

PROJECT ACTION SHEET

RESOURCE EVALUATION BRANCH

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

COMPANY: ..MITHCO.. ENFLGY...LTD.....

REPORT TITLE: ..SAWMILL, SOUT. SAWMILL REFLECTION SEISMIC. DASHAM

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:

For O'Brien

85-08-27

COMMENTS:

PROGRAM NUMBER: 9229-N10-1E

YEAR: 1983-84

Filed under same Project Number _____ or _____

(a) WRITTEN REPORTS:

*Combined
in
report
cover*

(1) Operations Report

Number: 22

(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 (11/11/84)

83-001

OTK-001 TO OTK-008

: OTK-008A

OTK-009 TO OTK-011

| | | <u>Noticer</u> | | Completed History | Approved |
|-------------|-----------------------|----------------|-----|----------------------|-------------------------|
| 9229-N10-1E | Sawmill 45 | KM | 206 | | 85-08-27 |
| 9229-N10-2E | Tram's Lake | | 173 | | 84-05-03 ✓ |
| " | -3E Island River | | 46 | | 84-05-02 |
| " | -4E Seed area | | | 84-02-25 | Not Approved |
| " | -7E Cameron Hills | | | 84-03-21 | N.R. |
| " | -8E Tram's Lake | | | 84-03-02 | N.R. |
| " | -9E Island River | | | 84-02-26 | N.R. |
| " | -10E Lost Field | | | 84-03-22 | N.R. |
| " | -11E Blackstone River | | | 84-03-17 | N.R. |
| " | -12E Cameron Hills | | | 85-01-21 | N.R. |

All above
Received
85-08-26

Geophysical Report

9249 N10-1E
SAWMILL - N.W.T.
E. A. No. 187

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 |

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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

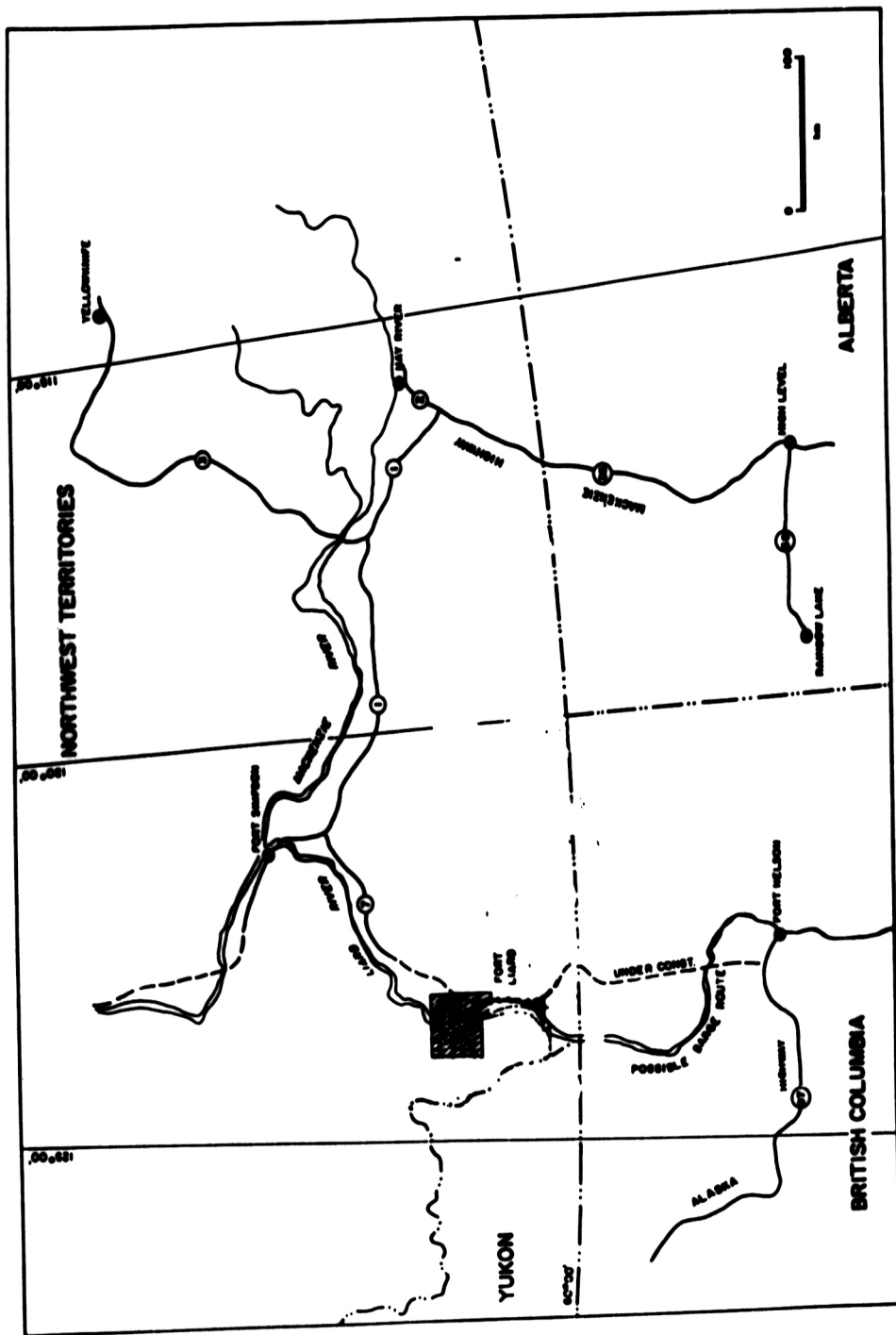
I. ABSTRACT

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.

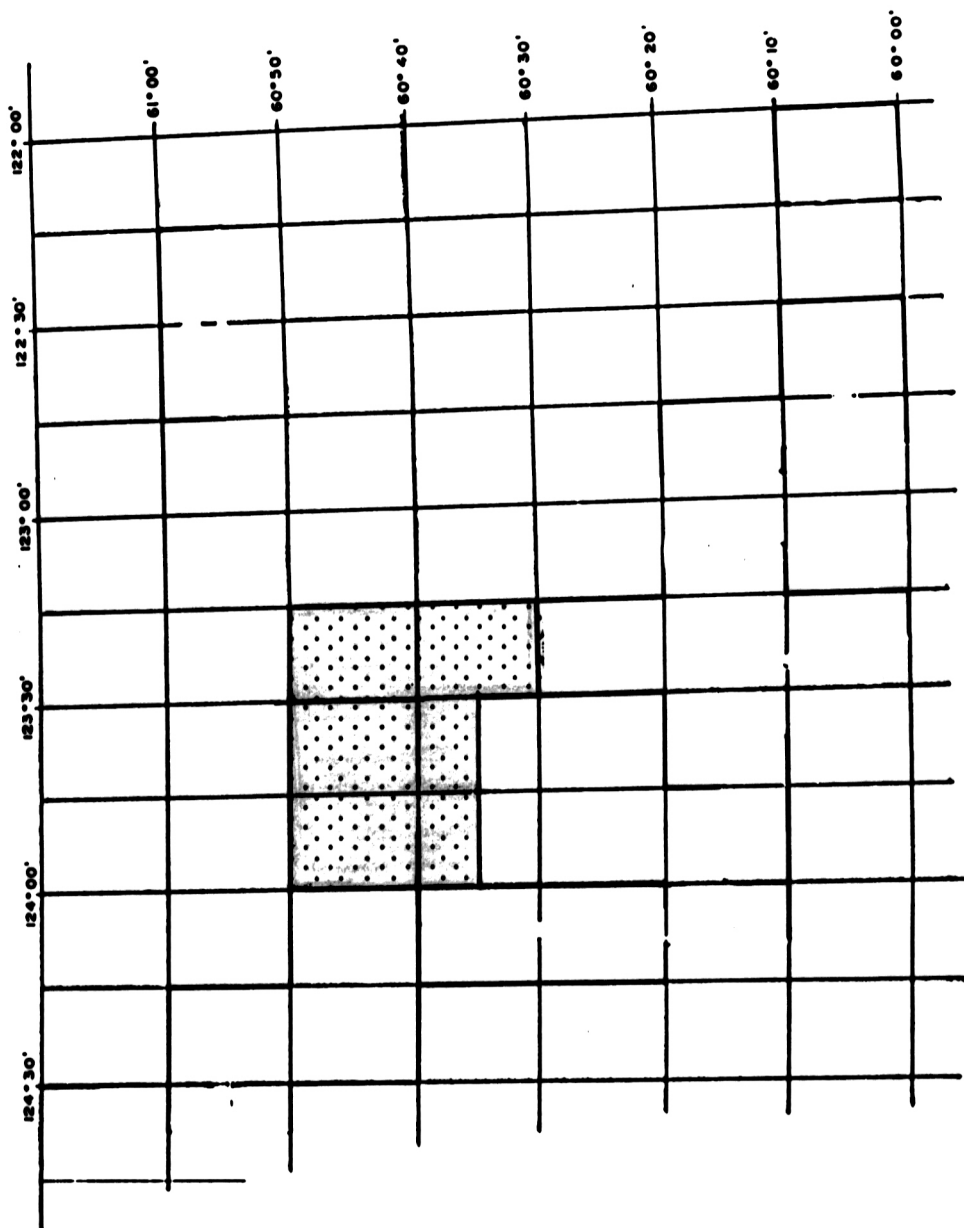
One line OTK 002 crossed Sawmill Mountain and could only be recorded using the Sefel helicopter portable crew. This 10.1 km line was recorded as part of the Kotaneelee "summer" program in October, 1983. The balance of the seismic program (83.18 km) was recorded with two conventional Sefel seismic crews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



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 1200% 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 Skinners
 - 1 - Tractor Operator
 - 1 - Cat Foreman
 - 1 - Cat Supervisor

Some 83.18 km of 4800% 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 4800% 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 SEGB 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 X STACK

FIELD RECORDING

| | |
|---------------------|-----------------------|
| DATE SHOT | OCTOBER, 1983 |
| SHOT BY | SEFEL GEOPHYSICAL LTD |
| | PARTY NO 521 |
| 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 | +-40 MS. |
| WINDOW | 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 | 11/19-40/56 HZ |
| 16 EQUALIZATION | |
| WINDOW | 500-2500 MS. |
| 17 VARIABLE TO FIXED DATUM CORRECTION | |
| FIXED DATUM | 1200 M/ASL |
| 18 FILM DISPLAY | 18 TR/IN |
| | 5 IN/SEC |
| POLARITY (X) NORMAL () REVERSE | |

PROCESSING PARAMETERS SELECTED BY
EMPRESS EXPLORATION CONSULTANTS

DESCRIPTION OF DATA PROCESSING - 4800 X STACK

FIELD RECORDING

| | |
|---------------------|-----------------------|
| DATE SHOT | MARCH, 1984 |
| SHOT BY | SEFEL GEOPHYSICAL LTD |
| SOURCE TYPE | PARTY NO. 501 |
| SOURCE PATTERN | DYNAMITE |
| CHARGE SIZE | SINGLE HOLE |
| GEOPHONE TYPE | 10 KG AT 18 M. |
| GEOPHONE PATTERN | MARK-LISA 10 MZ |
| INSTRUMENTS | 18 AT 3M INT. |
| FORMAT | MOS 10 |
| DATA CHANNELS | SEGB |
| RECORDING FILTER | 96 |
| RECORD LENGTH | 12/18-172/72 |
| SAMPLE INTERVAL | 6 SEC |
| GROUP INTERVAL | 2 MS. |
| SHOT POINT INTERVAL | 40 M. |
| SPREAD GEOMETRY | 40 M. |
| | 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 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 | 0-40 MS. |
| WINDOW | 500-2500 MS. |
| 11 COMMON OFFSET STACK | |
| 12 RESIDUAL NMO | |
| 13 MUTE | |
| 14 STACK | 4800 PERCENT |
| 15 TIME VARIANT FILTER | |
| 0-1000 MS | 14/22-65/75 MZ |
| 1000-4000 MS | 11/19-40/56 MZ |
| 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

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