

Final Report for a 2D Seismic Program in Maxhamish B.C. and Fort Liard, N.W.T.

Operated by : Canadian Forest Oil Ltd.

Operation Number : 9229-C131-1F

Land Use Permit : 99-8B0934

Type of Operation : 2D Seismic Acquisition Program

Location : Maxhamish B.C., - Fort Liard N.W.T.

Duration of Operation : 45 days

Principle Contractor : Schlumberger Geco Prakla of Calgary

Sub Contractors : Beaver Enterprises of Fort Liard (Line Clearing)
D. Gordon Contracting of Fort Nelson B.C. (Cat Cutting)
Impact Exploration Services Inc. (NEB and DIAND Approvals)
Envirosearch (Environmental Assessment)
Carswell Consulting Ltd. of Calgary (Operations Supervisor)

Interest Owners : Canadian Forest Oil Ltd., 45%
Paramount Resources Ltd., 22.5%
Berkley Petroleum Corporation, 22.5%

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Abstract

A 2D seismic acquisition program in the Maxhamish, B.C. - Fort Liard, N.W.T. was conducted by Canadian Forest Oil Ltd. (Canadian Forest) in conjunction with its partners over E.L. 381 and E.L. 380 from December 1998 to February 1999. Proximal to E.L. 381, a total of 84.16 kilometres of 2D vibroseis data was acquired under this seismic program approval. A total of 43.14 kilometres of this 84.16 kilometres of data was within the 3 kilometre distance of E.L. 381. Revision 1 of this approval adjusted the position of some of these seismic lines. As part of revision 2 of this program, proximal to E.L. 380, two 2D seismic lines were acquired. Line 99-EL380-003 is an exclusive 2D seismic line, 7.2 kilometres in length, acquired on behalf of Canadian Forest for itself and its partners. The second line acquired was shot under Canadian Forest's approval for BFR, now Explor. Line FTL-51 was acquired under non-exclusive status with all rights to ownership going to BFR (Explor). Canadian Forest and its partners purchased this line from BFR (Explor) and are submitting this line as a seismic purchase towards the work commitment of E.L. 380. Line FTL-51 is 28.0 kilometres in length. It is important to note that although the partners of both exploration licences are the same, the working interest varies. For E.L. 381, Canadian Forest has a 45% working interest, Paramount Resources Ltd. (Paramount) has a 22.5% working interest and Berkley Petroleum Inc. (Berkley) has a 22.5% working interest. For E.L. 380, the working interests are Canadian Forest 40%, Paramount 30% and Berkley 30% respectively.

Conventional vibroseis acquisition techniques were employed except over the Pettitot River where heliportable drills and handcut line slashing techniques were employed. Mr. Duncan Carswell of Carswell Consulting Ltd., was contracted by Canadian Forest Oil Ltd. to oversee the entire operation. Impact Exploration Services Inc. was contracted to assist with the approvals. EnviroSearch conducted the environmental assessment studies. Geco-Prakla was the principle contractor. Beaver Enterprises and D.Gordon Contracting provided line clearing and trucking services. The operation proximal to E.L. 380 took 45 days to complete with no weather delays. Line EL380-003 took 4 days to acquire from start to finish with only one of those days being the recording of the line.

The first four (4) 2D seismic lines acquired over EL 381 (Lines : 99CHI-001, 99CHI-002, 99CHI-003 and 99CHI-004) were of excellent quality, high frequency 120 fold data acquired as 240 channel data. Two sweeps from 10 - 120 hertz were conducted at every group interval with 3 vibrator trucks stationed end to end with zero drag at each shotpoint. The data were processed by Veritas GeoServices Ltd. of Calgary using a fairly standard processing runstream. Two passes of deconvolution and two passes of F-X deconvolution were applied to the data to maximize the signal and mitigate the noise in the shallow section while maintaining the data's integrity for the deeper section. Post-stack Kirchhoff time migration was applied to the data. The data were archived to tape and subsequently loaded onto a Seis-X workstation for interpretational purposes. Line 99EL380-003 was acquired as a 60 fold 2D line with 50 metre source intervals and 25 metre group intervals. Three vibroseis trucks were employed with a lower sweep frequency of 0 - 80 hertz. The data quality is defined as good.

Significant Dates and Statistics Summary

A summary of the significant dates are chronologically listed below with the increase / decrease of personnel noted alongside. Other requested statistics are quoted as requested.

- November 12th, 1998 - program submitted to Oil and Gas Commission in Fort St. John. DIAND in Yellowknife and the National Energy Board in Calgary
- November 25th, 1998 - Environmental Assessment filed with Diand and NEB
- December 3rd, 1998 - Revision 1 filed with O & G Commission, DIAND and NEB
- December 3rd, 1998 - Informed by DIAND that a response from the band was unlikely until after the dust would settle regarding the December 8th elections
- December 16th, 1998 - Addendum to Environmental Assessment filed with DIAND and NEB
- December 21st, 1998 - written approval received from Oil and Gas Commission for B.C. portion of program
- December 24th, 1998 - Land use permit received, NEB verbal approval received
- December 28th, 1998 - first of advance crew arrives
- December 29th, 1998 - NEB authorization received
- January 4th, 1999 - line clearing begins (16 personnel)
- January 7th, 1999 - Revision 2 program submitted to DIAND
- January 8th, 1999 - Revision 2 program submitted to NEB
- January 13th, 1999 - survey chaining crew arrive (additional 2 personnel)
- January 20th, 1999 - hand drilling crew arrives (Additional 6 personnel)
- January 21st, 1999 - hand drilling crew complete and departs (released 6 personnel)
- January 25th, 1999 - seismic recording crew arrives (additional 28 personnel)
- January 26th, 1999 - parameter testing, slashers started (additional 4 personnel)
- January 27th, 1999 - recording commenced
- February 1st, 1999 - chaining and surveying complete (2 personnel released)
- February 3rd, 1999 - line clearing and slashing complete (20 personnel released)
- February 5th, 1999 - NEB verbal approvals for Revision 2 received, DIAND approval granted for southern lines not in Nahanni Butte jurisdiction
- February 10th, 1999 - seismic recording complete (28 personnel released)

For EL 381 Exclusive Program

Total Distance Surveyed : 84.16 kilometres
 Down Time per Day : nil
 Number of Kilometres Recorded per Day : 5.6 km / day

For EL 380 Exclusive Program

Total Distance Surveyed : 7.2 kilometres
 Down Time per Day : nil
 Number of Kilometres Recorded per Day : 7.2 km / day

Weather Summary and Topographic Conditions

The ground was frozen throughout the operations. There was some snow cover, precipitation abnormally light this winter. For the EL 380 program, the low temperature of the day was -40 degrees Celsius with an average daily high of -20 degrees Celsius. The muskeg was frozen which assisted the project operations. For Line 99EL380-003, the weather conditions were warmer approximately by 15 degrees Celsius both a night-time lows and daily highs.

Topography was not steep except the western end of 99EL380-003 and around the Pettitot River. The river valley was accessed by a hand cut line and the equipment was lifted in by helicopter. Hand augered holes with small dynamite charges were drilled in the river valley to provide continuity where the vibrators could not go.

General Description of Operation and Acquisition

Seismic Equipment Used

The I/O System Two is an advanced delta sigma technology data acquisition system offering numerous advanced recording and signal processing features found on no other recording system. Amongst these features are:

- full 24 bit analog to digital recording
- Spectral Shaping Filter (SSF)
- Enhanced Hi-line Pickup Eliminator
- Total Self Calibration Testing
- Increased Spatial Sampling
- Reduced field battery power requirements
- Automatic Detection of pilot oversteering for vibroseis
- 32 available low cut frequencies and appropriate low cut filters

Survey Equipment Used

The Geco-Prakla survey equipment employed was a combination of conventional survey methods and real time GPS. The equipment includes Wild T1, T16 and DI-41 theodolites or Topcon GTS-3B Total Stations with integral infra-red distomats and electronic data recorders. Data reduction was assisted by the Prosters positioning software which produced SEGPI formatted survey. The GPS equipment was a Trimble 4000SE/Sse receiver with an antennae, radio modem and supporting software. The software enables upload and download of preplots as well as transformation from WGS-84 to a local datum (NAD 27) 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 to enable computation of a refined position. The real time GPS crew used 1 master GPS unit and rover GPS units complete with modem and radio link. The results of this survey methodology provided accuracies to approximately 1 metre spatially.

The following portions of lines were deemed to be within 3 kilometres of E.L. 381 and the resultant mileage is submitted by Canadian Forest Oil Ltd. (45% W.L.) and its partners Paramount Resources Ltd (22.5% W.L.) and Berkley Petroleum Inc. (22.5% W.L.)

EL 381 Program

<i>Line Name</i>	<i>Work Bonus Shotpoint Range</i>	<i>Work Bonus Mileage</i>
99-CHI-001	S.P. 556 - S.P. 1293	14.74 km
99-CHI-002	S.P. 481 - S.P. 1109	12.56 km
99-CHI-003	beyond 3 km from land	00.00 km
99-CHI-004	S.P. 193 - S.P. 985	15.84 km
Total		43.14 km

EL 380 Program

<i>Line Name</i>	<i>Work Bonus Shotpoint Range</i>	<i>Work Bonus Mileage</i>
99EL380-003	S.P. 113 - S.P. 401	7.20 km
Total		7.20 km

Acquisition Parameters

The principle energy source for the seismic survey was vibroseis. For the EL 381 program, three (3) vibroseis trucks centred inbetween the shotpoint flags with a 10 metre drag, were used with a shotpoint interval of 20 metres. Receiver groups were also layed out with 20 metre group intervals resulting in 120 fold data being acquired with the 240 channel recording system in a symmetrical split spread configuration. Linear sweeps from 10 - 120 hertz were used. The far offsets normally recorded were 2410 metres. A 2 millisecond sample rate was used with a record length of 5 seconds. Nine (9) OYO 10 hertz geophones were used for each group interval. (Enclosure 1 : Seismic section sidelabels) In the valley of the Pettitot River, ¼ kilogram charges of dynamite were used in shallow hand augered holes to provide continuous coverage.

For the EL 380 program, the source interval had a 50 metre spacing with a group interval of 25 metres resulting in 60 fold acquisition with a 240 channel system. Twelve second 10 - 80 hertz linear sweeps were used with 3 vibrator trucks. The far offset of the spread was 3037 metres with a 62.5 metre inside gap. The vibes were centred inbetween the flags to provide more sampling for statics control. A 2 millisecond sample rate was used with 6 seconds of recording time. Nine (9) OYO 10 hertz geophones were used for each group interval.

Geophysical Data Processing

For EL 381, the data was processed at Kelman Seismic Processing. The sequence began with demultiplexing and then an exponential amplitude gain recovery. A surface consistent deconvolution was applied to the data to increase frequency content. After the application of statics, trace edits and velocities, a zero phase deconvolution was applied to whiten the frequency spectrum. Residual statics work was conducted along with trace mutes before the data were stacked to 120 fold. Two passes of F-X deconvolution was applied to filter out ambient noise prior to post-stack Kirchhoff time migration. (Enclosure 1 : Seismic section sidelabels)

For EL 380, the data was processed at Integra. Dip Move-Out was applied to this data set prior to pre-stack time migration to enhance the structural imaging of the subsurface. The pre-stack migration algorithms typically provide a clearer image than post-stack migrations in structurally complex areas such as EL 380.