

**EXPLOR DATA LTD.  
(formerly BFR Consultants Ltd.)**

**WINTER 1998 FORT LIARD PROGRAM  
FINAL PLAN REPORT**

**on the  
NON-PROPRIETARY VIBROSEIS SEISMIC PROGRAM  
in  
FORT LIARD AREA  
N.W.T.**

**PROGRAM #9229-B059-007P  
LUP N97B823**

**LINES APPLIED FOR FTL-11 ,NF-30**

**Line NF-30 was not recorded**

<b>Duration:</b>	<b>February to March 1998</b>
<b>Contractor:</b>	<b>WesternGeco formerly Schlumberger Geco Prakla</b>
<b>Author:</b>	<b>Philip D. Gregory, P. Geoph Vice President</b>

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**Date:** **May 24, 2001**

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## **INTRODUCTION**

**EXPLOR DATA formerly BFR specializes in speculative seismic programs in foothills and frontier areas of Canada.**

**Using a combination of existing data, access, wells and geology, we proposed a program of non exclusive seismic data that we felt would provide a grid that would help establish a new geological framework for the area.**

## **STATISTICAL SUMMARY**

### **Significant Dates:**

**Commencement: February 21, 1998**

**Start Production: Mar 6, 1998**

**Termination: March 12, 1998**

**Number of Technical Personnel: 43**

**Number of Non-Technical Personnel: 15**

### **Recording Trucks Used:**

- 1 Party Manager Unit - F250 4x4
- 4 Line Units - F30 4x4
- 1 Transport Units - F700 4x4 (or equivalent)
- 1 Support Unit - F250 4x4
- 1 Mechanic Unit - F250 4x4
- 2 personnel Carriers
- 1 Battery Charging Unit
- 1 Cable/Geophone Repair Trailer
- 2 Honda A.T. V. Quads
- 1 Vibrator Technician Unit
- 1 Fuel Unit and Spare Parts Trailer
- 4 Mertz M18HD Buggy Vibrators



**Production Data:**

**Total Distance Surveyed:** 52.8 km

**Time Lost:** N/A

**Daily Production:**

**Mar 6 , 1988 ( 9.6 km)**

**Mar 7 - 7.2 km**

**Mar 8- 9 km**

**Mar 9 8.5km**

**Mar 10 6.8km**

**Mar 11 8.9km**

**Mar 12 2.8km**

**Summary of Conditions Pertaining to Weather and Terrain:**

Mild terrain, many creek/river crossings, average -15 C

**Summary of Factors Which Caused Down Time:**

No significant downtime

# **DATA ACQUISITION EQUIPMENT and FIELD PROCEDURES**

## **Line Cutting, Positioning & Survey**

### **Line Cutting Procedures**

All the new cut lines are kept to a minimum and average 6m. The lines are cut and are produced by the cat push. The lines must be of sufficient width to accommodate snow and debris while still allowing safe passage of equipment and the deployment of geophones and cable. Slash resulting from clearing is generally bucked up into shorter lengths and laid flat along the seismic lines. The windrowed slash pile have breaks placed every 300 m to allow for wildlife movement. In areas of large timber avoidance cutting is used to minimize the footprint of the operation.

### **Survey Procedures**

Once the line has been produced the chaining area will establish the location at all receiver and source points. The survey crew then follows establishing known points using GPS. From these known or fixed locations the remainder of the flags placed by the chaining crew are surveyed in using conventional methods.

## **Positioning & Survey Systems Equipment**

The survey equipment includes Wild T1, T16, or DI-4L theodolites or Topcon GTS-3B Total Stations with integral infra-red distomats (electronic distance measurers) and electronic data recorders.

The data recorder automatically records distance measurements and angular observations from the Total Stations. Station numbers and comments are entered through the alpha-numeric keypad by the surveyor. This data can be transferred from the data recorder to a microcomputer through a normal RS232 connection or to our survey processing department via modem. No manual input is required, but is available should the need arise.

The crews are supported with Proseis positioning software. This package handles all data reduction and outputs industry standard exchange formats (i.e., SEG P-1, UKOOA-84). The system also supports the generation of high quality postplots via a Houston Instruments DMP-50.

## **Positioning & Survey Systems Equipment Continued**

### **GPS Method**

A combination of conventional land survey methods and Real Time GPS methods for the layout and survey of source and receiver points were used. The GOS system was operated in either a Real Time Differential mode or a Real Time Kinematic mode for line survey. The equipment comprised of Trimble 4000SE/SSE receivers or an equivalent with antennae, radio/modems and software. The software enables upload and download of preplot and recorded data, as well as datum transformation from WGS-84 to a chosen local datum (NAD27) and map projection (UTM).

The system configuration features a reference receiver located at a known point that broadcasts, via the radio/modem, the code and carrier phase data in a compressed format to rover receivers. The rover receivers receive the broadcast data to enable computation of a refined position. This can be in the decimeter range for Real Time Kinematic solution, and typically sub 1-3 meters for the Real Time Differential solution.

The Real Time GPS survey crew consisted of 1 master (or reference) GPS unit and 3 rover GPS units complete with modem and radio link. This required an experienced GPS technician and 3 roving operators to operate the system and process the survey data.

### **Recording:**

#### **Shooting and Recording Procedures**

The recording unit for this operation is positioned along the seismic lines at suitable locations where access is most readily available. Geophones are deployed along the line and there is typically 13 km of line layed out

### **Recording System**

#### **Input/Output System Two**

The I/O SYSTEM TWO is an advanced delta sigma technology telemetry data acquisition system offering numerous advanced recording and signal processing features determined to be found on *no other recording system*. Amongst those features are the following:

- Full 24-bit analog to digital recording
- Spectral Shaping Filter (SSF)
- Enhanced Hi-Line Pickup Eliminator (HPE) – step resolution of 0.01 Hz over frequency band of DC to 420 Hz
- Total Self Calibration/Testing
- Increased Spatial Sampling

## **Recording System Continued**

The I/O SYSTEM TWO offers maximum flexibility during field deployment, thereby resulting in increased production. The benefits of digital transmission and the systems inherent protection against Hi-line induced interference make it an ideal choice for this environment.

- Reduced field battery power requirements (45% of System One) solar batteries
- Automatic detection of pilot overscaling for vibroseis
- Low cut filter of 32 frequencies of 3-90 Hz @ 12 dB/octave slope
- Alias filters of 100 Hz @ 4ms, 200 Hz @ 2ms, 400 Hz @ 1ms, 750 Hz @ 0.5ms

SSF for 3 start and 3 end frequencies for each of 3 gains, which may allow instrument suppression of the noise trains.

## **Recording Equipment:**

### **INPUT/OUTPUT SYSTEM TWO**

- 1 INPUT/OUTPUT SYSTEM TWO digital telemetry system, comprising:
  - 110 MRX's with solar batteries
  - 165 Spare battery modules
  - 2 Battery Charging Systems
  - 3 ALX's (Advance Line Taps)
  - 1 LIM's (Line Input Module)
  - 1 SCM (System Control Module)
  - 1 CSM (Correlator/Stacker Module)
  - 1 SIM (System Interface Module)
  - 2 SCSI (3480 Cartridge Drives)
  - 1 OCM (Operator Control Module)
  - 2 HHT's (Hand Held Terminal)
  - 1 Printer
  - 1 TOR GEOscience SRM-48P Digital Field Monitor w/VibraSig monitoring
  - 700 Strings of 10 Hz geophones (9 phones/string)
  - 115 Tescorp RSC interconnect cables (6 takeouts @ 42m or 84m)
  - 1 Pelton Advance II ESG

## **Recording Equipment Continued**

### **Vibrators and Control Electronics (Version 5.1 Hardware)**

- 4 Mertz M18HD Vibrators with Advance II Electronics (Version 5E)
- 1 Vibrator Technician's Unit
- 1 Vibrator Fuel/Support Unit
- 4 Mertz M 18 HD P-Wave Vibrator units mounted on 4x5 buggy each fitted with the following:
  - Pelton Advance II Vibrator Control Electronics (Version 5E)
  - WesternGeco (formerly Schlumberger Geco-Prakla) Zero Leak Fueling System
  - Mandatory Escape Hatches and Catwalks for Safety
  - Automatic Low Press Hydraulic Shut Down Systems
  - Automatic Air-bag Filling System
  - 20,000 lb Hydraulic Winch
  - Air Conditioning
  - VHF Mobile Radios
  - HD modifications increasing peak force to > 50,000 lbs.

### **Advance II Control Electronics – Features (version 5.1)**

- Pelton Version 5E Firmware
- Automatic Performance Reporting – Continuous Checksum and Error Reprots
- Vibra\*Sig QC Monitoring
- WesternGeco (formerly Schlumberger Geco-Prakla) VeiW-QC Statistical Analysis Program
- Mandatory Force Meter Analyzing Every Contract
- VeiW=QC Data and Time Motion Summaries Daily
- Enhanced Ground Force Control and Phase Locking

On sight computers for tailored sweep design dB/oct, dB/Hz and segmented non-linear sweeps.

Four high output vibrators provided, Mertz M-18HD vibrators mounted on 612 buggies. These units have a peak force in excess of 50,000 lbs over a frequency range of 5-250 Hz.

The virators are equipped with Pelton Advance II control electronics which feature enhanced ground force control and phase locking, non-linear sweep (dB/oct and segmented dB/Hz capability and vibrator QC options.

## **Parameters**

### **Parameters of Energy Source:**

**Vibroseis**

### **Source Array:**

4 Vib over 30m / Drag = 60 m  
Source Interval 80m  
Group Intervals 20m

### **Detector Equipment:**

9 Geophones per Group  
2.5 Geophone Spacing  
Type OYO 10 Hz

### **Detector Array:**

9 Geophones over 20 m

### **Recording System:**

I/O System II

### **Recording Parameters:**

Shot Interval:	80 m
Station Interval:	20 m
Channels:	450

### **Far Offsets:**

4510 m

### **Near Offsets:**

30 m

# GEOPHYSICAL DATA PROCESSING

## FOR SEISMIC REFLECTION DATA:

**Gain Recovery:** Type: T-Function (Exponent = 2)

**Bandpass Filter:** 8/12 - 45/55 HZ, 8/12 - 35/45 HZ

**Mute Pattern:** Time and Space Variant

<b>Type of Deconvolution:</b>	Surface Consistant	
<b>Operator Length:</b> 100m	<b>Pre Whitening:</b> -1%	
<b>Distance</b>	<b>Design Gate</b>	<b>APPL. Gate</b>
30 m	400-3200	0-5000 ms
4510	1500-3400	0-5000 ms

**Type of Velocity Analysis:** Normal Moveout Constant Velocity Stacks  
**Reference:** Surface  
**Distance Between Analysis:** every kilometer

**Picking Method:** Constant Velocity Stacks

## STATIC CORRECTION METHOD PARAMETERS:

<b>Statics</b>	Automatic Surface Consistent 1 <sup>st</sup> pass, Automatic Surface Consistent 2 <sup>nd</sup> pass, CDP Trim
<b>Iterations</b>	3 Total

**MIGRATION METHOD PARAMETERS:** Finite Differences  
100 % Interval Velocities

**TIME AMPLITUDE DISPLAY METHOD:**  
AGC Length 500 MS

**DISPLAY PARAMETERS:**  
**Horizontal Scale:** 64 Traces per Inch  
**Vertical Scale:** 3.75 Inches per second

# **WINTER 1998 FORT LIARD PROGRAM**

## **LIST OF LINES AND KILOMETERS SHOT PER LINE**

**FTL - 11**

**52.8 km**

**TOTAL**

**52.8 km**



## ENCLOSURES

### LINE FTL-11

#### MYLARS

- 1 Shot Point Map
- 1 Structure Stack Migration Section
- 1 Pre-Stack Time Migration Section

#### PAPER

- 2 Shot Point Maps
- 2 Structure Stack Migration Section
- 2 Pre-Stack Time Migration Sections

#### DISK

- 1 Survey Floppy

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