
All strings Enabled @ SP 32351
EOL: S1G2 disabled - 35 guns - 6240 in3

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	



# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315013TEST1
SEQUENCE	13
DIRECTION	185.0

	SP#	FFID	Raw SegD
SOL	33066	22975	NA
EOL	33225	23134	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	12.5			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	5 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	33066	33225
Date MM/DD/YY	11/12/23	11/12/93
Time UTC	19:45	19:59
Volume (cu in.)	720 in3	440 in3
Wind (kts)	E 19 kts	E 19 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	3941 m	3941 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Test line for Center of Source Calculations
One cluster enabled at a time, front then center then back, first with array 2 (central), then Array 4 (external)
5 seconds records - 12.5 m between shots

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

Time UTC	FILE	SP	Description
19:45	22975	33066	SOL MGL2315013TEST1 - S2G1,S2G2 enabled, 2 guns, 720 in3
19:48	23008	33099	Disabled S2G1,S2G2 - no source
19:48	23011	33102	Enabled S2G5 - 1 Gun 90ci
19:50	23036	33127	Disabled S2G5 - no source
19:50	23037	33128	Enabled S2G8, S2G9 2 Guns 440 in3
19:53	23062	33153	Disabled S2G8, S2G9 - no source
19:53	23067	33158	Enabled S4G1, S4G2 2 Guns 720 in3
19:54	23078	33169	Sdisabled S4G1 - 1 gun, 360 in3
19:54	23079	33170	Disabled S4G1, S4G2 - no source
19:54	23082	33173	Enabled S4G5 - 1 Gun 90 in3
19:56	23103	33194	Disabled S4G5 - no source
19:57	23106	33197	Enabled S4G8, 1 Gun 220 in3
19:57	23107	33197	Enabled S4G9, 2 Guns 440 in3
19:59	23134	33225	EOL MGL2315013TEST1 - S4G8,S4G enabled - 2 guns - 440 in3



# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315014S21
SEQUENCE	14
DIRECTION	278.5

	SP#	FFID	Raw SegD
SOL	33731	23135	NA
EOL	40903	30307	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	33731	40903
Date MM/DD/YY	11/12/23	11/14/2023
Time UTC	23:53	18:49
Volume (cu in.)	6240 in3 in3	6240 in3
Wind (kts)	E 20 kts	E 14.3 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	4110 m	6688 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Line with three "dog-leg" segments
S1G2 disabled entire line - 35 guns, 6240 in3
Dogleg started @ SP 36951

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	



# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315015S2S11
SEQUENCE	15
DIRECTION	2.5

	SP#	FFID	Raw SegD
SOL	41025	30308	NA
EOL	41328	30611	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	41025	41328
Date MM/DD/YY	11/14/23	11/14/2023
Time UTC	18:56	20:53
Volume (cu in.)	6240 in3	6240 in3
Wind (kts)	E 14.3 kts	E 10 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6688 m	6520 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
Turn line between S2 and S1
Noise turn at start and end
S1G2 disabled entire line - 35 guns, 6240 in3

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315016S11
SEQUENCE	16
DIRECTION	85.4; 95.9; 81; 95.6

	SP#	FFID	Raw SegD
SOL	42018	30612	NA
EOL	50625	39219	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL/LGSP
SP	42018	50625
Date MM/DD/YY	11/14/23	11/17/2023
Time UTC	21:00	01:14
Volume (cu in.)	6240 in3	5160 in3
Wind (kts)	E 12.6 kts	E 16 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6634 m	6080 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
This line is made of four "dog legs" segments
SOL: S1G2 disabled - 35 guns, 6240 in3
Strong turn noise at start of line
SP 43717: Gun 4-2 disabled d/t No Fire - 34 guns - 5880 in3
SP 49687: Gun 2-2 disabled d/t excessive high time timing errors - 33 guns - 5520 in3
SP 49942: Gun 3-1 disabled d/t weak/No sensor signal - 32 guns - 5160 in3 - Final volume
FFID 39220 generated at end of line without navigation headers - discarded

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

Time UTC	FILE	SP	Description
21:00	30612	42018	SOL MGL2315016S11 - S1G2 disabled, 35 guns 6240 in3
00:00	31114	42520	First shot 11/15
07:15	32311	43717	Disabled S4G2 after multiple failures to fire - 34 guns, 5880 in3
10:32	32820	44226	End of first dog leg - new heading: 95.9°
18:18	34050	45466	Start second dog leg
18:21	34068	45474	Turn noise visible on streamer d/t dogleg
18:22	34071	45477	End of 2nd dog leg - new heading: 81°
18:38	34113	45519	Turn noise gone
00:00	34991	46397	First shot 11/16
09:33	36605	48011	Beginning of the fourth dog leg - new heading: 95.6°
19:33	38281	49687	S2G2 disabled d/t excessive high time timing errors - 33 guns New Volume 5520 in3
21:04	38536	49942	S3G1 disabled d/t excessive high time timing errors - 32 guns New Volume 5160 in3
00:00	39020	50426	First shot 11/17
01:14	39219	50625	EOL MGL2315016S11 - S1G2, S2G2, S3G1, S4G2 disabled, 32 guns 5160 in3

# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315017S1EA1
SEQUENCE	17
DIRECTION	7.5

	SP#	FFID	Raw SegD
SOL	51030	39221	NA
EOL	52286	40452	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	51030	52286
Date MM/DD/YY	11/17/23	11/17/23
Time UTC	1:21	09:07
Volume (cu in.)	2580 in3	4800 in3
Wind (kts)	E 17 kts	SE 19 kts
Sea State (m)	1.5 m	1.5 m
Water Depth (m)	6135.7 m	5590 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
SOL: Arrays 1 and 2 recovered for maintenance; S3G1 and S4G2 disabled: 16 guns, 2580 in3
Strong turn noise at start of line
Streamer power failure: invalid FFID 39521-39538 (SP 51330-51347); missed SP 51348-51369
Missed SP 51411,51417,51419 because of high speed while redeploying sources
Full power (33 guns, 5520 in3) after SP 51448
SP52041: Array 2 disabled because of air leak.
SP 52270: Array partially back on line: S1G2,S2G1-2,S3G1,S4G2 disabled, 31 guns, 4800 in3 - last volume

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]



# Observers Log

Vessel	Marcus G. Langseth
Client	USGS - Uri Ten Brink - UTIG Shuoshuo Han
Area	Puerto Rico Trench
Job Number	MGL2315

Shift	00:00-12:00	12:00-24:00	
Science Officer	Cody Bahlau		
Acquisition	Gilles Guérin	Riley López	
Navigation	Koray Ergun	Aaron Marin	

LINE	MGL2315018MEA1
SEQUENCE	18
DIRECTION	196.1

	SP#	FFID	Raw SegD
SOL	61065	40453	NA
EOL	63564	42952	NA

Streamer Parameters				
	1	2	3	4
Length (m)	13650			
Auxiliaries	NA			
Shotpoint Interval: (m)	50			
Offset COS - CNG (m)	171.2			
Group Interval: (m)	12.5			
Number of channels	1092			
Streamer Depth (m)	12			

Source Parameters	
Total Volume	Bolt Guns 6600 in3
Work Pressure	1900psi +/- 100psi
Dual Source	no
Depth	12
Sub-array Separation	6
COS to COS	Single Source

Recording Parameters	
Record Length	20 s
Total recording delay	0
Sample Rate	2 ms
Polarity	SEGD standard
Low-Cut	3Hz analog
Hi-Cut	200Hz, 270dB/octave
File Format	SEGD

Description	SOL/FGSP	EOL
SP	61065	63564
Date MM/DD/YY	11/17/23	11/18/23
Time UTC	10:09	03:49
Volume (cu in.)	4800 in3	4800 in3
Wind (kts)	E 20 kts	SE 26 kts
Sea State (m)	1.5 m	2 m
Water Depth (m)	5490 m	3300 m

	Degraded/dead Channels
Dead	24,37,59,85,97,121,189,261,289,316,357,429,465,729,745,777,964,968,1069
Weak	
Noisy	

Auxiliaries	
Aux. 1-12	Gun Nearfield Hydrophone
1-1, 1-2, 1-3, 3-2, 3-3 Dead SOL thru EOL	

General / Line Comments
From EOL to SOL:S1G2,S2G1-2,S3G1,S4G2 disabled, 31 guns, 4800 in3
Strong turn noise at start of line
Last sequence for MGL2315

Abbreviations	
SOL/EOL - Start/End of Line	LGSP - Last Good SP
FGSP- First Good SP	LCSP - Last Chargeable SP
FOLSP - First Overlap SP	Fa - Feather Angle
BOT/EOT - Begin/End of Tape	SI - Seismic Interference
NDR - No Data Recorded	ITB - Imitation Time Break
NDR - No Data Recorded	ITB - Internal Time Break
N.T.B.P. - Not To Be Processed	

[illegible]