FINAL REPORT 1984

ATLANTIC GEOSCIENCE CENTRE

NEWFOUNDLAND DEEP SEISMIC SURVEY

M/V POLAR PRINCE

TABLE OF CONTENTS

I INTRODUCTION

Geophysical Service Inc. conducted the exclusive 1984 Newfoundland Deep Seismic Survey off the east coast of Canada for Atlantic Geoscience Centre during the period of 1984 09 23 through 1984 10 18. The M/V Polar Prince, GSI Party 2451, collected a total of 1051.6 km of marine seismic reflection data and 1040.550 km of gravity data for this project.

All seismic and gravity data were forwarded to GSI's office in Calgary for processing. All navigation data were post-processed and mapped by GSI's navigation department.

II EQUIPMENT

A. VESSELS

The M/V Polar Prince, a Canadian flag vessel of 76.5 m length and 1476.35 gross tonnage, was engaged in this single vessel operation.

For vessel details and crew list refer to Appendices A-1, A-2, and A-3.

B. RECORDING INSTRUMENTS

A Texas Instruments DFS V* unit was used to record 120 trace data at a 4 ms sample rate for 15 s to 18 s on 1/2 inch tape (format SEG-B: phase encoded) with a 1600 bpi packing density. Due to the greatly varying water depths and bottom structure encountered on this survey, the PGC rate, trip delay and final gain constant were varied for different lines. Daily and monthly instrument tests were conducted to monitor the performance of the DFS V unit.

When the data was examined in Calgary it was noted that traces 113 to 116 were recorded out of order. This problem was discussed with the client so that the traces could be renumbered and reordered during processing as indicated below:

Original Trace Number	Renumbered Trace Number
116	115
115	116
114	113
113	114

Recording instrument details are found in Appendix A-4.

* Texas Instruments trademark

C. STREAMER

A 3000 m Texas Instruments, comprised of 120 x 25 m groups, each containing 27 Texas Instruments two-chip dish hydrophones, was towed at a target depth range of 18 m to 22 m to collect seismic data.

Streamer details and diagrams are presented in Appendices A-5 and A-6.

D. SOURCE

An areal tuned airgun array of 103.57 L capacity was used to generate seismic energy at a 50 m shotpoint interval. This array, which had a total width of approximately 80 m, consisted of 48 active guns and 12 spare guns with various characteristics towed on five separate strings. Compressed air at an operating pressure of approximately 13.8 MPa was supplied by three LeRoi and three Norwalk Century compressors. A Texas Instruments TIGER II airgun control fired and timed each gun within the array, offering a phasing standard deviation of within +/- 1 ms.

Airgun array description and diagram are found in Appendices A-7 and A-9.

E. SURVEY

SPOT, a range-to-range navigation system manufactured by Offshore Navigation Inc. and operated by CAN-NAV Limited, was interfaced to the CMS II integrated satellite/doppler sonar system of the Texas Instruments R-980B computer to provide the primary navigation data. For the secondary source of navigation data satellite fixes were interfaced with Loran-C velocities. In addition, an ARGO DM-54 hyperbolic survey system, manufactured by Cubic Western Corporation and operated by CAN-NAV Limited, was also interfaced to the CMS II unit and served as the calibration navigation system. All navigation systems were calibrated prior to the start of this survey and were updated with satellite fixes and baseline crossings and extensions.

The SPOT base stations used in this survey were located at:

Sta. Cape Pine	046 36 56.34 N	053 31 58.00 W
Sta. Cappahayden	046 51 46.00 N	052 56 19.00 W
Sta. Fogo	049 42 28.86 N	054 03 28.54 W
Sta. Brehat	051 25 40.48 N	055 29 25.70 W

The Loran-C base stations were located at:

Sta. Fox Harbour	052 22 35.20 N	055 42 28.40 W
Sta. Cape Race	046 46 32.20 N	053 10 28.20 W
Sta. Angissoq	059 59 17.30 N	045 10 27.50 W

The ARGO base stations were located at:

Sta. Cape Race	046 39 31.17 N	053 47 26.15 W
Sta. Francis	047 48 26.58 N	052 47 16.42 W
Sta. Bonavista	048 42 04.08 N	053 05 08.48 W
Sta. Freels	049 15 42.06 N	053 30 04.93 W

For further details about the navigation systems, refer to Appendix A-9.

III OPERATIONS

The M/V Polar Prince commenced resupplying for the Newfoundland Deep Seismic Survey at 20:45 G.M.T. on 1984 09 23 in St. John's, Newfoundland. Upon completion of this task the vessel set a course for the prospect area, arriving at the survey site at 23:00 the next day. After the streamer was deployed and reballasted to meet the depth specifications of 18 m to 22 m, recording started on Line 1 at 17:12 on 09 25. However shortly thereafter an unidentified submerged object snagged the cable, cutting holes in ten live sections. The streamer was retrieved and repaired during the ensuing stormy weather conditions which prevailed through 14:02 on 09 28. At this time data collection activities resumed on Line 1A, but erratic streamer depths resulted in an early termination of the line at 16:36. Shooting restarted on Line 1B at 21:31, and upon completion of this line at 01:34 the next day the crew retrieved the streamer to facilitate travel to the next survey line.

The M/V Fred J. Agnich headed for the west end of Line 2 - Segment 1 (hereafter called just Line 2), but fishing vessels in the area frustrated attempts to scout water depths along the line and delayed deploying the streamer until 18:30 on 09 29. Because of the extensive fishing operations in the area, the client representative recognized it would be impossible to shoot the east-west leg of Line 2 as originally planned, so moved the preplot coordinates for this portion of the line north 1200 m. This necessitated extending the north-south portion of the line, Line 2 - Segment 2 (hereafter called Line 2-2), 1200 m to maintain the dogleg.

At 06:33 on 09 30 recording resumed in the middle of Line 2 as the M/V Fred J. Agnich headed northwest towards the shoreline, and terminated at 11:55 due to inadequate satellite navigation information. The vessel recircled to a point on the line located approximately 50 km offshore, and started recording data at 15:57 on Line 2A as it headed northwest once again. Shooting progressed smoothly until 23:28, when the streamer became entangled with fishing gear. Data collection resumed at 03:32 on 10 01 on Line 2B, which overlapped the start of Line 2A and headed the opposite direction, southeast. However fishing obstructions halted production at 16:23, and obstructed all further work at that location. Accordingly the vessel traveled approximately 8 km down the line and resumed recording on Line 2C at 07:59 on 10 02. However cable depths were too great, and at 08:31 the streamer was retrieved for reballasting.

Weather conditions deteriorated as the day progressed, complicating streamer troubleshooting activities and postponing data collection until 07:58 the next day, when work resumed on Line 2D. This portion of the line was completed at 14:22, and the vessel continued on the north-south dogleg (Segment 2) to record Line 2-2E. Swell noise and stormy seas terminated shooting activities at 18:13, delaying the start of Line 2-2F until 14:38 on 10 04. Navigation failure and airgun repairs halted work on this portion of the line, while inclement weather conditions frustrated attempts to record Line 2-2G the next day, and prevented any production during the next two days. During this period a compressor mechanic injured his hand, and was promptly evacuated to Bonavista Bay for medical assistance. An improvement in weather conditions on 10 08 allowed recording to resume at 04:41 on Line 2-2H and data collection progressed smoothly through the completion of the line at 15:51.

The next portion of the survey, Line 3, also consisted of two segments. The western portion was labeled Line 3-1, and ended at the first dogleg. The second segment, Line 3-2, consisted of the remainder of the line, including the second dogleg. After repairs were made on the airgun array, recording started on Line 3-1 at 03:09 on 10 09, and terminated at 14:44 when the streamer drifted out of depth specifications. The guns and cable were retrieved for troubleshooting, and the first shotpoints of Line 3-2A were recorded at 01:12 the next day. Production progressed well until interrupted at 21:31 by 35 knot winds and large swells. These weather conditions prevailed until 01:17 on 10 12, when work resumed on Line 3-2B.

During the next two days airgun failure resulted in the early termination of two line segments. On 10 12 work stopped at 18:46 on Line 3-2B due to loss of source volume. When the crew attempted to deploy the airgun array after repairs were completed, the boom cable for the starboard inner array slipped off the drum, thereby making it impossible to pull this element up to the boom. Consequently this string trailed approximately 7.6 m further back from the stern than the other four elements. The client representative approved continued production with this array configuration, and recording proceeded on Line 3-2C on 10 13 until the airgun volume fell below specifications.

As repairs were made on the airgun array weather conditions deteriorated, halting all production between 21:00 on 10 13 and 22:54 on 10 15. During this period the crew attempted to retrieve the starboard inner array. To do so the boom cable had to be severed and subsequently replaced. Further complications with airgun trailing equipment occurred when the crew lost the starboard paravane and float later on 10 14, and were unable to retrieve them. The client representative agreed that in view of the weather conditions the crew could continue shooting if they could obtain a reasonable spread using one paravane as there were no spare floats available. Accordingly on 10 15 the remaining float and paravane were transferred to the starboard side to prevent tangling of the elements, and the remainder of the prospect was recorded using an array spread of 45 m.

An improvement in weatner conditions allowed the shooting of Line 3-2D between 22:54 on 10 15 and 15:04 on 10 16, thus completing the survey lines. After the streamer and cable were retrieved the vessel set a course for St. John's, Newfoundland, terminating its participation in this survey upon reaching port at 02:30 on 10 18.

IV PRODUCTION STATISTICS

Total Kilometres	1 051.60
Total Hours	594.17
Recording Hours	132.93
Line Change Hours	34.05
Km / Total Hours	1.77
Km / Recording Hours	7.91
Km / Recording & Line Change Hours	6.30
Km / Total Days	42.48
Km / Recording Days	189.86
Km / Recording & Line Change Days	151.15

Total Shotpoints	21 032
Pops / Total Hours	35.40
Pops / Recording Hours	158.22
Pops / Recording & Line Change Hours	125.96
Pops / Total Days	849.53
Pops / Recording Days	3 797.25
Pops / Recording & Line Change Days	3 022.92

IV TIME STATISTICS

Weather Downtime	207.15	34.86 %
Recording	132.93	22.37 %
Travel & Resupplying	69.92	11.77 %
Streamer Failure	61.19	10.30 %
Line Change	34.05	5.73 %
Streamer Ballasting	32.06	5.40 %
Airgun Failure	26.15	4.40 %
Navigation Failure	16.68	2.81 %
Shipping Obstructions	14.04	2.36 %
TOTAL	594.17 Hours	100.00 %

GRAVITY DATA COLLECTION

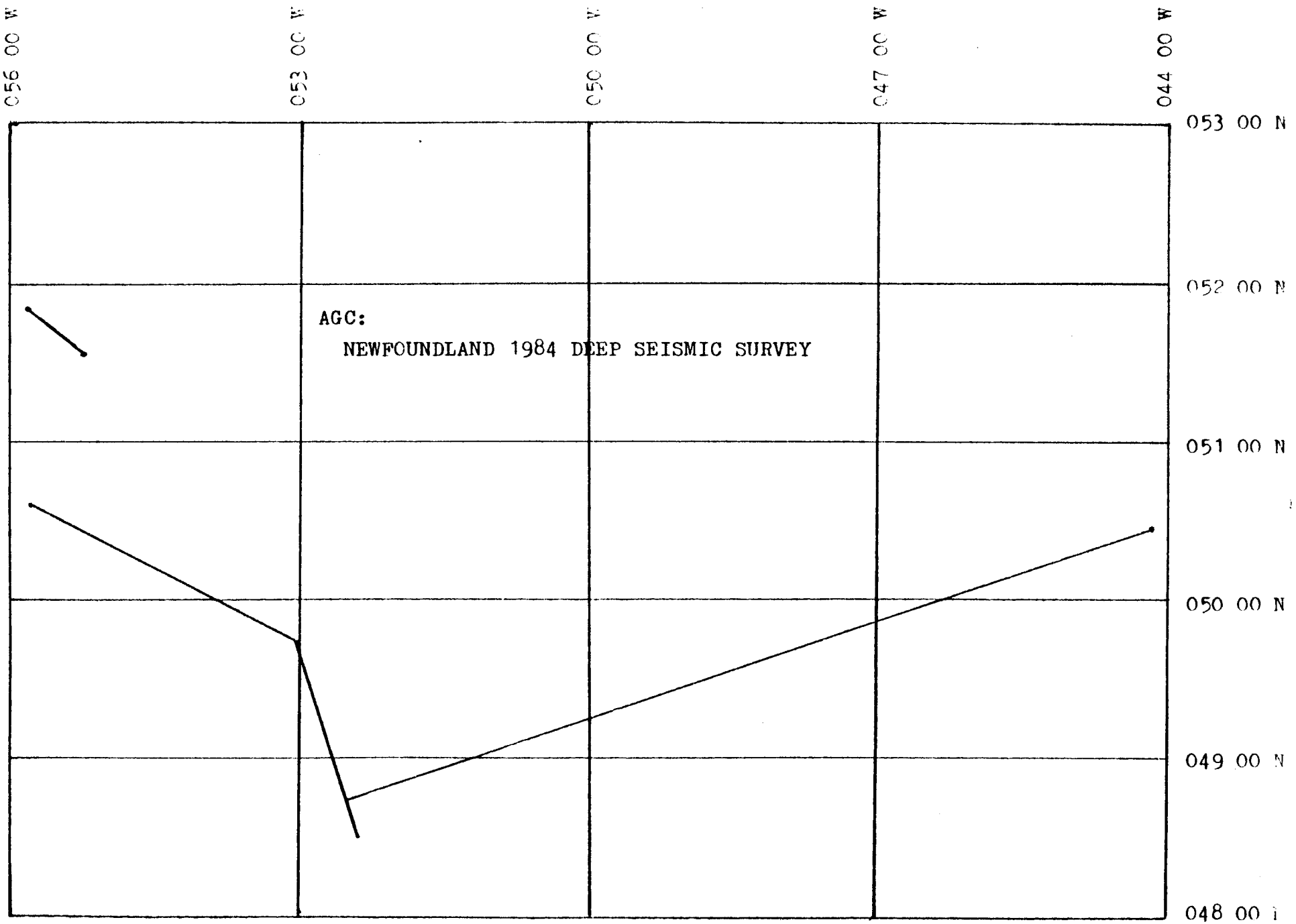
LINE	SHOTPOINT RANGE	TOTAL KM
1	101 - 321	11.050
1A	498 - 804	15.350
1B	985 - 1379	36.000
2A	229 - 890	33.100
2B	988 - 3520	126.650
2D	3645 - 4799	57.750
2-2F	354 - 1250	44.850
2-2H	2131 - 4058	96.400
3-1	101 - 2140	102.000
3-2A	2141 - 5381	162.050
3-3B	5414 - 8153	137.000
3-2C	8190 - 10295	105.300
3-2D	10330 - 12590	113.050
TOTAL		1040.550

TIME & PRODUCTION STATISTICS
ATLANTIC GEOSCIENCE CORPORATION: NEWFOUNDLAND 1984 DEEP SEISMIC SURVEY
M/V POLAR PRINCE
1984 09 23 to 1984 10 18

DATE	LINE	S.P. RANGE	TOTAL SHOTPOINTS	KM	RECORD	LINE CHANGE	TRAVEL/ SUPPLY	STREAMER HANDLING	NAV CALIB	DOWNTIME	TOTAL
09 23											
							12.42				
							3.25				
											15.67
09 24											
							23.00				
								1.00			
											24.00
09 25											
								17.20			
	Line 1	101 - 455	221	11.050	2.30						
										4.50 STRF	
											24.00
09 26											
										23.00 STRF	
										1.00 WX	
											24.00
09 27											
										24.00 WX	
											24.00
09 28											
										14.03 WX	
	LINE 1A	456 - 940	307	15.350	2.57						
										4.92 STRF	
	LINE 1B	941 - 1379	395	19.750	2.48						
											24.00
09 29											
	LINE 1B	1380 - 1704	325	16.250	1.56						
						16.02					
										6.42 OBS	
											24.00
09 30											
						6.55					
	LINE 2	101 - 1151	0	0.000						5.37 NAV	
										7.03 NAV	
	LINE 2A	101 - 987	662	33.100	4.52						
						0.53					
											24.00

DATE	LINE	S.P. RANGE	TOTAL SHOTPOINTS	KM	RECORD	LINE CHANGE	TRAVEL/ SUPPLY	STREAMER HANDLING	NAV CALIB	DOWNTIME	TOTAL
10 01											
	LINE 2B	988 - 3520	2533	126.650	12.85	3.53					
										7.62 OBS	
											24.00
10 02											
	LINE 2C	3521 - 3632	0	0.000						7.98 STRF 0.53 STRF 12.49 STRF 3.00 WX	
											24.00
10 03											
	LINE 2D	3633 - 4799	1155	57.750	6.40					7.97 WX	
	LINE 2-2E	101 - 321	221	11.050	1.43	2.42					
										5.78 WX	
											24.00
10 04											
	LINE 2-2F	322 - 1601	897	44.850	7.08					14.64 WX	
										2.28 NAV	
											24.00
10 05											
	LINE 2-2G	1602 - 2097	0	0.000						2.00 NAV 5.94 A/G 2.83 WX 13.23 WX	
											24.00
10 06											
										24.00 WX	
											24.00
10 07											
										19.00 WX	
								5.00			
											24.00
10 08											
	LINE 2-2H	2098 - 4058	1928	96.400	11.17			4.68			
						5.00					
										3.15 A/G	
											24.00

DATE	LINE	S.P. RANGE	TOTAL SHOTPOINTS	KM	RECORD	LINE CHANGE	TRAVEL/ SUPPLY	STREAMER HANDLING	NAV CALIB	DOWNTIME	TOTAL
10 09											
	LINE 3-1	101 - 2140	2040	102.000	11.58					3.15 A/G	
										7.77 STRF	
										1.50 A/G	
											24.00
10 10											
	LINE 3-2A	2141 - 5381	3241	162.050	20.32					1.20 A/G	
										2.48 WX	
											24.00
10 11											
										24.00 WX	
											24.00
10 12											
	LINE 3-2B	5382 - 8153	2740	137.000	17.48					1.29 WX	
										5.23 A/G	
											24.00
10 13											
	LINE 3-2C	8154 - 10295	2106	105.300	15.02					0.45 A/G	
										5.53 A/G	
										3.00 WX	
											24.00
10 14											
										24.00 WX	
											24.00
10 15											
	LINE 3-2D	10296 - 10469	140	7.000	1.10					22.90 WX	
											24.00
10 16											
	LINE 3-2D	10470 - 12813	2121	106.050	15.07						
								4.18			
							4.75				
											24.00
10 17											
							24.00				
											24.00
10 18											
							2.50				
											2.50
TOTALS			21032	1051.600	132.93	34.05	69.92	32.06	0	325.21	594.17


056 00 W
053 00 W
050 00 W
047 00 W
044 00 W
053 00 N
052 00 N
051 00 N
050 00 N
049 00 N
048 00 N
AGC:
NEWFOUNDLAND 1984 DEEP SEISMIC SURVEY

Geophysical Service Inc. wishes to take this opportunity to thank the Atlantic Geoscience Centre for its cooperation in the conduct of this survey.

Respectfully submitted,

John W. Clink
Arctic Marine Exploration Manager

JWC/kjb

APPENDIX A-1

M/V POLAR PRINCE

I VESSEL

Owner	Carino Company Ltd.
Year Built	1974
Shipyard	Gregsons, Blyth & Clelands
Country of Registry	Canada
Registration Number	362252
Classification	Ice Class 1, Lloyd's 100A1
Home Port	St. John's, Newfoundland
Trade	Research
Tonnage -- Gross	4180 cu m (1476.35 tons)
-- Registered	1532 cu m (541.25 tons)
Length	76.5 m
Beam	12.8 m
Draught	5.5 m
Type of Vessel	Seismic Research Vessel
Engines	2 - Mirrlees Ser II 6 Cylinder each 1800 HP
Power	2.68 MW
Speed	7.72 m/s (15 knots)
Endurance	60 days
Accommodation	43

II AUXILIARY EQUIPMENT

Generators (AC)	2 - Lister Blackstone, each 270 kW
	Shaft Alternator, 720 kW

III NAVIGATION EQUIPMENT

Radio Equipment	ITT High Frequency Telegraph System
	VHF: ITT STR 65
	Sea Voice RT100
	SSB: Sailor
Call Sign	VY4004
Gyrocompass	Anschultz IV
Auto Pilot	Anschultz
Radar	2 Decca
Fathometer	2 ELAC
Loran	2 Kodan LR735
	TI Loran

IV SEISMIC EQUIPMENT

Control System	CMS II *
Recording System	DFS V **
Streamer	120 trace - universal length
Airgun Array	Up to 103.57 L Mod I & Mod II
Compressors	Three: Norwalk Century 600 Three: LeRoi 750

V SAFETY EQUIPMENT

Fire Containment	Foam Deluge and Auxilary Pump System Engine Room CO_2 Smoke Diving Equipment Firesuits Extinguishers
Flotation	Life Rings Life/Work Vests & Survival Suits Life Jackets with Lights & Whistles Runabout with Engine Life Rafts
Signal	Life Raft Emergency Radio Pyrotechnics (distress signals) Aldis Signal Lamp
General	First Aid Equipment Line Thrower Lifeline Tether Harnesses Smoke Alarms Resuscitator

* GSI Trademark

APPENDIX A-2

CREW DESCRIPTION

SHORE-BASED PERSONNEL

1	Operations Supervisor
1	Senior Administrator

ON-BOARD SEISMIC PERSONNEL

1	Party Manager
2	CMS Operators
4 - 5	DFS V Operators
2	Technical Coordinators
4 - 6	Compressor & Airgun Mechanics
2	Survey Operators (CAN-NAV Limited)

VESSEL CREW

1	Ship's Captain
2	Mates

APPENDIX A-3

PERSONNEL

Operations Supervisor	C. Rowell	(U.S.)
Senior Administrator	F. Stark	(CDN)
Party Manager	J. Hennessey	(CDN)
CMS Operators	D. Accardo	(CDN)
	R. Locke	(CDN)
	A. Stroud	(CDN)
DFS V Operators	A. Burry	(CDN)
	A. Knee	(CDN)
	W. MacKenzie	(CDN)
	J. Malawony	(CDN)
	B. Pinsent	(CDN)
	S. Recoskie	(CDN)
	G. Stabback	(CDN)
Technical Coordinators	P. Downey	(CDN)
	A. Kirk	(CDN)
	S. Recoskie	(CDN)
Compressor & Airgun	J. Churchill	(CDN)
	E. Gaulton	(CDN)
	F. Ledwell	(CDN)
	D. MacDonald	(CDN)
	R. North	(CDN)
	D. Noseworthy	(CDN)
Survey Operators:		
CAN-NAV Limited	D. Young	(CDN)
	G. Tulk	(CDN)
VESSEL		
Captain	S. Re	(CDN)
Mates	G. Osbourne	(CDN)
	P. Vokey	(CDN)

APPENDIX A-4

INSTRUMENT DETAILS

Recording System	
Type	DFS V*
Serial No.	690
Transports	
Make & Model	DFS V*, EPT 10
Number in use	2
Number of tracks	9
Format	
Type	SEG-B Gapped (phase encoded)
Packing Density	1600 bpi
Tape Speed	49.06 ips
Bytes/Header	276
Bytes/Data Scan	314
Recording System	1 System/Nears and Fars
Sample Period	4 ms
Record Length	15 s - 18 S
Gain Control Mode	IFP
Gain Constant	24 dB
Total System Gain	120 dB
Dynamic Range	$\geq$ 84 dB
Reproduce Mode	PGC (variable rate)
Filters	Hi-Cut: 64 Hz @ 72 dB/oct Lo-Cut: 5.3 Hz @ 18 dB/oct
Camera	SIE ERC 10C
Polarity	
Camera	Negative/Downbreaks
Tape	Negative

* TI Trademark

APPENDIX A-5

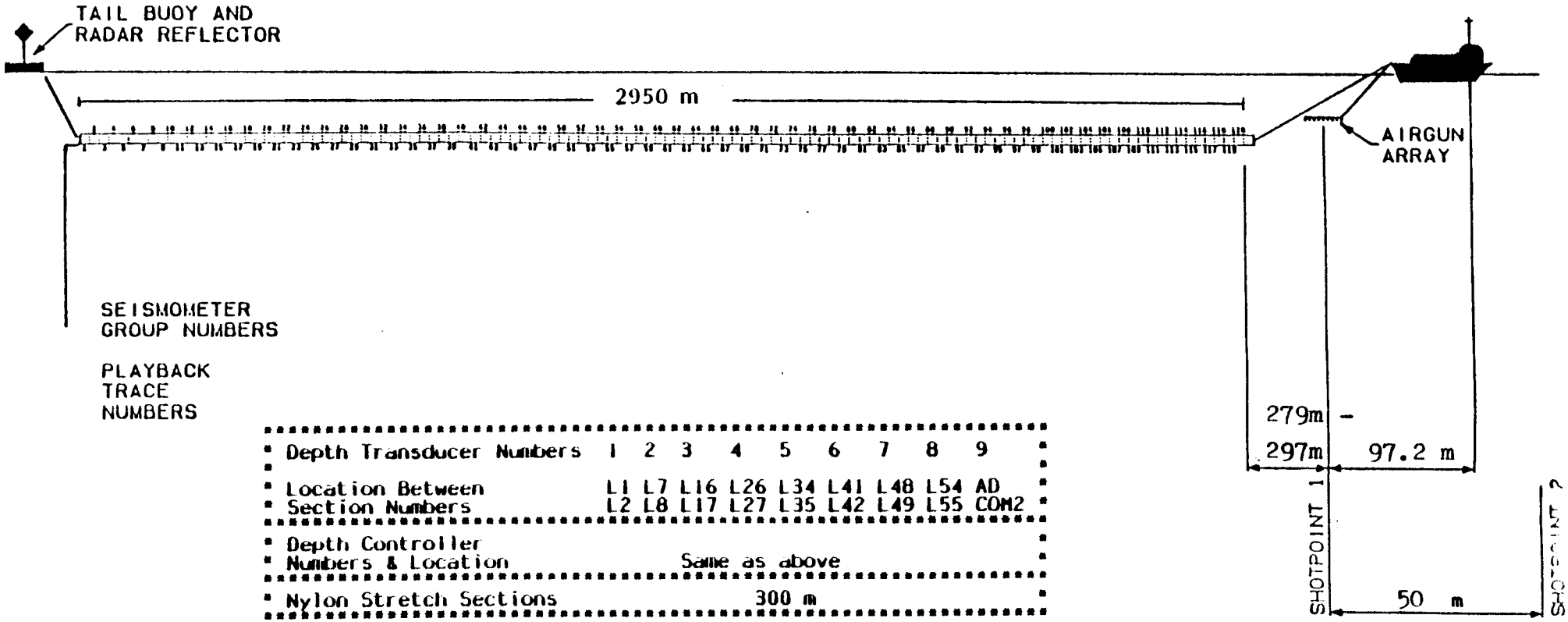
STREAMER DETAILS

Type	Texas Instruments PVC, Neutral Buoyancy, Continuous Tow
Length (Center to Center)	3007 m
Number of Groups	120
Group Length	25 m
Number of Extender Sections	N/A
Extender Section Length	N/A
Number of Live Sections	60
Live Section Length	50 m
Number of Hydrophones / Group	27
Hydrophone Interval	0.93 m
Adapter Section Length	1.0 m
Stretch Section Length	50 m
Total Length of Nylon Stretch Sections	300 m
Stretch Factor	10 %
Average Cable Depth	18 m - 22 m
Locations of Depth Transducers	See cable diagram
Location of Depth Controllers	See cable diagram
Type of Depth Controllers	Remote Controlled Syntron Birds (RCL-2)
Location & Details of Auxiliary Sections (if used)	See cable diagram

APPENDIX A-6

DIAGRAM of 3000 m STREAMER

120 Traces



Depth Transducer Numbers	1	2	3	4	5	6	7	8	9	
Location Between Section Numbers	L1 L2	L7 L8	L16 L17	L26 L27	L34 L35	L41 L42	L48 L49	L54 L55	AD COM2	
Depth Controller Numbers & Location	Same as above									
Nylon Stretch Sections	300 m									

L = Live Section
S = Stretch Section
AD = Adapter Section
COM = Compass Section

APPENDIX A-7

AIRGUN DESCRIPTION

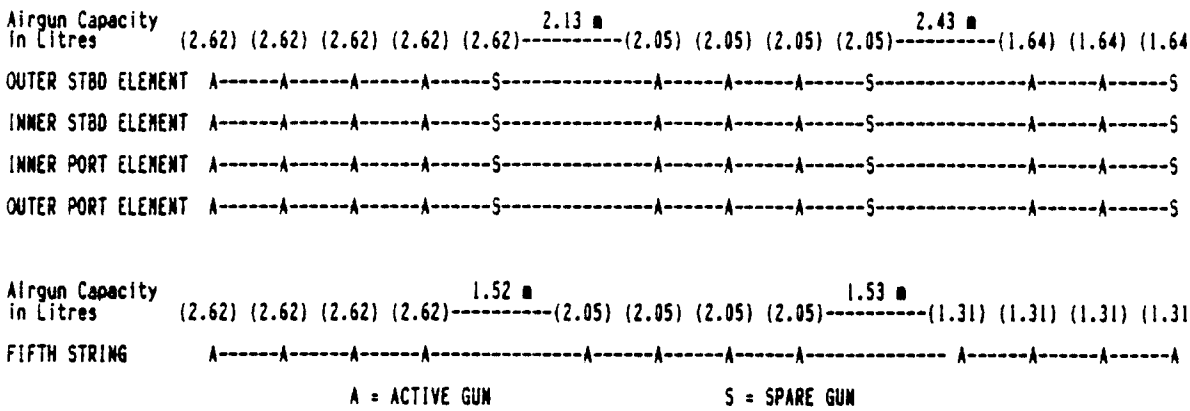
Type	Four String Areal Tuned Array, with additional Fifth String towed from Starboard tray
Total Volume in Use	103.56 L
Total Spare Volume	25.24 L
Timing Controller	
Type	TIGER II*
Serial No.	03
Firing Delay	51.2 ms
Operating Pressure	13.8 MPa
Compressors	
Type	LeRoi 750
No. in Use	Three
Type	Norwalk Century 600
No. in Use	Three
Operating Depth	12 m
Total Array Width	80 m
Length of each String	
Standard Four String Array	9.4 m
Fifth String	7.9 m
Distance from Stern to First Gun (all five strings)	60.0 m
Distance from Stern to Array Centre	64.7 m
Distance from Common Navigation Position to Array Centre	97.2 m
Distance from Array Centre to Near Group Centre (OFFSET)	279 m - 297 m

* GSI Trademark

APPENDIX A-8

GSI WIDE TUNED AIRGUN ARRAY

103.56 Litres



AIRGUN ARRAY COMPOSITION

Active Guns:	20 x 2.62 L	Spare Guns:	4 x 2.62 L
	16 x 2.05 L		4 x 2.05 L
	8 x 1.64 L		4 x 1.64 L
	4 x 1.31 L		
Total	103.56 L	Total	25.24 L

NOTES

1. Guns are Texas Instruments Mk II and Mk III PnuCon Airguns.

2. Airgun array is comprised of a standard four element array combined with a fifth element (towed between the two inner strings) for a total array width of 80 m.

3. In the four element array, each string is 9.37 m long, with 2.13 m between the first and second group of guns, and 2.43 m between the second and third group of guns. The additional fifth string is 7.85 m long, with 1.52 m separating the three groups of guns.

4. Centerline-to-centerline of all coalesced guns is 0.53 m. The front end of each element is located 60 m from the stern of the vessel.

APPENDIX A-9

SURVEY INFORMATION

PRIMARY SYSTEM

Type	SPOT
Survey Company	CAN-NAV Limited
Operating Frequency	2 MHz
Lane Width	149.8345 m
Antenna Height (above sea level)	10.3 m
Antenna Location (from stern)	50.6 m
Anatenna Offset from Ship's Centreline	5.9 m
Antenna Distance & Bearing from Common Navigation Position	19.0 m & 342 Degrees

SECONDARY NAVIGATION SYSTEM

System	Satellite Fixes / Loran-C Velocities
Type	Loran-C (range-to-range)
Survey Company	CAN-NAV Limited
Operating Frequency	100 KHz
Lane Width	299.6929 m
Antenna Height (above sea level)	9.7 m
Antenna Location (from stern)	43.5 m
Anatenna Offset from Ship's Centreline	6.9 m
Antenna Distance & Bearing from Common Navigation Position	13.0 m & 32 Degrees

Survey Information cont'd.

Type	Satellite Transit
Receivers	Magnavox MX1107 RS Dual Channel
Survey Company	GSI
Operating Frequencies	150/400 mHz
Antenna Height (above sea level)	19.3 m
Antenna Location (from stern)	32.5 m

CALIBRATION NAVIGATION SYSTEM

Type	ARGO DM-54
Survey Company	CAN-NAV Limited
Operating Frequency	1624 kHz
Lane Width	92.2626 M
Antenna Height (above sea level)	10.0 m
Antenna Location (from stern)	30.1 m
Antenna Offset from Ship's Centreline	3.6 m
Antenna Distance & Bearing from Common Navigation Position	4.4 m & 124 Degrees

Common Navigation Position	Satellite Antenna
Coverage	3000%
Shotpoint Interval	50 m
Auxiliary Equipment	2 track plotters
Primary calibration points used	Three way fixes & baseline crossings. Least square range resection. Satellite updates.

APPENDIX A-10

POST-PLOT PARAMETERS

Ellipsoid	Clarke 1866
Datum	NAD 1927
Projection	Lambert Conformal Conic
North Parallel	49 Degrees North
South Parallel	43 Degrees North
Map Scale	1: 1 012 000
Position Plotted	Antenna
Shotpoint Plot Interval	10
Shotpoint Label Interval	100

APPENDIX A-11

FATHOMETER / SINGLE TRACE PROFILER

FATHOMETER

Manufacturer	Simrad
Model	EA
Conversion Velocity	1480 m/s
Operating Frequency	38 kHz
Instrument corrected for draught	5.2 m
Transducer Position	
From Stern	47.0 m
From Common Navigation Position	14.5 m forward of antenna
Fathometer check	July 17, 1984 Lerwick, Shetland Islands

SINGLE TRACE PROFILER

Manufacturer	EPC Labs Inc.
Model	3210 S
Serial Number	444
Source	Seismic Trace #118 / #119
Gain Mode	IFP
Recorder Start	Field Time Break
Display Method	Single Channel Display
Hi Filter and Slope	64 Hz @ 72 dB/oct
Lo Filter and Slope	5.3 Hz @ 18 dB/oct