Report on the

RUSTY LAKE

GEOPHYSICAL EXPLORATION SURVEY

PROGRAM NO. 9229-C4-10E

in

FORT NORMAN
NORTHWEST TERRITORIES

Prepared by:
Chevron Canada Resources
March 10, 1992

Project Geophysicist: D. R. Dalley .....

Project Geophysicist: D. C. Jenkins .....

Division Geophysicist: A. E. Bowman .....

PROFESSIONAL GEOPHYSICIST ALBERTA
ARTHUR E. BOWMAN

TABLE OF CONTENTS

ABSTRACT

Chevron Canada Resources conducted a geophysical survey in the Fort Norman area of the Northwest Territories during the winter season of 1991. All the lands involved in the survey were held by the Crown.

The survey was designed to obtain regional subsurface coverage and tie well control to delineate hydrocarbon potential of the Fort Norman area. A total of 210 kilometres of seismic data were recorded and 210 kilometres of gravity data were measured along the seismic lines.

This report summarizes the procedures of data acquisition, processing and the results of the interpretation.

LIST OF ENCLOSURES

Enclosure 1 - 1:50 000 Shot Point Base Map

Enclosure 2 - Floppy disk with digital SP information

Enclosure 3 - Nine Migrated Seismic Sections

Enclosure 4 - One copy of Line 52X with interpreted horizons

Enclosure 5 - Little Bear to Paleozoic time interval map

Enclosure 6 - Paleozoic time structure map

Enclosure 7 - Gravity profiles

LIST OF FIGURES

SEISMIC PROGRAM DESCRIPTION

Program Number:	9229-C4-10E
Contractor's Permit #:	N90B472
Type of Survey:	Reflection CDP Seismic
Period of Field Operation:	January 30, 1991 to March 10, 1991
Locality of Work:	64 10' to 64 55' 124 30' to 125 50' (Figure 1, Enclosure 1)
Program Operator:	Chevron Canada Resources
Contractors:	Western Geophysical (Seismic Data Acquisition)
	Borek Construction Ltd.
	Franz Brouwer Contracting
	Star Tech Landsurveys Ltd. (GPS Surveying)

SEISMIC STATISTICAL SUMMARY

Significant Dates:

Date	Operation
January 22	Surveyors commenced.
January 25	Drills commenced.
January 25	Recorders left base.
January 30	Recording commenced.
March 10	Recording completed.
March 12	Vehicles released.

Number of Personnel:

There was a total personnel of 74 people. Native residents comprised 47% of field operations personnel.

Production Data:

Number of Kilometres Shot - 210.78

Number of Shots Taken - 2290

Average Daily Production:
- Kilometres Shot - 5.27
- SP's Recorded - 57

Production Notes:

- one day was lost due to equipment failure
- seven days were spent moving on the program (mobilization/demobilization)

GRAVITY PROGRAM DESCRIPTION

Program Number:	9229-C4-10E
Type of Survey:	Gravity
Period of Field Operation:	January 3, 1991 to March 5, 1991
Locality of Work:	64 10' to 64 55' 124 30' to 125 50' (Figure 1, Enclosure 1)
Program Operator:	Chevron Canada Resources
Contractors:	Star Tech Inc. (Gravity Data Acquisition) Target Survey (Gravity Consultant)

GRAVITY STATISTICAL SUMMARY

Significant Dates:

Date	Operation
January 3	Gravity recording commenced.
March 5	Gravity recording ended.

Number of Personnel:

There was a total personnel of 2 people. Native residents comprised 50% of field operations personnel.

Production Data:

Number of Kilometres Recorded - 210.78

Number of Stations Recorded - 1162

Instruments:

1 - Lacoste & Romberg Model G gravity meter

Range	- over 7000 milligals
Reading Accuracy	- +0.01 milligals
Drift Rate	- < 1 milligals/month

Recording Notes:

Gravity stations were located on seismic shot points as well as several GPS stations. The station spacing along the seismic lines was 180 metres. The survey was tied to the National Gravity Network station at Fort Nelson, B.C. A total of 1162 stations were read including repeats and temporary bases. After processing, 1148 stations remained and were used for the interpretation. Base station ties were repeated in under three hours. Base station and loop misties were all less than 0.1 mgals. Inner terrain corrections for Hammer zones A to D (0 to 170 metres) were estimated in the field by the observer using an inclinometer and range finder. Transportation from station to station was via snowmobile and walking.

FIELD PROCEDURES

Surveying:

Two wild T-16 Theodolite survey instruments were used for horizontal and vertical control. Two Nikon DTM-A5 EDM units were also used for control throughout the prospect.

Energy Source:

All shooting by Western Geophysical utilized a dynamite source.

Recording Parameters:

The recording parameters over the entire program remained constant, utilizing 2000% CDP coverage and a single hole source (see figure 2). The lines recorded (but not processed) to 15 seconds were: 64X, 52X, 40X and 26X.

SEISMIC DATA PROCESSING

The processing sequence for all lines was essentially the same. Each line was edited before receiving a dephasing filter, amplitude correction and a surface consistent deconvolution operator. Field statics and a floating datum were applied before a brute velocity correction and residual statics were calculated in a side flow. The data were then spectrally whitened before the brute velocity function was removed and a total velocity field applied. The previously calculated, residual statics were then applied and a stack section was generated.

Post-stack spectral whitening (CALFIL) and a spatial predictive deconvolution (SPPRED) were then applied to the data. Several lines were particularly noisy and benefited from a second application of the SPPRED program. Some amplitude scaling was done before the data were depth migrated, filtered and plotted with the floating datum removed.

Copies of the migrated sections are included with this report and figure 3 shows a list of migration velocities for the lines.

GRAVITY DATA PROCESSING

The drift corrected gravity was processed to a Bouguer gravity using a computer. Latitude corrections used the 1980 International Formula. Both Bouguer corrections and terrain corrections assumed a density of 2.55 grams per cubic centimetre. Inner terrain corrections were estimated in the field and outer terrain corrections (Hammer zones E (170 metres) to 37 kilometres) were calculated on the computer in the office.

INTERPRETATION NOTES

The time interval and time structure maps included in this report are hand-contoured, computer-posted maps, based on the interpretation of the Rusty Lake seismic program. The well ties are indicated on the map, however, there are other wells in the area that were not tied by the seismic program.

SEISMIC MARKERS

The seismic correlations used in the area are indicated on line 52X wnich is included as enclosure #4. The Little Bear reflector (orange) is reasonably well constrained by well ties and was used both as a migration velocity boundary (see figure 3) and to generate the Little Bear to Paleozoic time-interval map (enclosure #5). The Paleozoic reflector (yellow) also served the same purposes as well as being used to generate the Paleozoic time structure map (enclosure #6). The Nahanni reflector (blue) is an easily identifiable marker that was used as a migration velocity boundary and the Saline River (pink) and Proterozoic (red) reflectors were also used as migration velocity boundaries but were more difficult to interpret primarily due to a lack of well control.

PALEOZOIC TIME STRUCTURE MAP

The Paleozoic time structure map shows a large amount of relief with the trend of the features in a north-south direction. The major topographic highs are located at the well locations and a broad low slightly east of center separates the largest highs. This topographic low appears to be filled with a Tertiary cover which has a serious negative impact on data quality.

The regional trend of the Paleozoic surface appears to be a broad N-S trending monocline which dips toward the west. If any undrilled structural highs with significant relief exist in this area they are of the smaller variety and have not been covered by the line spacing used in this program.

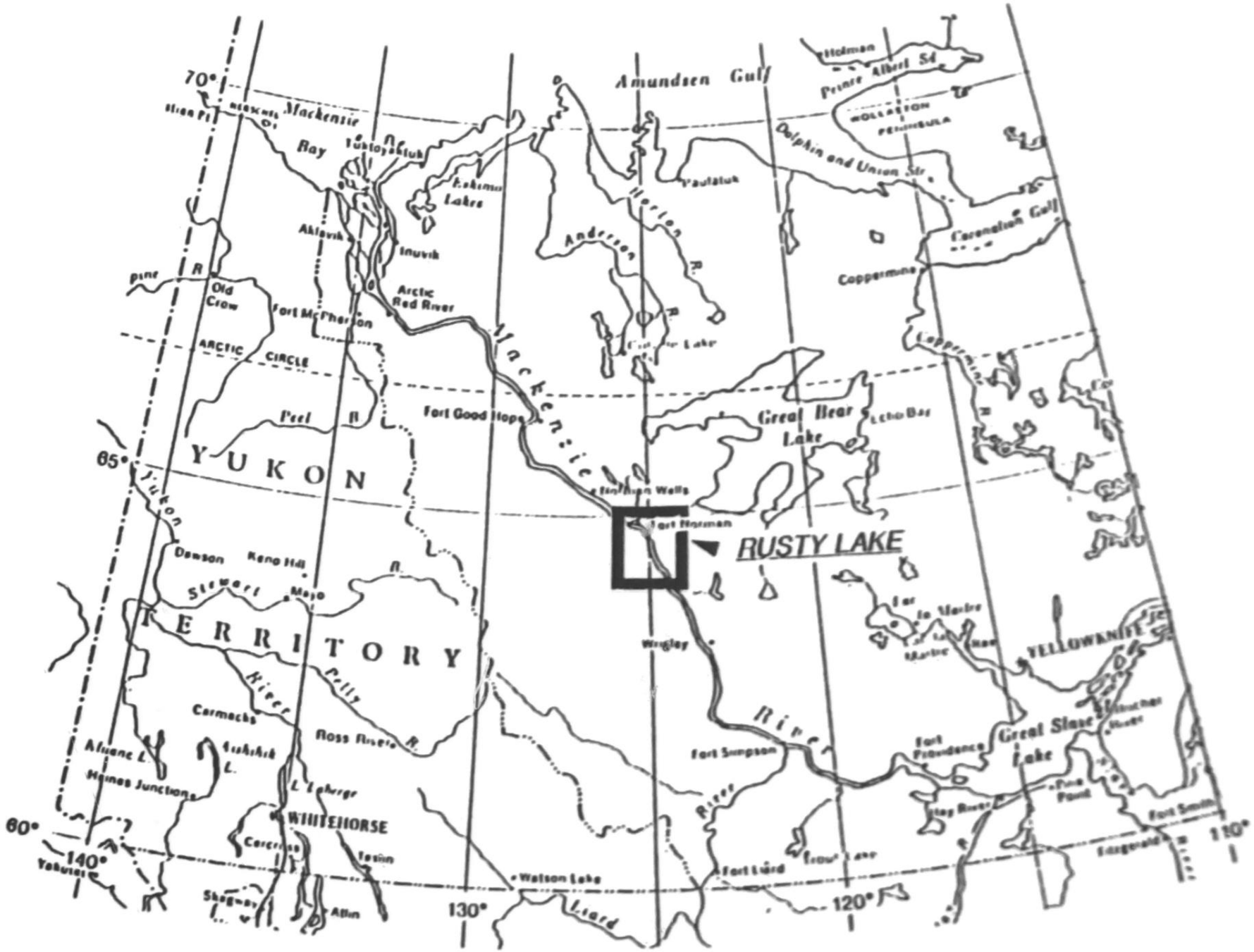
LITTLE BEAR TO PALEOZOIC TIME INTERVAL MAP

The Little Bear to Paleozoic time interval is not mappable over the extreme eastern area of the program due to the erosion of the top of the Little Bear. The area that is mappable, however, does demonstrate a north-south trend with a general thickening towards the west.

A possible thick is indicated on line 22X and line 6X, however, the thick Tertiary cover in this area prohibits a reliable interpretation of this feature. The seismic character of this interval is not a reliable interpretation tool either, also because of data quality. In areas where data quality is reliable, however, the Little Bear appears to have a monotonous "railroad track" character requiring the existence of a structural high to pursue an exploration target within the Little Bear.

GRAVITY

Gravity profiles for each line were generated from the computer and displayed with the seismic to aid the interpreter.



LOCATION MAP

FIGURE 1

RUSTY LAKE SEISMIC FIELD PARAMETERS

Instrumentation	DFS-V
Sample Rate	2 milliseconds
Record Length	5 seconds/15 seconds
Recording Filters	8/18 - 180/72 hertz
Sub-Surface Coverage	2000%
Number of Groups	96
Group Interval	30 meters
Geophone Array	9 at 3.3 meters
Geophones per Location	9
Shot Point Location	Between Groups
Shot Point Interval	90 meters
Spread	1815-45-SP-45-1815 meters
Shot Holes per Location	1
Hole Depth	14 meters
Dynamite Charge	2 kilograms/hole

FIGURE 2

TABLE OF MIGRATION VELOCITIES

INTERVAL	VELOCITY (m/sec)
Surface - Little Bear	3050
Little Bear - Paleozoic	3650
Paleozoic - Nahanni	4250
Nahanni - Saline River	5500
Saline River - Proterozoic	4250
Proterozoic - End of Data	6500

Figure 3