

EAST LIARD

9-9-N10-10E



Geophysical Report

EAST LIARD, N.W.T.

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Lat: 60 deg. 00 min. to 60 deg. 30 min. N  
Long: 123 deg. 07.5 min. to 124 deg. 00 min. W

Program Number	9229-N10-10E
Operator's Report Name	Northcor East Liard Seismic Program 1984
Type of Survey	Reflection Seismic
Survey Locality	Northwest Territories
Year of Field Work	1984
Operator	Northcor Energy Ltd. Calgary, Alberta
Prime Contractor	Sefel Geophysical Ltd. Calgary, Alberta
Exploration Agreement	E.A. No. 168
Author of Report	Empress Exploration Consultants Calgary, Alberta
Date of Report	March, 1985
Commencement of Survey	January 23, 1984
Completion of Survey	February 19, 1984



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### ENCLOSURES

1. Seismic Shot Point Map
2. Seismic Sections: one pre-fold paper copy and  
one film copy for Lines NEL 1,3-7
3. Interpretive Maps: one pre-fold paper print of each

#### Time Structural Maps:

- Paleozoic Unconformity
- Middle Mattson
- Near Base Mattson
- Near Top Nahanni

#### ABSTRACT

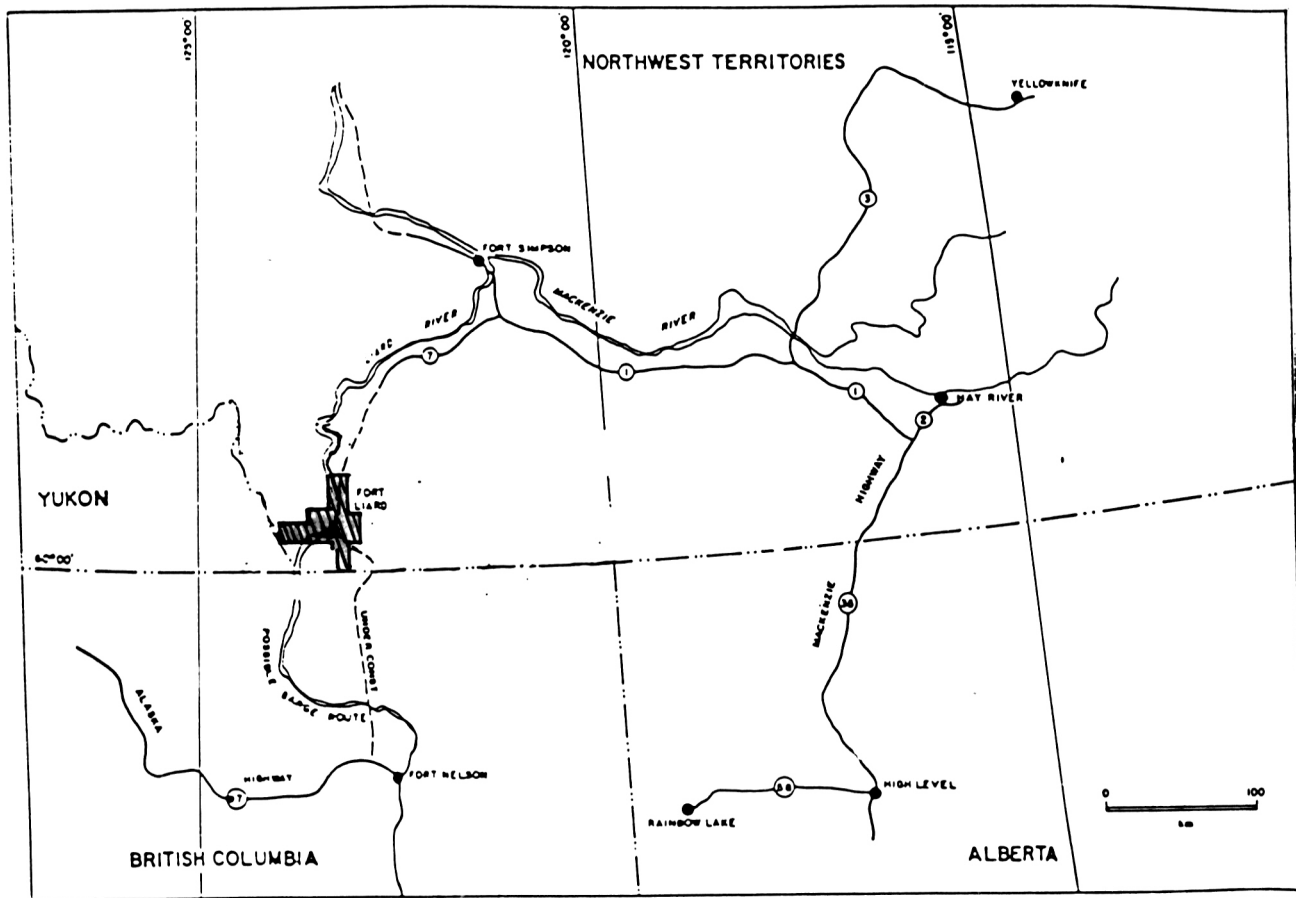
The prospect area lies just to the north of the southern boundary of the Northwest Territories, centers on the town of Fort Liard and is intersected by the Liard River.

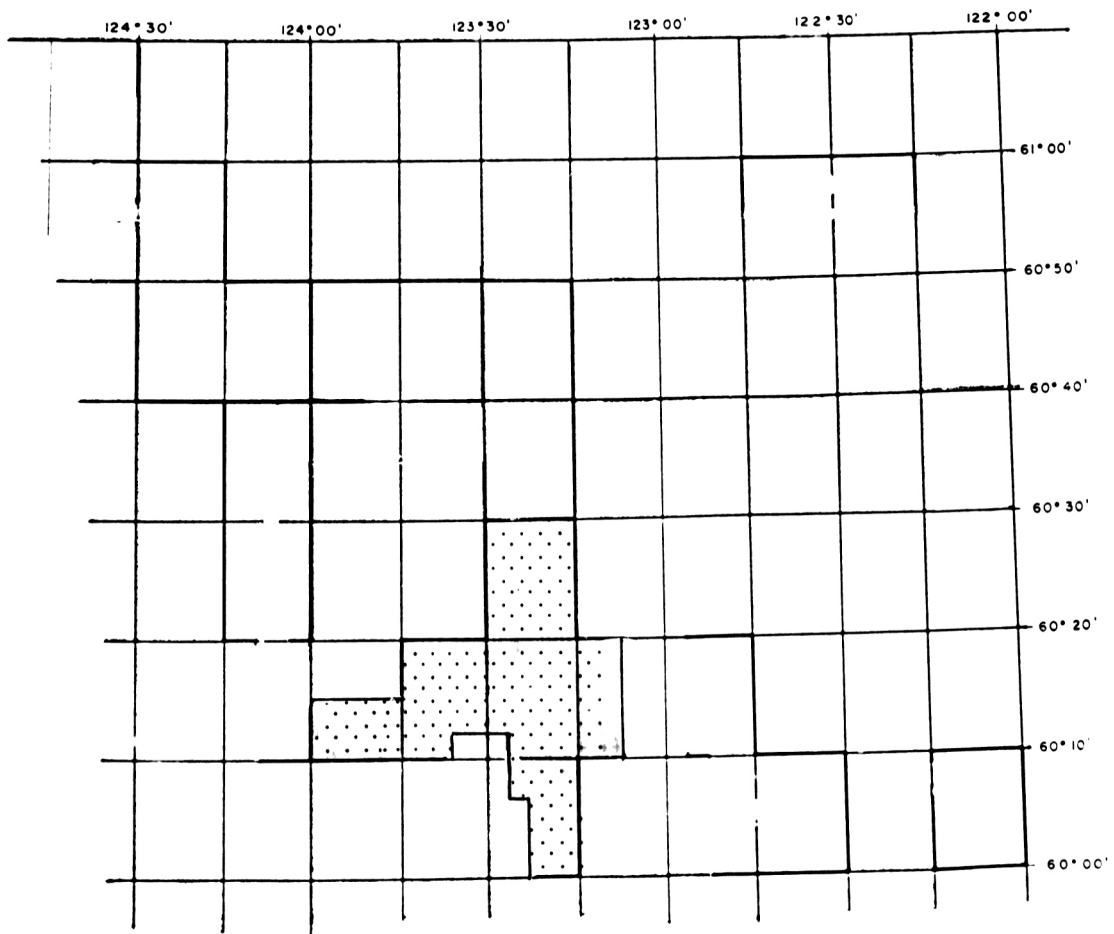
The survey was undertaken west of the river to study the geologic section for hydrocarbon accumulations. Only one line had been previously recorded in this area. The main target was hitherto undetected features involving the Middle Devonian Carbonate with secondary emphasis on Cretaceous, Mattson and/or Flett possibilities.

Party 506 of Sefel Geophysical Ltd., under the direction of Empress Exploration Consultants, Calgary, Alberta, began recording operations on or about January 23, 1984 and commenced recording February 6, 1984. During twenty-four working days (ten recording) 95.2 kilometers of seismic data were collected. Initial field parameters called for 2400% stacking due to anticipated poor quality data. Three lines were shot at 2400% however, because the field data appeared quite good, the stack for the balance of the program was reduced to 1200%.

Processing was performed by Sefel Geophysical Ltd. in Calgary and the data quality was good at the shallow levels, deteriorating with depth. In the absence of any well ties, correlations were based on seismic character, surface geology and jump correlation from distant control. In particular, the identification of the Nahanni event is speculative.

No significant prospects were found.





#### STATISTICAL SUMMARY

Tractors arrived at the program site January 23, 1984, drilling began February 1, 1984, and recording commenced February 6, 1984. The field survey was completed February 15, 1984 - a total of twenty-four days being worked of which ten were recording days.

Forty-three Canadian personnel - the total field complement - were employed on the program.

#### Basic Crew

- 1 - Party Manager
- 1 - Clerk
- 1 - Mechanic
- 3 - Camp Staff (Cook, Helper and Camp Attendant)
- 4 - Survey Crew
- 1 - Observer
- 1 - Junior Observer
- 1 - Shooter
- 1 - Shooter's Helper
- 4 - Line Truck Drivers
- 8 - Recording Helpers
- 4 - Drillers
- 4 - Drill Helpers
- 2 - Water Truck Drivers
- 4 - Cat Skinners
- 1 - Tractor Operator
- 1 - Cat Foreman
- 1 - Cat Supervisor

95.2 kilometers of seismic coverage were obtained, the daily production averaging 9.52 kilometers. No serious delays were experienced.

Topographically, the area is rolling foothills cut by steep coulees and is fairly heavily timbered. Muskego patches were encountered particularly to the north. Vehicular travel was slow due to the hills and tow cats were required at times.

The weather remained reasonably cold, winds relatively light and snowfall average. Hence, no weather-related delays were experienced.

DESCRIPTION OF DATA ACQUISITION EQUIPMENT  
AND FIELD PROCEDURES

(see also the attached section labels)

energy/source array: 2400% data: 4kg dynamite at 17m  
in a single hole, holes spaced  
80m apart in line with spread.

1200% data: 2kg dynamite at 13m  
in a single hole, holes spaced  
160m apart in line with spread.

detector type/array: 10 Hz GEOSPACE geophones were  
laid out in an in-line pattern  
of 18 geophones at 3m intervals  
centered on each station.  
Station or group interval was  
40m and the spread geometry:

1920m - 40m - x - 40m - 1920m

recording system: a 96 channel MDS-10 recording  
instrument was employed, using  
SEGB format. 6 seconds of data  
were recorded at 2 millisecond  
sample rate. The recording  
filter was 12/18 - 125/72 Hz.



# DESCRIPTION OF DATA PROCESSING

## 1. MIGRATED - 2400 % STACK

FIELD RECORDING	
DATE SHOT	FEBRUARY 1984
SHOT BY	SEFEL GEOPHYSICAL LTD
SOURCE TYPE	PARTY NO 506
SOURCE PATTERN	DYNAMIC
CHARGE SIZE	SINGLE HOLE
GEOPHONE TYPE	4 KG AT 12 M
GEOPHONE PATTERN	GEOSPAC-10 HZ
INTERVALS	18 AT 3 M INTERVALS
FORMAT	105 10 96 TRACES
RECORDING FILTER	56 HZ
RECORD LENGTH	12/18 - 125/22 HZ
SAMPLE INTERVAL	6 SEC
GROUP INTERVAL	2 MS
SHOT POINT INTERVAL	40 M
SPREAD GEOMETRY	80 M
	1920-40-X-40-1920 M
DIGITAL PROCESSING	
1 DEMULTIPLEX WITH GAIN REMOVAL	
PROCESSING SAMPLE RATE	2 MS
2 INSTRUMENT PHASE COMPENSATION	
3 GEOPHONE PHASE COMPENSATION	
4 CDP TRACE GATHERS	2400 PERCENT
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION	
OPERATOR DESIGN WINDOW	
MIN OFFSET	250-1750 MS
MAX OFFSET	1100-2600 MS
OPERATOR LENGTH	60 MS
PREWHITENING	1 PERCENT
7 WEATHERING STATICS	
DATUM ELEVATION	500 M ASL
DATUM VELOCITY	3700 M/SEC
WEATHERING VELOCITY	610 M/SEC
8 VELOCITY ANALYSIS	
9 N/A	
10 AUTOMATIC RESIDUAL STATICS	
MAX CORRELATION LAG	+/-30 MS
WINDOW	500-1500 MS
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	
14 STACK	2400 PERCENT
15 WAVE EQUATION MIGRATION	
16 BANDPASS FILTER	10/20 - 60/70 HZ
17 EQUALIZATION	
WINDOW	400-2500 MS
18 FILM DISPLAY	16 TRACES/IN
	5 INCHES/SEC
NORMAL POLARITY (POSITIVE VALUE PEAK)	
PROCESSING PARAMETERS SELECTED BY	
EMPRESS EXPLORATION CONSULTANTS	

2. MIGRATED - 1200 % STACK

FIELD RECORDING	
DATE SHOT	FEBRUARY 1984
SHOT BY	SEFEL GEOPHYSICAL LTD
	PARTY NO. 506
SOURCE TYPE	DYNAMITE
SOURCE PATTERN	SINGLE HOLE
CHARGE SIZE	2 KG AT 13 M
GEOPHONE TYPE	GEOSPACE-10 HZ
GEOPHONE PATTERN	1B AT 3 M INTERVALS
INSTRUMENTS	MOS-10 96 TRACES
FORMAT	SECB
RECORDING FILTER	12/18 - 125/72 HZ
RECORD LENGTH	6 SEC
SAMPLE INTERVAL	2 MS
GROUP INTERVAL	40 M
SHOT POINT INTERVAL	150 M
SPREAD GEOMETRY	1920-40-X-40-1920 M

DIGITAL PROCESSING	
1 DEMULTIPLEX WITH GAIN REMOVAL	2 MS
2 INSTRUMENT PHASE COMPENSATION	
3 GEOPHONE PHASE COMPENSATION	1200 PERCENT
4 CDP TRACE GATHERS	
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION	
OPERATOR DESIGN WINDOW	250-1750 MS
MIN OFFSET	1100-2600 MS
MAX OFFSET	60 MS
OPERATOR LENGTH	1 PERCENT
PREWHITENING	
7 WEATHERING STATICS	500 M ASL
DATUM ELEVATION	3700 M/SEC
DATUM VELOCITY	610 M/SEC
WEATHERING VELOCITY	
8 VELOCITY ANALYSIS	
9 NMO	
10 AUTOMATIC RESIDUAL STATICS	+/-30 MS
MAX CORRELATION LAG	250-1100 MS
WINDOW	
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	1200 PERCENT
14 STACK	
15 WAVE EQUATION MIGRATION	10/20 - 60/70 HZ
16 BANDPASS FILTER	
17 EQUALIZATION	400-2500 MS
WINDOW	16 TRACES/IN
18 FILM DISPLAY	5 INCHES/SEC

NORMAL POLARITY (POSITIVE VALUE PEAK)

PROCESSING PARAMETERS SELECTED BY  
EMPRES: EXPLORATION CONSULTANTS

3. UNMIGRATED - 2400 % STACK

FIELD RECORDING	
DATE SHOT	FEBRUARY 1984
SHOT BY	SEFEL GEOPHYSICAL LTD
	PARTY NO. 506
SOURCE TYPE	DYNAMITE
SOURCE PATTERN	SINGLE HOLE
CHARGE SIZE	4 KG AT 17 M
GEOPHONE TYPE	GEOSPACE-10 HZ
GEOPHONE PATTERN	18 AT 3 M INTERVALS
INSTRUMENTS	MDS-10 96 TRACES
FORMAT	SEGB
RECORDING FILTER	12/18 - 125/72 HZ
RECORD LENGTH	6 SEC
SAMPLE INTERVAL	2 MS
GROUP INTERVAL	40 M
SHOT POINT INTERVAL	80 M
SPREAD GEOMETRY	1920-40-X-40-1920 M

DIGITAL PROCESSING	
1 DEMULTIPLEX WITH GAIN REMOVAL	
PROCESSING SAMPLE RATE	2 MS
2 INSTRUMENT PHASE COMPENSATION	
3 GEOPHONE PHASE COMPENSATION	
4 CDP TRACE GATHERS	2400 PERCENT
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION	
OPERATOR DESIGN WINDOW	
MIN OFFSET	250-1750 MS
MAX OFFSET	1100-2600 MS
OPERATOR LENGTH	60 MS
PREWHITENING	1 PERCENT
7 WEATHERING STATICS	
DATUM ELEVATION	500 M ASL
DATUM VELOCITY	3700 M/SEC
WEATHERING VELOCITY	610 M/SEC
8 VELOCITY ANALYSIS	
9 NMO	
10 AUTOMATIC RESIDUAL STATICS	
MAX CORRELATION LAG	+/-30 MS
WINDOW	500-1500 MS
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	
14 STACK	2400 PERCENT
15 BANDPASS FILTER	10/20 - 60/70 HZ
16 EQUALIZATION	
WINDOW	400-2500 MS
17 FILM DISPLAY	16 TRACES/IN
	5 INCHES/SEC
REVERSE POLARITY (NEGATIVE VALUE PEAK)	

PROCESSING PARAMETERS SELECTED BY  
EMPRESS EXPLORATION CONSULTANTS

4. UNMIGRATED - 1200 % STACK

FIELD RECORDING	
DATE SHOT	FEBRUARY 1984
SHOT BY	SEFEL GEOPHYSICAL LTD
	PARTY NO 506
SOURCE TYPE	DYNAMITE
SOURCE PATTERN	SINGLE HOLE
CHARGE SIZE	2 KG AT 13 M
GEOPHONE TYPE	GEOSPACE-10 HZ
GEOPHONE PATTERN	18 AT 3 M INTERVALS
INSTRUMENTS	MDS-10 96 TRACES
FORMAT	SEGB
RECORDING FILTER	12/18 - 125/72 HZ
RECORD LENGTH	6 SEC
SAMPLE INTERVAL	2 MS
GROUP INTERVAL	40 M
SHOT POINT INTERVAL	160 M
SPREAD GEOMETRY	1920-40-X-40-1920 M

DIGITAL PROCESSING	
1 DEMULTIPLEX WITH GAIN REMOVAL	2 MS
PROCESSING SAMPLE RATE	
2 INSTRUMENT PHASE COMPENSATION	
3 GEOPHONE PHASE COMPENSATION	1200 PERCENT
4 CDP TRACE GATHERS	
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION	
OPERATOR DESIGN WINDOW	250-1750 MS
MIN OFFSET	1100-2600 MS
MAX OFFSET	60 MS
OPERATOR LENGTH	1 PERCENT
PREWHITENING	
7 WEATHERING STATICS	500 M ASL
DATUM ELEVATION	3700 M/SEC
DATUM VELOCITY	610 M/SEC
WEATHERING VELOCITY	
8 VELOCITY ANALYSIS	
9 NMO	
10 AUTOMATIC RESIDUAL STATICS	+-30 MS
MAX CORRELATION LAG	250-1100 MS
WINDOW	
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	1200 PERCENT
14 STACK	10/20 - 60/70 HZ
15 BANDPASS FILTER	
16 EQUALIZATION	400-2500 MS
WINDOW	16 TRACES/IN
17 FILM DISPLAY	5 INCHES/SEC

NORMAL POLARITY (POSITIVE VALUE PEAK)

PROCESSING PARAMETERS SELECTED BY  
EMPRESS EXPLORATION CONSULTANTS

### DISCUSSION OF STUDY

The area west of the Liard River had been traversed by only one east-west line. This line showed the subsurface elements of the Liard Thrust fault, showed normal faulting patterns within the Mattson interval and showed some interesting wedging at the Mattson-Mississippian interface. A seismic program was laid out across a perceived hinge line to map any potential hydrocarbon prospect which might occur in the Nahanni, Mississippian-Mattson or the Cretaceous.

Initially it was believed that data quality could be very poor. A 2400% stack was planned but when initial field data was observed and found to be of good quality the stack was reduced to 1200%. Processing culminated in a wave equation migration.

The Paleozoic unconformity could be readily observed on the seismic and was tied to outcrops. Although oil and gas shows in the Cretaceous are not uncommon, no trap was mapped.

The Middle Mattson event was of good quality and best expressed the normal faulting observed within this unit. No traps were mapped.

The Base Mattson-Mississippian interface is a poorer quality correlation. There was some initial hope of a trap along an apparent hinge line aided perhaps by faulting. No such trap was found.

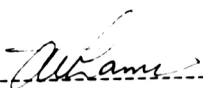
Finally, the Nahanni event is a very tenuous correlation. The level was deduced from far-flung data and

the quality is "form line" in nature. Again no significant prospect was mapped.

COMMENTS AND CONCLUSIONS

The seismic interpretation of the East Liard area successfully acquired diagnostic data west of the Liard River. Maps were compiled at four different levels to evaluate known potential reservoir beds. In no case was a significant structural prospect found. No obvious expression of a stratigraphic trap was observed and further evaluation would require subsurface control.

It was concluded that this part of the block should be surrendered.

  
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A.T. Lamb

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