EXPLOR DATA LTD.
(Formerly BFR Consultants Ltd.)

SUMMER 1999 FORT LIARD PROGRAM

FINAL PLAN REPORT

on the

NON-PROPRIETARY HELI-PORTABLE SEISMIC PROGRAM

in

FORT LIARD PROSPECT
N.W.T

PROGRAM #9229-E34-1P
LUP N98B861

FTL-29

NOT RECORDED: FTL-5, 13X, 6X, 11X, KOT-10, SWM-1, JF-1, BVR-1, BVR-2

Duration: August - December 1999
Contractor: WesternGeco formerly Schlumberger Geco-Prakla
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Vice President

Date: June 14,01

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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: **August 14, 1999**

Start Production: **November 22, 1999**

Termination: **December 6, 1999**

Number of Technical Personnel: **32**

Number of Non-Technical Personnel: 8

Type and Number of Equipment Used:

1 Advance Party Manager Unit

1 Drill Push Unit

1 Cat Push Unit1

1 QHSE advisor Unit

2 RC Party Manager Units

1 Personnel Carrier

1 Observer Support Unit

1 Recorder and Generator

2 1 ton Line Units

1 5 ton Equipment Carrier

2 Line/Crew support units

1 Mechanic Unit

1 1 ton Fuel Unit

1 Supply Unit

Production Data:

Total Distance Surveyed: 13.50 km
Time Lost: 1 day recording

Daily Production:
November 29 –.5 km
November 30- 3.3 km
December 1- 3.5 km
December 2- 3.9 km
December 3 **weather day**
December 4 2.3
December 5 pick up
December 6 pick up

Summary of Conditions Pertaining to Weather and Terrain:

Very steep, rugged (elevations range from 800 feet to 3500 feet)

Summary of Factors Which Caused Down Time:

Recording crew unable to work December 3, 1999 due to heavy snowfall.

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. 6 Geophones were laid down every 15 m.

Recording System

Input/Output System Two

The I/O SYSTEM TWO is an advanced delta sigma tecnology 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

Parameters

Parameters of Energy Source:	Heli-portable/Dynamite
Source Array:	Single Hole
Detector Equipment:	6 Geophones per Group 3 Geophone Spacing Type 30 Hz
Detector Array:	6 Geophones over 15 m
Recording System:	**I/O System II**
Recording Parameters:	
Shot Interval:	90 m
Station Interval:	15 m
Channels:	600
Far Offsets:	4500 m
Near Offsets:	15 m

GEOPHYSICAL DATA PROCESSING

FOR SEISMIC REFLECTION DATA:

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

Bandpass Filter: **8/12-70/80 HZ**

Mute Pattern: **Distance: 464 479 4500 ms Time:-500 200 2100 ms**

Type of Deconvolution: Surface Consistent Spiking
Operator Length: 80 ms Prewhitening: 1 %
1000-3000 ms at 15m offset
1500-3000 ms at 4500 m offset

Distance **Design Gate** **APPL. Gate**

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 1st pass
Automatic Surface Consistent 2nd pass
Iterations **4**

MIGRATION METHOD PARAMETERS:
Spike Supression

TIME AMPLITUDE DISPLAY METHOD:
500 ms AGC

DISPLAY PARAMETERS:
Horizontal Scale: 34 TPI
Vertical Scale: 5 IPS

SUMMER 1998 PROGRAM

LIST OF LINES AND KILOMETERS SHOT PER LINE

FTL-29	13.50 km

TOTAL	13.50 km

ENCLOSURES

LINE FTL-29

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