

PROJECT ACTION SHEET

RESOURCE EVALUATION BRANCH

PROJECT NUMBER:....9229-N10-2E.....

COMPANY:..MILTON ENERGY LTD.....

REPORT TITLE:..SAWMILL, SOUTH SAWMILL REFLECTION SEISMIC PROGRAM

The following action has been taken:

Receipt acknowledged✓

Reports and maps date-stamped✓

Memo sent to Land Management

Reports for review list edited

Inventory sheet made✓

Mylar

REVIEW AND APPROVAL made by:

Joh O'Brien 85-08-27

COMMENTS:

PROGRAM NUMBER: 9229-N10-1E

YEAR: 1983-84

Filed under same Project Number _____ OR _____

(a) WRITTEN REPORTS:

Four reports
Report
Cover

(1) Operations Report

Number: 2

(2) Interpretation Reports

Number: 1

(b) MAPS:

(1) Shotpoint Maps

Number: 2

(2) Interpretation Maps

Number: 8

TIME STRUCTURE MAPS (4)

DEPTH STRUCTURE MAPS (4)

(3) Other Maps

Number: _____

(c) SEISMIC SECTIONS

Number: 13 (sic)

83-001

OTK-007 TO OTK-008

OTK-008A

OTK-009 TO OTK-011

Notices:

		KM	Completed Survey	Approved
9229 - N10 - 1E	Savannah 45	206		85-08-27
9229 - N10 - 2E	Tamir Sabe	173		84-05-03 ✓
" - 3E	Island River	46		84-05-02
" - 4E	Scattered areas		84-02-25	not required
" - 7E	Cameron Hill		84-03-21	M. R.
" - 8E	Tamir Sabe		84-03-02	M. R.
" - 9E	Island River		84-02-26	M. R.
" - 10E	Scattered areas		84-03-22	M. R.
" - 11E	Blackstone River		84-03-17	M. R.
" - 12E	Cameron Hill		85-01-21	M. R.

*All above
Received
85-08-26*

Geophysical Report

92° 9' N 10° 1' E
SAWMILL - N.W.T.
E.A. No. 167

Aug 26 1985

Project #

SAWMILL, N.W.T.

Lat: 60 deg. 30 min. to 60 deg. 50 min. N
Long: 123 deg. 15 min. to 124 deg. 00 min. W

Program Number	9229-N10-1E
Operator's Report Name	Northcor Sawmill Seismic Program 1983, 1984
Type of Survey	Reflection Seismic
Survey Locality	Northwest Territories
Year of Field Work	1983, 1984
Operator	Northcor Energy Ltd. Calgary, Alberta
Prime Contractor	Sefel Geophysical Ltd. Calgary, Alberta
Exploration Agreement	E.A. No. 167
Author of Report	Empress Exploration Consultants Calgary, Alberta
Date of Report	March, 1985
Commencement of Survey	September, 1983
Completion of Survey	February, 1984

TABLE OF CONTENTS AND ENCLOSURES

	Page
I. ABSTRACT.....	1
II. Locality Map.....	2
IIIA. Statistical Summary - Summer Portable Program..	4
IIIB. Statistical Summary - Winter Program.....	6
IV. Data Acquisition Equipment and Field Procedures	8
V. Description of Data Processing.....	10
VI. Discussion.....	12

ENCLOSURES

1. Seismic Shot Point Map
2. Seismic Sections: two pre-fold paper copies and one film copy for Lines OTK 001 - OTK 005, Ptn. OTK 006, OTK 009, and Ptn. OTK 010
3. Interpretive Maps: one pre-fold paper print of each

Time Structural Maps:

- Near Base Mattson
- Near Top Nahanni

Depth Structural Maps:

- Near Base Mattson
- Near Top Nahanni

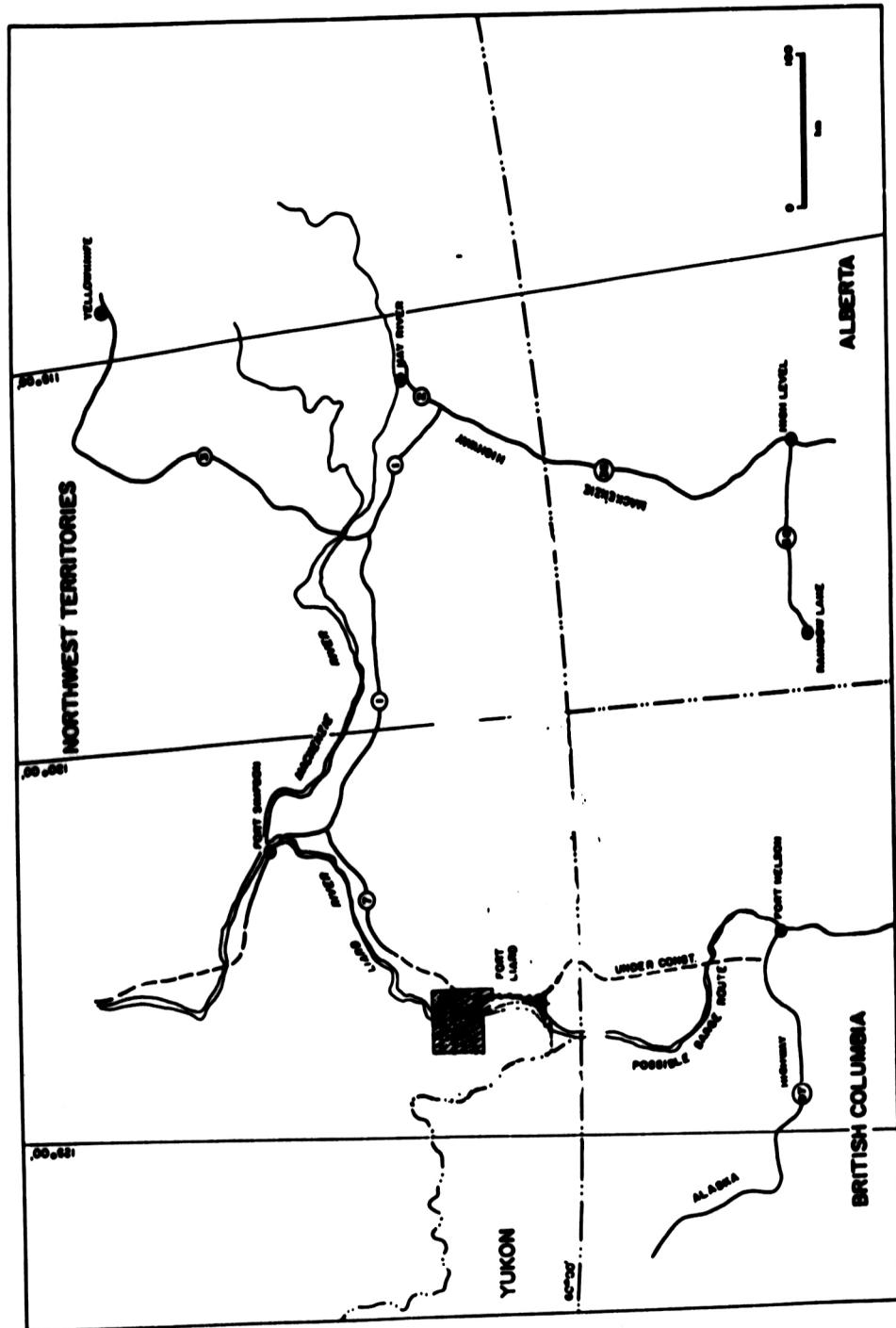
I. ABSTRACT

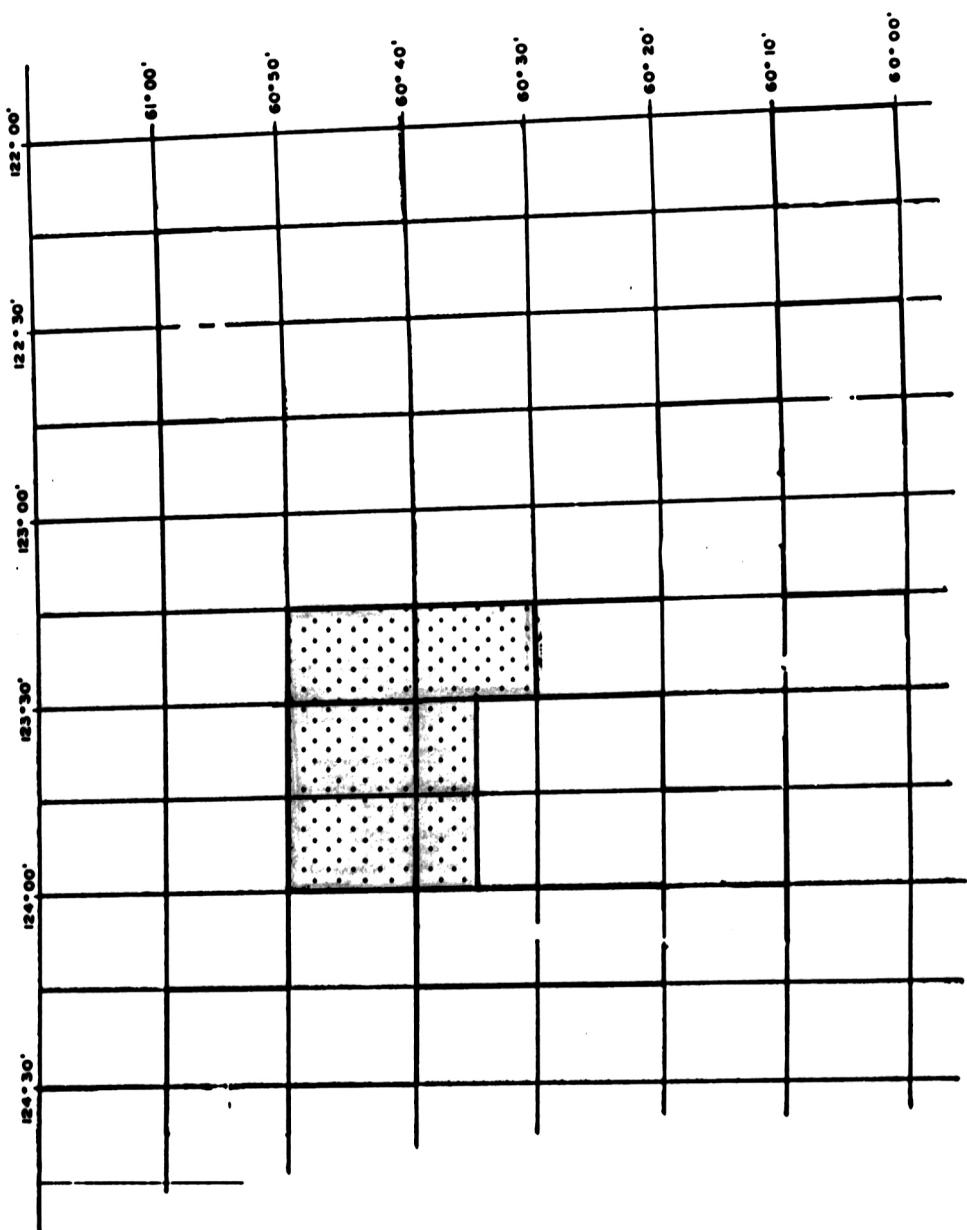
The Sawmill area lies in the southwest corner of the N.W.T. along the Liard River some 25 km north of Fort Liard. The seismic program was undertaken over the central portion of the block in mountainous terrain. The exploration objective was to determine whether a hydrocarbon accumulation similar to the Pointed Mountain Middle Devonian Carbonate gas field might exist in this previously lightly explored area.

One line OTK 002 crossed Sawmill Mountain and could only be recorded using the Sefel helicopter portable crew. This 10.1 km line was recorded as part of the Kotaneelee "summer" program in October, 1983. The balance of the seismic program (83.18 km) was recorded with two conventional Sefel seismic crews in February and March of 1984.

Processing was done by Sefel Geophysical in Calgary. The data quality ranged from very poor to unuseable in the Quaternary fill along the river to poor over Mattson outcrop to generally fair over the remaining outcrops. Overall the data is considered interpretable.

Time and depth maps were prepared for the Base of Mattson and the 'Nahanni' events. No significant prospects were found.





LOCALITY MAP

IIIA. STATISTICAL SUMMARY
SUMMER PORTABLE PROGRAM

The summer portable seismic crew which recorded one line in this area was a part of the Kotaneelee-Jackfish program. The overall operation began in late June, 1983 and terminated in late October, 1983. While scouting, slashing, surveying and drilling occurred throughout this period, the main effort on this line was in October, 1983.

Personnel

The total crew consisted of 56 to 57 personnel all of Canadian nationality. The makeup was as follows:

- 1 - Party Manager
- 1 - Clerk (Clerk, Powderman, Supply Driver)
- 1 - Mechanic (Water Hauler)
- 1 - Operator
- 1 - Junior Operator
- 1 - Shooter
- 1 - Shooter's Helper
- 1 - Head Linesman
- 10 - Recorder Helpers
- 5 - Survey Crew (When Needed)
- 6 - Slashers
- 1 - Drill Co-ordinator
- 9 - Drillers (When Needed)
- 9 - Drillers' Helpers (When Needed)
- 1 - Drill Mechanic
- 2 - Kitchen Staff
- 1 - Camp Attendant
- 2 or 3 - Pilots
- 2 - Chopper Mechanics

Production Data

The 10.1 km of 1200t seismic was obtained over three recording days for an average of 3.5 km per day.

Conditions

The formidable terrain required that all movements be assisted by helicopter transport. This included the pick up of cable and geophones and the "doghouse". Fog, wind and treacherous terrain, not to mention bears, all contributed to a slow and expensive operation. Most of all, the drilling conditions were frightful. The portable drills had to be dismantled and reassembled for each move or even for a skid. Each movement required the Bell 214 helicopter and with eight drills working unavoidable delays were experienced. The drills were fundamentally "hard rock" devices and over the Mattson outcrop in particular, the alternating hard and soft rock layering resulted in collapsed holes and/or "sticking" on hard ledges. Loading the "spec" charges at the "spec" depth was frequently impossible. Compromises on "specs" and finding a suitable drilling mud proved necessary to obtain reasonable production.

IIIB. STATISTICAL SUMMARY
WINTER PROGRAM

Scouting advance crews arrived at the campsite around December 29, 1983. While some survey and scouting were begun, cat work began about February 15, 1984 with drilling about February 20 and recording March 10, 1984. Two recording crews (Sefel 501 and 506) were employed in order to complete as much program as possible prior to breakup. The crews demobilized on March 31, 1984.

A total of eighty-six Canadian personnel were employed on the crews with each basic crew made up as follows:

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
- 4-9 - Drillers
- 4-9 - Drill Helpers
- 2-4 - Water Truck Drivers
- 4-7 - Cat Skimmers
- 1 - Tractor Operator
- 1 - Cat Foreman
- 1 - Cat Supervisor

Some 83.18 km of 4800ft seismic reflection data were obtained over some 21 recording days for a production rate of 3.96 km per day.

No significant delays were encountered as a result of weather or terrain. The spring breakup did result in one of the planned lines being cancelled.

IV. DATA ACQUISITION EQUIPMENT AND FIELD PROCEDURES

Positioning Equipment

The horizontal and vertical positioning surveys were conducted using standard "land surveying" techniques. Theodolite and EDM measuring systems were employed with "take-offs" from governmental control points.

Aircraft

The summer portable crew utilized three helicopters which were contracted from Associated Helicopters Ltd. and Okanagan Helicopters Ltd., Calgary, Alberta. These were an A-Star, a Bell 215 and a Bell 206. Further air support for both winter and summer crews was provided by Villers Air of Fort Nelson, B.C.

All aircraft were of Canadian registry.

Energy Source

Dynamite was the energy source. For the summer portable crew, charge, depth and hole pattern were variable according to the surface geology. Based on Amoco Canada Petroleum Company Ltd. information and advice a standard single hole shot was used where the surface outcrop was not Mattson. This hole was loaded with 25 kg of dynamite at a depth of 23m. Where the surface outcrop was Mattson a two hole in-line pattern (10m separation) was shot with each hole to be loaded with 50 kg dynamite at a depth of 30m. Because of the severe drilling conditions these specifications were very difficult to meet and shallower holes with less charge were often the case. Shot holes were spaced every 100m.

The experience gained over the summer led to a drastic revision for the winter program. An examination of various field records representing a variety of charge sizes, hole depths, patterns and surface conditions revealed no obvious relationships between these parameters and record quality in this area. It was decided therefore to increase the stack to 4800t and use single holes loaded with 10 kg of dynamite at a depth of 17m. The shot holes were spaced every 40m. This approach significantly reduced the drilling time and the increased stack more than compensated for any loss in energy. In addition, costs were lowered.

Detector Equipment

Both summer and winter programs employed an 18 geophone in-line array at 3m intervals. The summer portable crew used Mark 10 Hz geophones and a group interval of 25m while the winter crew used Geospace 10 Hz geophones and a group interval of 40m.

Recording System

The summer crew employed a 96 trace Sercel 338 recorder while the winter crew used a 96 trace MDS 10 recorder. Both recorded at 2 milliseconds sample interval for six seconds of data in SEG-B format. The summer crew used an 8/12-125/24 Hz field filter compared to a 12/18-125/72 Hz filter on the winter crew.

Processing Parameters

See accompanying section labels. No migration was performed.

DESCRIPTION OF DATA PROCESSING - 1200 % STACK

FIELD RECORDING

DATE SHOT	OCTOBER, 1983
SHOT BY	SEFEL GEOPHYSICAL LTD
SOURCE TYPE	DYNAMITE
SOURCE PATTERN	SINGLE HOLE
CHARGE SIZE	24 KG AT 15 M
GEOPHONE TYPE	MARK-L15 10 HZ
GEOPHONE PATTERN	18 AT 3 M INT.
INSTRUMENTS	338 HR SERCEL
FORMAT	SEGB
DATA CHANNELS	96
RECORDING FILTER	8/12-125/24 HZ
RECORD LENGTH	6 SEC
SAMPLE INTERVAL	2 MS.
GROUP INTERVAL	25 M.
SHOT POINT INTERVAL	100 M.
SPREAD GEOMETRY	1200-25-X-25-1200

DIGITAL PROCESSING

1 DEMULTIPLEX WITH GAIN REMOVAL PROCESSING SAMPLE RATE	2 MS
2 CDP TRACE GATHERS	1200 PERCENT
3 INSTRUMENT PHASE COMPENSATION	
4 GEOPHONE PHASE COMPENSATION	
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION OPERATOR DESIGN WINDOW	
MIN OFFSET	350-1350 MS.
MAX OFFSET	700-1700 MS.
OPERATOR LENGTH	80 MS.
PREWHITENING	1 PERCENT
7 WEATHERING STATICs DATUM ELEVATION	VARIABLE DATUM
DATUM VELOCITY	3700 M/SEC.
WEATHERING VELOCITY	610 M/SEC.
8 VELOCITY ANALYSIS	
9 NMO	
10 AUTOMATIC RESIDUAL STATICs MAX CORRELATION LAG WINDOW	+-40 MS. 500-2500 MS.
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	
14 STACK	1200 PERCENT
15 TIME VARIANT FILTER 0-1000 MS	14/22-65/75 HZ
1000-4000 MS	11/18-40/58 HZ
16 EQUALIZATION WINDOW	500-2500 MS.
17 VARIABLE TO FIXED DATUM CORRECTION FIXED DATUM	1200 M/ASL
18 FILM DISPLAY	16 TR/IN 5 IN/SEC
POLARITY (X) NORMAL () REVERSE	

PROCESSING PARAMETERS SELECTED BY
EMPRESS EXPLORATION CONSULTANTS

DESCRIPTION OF DATA PROCESSING - 4800 % STACK

FIELD RECORDING

DATE SHOT	MARCH, 1984
SHOT BY	SEFEL GEOPHYSICAL LTD
SOURCE TYPE	DYNAMITE
SOURCE PATTERN	SINGLE HOLE
CHARGE SIZE	10 KG AT 10 M.
GEOPHONE TYPE	MARK-L15A, 10 HZ
GEOPHONE PATTERN	10 AT 3M INT.
INSTRUMENTS	MDS 10
FORMAT	SEGS
DATA CHANNELS	96
RECORDING FILTER	12/18-172/72
RECORD LENGTH	6 SEC
SAMPLE INTERVAL	2 MS.
GROUP INTERVAL	40 M.
SHOT POINT INTERVAL	40 M.
SPREAD GEOMETRY	1920-40-X-40-1920

DIGITAL PROCESSING

1 DEMULTIPLEX WITH GAIN REMOVAL	
PROCESSING SAMPLE RATE	2 MS
2 CDP TRACE GATHERS	4800 PERCENT
3 INSTRUMENT PHASE COMPENSATION	
4 GEOPHONE PHASE COMPENSATION	
5 AUTOMATIC GAIN CURVE APPLICATION	
6 SPIKING DECONVOLUTION	
OPERATOR DESIGN WINDOW	
MIN OFFSET	350-1350 MS.
MAX OFFSET	700-1700 MS.
OPERATOR LENGTH	80 MS.
PREWHITENING	1 PERCENT
7 WEATHERING STATIC	VARIABLE DATUM
DATUM ELEVATION	3700 M/SEC.
DATUM VELOCITY	610 M/SEC.
8 VELOCITY ANALYSIS	
9 NMO	
10 AUTOMATIC RESIDUAL STATIC	
MAX CORRELATION LAG	+-40 MS.
WINDOW	500-2500 MS.
11 COMMON OFFSET STACK	
12 RESIDUAL NMO	
13 MUTE	4800 PERCENT
14 STACK	
15 TIME VARIANT FILTER	
0-1000 MS	14/22-65/75 HZ
1000-4000 MS	11/19-40/56 HZ
16 EQUALIZATION	
WINDOW	500-2500 MS.
17 VARIABLE TO FIXED DATUM CORRECTION	
FIXED DATUM	1200 M/ASL
18 FILM DISPLAY	16 TR/IN
	3 IN/SEC
POLARITY (X) NORMAL () REVERSE	

PROCESSING PARAMETERS SELECTED BY
EMPRESS EXPLORATION CONSULTANTS

VI. DISCUSSION

A. Sawmill

The area under study is structurally complex. The data quality ranged from no data to quite good and was generally adequate. The interpretation approach was as follows:

a) Correlations from available lines to the south of the block were interpolated.

b) Total corrections were noted and surface geological information was transferred onto each line.

c) Seismic correlations were made to tie the key geologic events (Base Cretaceous, Base Mattson, 1st Black Shale and Nahanni).

d) Working depth sections were constructed as an aid to and check on the seismic time correlations. Surface and well geology were tied, seismic events followed, layer thicknesses were kept stable and known and observed faults fitted. Constant interval velocities were employed in this exercise as the limited velocity information available proved to be both highly variable and unpredictable. These velocities were:

Cretaceous	3500 m/s
Mattson	4000 m/s
Besa River	3400 m/s
1st Black Shale	4200 m/s

e) Time and depth structure maps were prepared for the Nahanni and Base Mattson events.

No significant prospects were observed within the survey area. In general the objective "Nahanni" carbonates appear to rise to the north-northeast towards the Nahanni Butte subcrop. There is an interpreted depth anomaly across the Liard River whereby the Nahanni appears deeper to the east. This observation could be explained by a thrust fault in the vicinity of the river and such a fault may provide a hydrocarbon trap. To test for this possibility and in view of the poor data quality in the river vicinity, a combination broadside and inline refraction plus reflection seismic line should be considered in the northeast of the block down the middle of the Liard River oxbow.



A.T. Lamb

Empress Exploration Consultants