FINAL REPORT
ATLANTIC GEOSCIENCE CENTRE
SCOTIAN SHELF
OFFSHORE NOVA SCOTIA
M/V FRED J. AGNICH
1989

TABLE OF CONTENTS

I INTRODUCTION

Geophoto Services, Ltd., a subsidiary of Halliburton Geophysical Services, Inc., conducted a marine seismic survey for Energy Mines and Resources, Atlantic Geoscience Centre (AGC), in the Offshore Nova Scotia Margin under contract number 23420-9-R312/01-OSC.

The M/V Fred J. Agnich, HGS Party 2995, collected 618.95 km of seismic data during the period 1989 09 25 through 1989 10 25.

II EQUIPMENT

A. VESSEL

The M/V Fred J. Agnich, a Canadian flag vessel of 56.4 m length and 979.59 gross tons, was engaged in this single vessel operation.

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

B. RECORDING INSTRUMENTS

A Texas Instruments DFS V was used to record seismic data from the conventional analog streamer. Data was sampled at 4 ms and recorded through 90 Hz 72 dB/ octave high cut and 3.5 Hz 18 dB/octave low cut filters. The record length varied between 21 s and 23 s.

Recording instrument details are found in Appendix A-4.

C. STREAMER

A 3000 m analog streamer with 120 groups 25 m in length, each containing 32 hydrophones, was used. The cable was towed at an average depth of 14 m +/-2 m.

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

D. SOURCE

For this survey, a point source 6 string gun array was used. The two outer arrays had paravanes and floats to achieve the outer-to-outer spread required. The array consisted of 64 active guns with a total volume of 115.7 L, and 6 spares with a volume of 13.92 L. The two outer sub-arrays were towed from the stern boom

tips with paravanes and floats, while the middle sub-arrays were towed from the boom tips and the inner sub-arrays were towed from the vessel's outer stern. The total spread, determined by using an Optical Range finder and a Sextant, outer to outer, was 86 m. The towing depth of all gun strings was 12 m and towing depths were monitored from depth gauges (3 on the outers, 2 on the middles and 1 on the inners).

A great many problems were encountered with paravane instability. Gun work took a large amount of time. Deployment and retrieval of the guns was time-consuming as the inner arrays had no malt reels, requiring manual handling and coiling on deck.

On 10 12 both tow chains from the booms to the outer arrays let go in bad weather. The tow cable for the port outer array broke, leaving only the firing line holding the array. A tag line was placed on the firing line and gun string and as soon as the weather permitted, the guns were brought back on for repair. No other problems with the guns were encountered for the rest of the prospect.

The timing and firing of the guns was controlled by a Texas Instruments Airgun Controller (TIGER II) system. This system continually adjusts the firing pulse to each individual gun to make it fire at a particular time, so that the whole array will fire simultaneously and obtain optimum performance. Individual gun firing delays were continuously controlled to maintain array timing with +/- 1 ms of the operational 51.2 ms.

E. NAVIGATION

Starfix, Model 5200A, was the primary system with a Magnavox MX4400, and the MagNavox MX1108 Dual satellite receivers used as secondary systems.

Survey instrument details found in Appendix A-9.

III OPERATIONS

The M/V Fred J. Agnich was delayed in commencing the AGC project due to waiting on repairs to the starboard main engine. These were completed 1989 09 24 and sea trials run. Coincidentally the Starfix navigation system was calibrated.

The Agnich left port on 09 25, scouted Line 2 and worked on seismic equipment while travelling to Line 1. Both

streamers were checked out and the starboard one selected for the survey. Considerable time was spent bringing all equipment up to operating specifications after the long layoff from early in the year and with much time lost due to weather.

On 1989 10 02 the systems were deemed operable and recording commenced on Line 1, but failures occurred and this turned into a test line.

Recording began in earnest on the seaward end of Line 1 at 1989 10 03 01:50 GMT and was interrupted for DFS failure, source repair, streamer ballast, source repair, and weather, all on 10 03. The weather delay continued until 10 06 14:30 when the source was again deployed and the CMS repaired. Shooting commenced on Line 1D at 10 07 07:23 but weather again interrupted the work until 10 08 when recording commenced on Line 1E at 18:53. Source repairs were required at 10 09 08:17 but were interrupted by weather at 15:03. Recording restarted at the shoreward end of the line (Line 1F) at 10 11 16:44 but the weather closed in again at 23:46 and prevented data collection until Line 1G was started at 10 14 08:01 and Line 1 was completed at 12:56, some eleven and one-quarter days and three hundred twenty kilometres after the useful commencement.

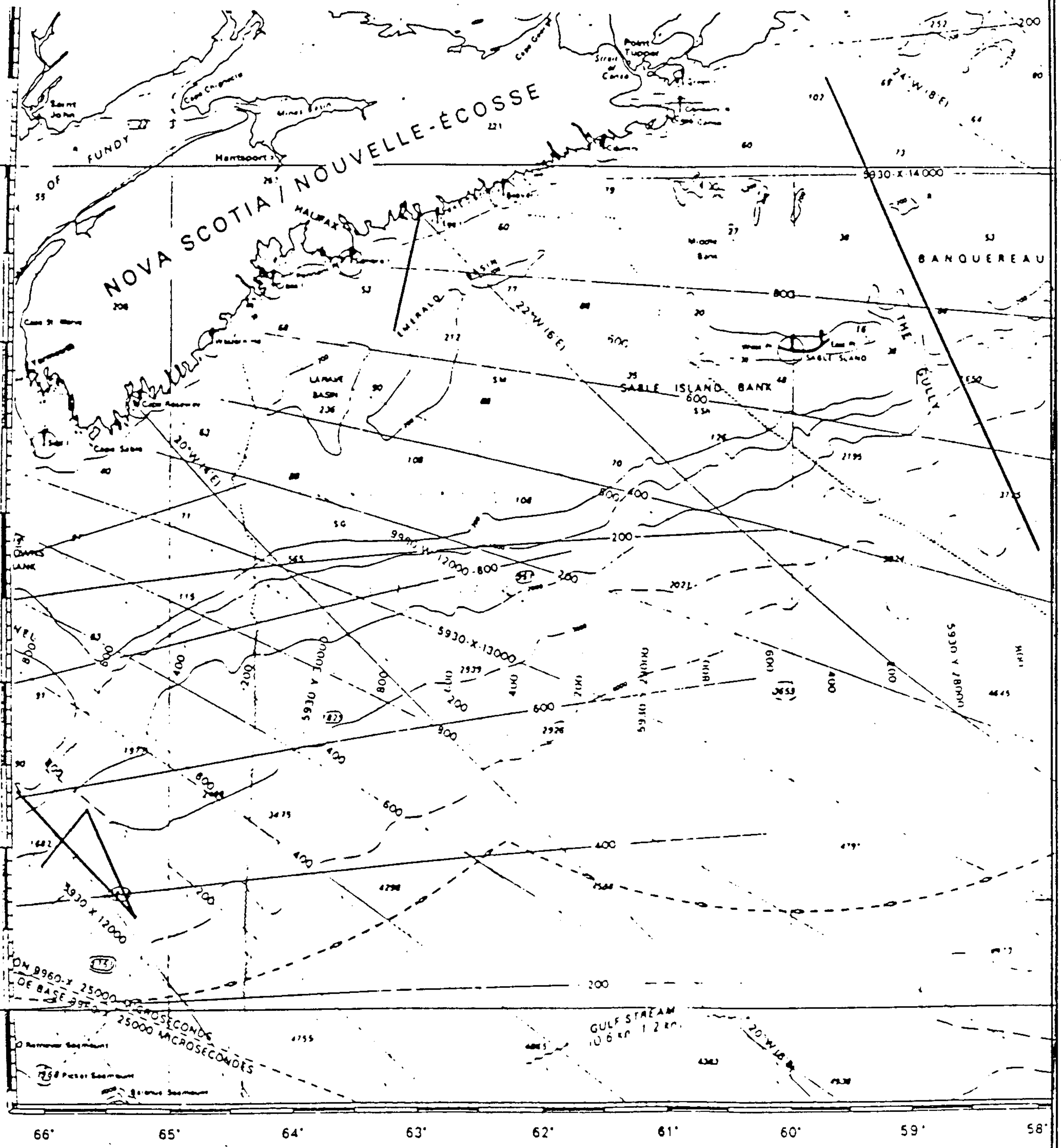
The guns and streamer were retrieved and travel to Line 2 commenced at 10 14 19:20. The Agnich arrived in the vicinity of Line 2 at 10 15 11:15 and recording commenced northward at 22:12. The following morning at 07:00 GMT the cable tangled with fishing gear and this took until 21:16 to clear and return to collection. Line 2 was completed 10 16 23:21.

The guns and streamer were retrieved and the Agnich travelled to Halifax, arriving there at 10 17 13:00. Resupply was finished and the vessel departed harbour at midnight for Line 3. After a day's travel the weather worsened and prevented work until approximately 10 22 13:00. Recording commenced 10 23 00:21, shooting to the southeast. The line was interrupted once for source failure and then completed at 20:57.

After a short line change, Line 4 was commenced at 22:42 and completed at 1989 10 24 09:08.

After another short line change and some work on the guns, Line 5 commenced at 12:38 and was completed at 19:18. The trailing equipment was retrieved by 10 25 01:15 and course set for Halifax, which was reached by midnight GMT, concluding the prospect.

MAP OF AREA


NOVA SCOTIA / NOUVELLE-ÉCOSSE
FUNDY
HALIFAX
EMERALD BASIN
LA HAVE BASIN
SABLE ISLAND BANK
SABLE ISLAND
BANQUEREAU
THE GULLY
5930-X-14000
5930-X-13000
5930 X 12000
5930 Y 30000
5930 Y 38000
GULF STREAM
25000 MICROSECONDES
66°
65°
64°
63°
62°
61°
60°
59°
58°
45°
44°
43°
42°
40°

TIME STATISTICS

Recording Activities			**90.94**	**12.6**
Line Change			**19.66**	**2.7**
Travel			**71.13**	**9.8**
Supply			**11.00**	**1.5**
Streamer Handling			**56.97**	**7.9**
Airgun Handling			**64.72**	**9.0**
Weather			**343.61**	**47.5**
Other Downtime			**64.97**	**9.0**
Fishing Gear	14.27	22.0		
Airguns	45.28	69.7		
Navigation	0.00	0.0		
CMS	3.42	5.3		
Instrument D/T	2.00	3.1		
Total	64.97	100.00		
TOTAL			**723.00**	**100.00**

PRODUCTION STATISTICS

Total Kilometres	608.74
Total Hours	723.00
Recording Hours	90.94
Line Change Hours	19.66
Km / Total Hour	0.84
Km / Recording Hour	6.69
Km / Record & L/C Hour	5.50
Km / Total Day	20.21
Km / Recording Day	160.65
Km / Record & L/C Day	132.10

Total Pops	12379
Pops / Total Hour	17.12
Pops / Recording Hour	136.12
Pops / Record & L/C Hour	111.93
Pops / Total Day	410.92
Pops / Recording Day	3266.95
Pops / Record & L/C Day	2686.22

TIME AND PRODUCTION STATISTICS

ATLANTIC GEOSCIENCE CENTRE — M/V FRED J. AGNICH
OFFSHORE MARGIN PROSPECT — 1989 09 24 TO 1989 10 07

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	OTHER DOWNTIME	ROW TIME
09-25			-		-					3.00						3.00
																3
09-26			-		-					1.38						1.38
												17.62				17.62
														5.00		5.00
																24
09-27			-		-									24.00		24.00
																24
09-28			-		-									24.00		24.00
																24
09-29			-		-							10.00				10.00
"			-		-									14.00		14.00
																24
09-30			-		-									17.00		17.00
"			-		-					7.00						7.00
																24
10-01			-		-									4.00		4.00
"			-		-							8.50				8.50
"			-		-								7.00			7.00
															4.50 GUN	4.50
																24
10-02			-		-										21.00 GUN	21.00
"			-		-									3.00		3.00
																24
10-03			-		-								1.83			1.83
"	1	101	- 630	101	-	613	513	25.65	3.74							3.74
"			-		-										2.00 DFS	2.00
"			-		-										1.58 GUN	1.58

TIME AND PRODUCTION STATISTICS

ATLANTIC GEOSCIENCE CENTRE — M/V FRED J. AGNICH
OFFSHORE MARGIN PROSPECT — 1989 09 24 TO 1989 10 07

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	OTHER DOWNTIME	ROW TIME
10-03	1A	577	-1061	614	- 1011	398	19.90	3.42								3.42
"			-		-							2.00				2.00
"			-		-										4.33 GUN	4.33
"	1B	981	-1625	1012	- 1625	614	30.70	4.68								4.68
"			-		-									0.42		0.42
							76.25									24
10-04			-		-									24.00		24.00
																24
10-05			-		-									24.00		24.00
																24
10-06			-		-									14.50		14.50
"			-		-								9.50			9.50
																24
10-07			-		-								3.97			3.97
"	1C	1593	-1638		-										3.42 CMS	3.42
"	1D	1593	-3128	1626	- 3128	1503	75.15	10.77								10.77
														5.84		5.84
							75.15									24
10-08			-		-									12.5		12.50
"			-		-								6.38			6.38
"	1E	3097	-3838	3129	- 3838	710	35.50	5.12								5.12
							35.50									24
10-09	1E	3839	-5051	3839	- 5045	1207	60.35	8.28								8.28
"			-		-										6.77 GUN	6.77
"			-		-									8.95		8.95
							60.35									24
10-10			-		-									24.00		24.00
																24

TIME AND PRODUCTION STATISTICS

ATLANTIC GEOSCIENCE CENTRE — M/V FRED J. AGNICH
OFFSHORE MARGIN PROSPECT — 1989 09 24 TO 1989 10 07

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	OTHER DOWNTIME		ROW TIME
10-11			-		-									2.50			2.50
"			-		-							4.50					4.50
"			-		-								9.74				9.74
"	1F	6501	-5471	6501	-	5509	993	49.65	7.03								7.03
"			-		-									0.23			0.23
								49.65									24
10-12			-		-									24.00			24.00
																	24
10-13			-		-									24.00			24.00
																	24
10-14			-		-			2.67						2.67			2.67
"			-		-			5.35					5.35				5.35
"	16	5541	-4817	5508	-	5046	463	4.92	4.92								4.92
"			-		-								4.07				4.07
"			-		-							2.33					2.33
"			-		-					4.66							4.66
																	24
10-15			-		-					11.25							11.25
"			-		-							5.42					5.42
"			-		-								5.53				5.53
"	2	101	- 359	101	-	359	259	12.95	1.80								1.80
								12.95									24
10-16	2	360	-1339	360	-	1329	970	48.50	7.00								7.00
"			-		-										14.27	FGR	14.27
"	2A	1261	-1566	1330	-	1566	237	11.85	2.08								2.08
"			-		-								0.65				0.65
								60.35									24
10-17			-		-						13.00						13.00
"			-		-							11.00					11.00
																	24

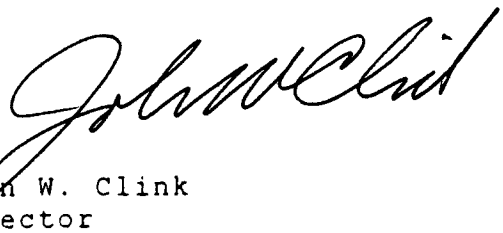
TIME AND PRODUCTION STATISTICS

ATLANTIC GEOSCIENCE CENTRE — M/V FRED J. AGNICH
OFFSHORE MARGIN PROSPECT — 1989 09 24 TO 1989 10 07

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	OTHER DOWNTIME	ROW TIME
10-18			-		-					24.00						24.00
																24
10-19			-		-									24.00		24.00
																24
10-20			-		-									24.00		24.00
																24
10-21			-		-									24.00		24.00
																24
10-22			-		-									13.00		13.00
			-		-								6.00			6.00
			-		-							5.00				5.00
																24
10-23			-		-							0.35				0.35
"	3	101	-1193	101	- 1193	1093	54.65	7.40								7.40
"			-		-										5.60 GUN	5.60
"	3A	1157	-2180	1194	- 2180	987	49.35	7.60								7.60
"			-		-				1.75							1.75
"	4	101	- 276	101	- 276	176	8.80	1.30								1.30
							112.8									24
10-24	4	277	-1564	277	- 1564	1288	64.40	9.13								9.13
"			-		-				2.00							2.00
"			-		-										1.50 GUN	1.50
"	5	101	-1068	101	- 1068	968	48.40	6.67								6.67
"			-		-								4.70			4.70
							112.8									24
10-25			-		-							1.25				1.25
"			-		-					22.75						22.75
																24
TOTALS						12379	608.74	90.94	19.66	71.13	11.00	56.97	64.72	343.61	64.97	723.00

Geophoto Services, Ltd. wishes to take this opportunity to thank Atlantic Geoscience Centre for its co-operation in conducting this survey.

Respectively submitted,



John W. Clink
Director
Geophoto Services, Ltd.

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APPENDIX A-1

M/V FRED J. AGNICH

I VESSEL

Owner	Geophoto Services, Ltd.
Flag	Canadian
Year Built	1973
Shipyard	Ferguson's, Pictou, N. S.
Country of Registry	Canada
Registration Number	330117
Classification	Lloyds 100 A1 LMC ICE 2, CS IIX
Home Port	St. John's, Newfoundland
Trade	Research/Utility
Tonnage	Gross 979.59 tons
Dimensions	a. Length 56.4 m b. Beam 11.9 m c. Depth 4.6 m d. Draught, Medium 4.1 m
Type of Vessel	Rig Supply Vessel
Engine	2 - EWSL 16 MGR Lister Blackstone 2000 HP
Speed	7.2 m/s (14 knots)
Fuel Capacity	295 m3
Fresh Water Capacity	60 m3
Fresh Water Maker	N/A
Endurance	35 days
Number of Berths	36
Ship's Crew (#)	9
Technical Personnel (#)	17
Helicopter D-Rating	MB105, Bell 206 L Longranger or equivalent
Lub Oil Capacity	4545 L
Cable Oil Capacity	18,180 L
Blades/Propeller	4 blades each/2 propellers
Variable Pitch	N/A
Bow Thruster	Transverse Tunnel - Electric
Stern Thruster	N/A

II AUXILIARY EQUIPMENT

Generators (AC)	2 - Cat D 343 at 250 Kw 1 - Cat D 333 at 115 Kw
Clean Power Generator	1 x Motor Generator (110 V) plus 2-5 KVA UPS (110 V)

III NAVIGATIONAL EQUIPMENT

Radio Equipment	VHF: CMS DN42 SSB: 400 W Radio Telephone
Call Sign	VOBJ
Gyrocompass	Sperry Rand
Auto Pilot	Sperry Rand
Radar	Furuno FR 800D Decca RM 916
Fathometer	Simrad EA
Standard Compass	Magnetic
Echo Sounder	Simrad
Marisat Receiver	MX III
Marisat Number	1560203
Other Communications	Facsimile Capable
Weather Fax	Alden Mx4
Radio Direction Finder	Standard Ship

IV SEISMIC EQUIPMENT

Control System	CMS III
Recording System	Texas Instument DFS V
Streamer	Conventional (Analog)
Airguns	MOD II, Sleeve Gun
Airgun Control	TIGER II
Compressors	4 PB 44/300 2 Sullair

V SAFETY EQUIPMENT

Fire Containment	Foam Deluge and Auxiliary Pump System Engine Room CO2 Smoke Diving Equipment Firesuits Extinguishers
Flotation	Life Rings Life/Work Vests & Survival Cots Life Jackets with Lights & Whistles Runabout with Engine Life Rafts Survival Suits
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
** Texas Instruments Trademark

APPENDIX A-2

CREW DESCRIPTION

SHORE-BASED PERSONNEL

1	Operations Supervisor

ON-BOARD SEISMIC PERSONNEL

1	Party Manager
2	Systems Engineers
3	Systems Operators
4	Quality Control
1	Back Deck Supervisor
8	Source Mechanics
2	Client Representatives
2	Navigation (John Chance, Inc.)
1	Chief Engineer
3	Second Engineers

VESSEL

1	Ship's Captain
2	Mates

APPENDIX A-3

VESSEL PERSONNEL

Operations Supervisor	M. Kimball	(CDN)
Party Manager	J. Hennessey	(CDN)
Systems Engineers	L. Redbourne	(CDN)
	R. Burgoyne	(CDN)
Systems Operators	R. Visser	(CDN)
	A. Gall	(CDN)
	E. Hann	(CDN)
Quality Control	P. Twa	(CDN)
	A. Hatchard	(CDN)
	T. Knee	(CDN)
	A. Gaulton	(CDN)
Back Deck Supervisor	E. Humber	(CDN)
Source Mechanics	E. Gaulton	(CDN)
	C. Jordan	(CDN)
	G. Herritt	(CDN)
	H. Crews	(CDN)
	W. Lomond	(CDN)
	D. O'Brien	(CDN)
	D. Mitchell	(CDN)
	R. Bancroft	(CDN)
Client Representatives	B. Kay	
	J. Neilsen	
Navigation (John Chance, Inc.)	J. Andrus	(U.S.)
	D. Broadenaux	(U.S.)
Chief Engineer	G. Reid	(CDN)
Second Engineer	D. Porter	(CDN)
	I. Procter	(CDN)
	G. St.Louis	(CDN)
Captain	W. Risser	(CDN)
Mate	W. West	(CDN)
	D. Shaw	(CDN)

APPENDIX A-4

RECORDING INSTRUMENT DETAILS

Recording System		
Type	:	Texas Instruments DFS V
Serial Number	:	584
Number of Analog Modules	:	2
Sample Rate	:	4 ms
Hi Cut Filter and Slope	:	90 Hz 72 db per octave
Low Cut Filter and Slope	:	3.5 Hz 18 db per octave
Gain Constant	:	36 dB
Quoted System Dynamic Range	:	84 dB
Final System Gain	:	120 dB
System Polarity	:	as per Seg B definition
Record Length	:	21 - 23 sec (varied)
Transports	:	2 - 10 in. Texas Instruments FX 6250 Transports
Number of tracks	:	9
Tape Format	:	SEG B GCR 6250 bpi
Reproduce Mode	:	DEFLOAT
Initial Gain	:	42 dB
Galvo	:	12 db
No. of Bytes in Header Block	:	276
No. of Bytes per Data Scan	:	314
Auxiliary Channels	:	61-64
Timing Word Zero	:	galvo 4
Record Number	:	Aux Channel 61

APPENDIX A-5

STREAMER DETAILS

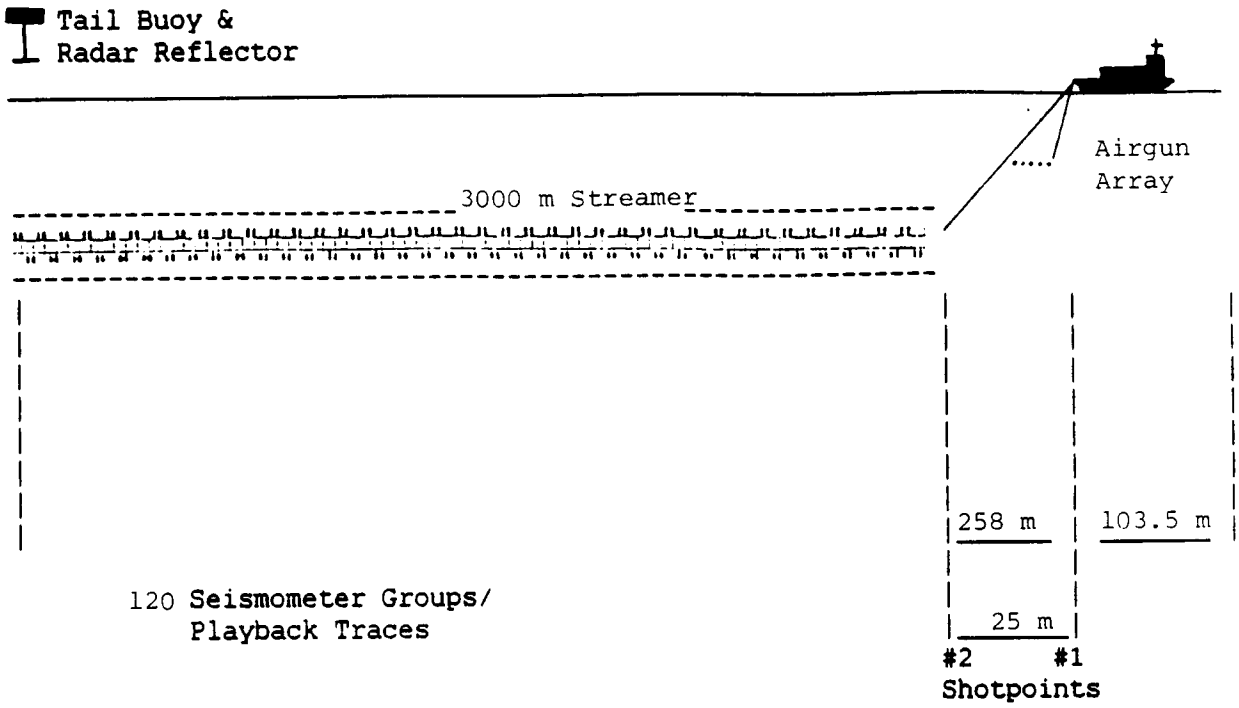
Type of Streamer	:	Conventional (Analog)
Number of Live Sections	:	60
Live Section Length	:	50 m
Compass Coil Section	:	14 at 4 m each
Front End Adaptor	:	1 at 1 m
Number of Groups	:	120
Length of Groups	:	25 m (27 hydrophones)
Streamer Skin Type	:	PVC Warm-Water Sections
Number of Stretches	:	7
Length of Stretch Sections	:	50 m
Calculated Stretch Factor	:	10 %
Sensitivity	:	6.86 uVolts/uBar, +/-1.5dB
Target Depth	:	14 m, +/- 2 m
Type of Depth Controllers	:	DigiCourse 396 Birds
Compass and Depth Transducer	:	DigiCourse 396 Birds
Number Depth Controllers Used	:	11
Number of Depth and Compass Units in Use	:	11

All the DigiCourse 396 birds are mounted upon 4 m sections which contain a coil for communication between the Digital Acquisition Unit in the instrument room and the unit itself.

APPENDIX A-6

STREAMER DIAGRAM
120 **TRACES**

M/V FRED J. AGNICH



Depth Transducer Numbers	1	2	3	4	5	6	7	8	9	10	11	12
Location Between	S	6	12	18	24	30	36	42	48	54	60	
Section Numbers	L1	7	13	19	25	31	37	43	49	55	S	
Depth Controller	S	12	24	36	48	60	72	84	96	108	120	
Numbers & Locations	L1	13	25	37	49	61	73	85	97	109	S	
Nylon Stretch Sections	50 m											

A = Active S = Spare

APPENDIX A-7

SOURCE DETAILS

Type	:	6 element
Airguns	:	MOD II, SLEEVE GUN
Total Volume (Active)	:	115.7 L
Total Spare Volume	:	13.9 L
Operating Pressure	:	12.4 - 13.8 MPa
Operating Depth	:	12 m +/- 1 m
Timing Controller	:	TIGER II
Firing Delay	:	51.2 ms
Distance Stern to Centre Array	:	70 m
Distance from Common Navigation Point to Centre of Array	:	103.5 m
Array String Length		
Inners	:	16.59 m
Middles	:	17.78 m
Outers	:	10.66 m
Array Spread Outer to Outer	:	86 m
Compressors	:	4 PB 44/300 2 Sullair

Airgun and Compressor Discussion

The normally 2.048 L Mod 3 guns are all without valve bodies and spiders. The volume of these guns is therefore increased to 2.311L. The 1.639 L guns have the valve bodies and spiders removed as well, and now have a volume of 1.885 L each.

APPENDIX A-8
AIRGUN ARRAY
M/V FRED J. AGNICH

115.72 Litre - 6 Element

AIRGUN CAPACITY:

```
(Litres)           |[2.35][2.35][2.35][2.35] [1.93][1.93] [1.93] [1.93] [1.93] [.70] [.70] [.37] [.37]
STBD OUTER ELEMENT |--A-----A-----A-----S--------A-----A-------A-------A-------A-------A------A------A------A
PORT OUTER ELEMENT |--A-----A-----A-----S--------A-----A-------A-------A-------A-------A------A------A------A
                                        <2.6 m>      <2.44 m><2.44 m><1.83 m><1.52 m><1.52 m><1.22 m><1.22>

(Litres)           |[2.35][2.35][2.35][2.35][2.35] [2.35][2.35][2.35] [2.35] [1.93][1.93] [1.93] [.70] [.70]
STBD MIDDLE ELEMENT|--A-----A-----A-----A-----S-------A-----A-----S-------A-------A------A-------A------A-------A
PORT MIDDLE ELEMENT|--A-----A-----A-----A-----S-------A-----A-----S-------A-------A------A-------A------A-------A
                                      <2.9 m>            <2.29 m><2.74 m>     <2.44 m><2.13 m><2.13 m>

(Litres)           |[2.35][2.35][2.35] [2.35][2.35] [2.35] [1.93] [.70]
STBD INNER ELEMENT |--A-----A-----A--------A-----A-------A-------A------A
PORT INNER ELEMENT |--A-----A-----A--------A-----A-------A-------A------A
                              <2.44 m>     <2.44 m><2.44 m><2.44 m>
```

A = Active Airgun S = Spare Airgun

AIRGUN ARRAY COMPOSITION

Active Guns:	32 X 2.35 L	Spare Guns:	6 X 2.35 L
	18 X 1.93 L		
	10 X .70 L		
	4 X .37 L		
Total Active Guns:	118.42	Total Spare Guns:	14.10

NOTES:

1. This airgun array is comprised of 6 elements. The total array width is 86 (m +/- 1 m).
2. Mod II and Sleeve Airguns.
3. The array contained 70 airguns; however, the working array consisted of 64 guns, allowing 6 guns to be used as spares as required.

APPENDIX A-9

SURVEY INFORMATION

CMS Software in use CMS Program in use	:	903.11
Patches in use	:	None
STS Software Version	:	7.2
990 QC Software Version	:	1.0
990 Nav Software Version	:	3.6
Tiger II Software Version	:	3.3
Shotpoint Interval	:	50 m
Mag. Dec.	: :	21.5 W (Line 1, A, B) 20.5 W (Line 2, 3, 4, 5)
Geoidal Height	:	-24.2 m (WGS-72)
Spheroid	:	CLARKE 1866
Semi Major Axis	:	6378206.4
Reciprocal of Flattening	:	294.9786985
Datum	:	North American 1927
delta X	:	39 m
delta Y	:	-154 m
delta Z	:	-180 m

Mapping Parameters

Grid projection	:	UTM Zone 21
Central Meridian	:	057 00 00.00 W

Primary System

Type	:	Starfix
Model	:	5200A
Mobile Serial Number	:	025
Type	:	Geostationary Satellite
Survey Company	:	John Chance & Associates
Operational Frequency	:	GII 12.255 MHz
	:	WIV-A 12.255 MHz
	:	WIV-B 12.285 MHz
	:	F1R 13.130 MHz
Pseudo Argo Frequency	:	1.498 MHz
Pseudo Argo Velocity	:	299685986 ms
Pseudo Argo Lane Width	:	100.0 m
Antenna Height from Sea Level	:	24.2 metres
Antenna Location from CNP	:	0.0 m at 000 deg.
Offset from Ship's Centreline	:	0.0 m

Primary GPS

Type	:	Magnavox
Model	:	MX4400
Mobile Serial Number	:	303
Type	:	Geostationary Satellite
Survey Company	:	John Chance & Associates
Operational Frequency	:	1575.42 MHz
Antenna Height from Sea Level	:	10.2 m
Antenna Location from CNP	:	7.9 m at 155.4 deg
Offset from Ship's Centreline	:	3.3 m to Stbd

Transit Satellite System

Model	:	Magnavox MX1107 Dual
Serial Number	:	4034
Operating Frequency	:	150/400 KHz
Antenna Height from Sea Level	:	19.0 m
Antenna Location from CNP	:	1.0 m at 270.0 deg
Offset from Ship's Centreline	:	1.0 m to Port

APPENDIX A-10

POST-PLOT PARAMETERS

Spheroid	:	Clarke 1866
Datum	:	NAD 1927
Projection	:	UTM Zone 21
Central Meridian	:	057 00 00.00 W
Map Scale	:	1:100000
Position Plotted	:	Common Nav. Point (CNP)
Shotpoint Plot Interval	:	50 m
Shotpoint Label Interval	:	Every 100th shotpoint