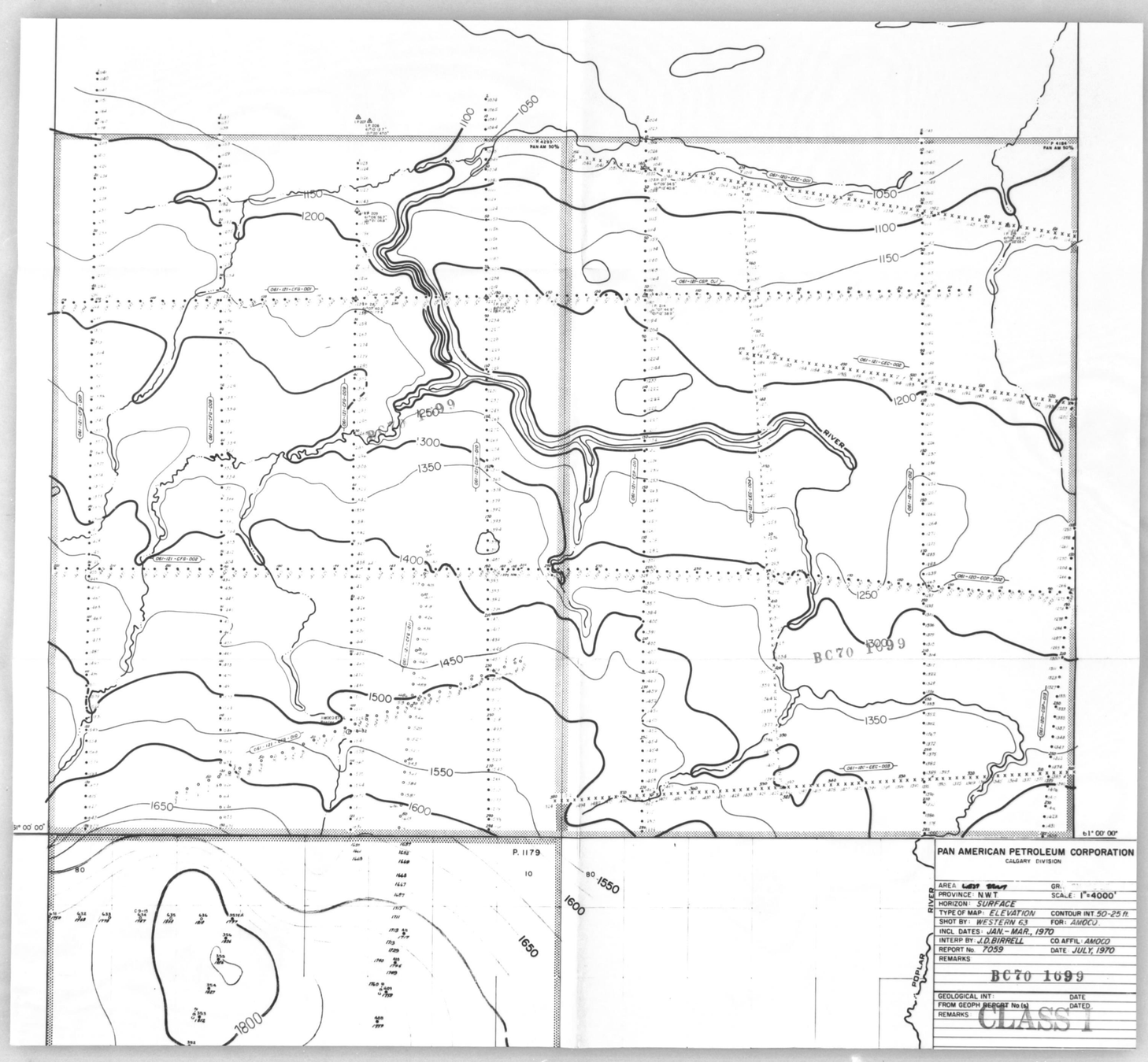


PAN AMERICAN PETROLEUM CORPORATION
CALGARY DIVISION

AREA: LEDUC Study	GR:
PROVINCE: N.W.T.	SCALE: 1"=4000'
HORIZON: SURFACE	
TYPE OF MAP: ELEVATION	CONTOUR INT. 50-25 ft.
SHOT BY: WESTERN 63	FOR: AMOCO
INCL. DATES: JAN.- MAR., 1970	
INTERP BY: J.D. BIRRELL	CO. AFFIL: AMOCO
REPORT No. 7059	DATE: JULY, 1970
REMARKS	

BC70 1099

GEOLOGICAL INT:	DATE
FROM GEOPH REPORT No (s)	DATED
REMARKS	

CLASS I


430
420
410
400
390
380
370
360
350
340
330
RIVER
108-C-69
REL
340?
3RD H.R.L. - PINE POINT
10ms. ≙ 57ft.
61° 00' 00"
SURVEY MISTIE
SHELL
PAN AMERICAN PETROLEUM CORPORATION
CALGARY DIVISION
AREA: WEST TEXT
GRID:
PROVINCE: N.W.T.
SCALE: 1"=4000'
HORIZON: 3RD H.R.L. - PINE POINT
TYPE OF MAP: ISOCHRON
CONTOUR INT: 10 MS.
SHOT BY: WESTERN G.S.
FOR: AMOCO
INCL. DATES: JAN. - MAR., 1970
INTERP BY: J.D. BIRRELL
CO. AFFIL: AMOCO
REPORT No. 7059
DATE: JULY, 1970
REMARKS
BC70 1702
GEOLOGICAL INT:
DATE
FROM GEOPH REPORT No.(s)
DATED
REMARKS
CLASS I

REPORT OF SEISMOGRAPH REFLECTION GEOPHYSICAL SURVEY

CONDUCTED BY

WESTERN GEOPHYSICAL COMPANY OF CANADA LTD.

FOR

AMOCO CANADA PETROLEUM COMPANY LTD.

IN 1970

ON AND OFF

NORTH WEST TERRITORIES PERMIT 4293

Prepared By: J. L. Hudson

District Geophysicist

Submitted in support of application for credit; see affidavit made by_____ of_____1970 and in accordance with work obligations under Section____, sub-section_____of the Regulations.

TABLE OF CONTENTS

Enclosures: Third Hay River Lime - Mid. Devonian Carbonate Isochron Map

Surface Elevation Map
Spread Diagram

INTRODUCTION

During January of 1970 a conventional seismic reflection survey was carried out by Western Geophysical Company of Canada Ltd. on behalf of Amoco Canada Petroleum Company Ltd.. The survey was conducted on and off Northwest Territories Permit 4293..

P 4350

P 4346

P 4347

P 4344

P 4343

MACKENZIE

River

Liard

RIVER

Trout

LAKE

STATISTICAL DATA

A. Mobilization and Recording Dates

The crew arrived in the permit area from Calgary on the sixth of January via the existing seismic trails, the Simpson Trail and the Mackenzie highway. Shooting commenced the 7th of January and was completed the 10th of January.

B. Production

The survey consisted of two lines (CFG-010 and CFG-011) covering a total of 1325 miles and requiring 150 shots and 450 stations. Four days were spent conducting the survey thus giving an average daily production of 3.2 miles.

C. Equipment

1 Recording Truck (D.D.S. 620 Recording Instruments, 36 channel)

1 Shooting Truck

2 Cable Trucks

1 Party Manager's Truck

2 Survey Trucks

1 Supply Truck

2 Conventional Shot Hole Drills

1 Sewell Auger Drill

3 Water Trucks

1 Fold Out kitchen-sleeper trailer

1 Fold out utility-sleeper trailer

1 Power Supply-Mechanical Shop trailer

1 Gas Trailer

1 Bulldozer

D. Personnel

1 Party Manager

1 Computer Clerk

1 Observor

1 Asst. Observor

4 Recording Helpers

2 Surveyors

2 Rodmen

1 Shooter

1 Shooter's Helper

2 Cable Truck Drivers

1 Mechanic

1 Mechanic's Helper

1 Supply Man

3 Drillers

3 Driller's Helpers

3 Water Truck Drivers

1 Cook

1 Cook's Helper

1 Camp Attendant

TOTAL: 31 MEN

E. Surveying

The survey was conducted using Wilde Model T1-A theodolites and steel tapes and was based on a telerometer control survey using government monuments as original control.

F. Unusual Condtions

The operation was normal.

FIELD PROCEDURES

A group interval of 162' was used for symmetric shots resulting in a spread length of 2830'. Six hundred percent coverage was obtained. Six seismometers at a spacing of 30' were used for each group.

Single holes to a depth of fifty feet, loaded with 2½ lb. charges were used.

DATA PROCESSING

The data processing was performed by Amoco Canada in Calgary.

Near surface and elevation corrections to a 1300' datum were applied.

Normal moveout, trace muting, frequency filtering and amplitude level equalization were applied to the data.

RESULTS AND INTERPRETATION

The objective of the survey was to detail a previously mapped anomaly, particularly to determine its northeast (up-dip) extent.

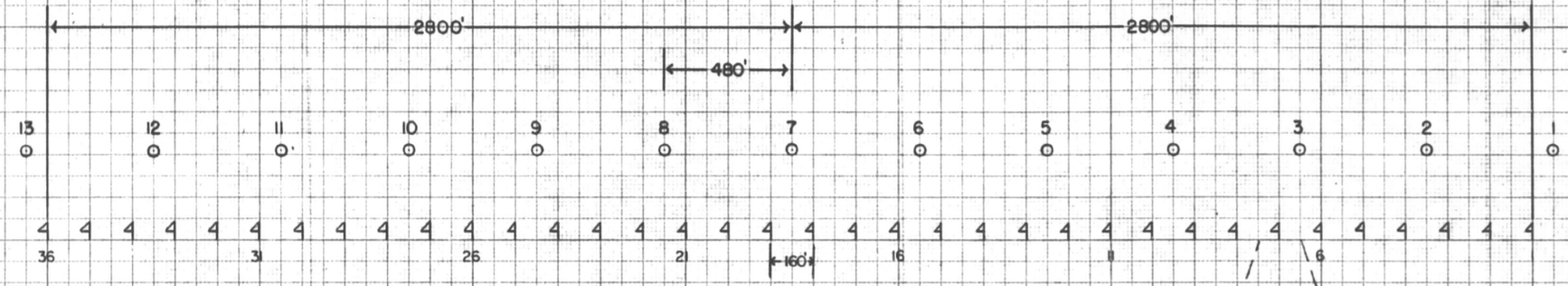
Fair quality seismic data was obtained, the second Hay River Lime, Third Hay River Lime and Mid Devonian Carbonate reflections being of adequate quality for mapping.

The center and northeast edge of the anomaly appeared on line CFG-010, while line CFG-011 is located east of the anomaly. The anomaly could not be extended to the northeast from its extent as shown by the previous seismic coverage.

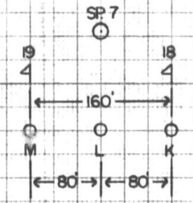
Line CFG-010 demonstrates, as did lines CFG-008 and CFG-009, that the rim of the feature is approximately 30 ms. (140') higher structurally than the central portion, suggesting that the anomaly may be caused by an atoll.

WESTERN F-63

JANUARY, 1970

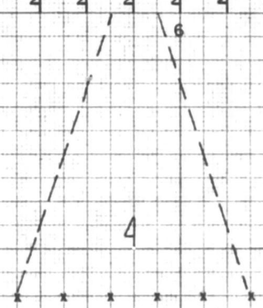


SOURCE POINT 7 (DETAIL)



SHOT HOLE

N.B. USE "L" HOLE ONLY.



6 GEOPHONES/GROUP

GEOPHONES 12' APART

SOURCE POINT

GROUP CENTER

GEOPHONE

R19W
R18W
R17W
R16W
FORT SIMPSON
MARTIN ISLAND
GREEN ISLAND
HANSON ISLAND
MACKENZIE
RIVER
RIVER
RIVER
IMPERIAL OIL
290
300
310
320
280
290
300
310
320
330
340
350
360
370
380
DRIFT CONTROL WITHIN BLUE LINE IS NOT RELIABLE.

1 of

R19W

R 18 W

R17W

R16W

FORT SIMPSON

MARTIN ISLAND

HARRIS RIVER

GREEN ISLAND

HANSON ISLAND

MACKENZIE RIVER

290

300

310

320

280

330

340

360

380

350

370

NAHANNI-SALT INTERVAL THICKENS SLIGHTLY - S.P. 32-44

DRIFT CONTROL WITHIN BLUE LINE IS NOT RELIABLE.

BCP 1706

BCP 1706

1 of

NAHANNI STRUCTURE
10 ms. = 55 ft.

NAHANNI STRUCTURE
10 ms. = 55 ft.

NAHANNI STRUCTURE
10 ms. = 55 ft.

ALL CORRELATIONS ARE CONSIDERED RELIABLE, BUT VALUES WITHIN BLUE LINES ARE CONSIDERED TO BE UNRELIABLE

DRIFT CONTROL BETWEEN BLUE LINES IS UNRELIABLE

DATA OUTSIDE DASHED BLACK LINE IS CONSIDERED HIGH RESOLUTION, DATA INSIDE IS CONSIDERED LOW RESOLUTION

DRIFT CONTROL BETWEEN BLUE LINES IS NOT RELIABLE

DATA OUTSIDE DASHED BLACK LINE IS CONSIDERED HIGH RESOLUTION', DATA INSIDE IS CONSIDERED LOW RESOLUTION

R15W

AMOCO CANADA
PETROLEUM COMPANY LTD.

AREA: Fort Simpson	GRID:
PROVINCE: N.W.T.	SCALE: 1" = 4000'
HORIZON: NAHANNI FM.	
TYPE OF MAP: STRUCTURE	CONTOUR INT.: 10 Ms.
SHOT BY: WESTERN GEO.	FOR: AMOCO
INCL. DATES: JAN.–MAR., 1970	
INTERP BY: J.D. BIRRELL	CO. AFFIL.:
REPORT No.: 7059	DATE: JULY, 1970
REMARKS:	
BC70-1706	
GEOLOGICAL INT.:	DATE:
FROM GEOPH. REPORT No.:	
DATED:	
REMARKS: CLASS I	

242

R19W

R18W

R17W

R16W

FORT SIMPSON

HARRIS

MARTIN ISLAND

RIVER

GREEN ISLAND

HANSON ISLAND

MACKENZIE

RIVER

RIVER

475

500

525

550

575

600

625

650

700

BCFO 1708

1 of 2


550
575
600
625
650
675
700
RIVER
LAIRD
JEAN MARIE CREEK
SPENCE
RABBITSKIN
R15W
61°45'00"
61°30'00"
BC70 1708
AMOCO CANADA
PETROLEUM COMPANY LTD.
AREA: FORT SIMPSON
PROVINCE: N.W.T.
HORIZON: SURFACE
TYPE OF MAP: ELEVATION
SHOT BY: WESTERN GEO
INCL. DATES: JAN.-MAR., 1970
INTERP BY: J.D. BIRRELL
REPORT No. 7059
SCALE 1" = 4,000'
CONTOUR INT. 25 ft.
FOR: AMOCO
DATE: JULY, 1970
CLASS I

Ottawa copy

REPORT OF GEOPHYSICAL
&
SEISMOGRAPH REFLECTION SURVEY

On and Off Northwest
Territories Permit Nos.
4343, 4344 and 4347

Prepared by: J.L.Hudson, Dist. Geophysicist

1970

REPORT OF SEISMOGRAPH REFLECTION GEOPHYSICAL SURVEY

CONDUCTED BY

WESTERN GEOPHYSICAL COMPANY OF CANADA LTD.

FOR

AMOCO CANADA PETROLEUM COMPANY LTD.

IN 1970

ON AND OFF

NORTH WEST TERRITORIES PERMITS

4343, 4344, 4347

Prepared By: J. L. Hudson
District Geophysicist

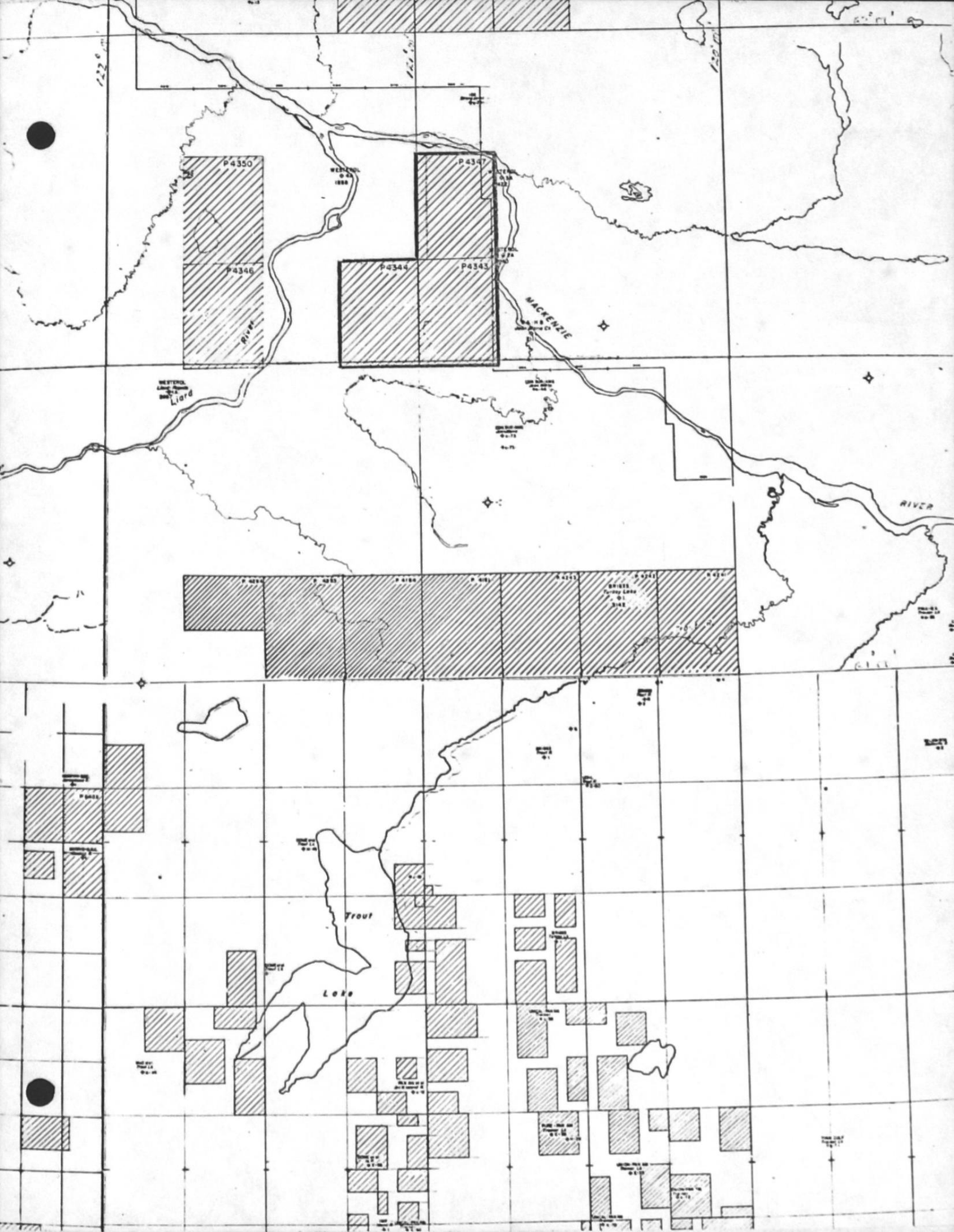
Submitted in support of application for credit; see affidavit made by_____ of_____1970 and in accordance with work obligations under Section_____, subsection_____of the Regulations.

TABLE OF CONTENTS

Enclosures: Nahanni Structure Map
Surface Elevation Map
Spread Diagram

INTRODUCTION

During January, February and March of 1970 a conventional seismic reflection survey was carried out by Western Geophysical Company Of Canada Ltd. on behalf of Amoco Canada Petroleum Company Ltd. The survey was conducted on and off of Northwest Territories Permits 4343, 4344 and 4347.


P4350
P4346
P4347
P4344
P4343
Liard
River
MACKENZIE
RIVER
Trout
Lake

STATISTICAL DATA

A. Mobilization and Recording Dates

The crew arrived in the permit on the 11th of January via existing seismic trails, the Simpson Trail and the Mackenzie highway. Shooting commenced the 12th of January and stopped temporarily on the 14th of February. The crew returned to the area on the 18th of March and completed the survey on the 30th of March, 1970.

B. Production

The survey consisted of fifteen lines (CLQ-001-CLQ-015) covering a total of 189 miles and requiring 2000 shots and 6000 stations. Thirty-seven days were spent conducting the survey thus giving an average daily production of 5.1 miles.

C. Equipment

1 Recording Truck (D.D.S. 620 Recording Instruments 36 channel)

1 Shooting Truck

2 Cable Trucks

1 Party Manager's Truck

2 Survey Trucks

1 Supply Truck

3 Conventional Shot hole Drills

1 Sewell Auger Drill

3 Water Trucks

1

1 Fold out kitchen-sleeper Trailer

1 Fold out utility-sleeper Trailer

1 Power Supply-Mechanical Shop Trailer

1 Gas Trailer

1 Bulldozer

D. Personnel

1	Party Manager
1	Computer Clerk
1	Observor
1	Asst. Observor
4	Recording Helpers
2	Surveyors
2	Rodmen
1	Shooter
1	Shooter's Helper
2	Cable Truck Drivers
1	Mechanic
1	Mechanic's Helper
1	Supplyman
3	Drillers
3	Drillers Helpers
3	Water Truck Drivers
1	Cook
1	Cook's Helper
1	Camp Attendant

TOTAL 31 MEN

D. Surveying

The survey was conducted using Wilde Model T1-A theodites and steel tapes and was based on a government controlled survey along east outline of range 16 west of the sixth meridian.

FIELD PROCEDURES

With the exception of line CLQ-002, a group interval of 162' was used for symmetric shots resulting in a spread length of 2830 feet. Six seismometers at 30 feet spacing were used for each group. On line CLQ-002, a group interval of 110 feet was utilized; 6 seismometers at 18.5 foot spacing. On this line every fourth shot was assymetric, 30 groups being recorded to the south and six groups to the north. This resulted in a spread length of 1,920 feet for the symmetric shots. This line was recorded with 400 percent coverage.

Single holes to a depth of fifty feet, loaded with from ½ to 2½ lbs. of dynamite were used over a large majority of the area. Multiple holes, deep holes and charge size were tested on various source points of line CLQ-010 and on source point 020 of line CLQ-001. A large portion of the area is covered with unconsolidated sands and clay. It was found that charges of more than 2½ lbs. would set up a strong reverberation in this low velocity layer, and that charges of less than ½ lb. might not provide the necessary penetration of energy through this layer. The use of deep holes (80 to 120') did not seem to result in significant improvement. The test shots at CLQ-001, S.P.020 indicated that two hole patterns at 160 feet spacing might improve record quality. Line CLQ-011 was shot entirely with patterns, and CLQ-012 and CLQ-002 shot alternating patterns and single holes. The raw data write-outs of line 012 seem to indicate that the patterns are generally better in quality than the single holes.

DATA PROCESSING

The data processing was performed by Amoco Canada in Calgary.

Near surface and elevation corrections to a 500' datum were applied.

Normal moveout, trace muting, frequency filtering and amplitude level equalization were applied to the data.

RESULTS AND INTERPRETATION

It was found that a sub-weathering, low velocity, drift layer occured in varying thicknesses over almost the entire area. The layer was usually, approximately 6,500'/sec. in velocity and at times was in excess of 1500' in depth. A shale of approximately 11,000'/sec. was found to exist below the drift. The frequency of the data in the area was extremely variable. This is caused by the variability of the near surface layer. Over a large part (80% approx.) of the area the shot is placed in unconsolidated soils and clays resulting in low frequency data, whereas in other parts of the area the charge is placed in shale or hard clay resulting in high frequency data. Where high frequency was recorded reflections from the Elk Point salt could be recognized (if it were present) and also reflections from detrital beds in the section. The top of the Nahanni could almost always be recognizable, no matter what the frequency of the data was.

The Nahanni structure map shows three anomalous areas.

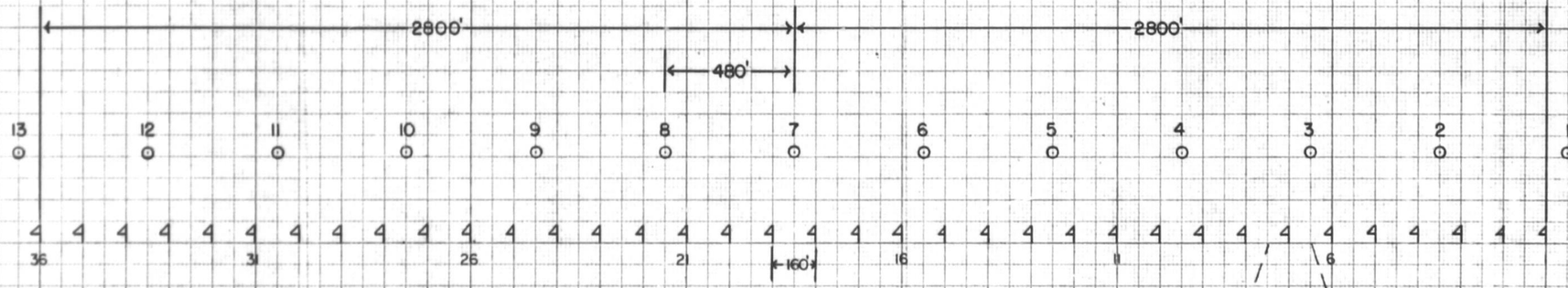
(1) The reef on which the Cdn.Sup.-K.M.G. Jean Marie B-48 well (61°27'N, 120°38'W) was drilled to the southeast of permit 4343,

(2) A structure at the intersection of lines CLQ-008 and CLQ-011 in the west central portion of permit 4344. This structure is apparently too small, both areally and in height, to be considered drillable.

(3) An anomaly in the northern part of Permit 4347. This anomaly is made up of a low on the Nahanni which results from it's collapse where the Elk Point salt is partially or completely dissolved away. In addition there appears to be a small build-up on the Nahanni jus just to the south of the salt collapse feature. It was felt that if the upper Chinchaga Dolomite were porous the salt collapse feature could form a trap, but the potential production would be too small to consider the anomaly drillable.

WESTERN F-63

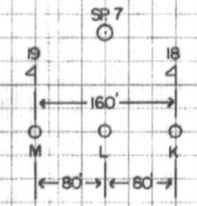
JANUARY, 1970



SOURCE POINT

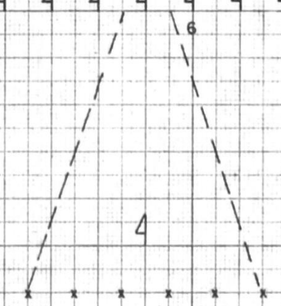
GROUP CENTER

SOURCE POINT 7 (DETAIL)



SHOT HOLE

N.B. ~~ALL SHOTS~~ USE "L" HOLE ONLY.



6 GEOPHONES/GROUP
GEOPHONES 20' APART

GEOPHONE

ESSER CO

KS STANDARD © GRAPH SECTION

R19W
R18W
R17W
R16W
FORT SIMPSON
MARTIN ISLAND
GREEN ISLAND
HANSON ISLAND
RIVER
MACKENZIE
RABBITSKIN
RIVER
HARRIS
NAHANNI-SALT INTERVAL THICKENS SLIGHTLY - S.P. 52-44
290
300
310
320
330
340
350
360
370
380
280
1 of 2


NAHANNI STRUCTURE
10 ms. = 55 ft.
NAHANNI STRUCTURE
10 ms. = 55 ft.
NAHANNI STRUCTURE
10 ms. = 55 ft.
RIVER
LAIRD
JEAN MARIE
CREEK
SPENCE
RIVER
R15 W
AMOCO CANADA
PETROLEUM COMPANY LTD.
AREA:
GRID:
PROVINCE: N.W.T.
SCALE: 1" = 4000'
HORIZON: NAHANNI FM.
TYPE OF MAP: STRUCTURE
CONTOUR INT.: 10 Ms.
SHOT BY: WESTERN 63
FOR: AMOCO
INCL. DATES: JAN.-MAR., 1970
INTERP. BY: J.D. BIRRELL
CO. AFFIL.:
REPORT No.: 7059
DATE: JULY, 1970
REMARKS:
GEOLOGICAL INT.:
DATE:
FROM GEOPH. REPORT No(s):
DATED:
REMARKS:
CLASS I

2 of 2