9229-P28-1E

GEOPHYSICAL EXPLORATION REPORT

Program No: 9229-P28-1E

COLVILLE/LAC-A-JACQUES SURVEY

in the

Northwest Territories

Exploration Agreement No's 160 and 163

by

Petro-Canada Inc.

April, 1985

Land use Permit No.: N83B987

Area Coordinates: Latitude 66°30' - 68°10' North
Longitude 123° - 128°15' West

Data Acquisition: Seismic - Seiscom Delta United (Int'l) Corp.
Gravity - Airborne Resources Development Ltd.

Field Work Period: December 1983 - April 1984

Submitted by:

K. N. Davies
Project Geophysicist
N.W.T. Region

R. Niederauer
Project Geophysicist
N.W.T. Region

J.B. Henry, P. Geoph.
Regional Geophysicist
N.W.T. Region

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LIST OF DATA UNDER SEPARATE COVER

1. 6 Mylar Shotpoint Maps: 96 L, M, N, O, 97B, 106P

2. 17 Seismic Sections: 14X, 24X, 52X, 70, 72X, 79X, 81X, 88X, 90X, 92X, 94D, 101X, 109X, 112X, 114, 114X, 118X

   1 mylar and 2 paper copies of each section
   (normal and reverse polarity)
   Exception: Line 90X-2 processing versions

3. Bouguer Gravity Profiles: 14X, 24X, 52X, 70, 72X, 79X, 81X, 88X, 90X, 92X, 94D, 101X, 109X, 112X, 114, 114X, 118X

   2 paper copies of each profile
   Note: Gravity not obtained - 24X SP 1058-1085
   - 92X SP 595-808
   - 112X SP 150-340

4. Gravity Survey Index Map

   1 paper copy

REFERENCES

Cook, D. G. and Aitken, J. D., 1973: Tectonics of Northern Franklin Mountains and Colville Hills, District of Mackenzie, Canada, in Pitcher, M. G., ed., Arctic Geology: Am. Assoc. Petroleum Geologists, Mem. 19, p. 13-32.

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SECTION ONE

INTRODUCTION

Petro-Canada Inc. conducted a geophysical survey over the central part of the Northern Interior Plains in the Northwest Territories during the 1983-84 winter season. The lands involved were covered by Exploration Agreements numbers 160 and 163, Colville and Lac-a-Jacques respectively. See Figure 1.1 for the location.

The survey was a regional program designed to obtain subsurface information to locate features with hydrocarbon potential. A total of 818.6 kilometres of seismic data were shot and 705.3 kilometers of gravity was measured along the seismic lines.

This report, submitted to COGLA to partially fulfill the requirements of the Exploration Agreements, summarizes the procedures of data acquisition, processing, and the results of the interpretation.

The interpretation of this data incorporated Petro-Canada's existing seismic data. Seismic time structure and isochron maps, as well as a Bouguer gravity fence diagram were produced and are enclosed with the report.

Data which has been sent separately from this report includes mylar copies of seismic base maps and seismic sections, paper copies of gravity profiles, a gravity survey index map and seismic sections.

For the purpose of this report, the interpretive results shall be discussed separately for each Exploration Agreement. The division between Exploration Agreements is roughly at latitude 126° West.

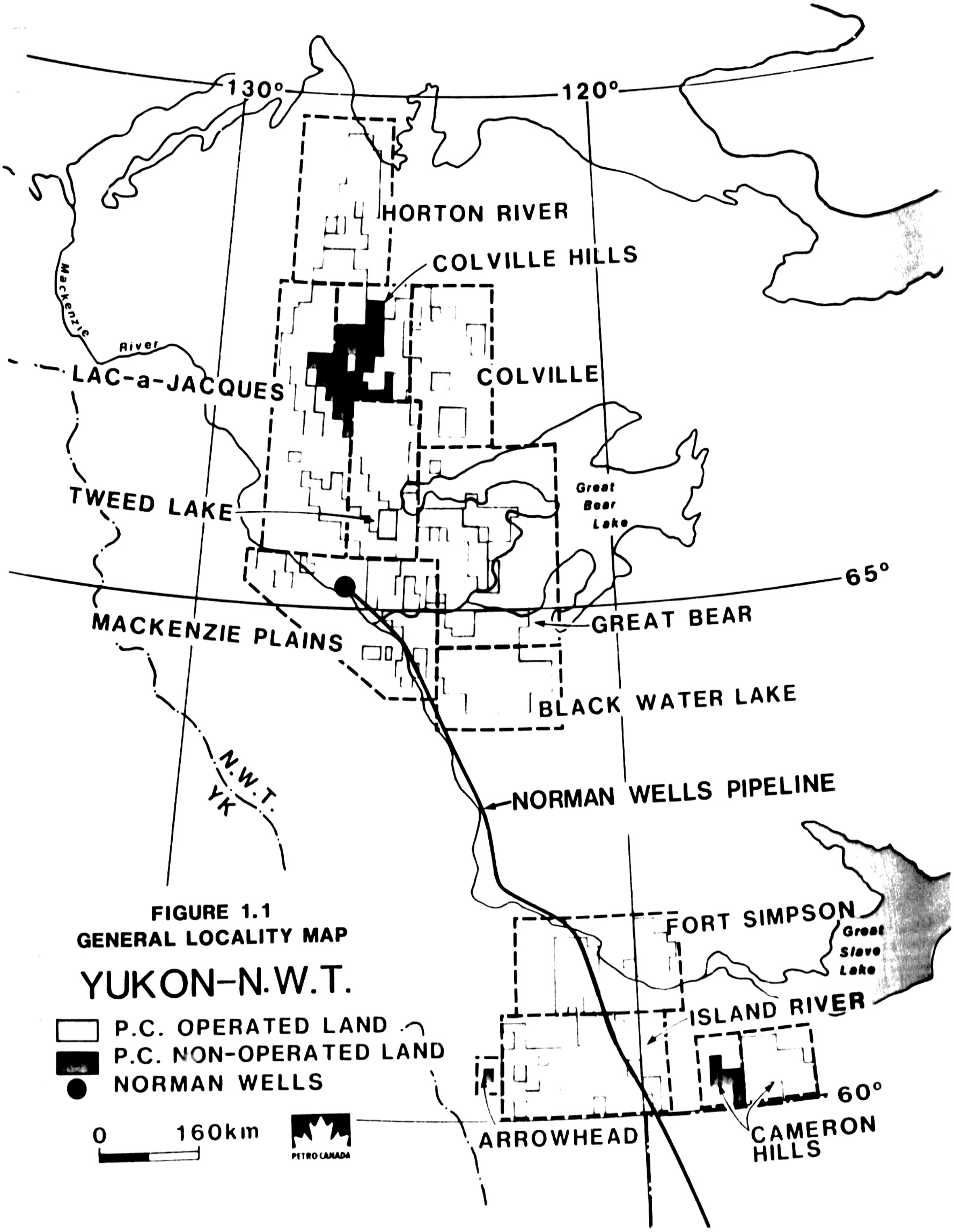


FIGURE 1.1
GENERAL LOCALITY MAP

YUKON–N.W.T.

SECTION TWO

DATA ACQUISITION AND REDUCTION

2.1 FIELD OPERATIONS SUMMARY

2.1.1 Field Conditions

Many problems were encountered in December and caused delays in the initial stages of the program. The access to the project area was hampered by a lack of ice on the lakes. Numerous detours had to be cut.

Weather conditions during the course of the program ranged from extreme to moderate. In December and January the average temperature was -45°C with temperatures dropping to -57°C on several occasions. The progress during this period, which coincided with work in the northeastern part of the project area, was very slow.

All phases of the operation were hampered by cold weather, rough terrain, and drilling conditions. The drilling was slow due to the presence of gravel, sand, wet clay, and rock which conventional air-only drills could not drill efficiently.

As work progressed to the west from February 1st to break-up, the temperature moderated to an average of -40°C. The factors responsible for an increase in production included longer daylight hours, better terrain, and a great improvement in drilling conditions. Drilling production increased by 300-400% during the last two and one half months of operations.

In the northeastern part of the project area the terrain was rough with steep hills and very little tree cover. In the area of Aubry Lake and continuing west, the terrain was characterized by gentle, rolling hills with numerous small lakes and sparse forest cover. The topography became more rugged in the southwestern part of the region which was also lake filled and contained numerous rock outcroppings. Elevations within the project area range from approximately 200 to 580 m above sea level.

2.1.2 Seismic Operations

The major contractor was Seiscom Delta United, who subcontracted the surveying, bulldozing, drilling, and catering. A total of 67 people were employed, of which 49% were residents of the Northwest Territories.

Tables 2.1, 2.2, 2.3, and 2.4 summarize the project chronology, production, drilling, and organization.

Mobilization	December 13, 1983 Drill Camp December 17, 1983 Recording Camp
Recording Started	January 4, 1984
Completion of Recording	April 16, 1984
Demobilization Date	April 16 - 18, 1984

Table 2.1 Seismic Project Chronology

Total Recording Days	101
Total Poor Weather Days	nil
Total Moving Days	2
Production Profiles Shot	6,150
Kilometres Shot	818.64
Average Profiles per Day	61
Average Kilometres per Production Day	8.11
Total Days Mobilization/ Demobilization	9 - mobilization 2 - demobilization

Table 2.2 Seismic Production

Total Poor Weather Days	Nil
Total Drilling Days	105
Number of Holes Drilled	6,351
Average Hole Depth	14.8 metres
Average Holes per Day	60
Total Metres Drilled	92,295
Powder Consumed	12,632 kilograms
Average Charger per Hole	2 kilograms

Table 2.3 Seismic Drilling

Seiscom Delta United Recording Crew:

Party Manager	2
Clerk/Supplyman	2
Expeditors	2
Mechanics	2
Mechanic's Helper	1
Monitor	1
Observer	1
Jr. Observer	1
Shooter	1
Shooter's Helper	1
Cable Truck Driver	4
Recording Helpers	8

Drilling:
(Hugh Denham Enterprises)

Drilling Push	1
Drillers	8
Drill Helpers	8
Water Truck Drivers	2

Catering:
(Hofam Catering)

Cooks	2
Cook's Helper	2
Camp Attendants	2

Bulldozers:
(Borek Contruction Ltd.)

Cat Foreman	1
Cook	1
Strip Camp Operator	2
Cat Operators	8

Survey:
(Thomas Explcration Surveys Ltd.)

Surveyors	2
Rodmen	2

Table 2.4 Project Organization

2.1.3 Gravity Operations

Airborne Geophysical was contracted to undertake the gravity acquisition. A single gravity operator was employed.

Table 2.5 summarizes the project chronology and production.

Project Chronology	
Mobilization Date	December, 1983
Demobilization Date	April 15, 1984
Production	
Total number of stations	2,906
Total number of lines	17
Total distance run	705.33 km.

Table 2.5 Gravity Project Chronology and Production

2.2 SEISMIC DATA ACQUISITION

2.2.1 Instruments

Table 2.6 summarizes equipment used in drilling, recording, detection, and surveying.

Drilling		
8 Drilling Rigs	6 - TF - 110 Mayhew Air Drills (2 with Air/Water)	
	1 - TF - 110 Mayhew Air Drill with down hole hammer	
	1 - TF - 110 Top Drive Air/Water with down hole hammer	
Recording		
Amplifiers	Texas Instruments	DFSV
Tape Systems	Texas Instruments	DFSV
Camera	S.I.E.	ERC-10C
Detection		
Remote Firing System	Input -Output, Encoder/Decoder	
Cables	Mark Products, 430m cables	
Geophone Strings	Geosource, 10 HZ(winter base) 250 ohm coil	
Surveying		
2	Wilde T-16 Theodolite	
1	D14L Distomat	

Table 2.6 Seismic and Survey Instruments

2.2.2 Parameters

The source-detector geometry was a 1584-33-X-33-1584 spread. The interval between geophone groups was 33 metres. The detector array geometry used was 9 geophones in line over 66 metres in the Lac-a-Jacques project and over 33 metres in the Colville project.

Table 2.7 lists the recording parameters used.

Sample Rate	2 milliseconds
Record Length	6 seconds
Recording Filter	Low cut-8 Hz., high cut-128 Hz.
Sub-surface Coverage	1200%
No. of Groups	96
Group Interval	33 metres
Group Array	Inline array over 66 metres in Lac-a-Jacques, 33 metres in Colville
Seismometres per Group	9
Shotpoint Interval	132 metres
Spread Length	1584-33-x-33-1584
Energy Source	2 kilograms of 60% geogel (dynamite)
Holes per Shot Location	1
Average Hole Depth	14.8 metres

Table 2.7 Recording Parameters

2.2.3 Survey System

New cut lines were surveyed-in using topographic features and sun shots. Stations elevations were computed by stadia, and horizontal locations by latitudes and departures. Shot point and station intervals were measured with a chain and rod.

Accuracy of positioning is ± 1 metre in elevation and ± 10 metres in horizontal distance.

2.3 GRAVITY DATA ACQUISITION

2.3.1 Field Techniques and Measurements

The aircraft and equipment used were:

1 Terra Jet
1 Lacoste and Romberg G-Meter #232
(Conversion Constant = 1.05506)

The observed gravity at Government station #8549-59 (Norman Wells airport terminal) was tied by aircraft to the primary field base A-70-84. The further devlopment of the field base network was accomplished by a "step-by-step" method, where each previously set base was used as the initial for the next one. In order to increase the accuracy of the network, two additional bases (A-112X-84 and F-81X-84) were tied back to the primary base at Norman Wells, bringing the number of primary field bases to three.

The gravity was observed along the seismic lines every 264 metres or, every other shotpoint. Three readings were taken at each station.

Table 2.8 summarizes the gravity measurements taken.

Gravity station interval	264 metres (each second S.P.)
Number of independent readings at each station	3
Meter setting	On the ground
RMS accuracy of single gravity observation (115 repeats)	+/ 0.04 mgal

Table 2.8 Gravity Measurements

2.3.2 Accuracy of Data

Elevation and co-ordinates of each shot point were provided by the seismic reflection survey group.

The absolute accuracy of the Bouguer gravity is affected by the accuracy of the:

Base network	± 0.05 mgal
Observed gravity	± 0.04 mgal
Loop elevation	+/- 0.55m or +/- 0.17 mgal (@ 0.3086 mgal/m)
Positioning	Negligible
Terrain and tidal corrections	Negligible
Total	+/- .18 mgal

The total absolute accuracy is calculated as the square root of the sum of squares of all the above RMS accuracies.

2.4 GEOPHYSICAL DATA PROCESSING

2.4.1 Seismic

The seismic data recorded was processed at Petro-Canada in June, 1984. The following format was used:

1. Demultiplex/Display: 2 msec Sample rate
2. Edit
3. Amplitude Recovery - Exponential gain
4. F-K Filtering
   3 msec/TR(0%)-7msec/TR(100%)-100msec/TR(100%)-140msec/TR(0%)
5. Spiking Deconvolution-a) Operator length: 80 msec
   b) Prewhitening: 1%
   c) Design Window: 300-300 msec @ 33 metres offset
   600-3300 msec @ 1584 metres offset
6. Structural Correction - Intercept method
   Datum - 305 metres
   Datum Velocity - 5500 metres/sec
   Sample rate - 2 msec
7. Edit - Zero ranges - 0 to 198 metres
8. Dove Velocity Spectra (Dip Optimized Velocity Enhancement)
9. Autostat/Ansac - Surface Consistent Residual Statics
   Design Window: 350-1300 msec Colville Project
   Design Window: 350-3500 msec Lac-a-Jacques Project
10. Shot Geophone Stack
11. Dove Velocity Spectra
12. Normal Moveout Correction
13. Common Range Stack
14. Automatic Amplitude Control
15. Trace muting - Distance (metre) 0 528 1584
    Time (msec) 0 150 350

16. Filter - Time Variant
    30/120-80/120 From 0 msec to 1100 msec
    18/120-65/120 From 1600 msec to 4000 msec
    for Colville Project

    20/120-80/120 From 0 msec to 1000 msec
    16/120-65/120 From 140 msec to 4000 msec for
    Lac-a-Jacques Project

17. CDP stack: 1200%

18. Automatic Amplitude Control
    - window: 400 msec

19. Coherency Amplification

20. Display to Film: Scale - horizontal: 40 traces/inch
    - vertical: 3.75 inches/sec
    - CDP interval: 16.5 metres

Steps 4 and 7 were excluded in the processing of the Lac-a-Jacques data.

After residual statics were done, common shot and common geophone stacks were used to check and further improve the statics.

The velocity analysis involved obtaining a velocity spectrum from the data using a contour version of the semblance between time and velocity. The distance between analysis was 3.4 kilometers. The velocity functions used in the normal moveout applications were then checked and modified using common offset stacks.

2.4.2. Gravity

Field processing was done by the contractor and included conversion of meter reading to milligals, plus drift and tidal corrections. The inner zone terrain correction was estimated by the operator in the field. In Calgary, the contractor sorted the field data by lines, rather than by daily loops, and calculated Bouguer gravity using a crustal density of 2.35 grams/cc. The outer zone terrain correction was calculated and, together with the inner zone corrections, were added to the Bouguer gravity. The data were then transcribed onto magnetic tape and delivered to the Gravity and Magnetic Group of Petro-Canada Inc. for final processing as follows:

1) Merging the line oriented data into the Merged Survey File (MSF).

2) Correcting for discrepancies at line intersections using systematic adjustments.

3) Low-pass filtering of the Bouguer anomalies.

4) Plotting of the gravity profiles, index map, and fence diagram.

SECTION THREE

INTERPRETATION OF RESULTS

3.1 REGIONAL GEOLOGY

The Colville/Lac-a-Jacques geophysical survey covered a large area on the Horton and Great Bear Plains physiographic provinces, Figure 3.1. The project area is bounded to the northeast by the Coppermine Arch, the western-most extension of the Canadian Sheild. To the south and east are the prominent ridges and rolling hills of the Colville Hills and to the southwest, the outreaches of the Franklin Mountains.

3.1.1 Structural Geology

After deposition of massive units of Proterozoic strata, the region underwent uplift and erosion. Several lesser movements occurred throughout the Paleozoic, but for the most part, a stable platform existed until the end of Devonian time. Major uplift and erosional cycles, and particularly the Laramide Orogeny, caused deformation of all units. These latter compressive stages produced or accentuated numerous folds and faulted anticlines in the Colville Hills. The majority of these structures appear to die out in the program area, where the surface topography is generally of low relief. Surficial features strike from northwest-southeast in the Lac-a-Jacques area to predominantly northeast-southwest in the Colville Area.

Figure 3.2 shows prominent local features such as the Colville High, the Belot Ridge, the Colville Ridge, and the Maunoir Ridge.

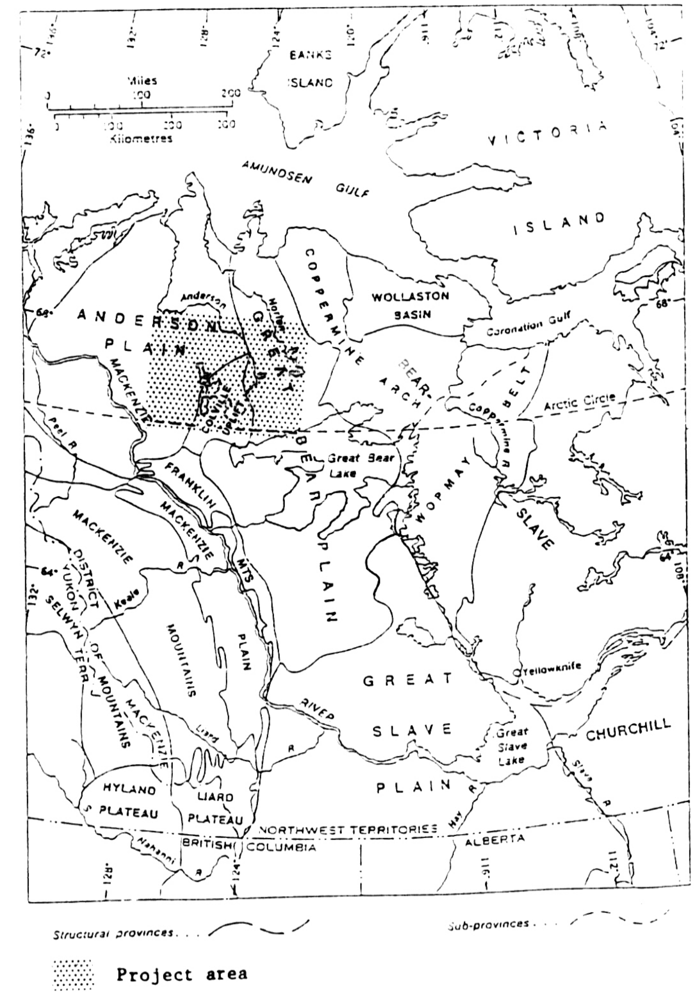


Figure 3.1 Map of the physiographic provinces in the Colville/Lac-a-Jacques project area (modified from Douglas et al., 1963).

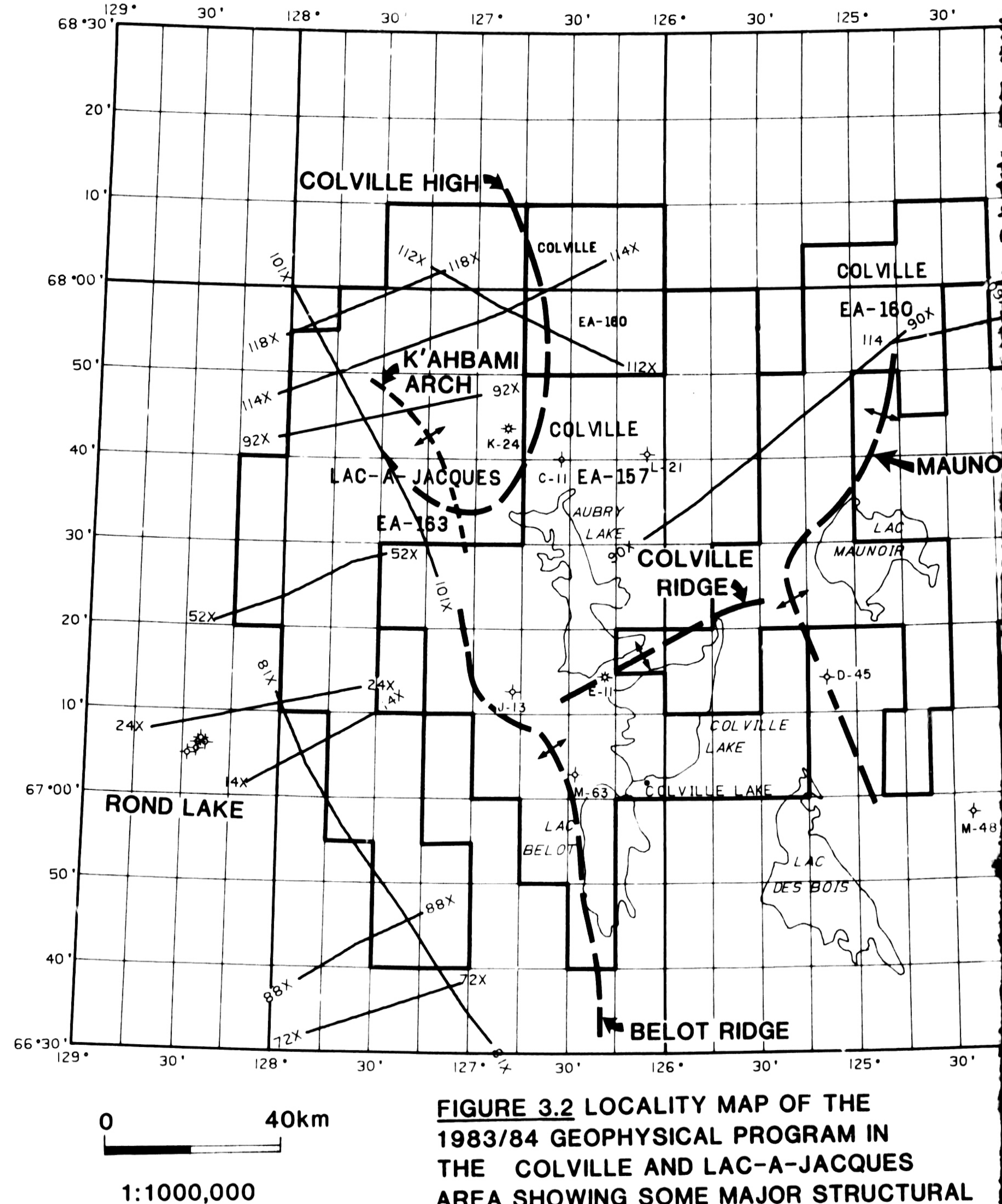
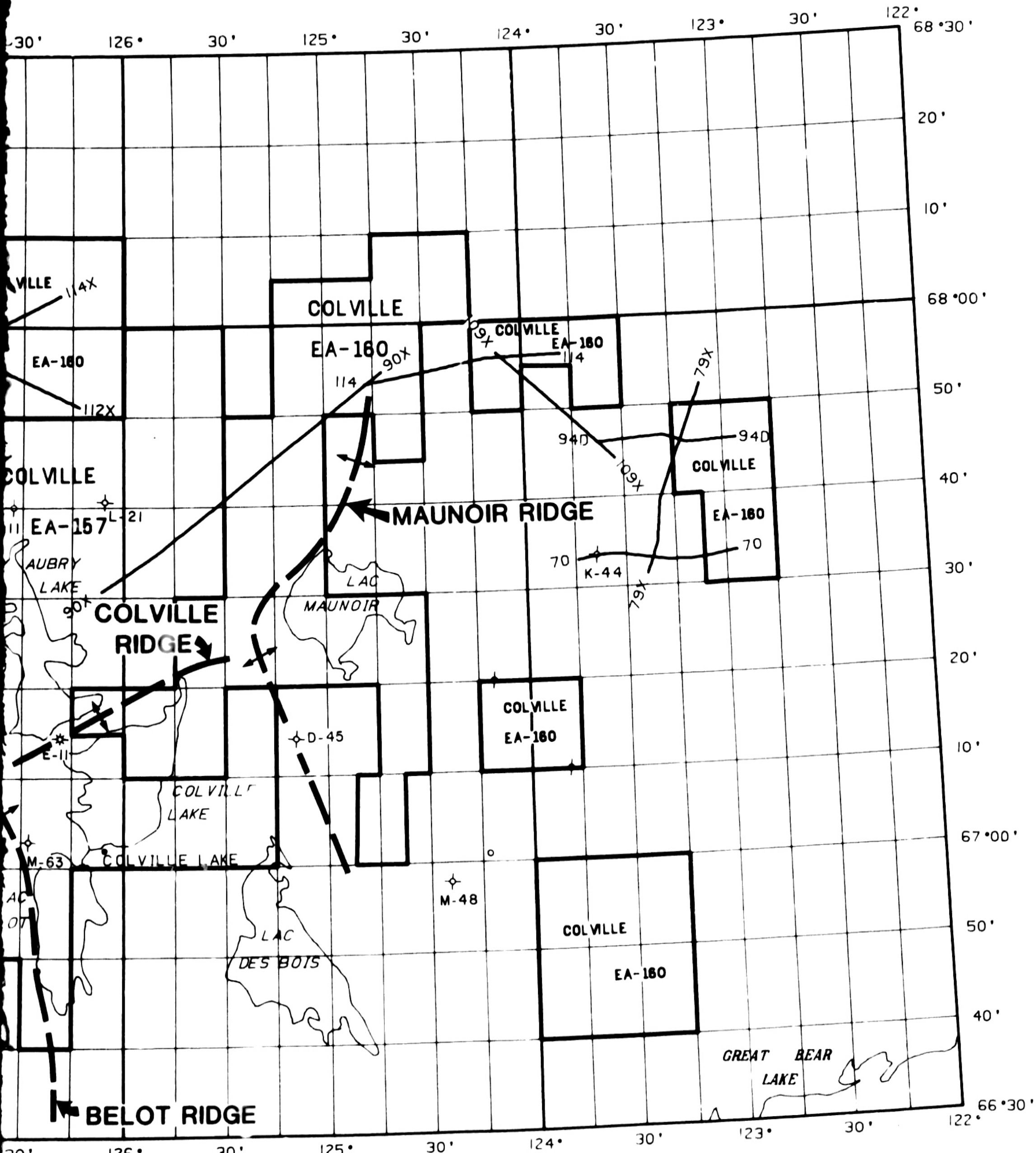


FIGURE 3.2 LOCALITY MAP OF THE 1983/84 GEOPHYSICAL PROGRAM IN THE COLVILLE AND LAC-A-JACQUES AREA SHOWING SOME MAJOR STRUCTURAL FEATURES



.2 LOCALITY MAP OF THE
GEOPHYSICAL PROGRAM IN
LVILLE AND LAC-A-JACQUES
OWING SOME MAJOR STRUCTURAL
S

— — SURFACE STRUCTURES

- - - - SUBSURFACE STRUCTURES

3.1.2 Stratigraphy

The stratigraphic succession ranges from Pre-Cambrian to Recent, Figure 3.3. Thick clastics and carbonates of the Proterozoic lie beneath the pre-Paleozoic unconformity.

Paleozoic sediments are primarily representative of shallow marine deposition on a shelf between the craton to the east and a mobile positive feature to the west. Post-Devonian, pre-Cretaceous and post-Cretaceous erosional cycles truncate successively older rocks eastward.

The Mount Clark sandstone lies unconformably upon Proterozoic strata. The Mount Clark Formation is succeeded by the Mount Cap Formation, a unit of interbedded glauconitic sands, shales and dolomite. Above the Mount Cap Formation is the Saline River Formation consisting of shale, dolomite, and evaporites.

Siluro-Ordovician carbonates of the Franklin Mountain and Mount Kindle Formations overlie the Saline River Formation. In the eastern part of the project, these carbonates are overlain by a veneer of Cretaceous clastics and glacial drift. Westward, they are capped by Devonian age carbonates and clastics and a thickening Cretaceous section.

3.1.3 The Prospect

The primary hydrocarbon reservoir of the region is in the Cambrian sands of the Mount Clark Formation. The sands were derived primarly from the Canadian Shield to the east. The depositional limit of the sands is thought to be near the western edge of the program area. Eastward, the sands are thicker, coarser, and cleaner (Dixon, 1977-78). The thickest section encountered is 50 kilometers south of the eastern part of the Colville project area, where 53 metres are present in the Maunoir M-48 well. The thinnest section observed is at the Tedji K-24 gas well where approximately 10 metres was found.

Traps can be expected on post depositional structural highs or on the flanks of Proterozoic highs. The Mount Clark sands may be absent on the top of paleo-highs.

A secondary target is sand stringers within the Mount Cap Formation. This unit also demonstrates more favorable sand development eastward. In the western part of the project area, the Mount Cap Formation becomes increasingly carbonaceous.

The Mount Cap Formation should provide both source and seal for the Mount Clark Formation with the Saline River Formation acting as a seal for both.

3.2 CORRELATION OF GEOLOGY TO GEOPHYSICS

Synthetic seismograms for the Aubry J-13 and Ewekka C-11 wells are shown in Figures 3.4 and 3.5. The location of these wells, with others, is given in Figure 3.2, together with the location of the seismic lines in the Colville and Lac-a-Jacques Exploration Agreements.

Two events have been mapped, the top of Proterozoic and the near top of the Saline River Formation salt. Both reflections are easily followed over much the study area. The Aubry well synthetic shows the reflector producing the strong event is probably a low velocity, low density shale just below the top of salt.

Another identifiable event in Lac-a-Jacques area is a cherty zone within the Franklin Mountain Formation. An event near the top of the Mount Cap Formation was identified throughout both project areas. However, neither event was mapped.

3.3 PRESENTATION OF RESULTS

3.3.1 Data Quality

Seismic data quality is fair to good in most of the Lac-a-Jacques project area where a cover (70 metres or greater) of Cretaceous or more recent material lies over the carbonates. The Devonian carbonates are subject to subsurface solution collapse with infilling of Cretaceous clastics (van Everdingen, 1981). These areas will produce noisy discontinuous zones on the seismic sections.

In the eastern part of the Colville project, near surface Siluro-Ordovician carbonates cause severe reverberation. This, combined with pre-Paleozoic deformation yields extremely poor data.

3.3.2 Seismic Maps

The Lac-a-Jacques project involves NTS grids 96 L, 96 M, 106 P, and 97 B west. The Colville project involves NTS grids 96 N and 96 O. Figure 3.6 shows the location of the seismic lines.

The 1984 data in the Lac-a-Jacques project is superior to all previous data, which was incorporated into the mapping. Due to the poor data quality in the eastern part of the Colville area, NTS grid 96 O, the seismic data was not interpreted. Some of the earlier data required adjustments to the new due to variations in static corrections, resolution, and polarity.

The following maps at a scale of 1/100,000 were produced.

1) Top Proterozoic Time Structure - Colville/Lac-a-Jacques
Figure 3.7

2) Top Cambrian Salt Time Structure - Lac-a-Jacques
Figure 3.8

3) Cambrian Salt-Proterozoic Isochron - Lac-a-Jacques
Figure 3.9

3.3.3 Gravity Data

Bouguer gravity profiles were generated at the same horizontal scale as the seismic sections, that is 1:25,989. The vertical scale used for the profiles is 2.5 mgal/inch. Initial and final values are shown at the ends of the Bouguer plots.

The Bouguer gravity fence diagram, Figure 3.9, is displayed at 1/250,000. The zero line is -20 milligals and the vertical scale is 5 mgal/inch.

3.4 DISCUSSION OF RESULTS FOR LAC-A-JACQUES PROJECT

3.4.1 Proterzoic, Cambrian Morphology

The Proterozoic and top of Cambrian salt seismic structure maps, Figures 3.7 and 3.8, show gentle regional dip to the southwest. The dominant feature of this region is a northwest oriented series of faulted highs beginning west of Lac Belot and extending diagonally northwards into the Anderson Plain. The northern part of this feature shall be referred to as the K'ahbami Arch. See Figure 3.2 for location. Depressions trend into this highland from the north, west and south. The remainder of the region is characterized by low amplitude broad folds with minor faulting.

The top of Cambrian salt to Proterozoic isochron map, Figure 3.9, indicates regional thickening from north to south. This appears to be caused primarly by thickening of the Saline River Formation, probably its evaporite unit.

3.4.2 Age of Structuring

A high, referred to as the Colville High and centered around the Tedji K-24 well, incorporates the K'ahbami Arch. Seismic sections show that south and west of the Colville High, Proterozoic strata dip westward; Figure 3.11, is shown as an example of the typical configuration. Northeast of Tedji K-24, the Precambrian strata dip eastward. Prominent east dipping intra-Proterozoic events are also observed on data in the Colville study region east of Colville Lake. The Colville High, then, is a Precambrian structure. The isochron map of the Cambrian salt to Proterozoic shows pronounced thinning over the K'ahbami Arch. Thinning of units beneath the salt is also evident, demonstrating that it was high at least as early as Middle Cambrian time.

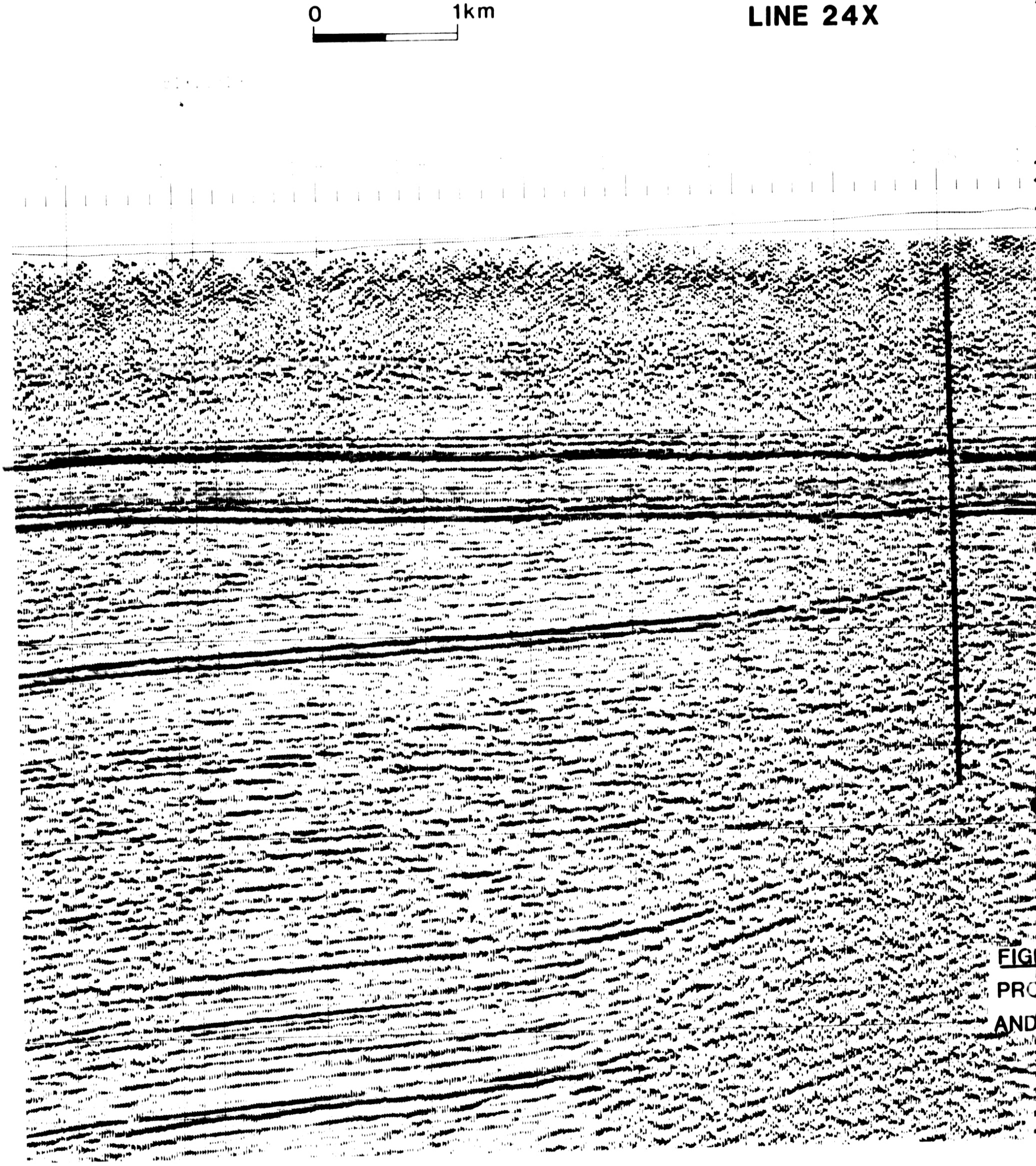
3.4.3 Fault Interpretation

The complex linear ridges in the Colville Hills to the east may be the result of periodic movement along a regional system of basement controlled strike-slip faults which have been dextrally reactivated (Willot and Davis, 1978). Structures have been produced by deep-seated block faulting. Many of the faults have been active throughout geologic history. The Lac-a-Jacques project region is on the periphery of the Colville Hills and the structural style seems similar although less dramatic.

The K'ahbami Arch appears to be associated with the Belot Ridge to the south. The Belot Ridge is faulted down to the west while the K'ahbami Arch is faulted down to the east. The reversal of fault direction is suggestive of strike-slip faulting. The nature of the strike-slip fault is uncertain but may be high angle reverse. It clearly involves Proterozoic strata to great depth. Cook and Aitken (1973) document similar structural assemblages in the Franklin Mountain to the south, where a transverse fault connects thrusted zones of opposing dip. A similar fault has been interpreted between the two ridges in the Lac-a-Jacques project and may perform an analogous function.

A number of faults penetrate the entire section indicating they occurred during the Laramide Orogeny. One example of a reactivated minor fault is exhibited on Line 24X, Figure 3.11, where the offset in the pre-Cambrian is greater than that in the section above. The northern part of the K'ahbami Arch and associated faults are shown on line 114X, Figure 3.12. The throw in the Proterozoic is clearly greater than in the overlying Paleozoic sediments.

LINE 24X



FIG
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AND

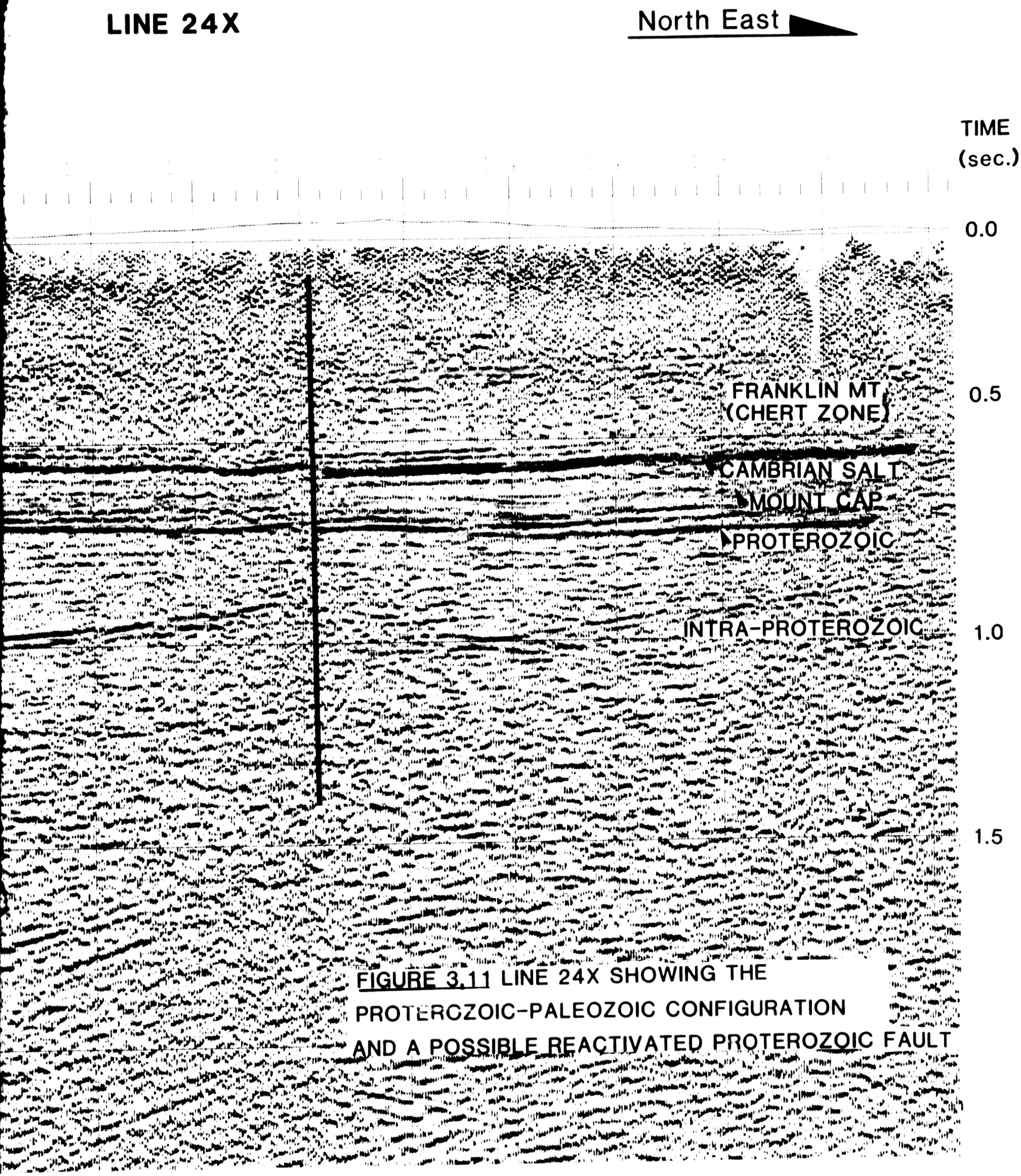
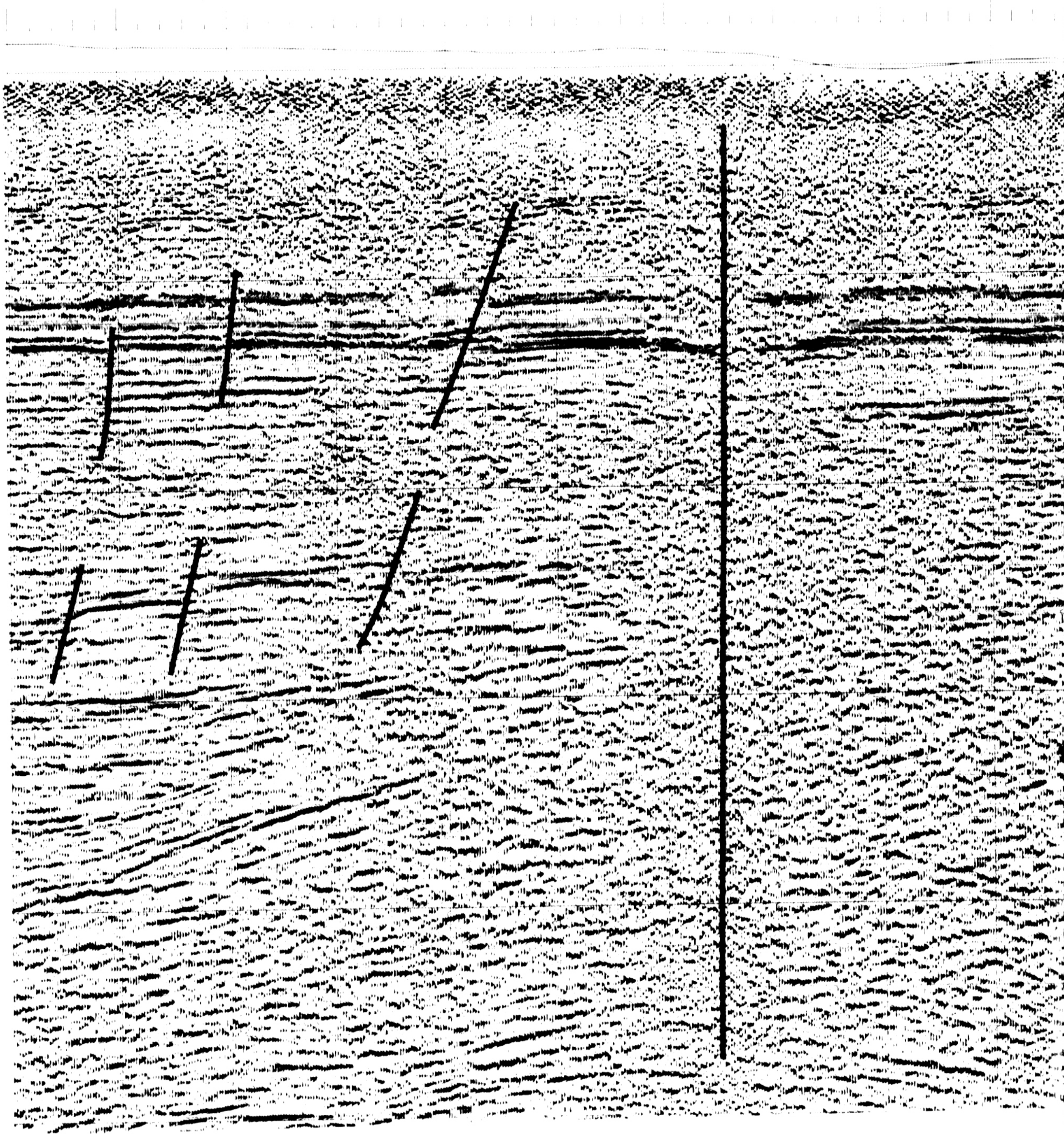


FIGURE 3.11 LINE 24X SHOWING THE PROTEROZOIC-PALEOZOIC CONFIGURATION AND A POSSIBLE REACTIVATED PROTEROZOIC FAULT

0 1km

LINE 114X



X

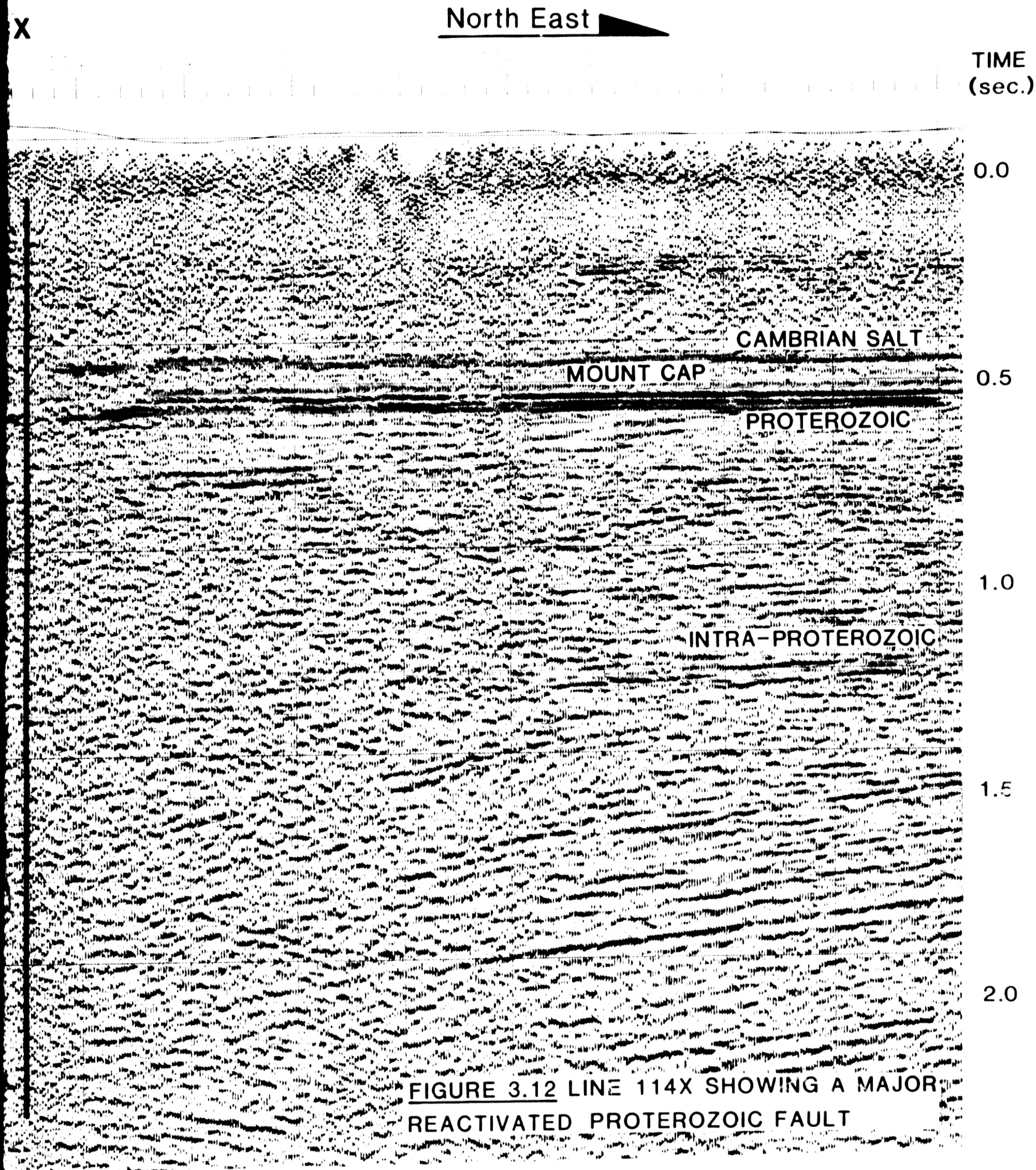


FIGURE 3.12 LINE 114X SHOWING A MAJOR REACTIVATED PROTEROZOIC FAULT

Many faults of 15 to 30 milliseconds throw do not cut the top of Cambrian salt, suggesting adjustments within the salt or Middle Cambrian faulting. Line 81X, Figure 3.13, shows several examples, the right hand faults in particular are best interpreted as Cambrian faults.

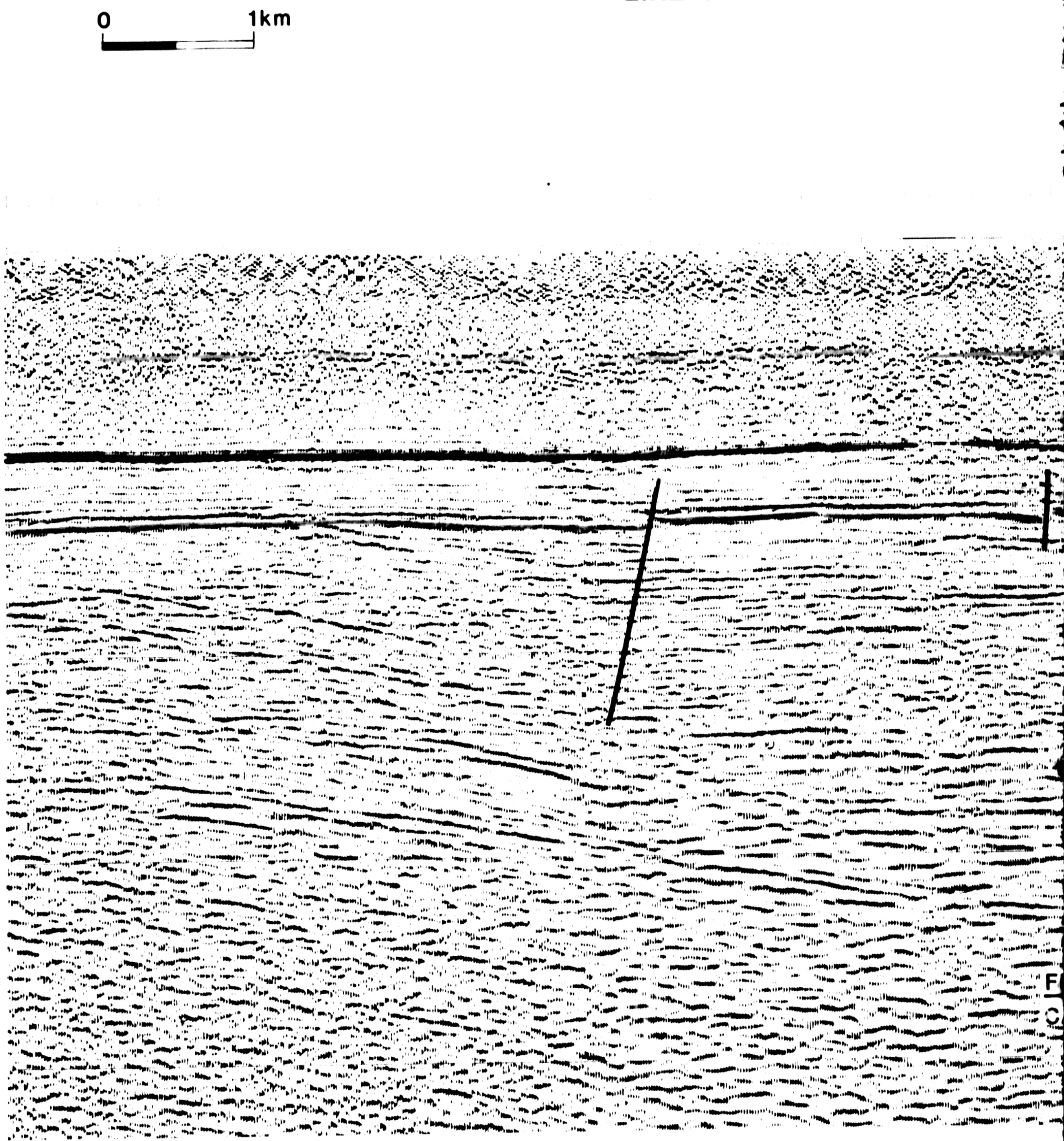
3.4.4 Gravity Interpretation

The Department of Energy, Mines and Resources Regional Bouguer Gravity Map (1969) shows a positive gravity anomaly centered on the Colville High. This high is also seen on the gravity profiles and the fence diagram of the Colville/Lac-a-Jacques gravity survey, Figure 3.9.

Without gravity maps or residual plots, only a cursory interpretation was made. The regional gravity changes are probably caused by a combination of structuring and lateral density changes within the Proterozoic. There is no evidence that the thickness of the Franklin Mountain carbonates or the top of the Proterozoic Unconformity has any effect on the gravity. Structures in the Paleozoic strata also do not show in the data when the regional gravity is visually removed. Effects of faults are not evident or are questionable at best.

Residuals are interpreted to be due to the density contrast between Cretaceous or younger material and the underlying carbonates, particularly in the area south of Lac Belot where the Cretaceous is relatively thick (i.e. greater then 100 metres). The profiles become smoother where the top of carbonates are more deeply buried, suggesting a decreasing residual influence.

LINE 81X



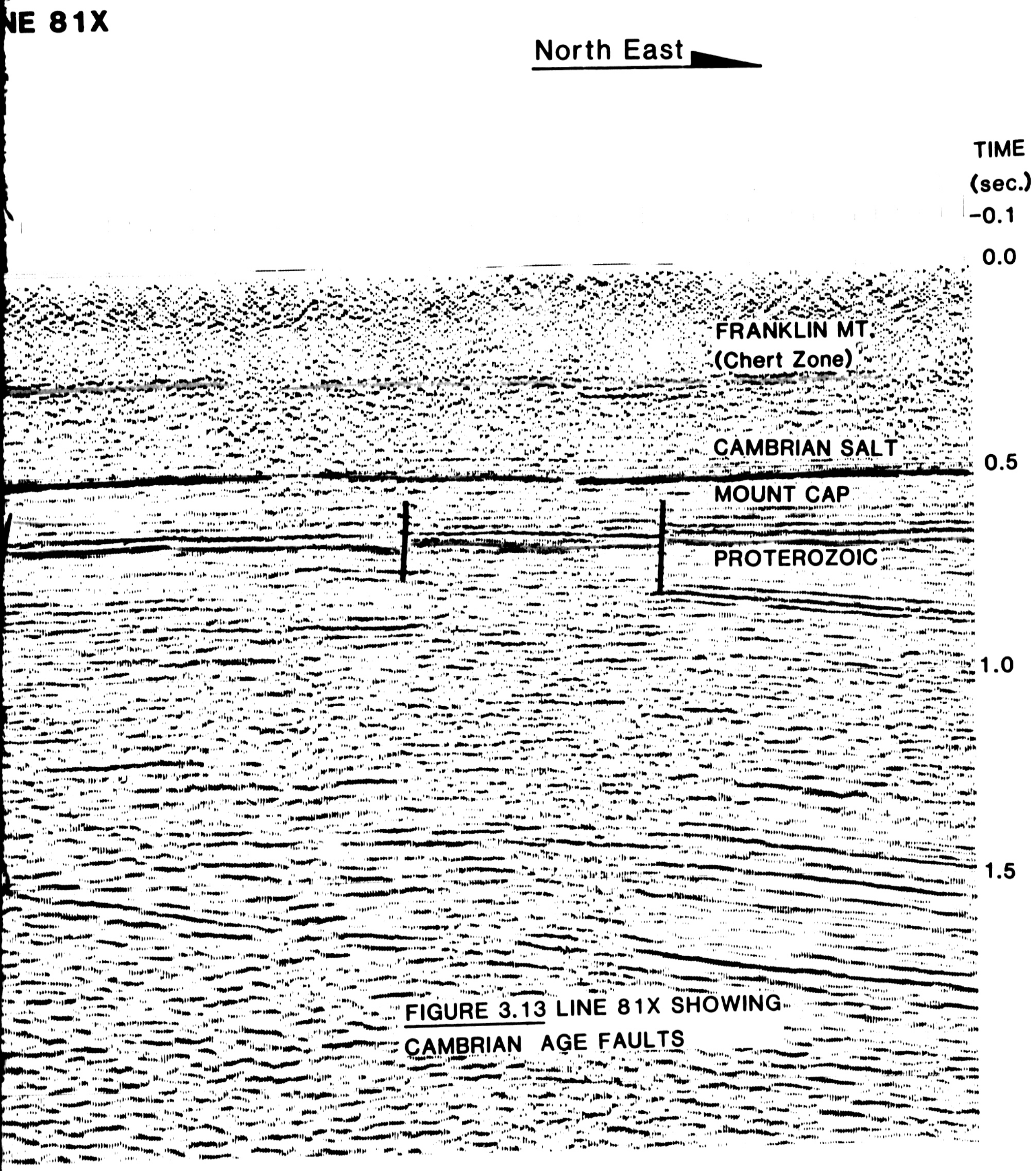


FIGURE 3.13 LINE 81X SHOWING CAMBRIAN AGE FAULTS

3.4.5 Future Exploration

Sand pinchouts on the flanks of the Colville High should be prospective in terms of sand thickness and quality. To the north, Cambrian sand are probably discontinuous. Stratigraphic pinchouts may exist on the west flank, updip of regional strike, however, the Mount Clark Formation becomes increasingly thin and silty in this direction. The K'ahbami Arch and its associated structures may have formed a complete barrier to sand deposition on the west side. In the basin to the south, a thicker Cambrian isochron exists, and better quality sand could be present.

Three possible structures are being delineated with a seismic program in the 1984-85 season. The first is the southern extention of the K'ahbami Arch, the second is 30 kilometres northeast of the Rond Lake wells and the third is 25 kilometres northeast of the Tedji well. Seismic control is sparse, but all show some evidence of isochron thinning over the top.

An additional lead is centered at 67°N, 127°30'W, west of Lac Belot in the southern basin. Surface expression is shown by an outcrop of Devonian rock surrounded by Cretaceous material.

Gravity measurements will be obtained with the 1984-85 program and combined with the 1983-84 data. This should provide adequate coverage to produce gravity maps in the Lac-a-Jacques project area.

3.5 DISCUSSION OF RESULTS FOR COLVILLE PROJECT

3.5.1 Regional Structural Style

In the western part of the Colville area there are two major features. The first is the Colville Ridge which trends northeast between Aubry and Colville Lakes. The second is the Maunoir Ridge which trends southwest toward Lac Maunoir and then swings to the southeast. Both of these structures are shown in Figure 3.2.

3.5.2 Proterozoic Structures

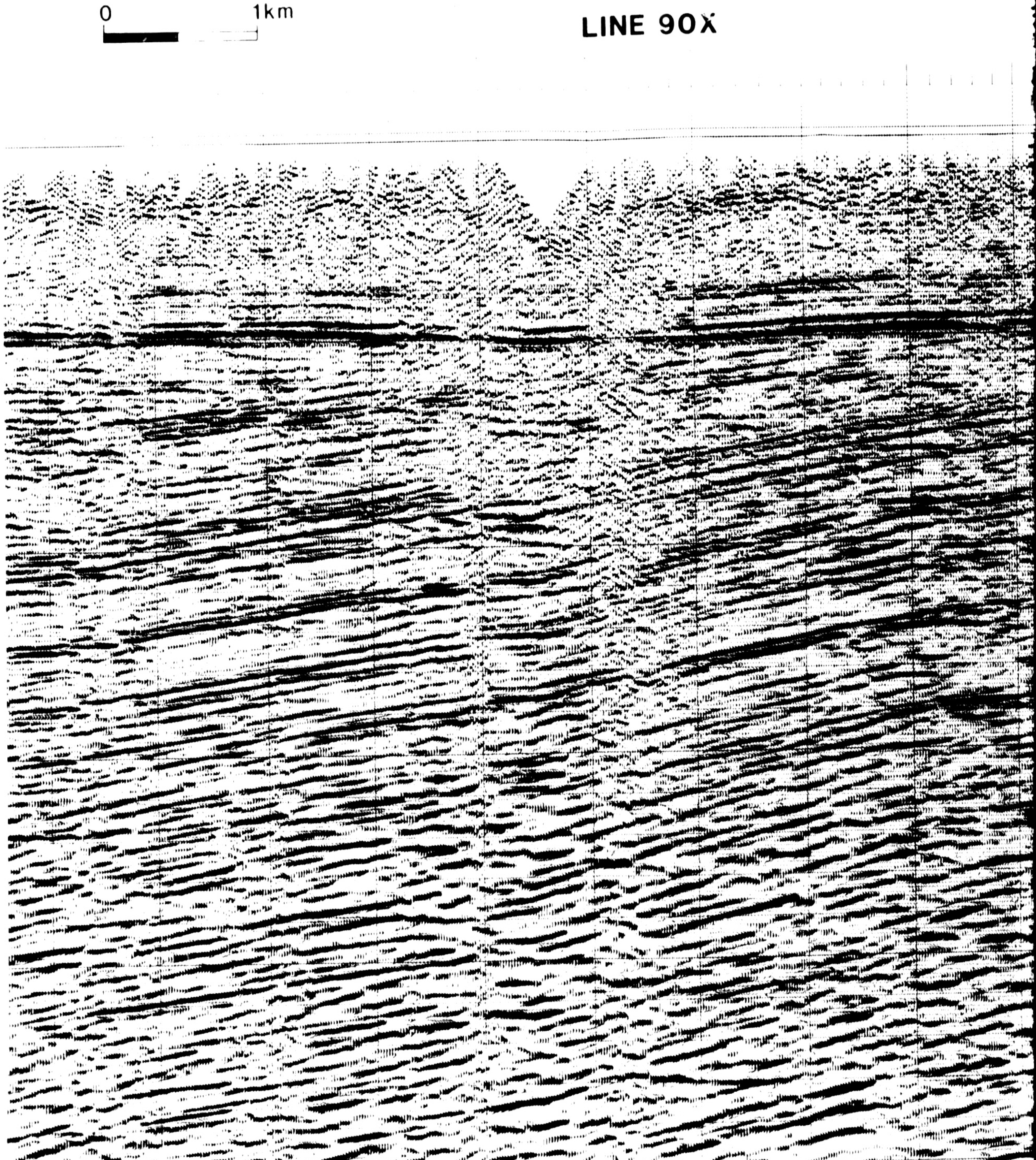
Most interpreted faults have a north to northeasterly trend. The Proterozoic is characterized by broad folds and minor faulting, Figure 3.7. A major fault occurs in the Proterozoic along the same trend as the Maunoir Ridge. The fault is shown on line 90X in Figure 3.14. The fault trends south toward the Colville well D-45. The structure is interpreted as a faulted anticline, as are most of the ridges in the area.

Most structures in the area probably originated in the Proterozoic. Faulting may have taken place at later times and certainly reactivation occurred during the Laramide Orogeny.

In the western part of the area where the seismic data quality is good, the top of the Proterozoic dips gently toward the southwest, Figure 3.14. The Proterozoic is near surface in the east part of the prospect.

3.5.3 The Cambrian Section

The thickness of the Saline River, Mount Cap and Mount Clark Formations are relatively constant in the Colville area. The interval from the top of the Saline River to the Proterozoic thins slightly over Proterozoic highs suggesting some structures in the area are at least Middle Cambrian in age.


0
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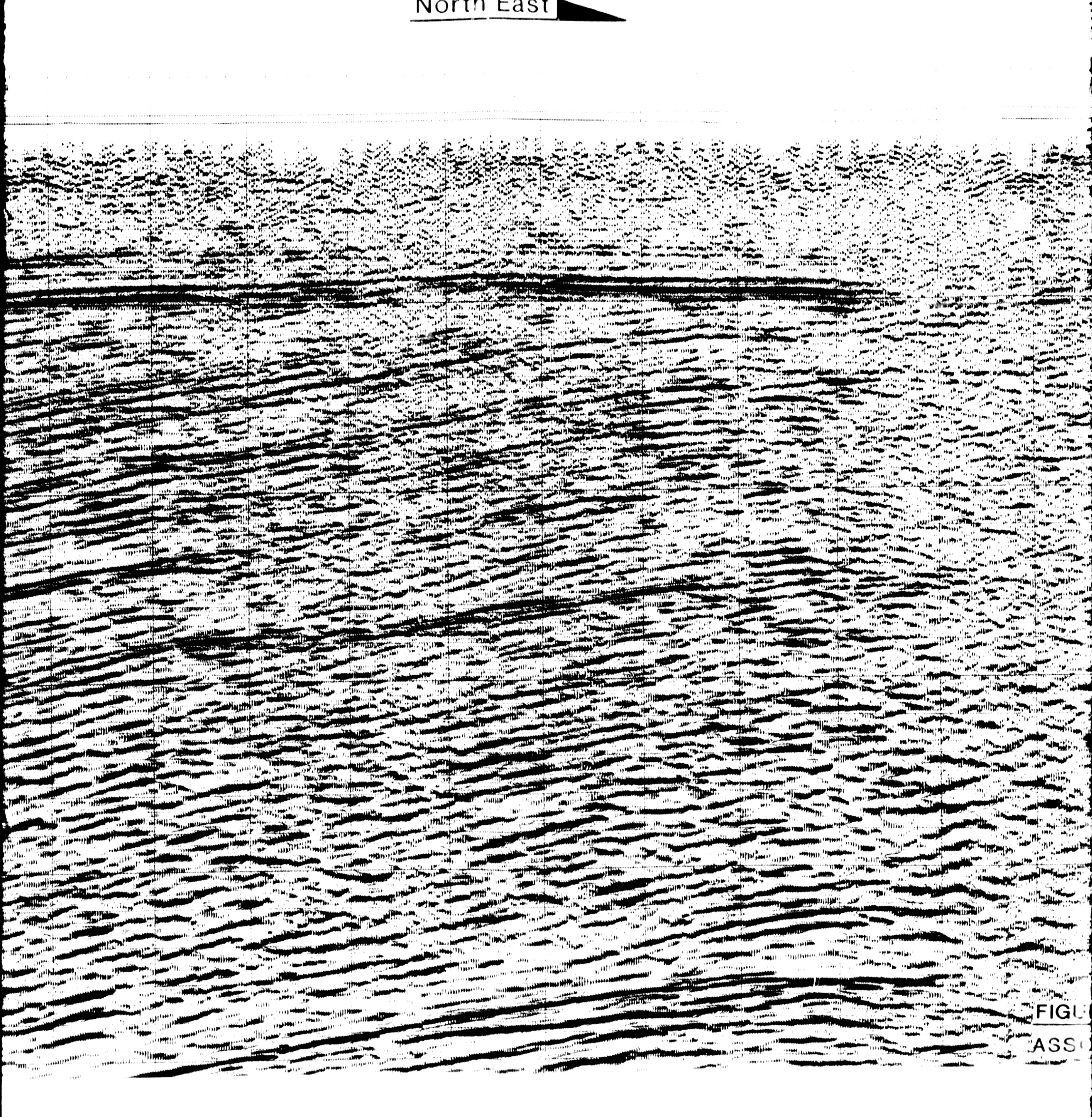
LINE 90X



FIGU

ASS

TIME
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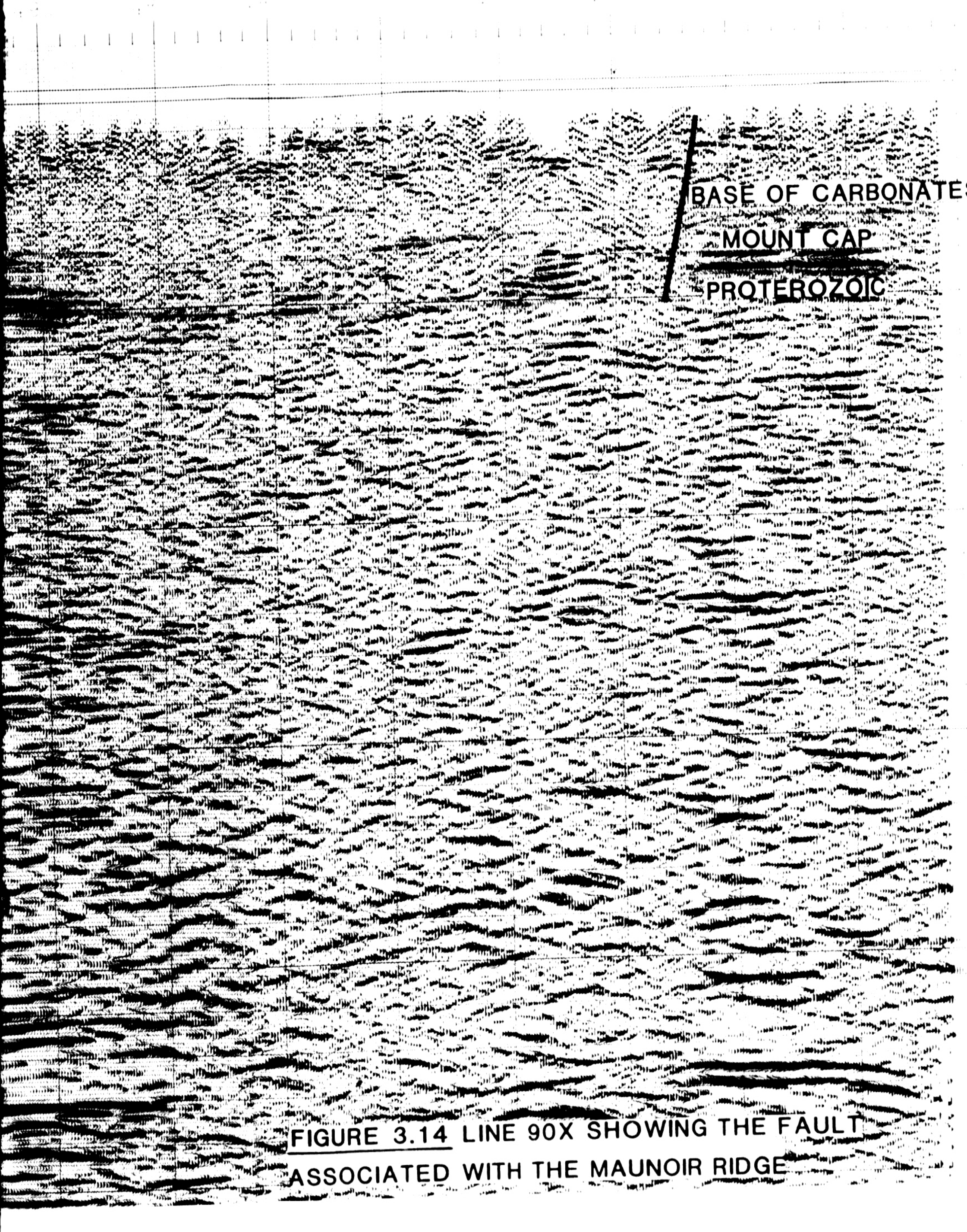

FIGURE 3.14 LINE 90X SHOWING THE FAULT ASSOCIATED WITH THE MAUNOIR RIDGE

3.5.4 Gravity

The Bouguer gravity profiles in the Colville area correlate well with the regional gravity in the Northwest Territories (Department of Energy, Mines and Resources Regional Bouguer Gravity Map, 1969). The gravity decreases from the west toward line 114 as shown on the Bouguer gravity fence diagram in Figure 3.10. Regional gravity then increases slightly toward the east. The structuring within the Proterozoic and density changes of the Proterozoic clastics are probably the main causes of Bouguer gravity anomalies in the area.

Residual gravity effects are most likely caused by near surface changes in density. Some faults in the Paleozoic section produce minor gravity anomalies.