

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

**WINTER 2000 FORT LIARD PROGRAM**

**FINAL PLAN REPORT**

**on the**

**NON-PROPRIETARY HELI-PORTABLE/VIBROSIES SEISMIC  
PROGRAM**

**in**

**FORT LIARD AREA  
N.W.T.**

**PROGRAM # 9229-E034- 4P  
LUP # N98B861**

**Lines Recorded  
SWM-1X, FTL-52**

**Duration:**

**February 2000**

**Contractor:**

**WesternGeco formerly Schlumberger Geco Prakla**

**Author:**

**Philip D. Gregory, P. Geoph.  
Vice President**

**9 2 2 9 - E 3 4 - 4 P**

---

**Date:**

**January 17, 2002**

## TABLE OF CONTENTS

- I           **INTRODUCTION**
- II           **LOCATION MAP**
- III           **STATISTICAL SUMMARY**
- IV           **DATA ACQUISITION EQUIPMENT**  
              and **FIELD PROCEDURES**
- V           **GEOPHYSICAL DATA PROCESSING**
- VI           **ENCLOSURES**

## INTRODUCTION

Explor Data Ltd. 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:** March 24, 2000

**Start Production:** Line FTL-52 ,March 27, 2000  
Line SWM-1X , March 30,2000

**Termination:** Line FTL-52 ,March 29, 2000  
Line SWM-1X , April 3 ,2000

**Number of Technical Personnel:** 42

**Number of Non-Technical Personnel:** 8

### **Type and Number of Equipment Used:**

- 1 Party Manager Unit
- 1 Cat Push Unit
- 1 Personnel Carrier
- 1 Observer Support Unit
- 2 Recorder and Generator
- 5 1 ton Line Units
- 1 5 ton Equipment Carrier Units
- 2 T/S Units
- 1 Mechanical Unit
- 1 1 ton Fuel Unit
- 2 ATV/Skidoo Units
- 1 Vib Tech Unit
- 1 Buggy Vibrator Units
- 1 3 ton Fuel Unit
- 1 Vib Support Trailer Unit
- 1 Battery Charging Unit

**Production Data:**

**Total Distance Surveyed :** 44.520 km

**Time Lost:** 0

**Daily Production:** Line FTL-52 , Average 8.86 km per/day  
Line SWM-1X , Average 3.588 km per/day

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

General layout of the line was rough and hilly

**Summary of Factors Which Caused Down Time: N/A**

# **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 1.5 m wide. Source Point Locations need to be large enough to accommodate positioning the drill units with a long line helicopter. Heli-pads are required every 1 to 2 km to accommodate helicopter landing during program operations. New heli-pads require a 35 m diameter area. Natural clearings were used whenever possible.

### **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-8 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 to allow connection of seismic line data cables. The program was recorded with helicopter assist. Geophones were laid down every 15m on vibe portion , 20 on dynamite portion.

### **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 Tuel/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.

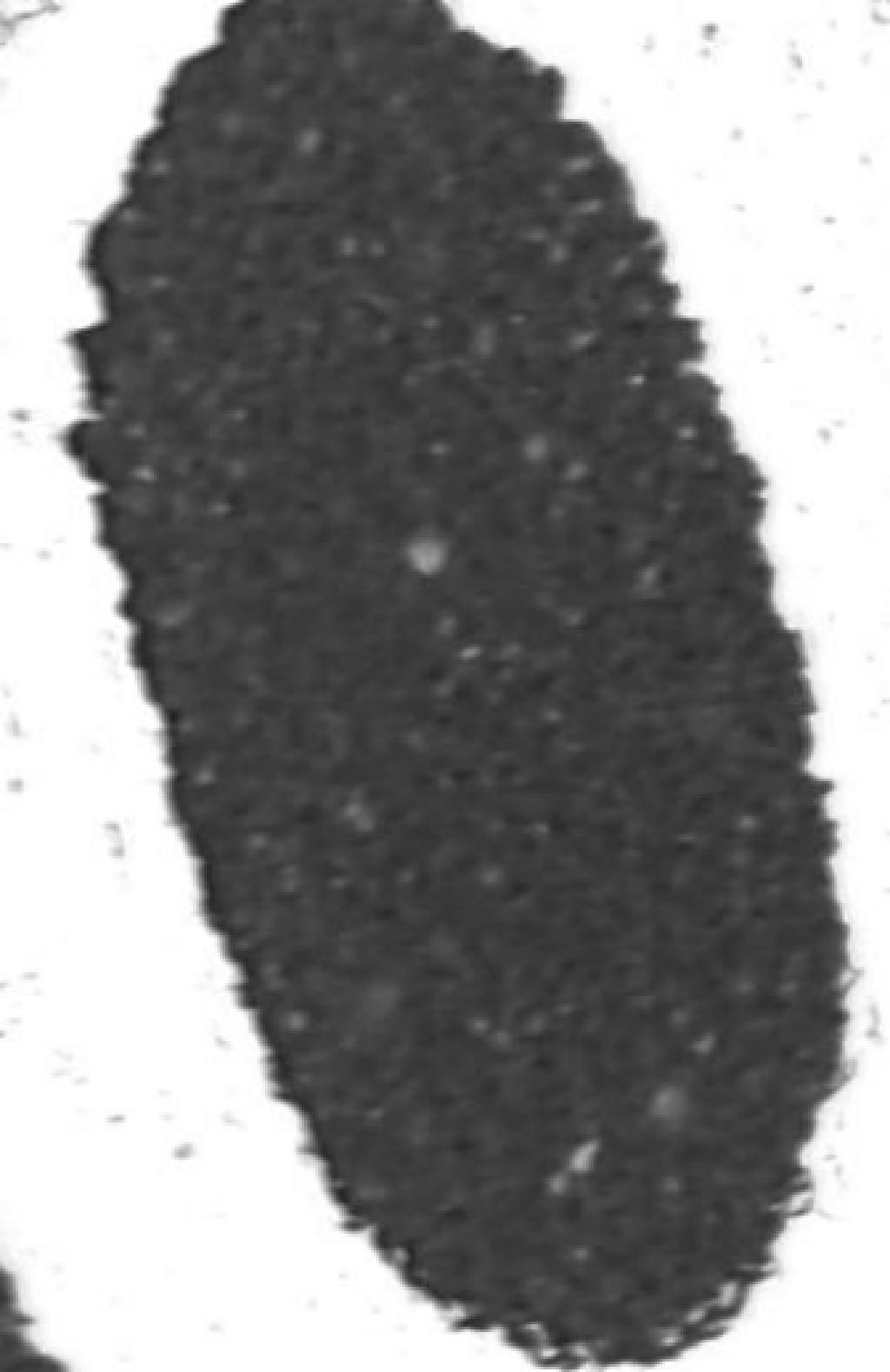
### Advance II Control Electronics – Features (version 5.1)

- 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 vibrators 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

<b>Parameters of Energy Source:</b>	Dynamite, Vibrosies
<b>Source Array:</b>	Single hole, charge: 5 kg, depth: 18m 4 over 3m, Sweep Length: 12 seconds Number of Sweeps: 6
<b>Detector Equipment:</b>	1 x 6 Geophones per Group Dyn:4, Vib: 1.667 Geophone Spacing Type 10 Hz
<b>Detector Array:</b>	6 Geophones over 20 m
<b>Recording System:</b>	I/O System II
<b>Recording Parameters:</b>	
<b>Shot Interval:</b>	Dyn: 50 m, Vib: 45 m
<b>Station Interval:</b>	Dyn: 20 m, Vib: 15 m
<b>Channels:</b>	Dyn: 400, Vib: 600
<b>Far Offsets:</b>	Dyn: 4010m, Vib: 4492.5m
<b>Near Offsets:</b>	Dyn: 10m, Vib: 7.5m

# GEOPHYSICAL DATA PROCESSING

## FOR SEISMIC REFLECTION DATA:

**Gain Recovery:** Exponential Gain Curve  $K [ T ] PWR [ N ] [ EXP [ AT ] ]$   
 $K=1, A=0, N=2$

**Bandpass Filter:** Zerophase Time Variant

**Mute Pattern:** Time and Space Variant

**Type of Deconvolution:** Surface Consistent Spiking

**Type of Velocity Analysis:** Constant Percentage Moveout

**Distance Between Analysis:** Every kilometer

**Picking Method:** Constant Percentage Moveout

## STATIC CORRECTION METHOD PARAMETERS:

**Statics** Generalized Linear Inversion, Automatic Surface Consistent

**Iterations** 8 Total

**MIGRATION METHOD PARAMETERS:** Kirchoff Summation Datum Referenced, to  
plotted weathering replaced surface, separately at shot and receiver

## TIME AMPLITUDE DISPLAY METHOD:

500 MS AGC

## DISPLAY PARAMETERS:

Horizontal Scale: Dyn: 50.8 TPI, Vib: 67.733 TPI  
Vertical Scale: 5 IPS

## WINTER 2000 FORT LIARD PROGRAM

### LIST OF LINES AND KILOMETERS SHOT PER LINE

FTL-52 (dynamite) 26.58 km

SWM-1X (vibrosies) 17.94 km

**TOTAL** 44.52 km

## ENCLOSURES

LINE            FTL-52, SWM-1X

MYLARS

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

PAPER

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

DISK

- 1        Survey Floppy

**WARNING:** BEFORE March 15, 2015 THESE DATA REMAIN THE EXCLUSIVE PROPERTY OF EXPLOR DATA LTD. OF CALGARY, ALBERTA. ANY UNLICENSED ACCESS, REPRODUCTION, SCAN, TRANSFER, SALE, TRADE, OR ANY OTHER AVAILABILITY IS PROHIBITED AND CONSTITUTES GRAND THEFT WHICH IS PUNISHABLE UNDER FEDERAL AND CIVIL LAW. VIOLATORS WILL BE PROSECUTED.