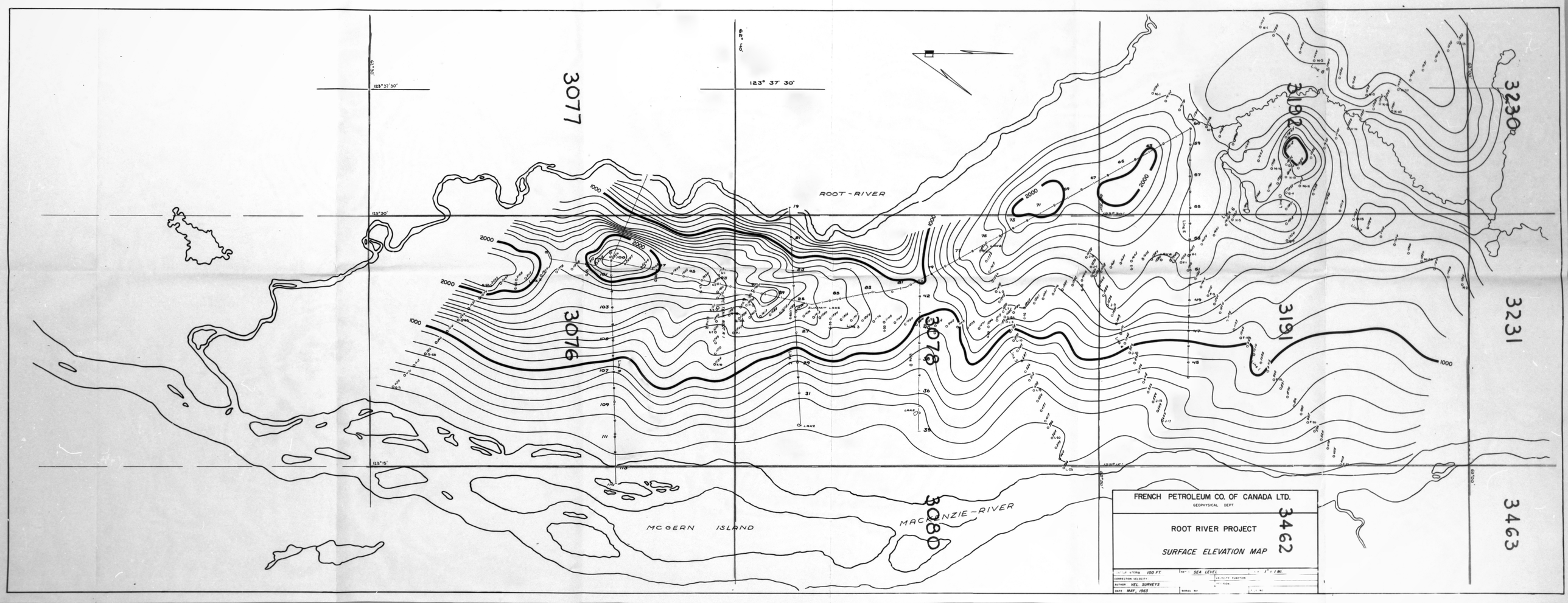
3077
3076
3078
3080
3082
3230
3231
3191
3463
3462
123° 37' 30"
123° 30'
123° 15'
ROOT - RIVER
MACKENZIE - RIVER
MCGERN ISLAND
LAKE
1000
2000
FRENCH PETROLEUM CO. OF CANADA LTD.
GEOPHYSICAL DEPT
ROOT RIVER PROJECT
SURFACE ELEVATION MAP
100 FT
SEA LEVEL
1" = 1 MI.
VEL SURVEYS
MAY, 1963

96-6-5-5

FINAL REPORT

REFLECTION SEISMOGRAPH SURVEY

on

ROOT RIVER AREA, N. W. T.

for

FRENCH PETROLEUM COMPANY OF CANADA LTD.

by

VELOCITY SURVEYS LIMITED

April, 1963.

Headquarters:	1603 Centre Street North, Calgary, Alberta.
Party Chief:	J. M. Murchison
Supervisors:	F. C. McConnell P. R. Grier

CONTENTS

FINAL REPORT

ROOT RIVER AREA, N. W. T.

A. INTRODUCTION

Operations commenced in the Root River Area with the barging of a drill, water truck and travel-all from Hay River to McGeve Island in early October, 1962. Actual operations started in late December, 1962, when seismic drilling commenced. Seismic recording commenced in mid-January, 1963.

Field headquarters were maintained in a tent camp complemented by two pre-fabricated trailers supplied by the French Petroleum Company of Canada Ltd., located on the prospect.

B. GENERAL INFORMATION

1. Prospect Location

The area lies between the Root and Mackenzie Rivers and is located roughly between Latitudes 62° 30' and 63° and Longitudes 123° 15' and 123° 37' 30".

2. Topography

The outstanding topographic feature is the surface expression of the Root River anticline trending in a north-south direction. This heavy, undulating surface feature abounds with cutbanks and channels draining to the west to the Root River and more gently to the east into the Mackenzie River. On some lines, the topography

was so rugged the drill and water truck had to be winched down hill.

3. Purpose of Survey

The object of the survey was to determine the existence of any anomalies favourable to the entrapment of oil. As the area was virtually virgin, exploratory-wise, emphasis was placed on structural anomalies with reefoid and stratigraphic entrapments also being stressed.

4. Accessibility and Weather

The area lies 100 miles north of Fort Simpson along the Mackenzie River. It is serviced by barge along the river during the summer season and by aircraft during the winter months. The temperature was below freezing during the entire operation, thus, the muskegs would carry conventional equipment.

5. Surveying

Vertical and horizontal control were run by a transit traverse and all spread distances were chained. All elevations were referred to the ground elevation at the F. P. C. Tenneco Root River No. 1 test. Several solar shots were taken as a check on the horizontal traverse.

6. Drilling

One, truck mounted, Mayhew 1,000 rotary drill, complemented by a three ton, 850 gallon tank mounted water truck, was assigned to this project. Long water hauls, coupled with extremely

rugged terrain, was the major operational problem in this area. The drilling was generally fair.

7. Geology

The area lies between the McConnell Range on the east and the Camsell Range on the west. The survey area is situated in such a complicated geological province, it is difficult to determine regional tilt and may embrace a fault block.

C. RECORDING EQUIPMENT

An Electro-Tech DS-8 flat bed tape recorder was used in conjunction with a set of modified S. I. E., P-11 amplifiers. Nine geophones per trace over 150 foot intervals were used in conjunction with two, 24 conductor, 1800 foot cables and supplemented by two, 24 conductor, 2640 foot cables.

D. FIELD TECHNIQUES

Split continuous profiling was employed, using an 1800 foot spacing between shot points, subsequently, utilizing a 2640 foot spacing. A 20-64-1 filter setting was used on record, with an out-42-1 filter used on playback.

Five pounds of powder anchored at 50 feet generally produced the optimum record.

As the holes, of necessity, had to be preloaded, some may be overshot where the holes were frozen and could not be re-loaded.

E. RECORD QUALITY

Record quality varied from good to poor, with a few NR records being obtained. The NR records were obtained in muskeg-type terrain.

F. COMPUTATION PROCEDURE

The records were computed by the standard French Petroleum Company refraction computation procedure and were corrected to a datum of 1,600 feet at a datum velocity of 12,000 feet per second.

The first shot in each hole was computed and subsequent shots were corrected to the first shot in the hole by means of a reflection lag time.

The playback record, which was used as specimen, was corrected to its monitor by a phase correction of 0.020 second.

The standard sections were plotted in two-way time, using a horizontal scale of five centimeters equal 1,000 feet and, later, 2,640 feet and a vertical scale of five centimeters equal 0.2 second.

Record sections were prepared from the tapes and were smoothed and processed by Canadian Magnetic Reduction.

G. DISCUSSION OF RESULTS

The following maps are submitted with this report:

Surface Topography
Middle Devonian
Precambrian

It is suggested that the main structural trends are tectonic in origin rather than as the result of reef growth or Pleistocene Glaciation.

The Middle Devonian event is the outstanding reflection on the records and carried extremely well over the area.

The Precambrian event, although not as consistent in either character or continuity as the Middle Devonian, carried sufficiently well for a map to be presented.

The Middle Devonian was identified from the F. P. C. Tenneco Root River No. 1 test. The Precambrian was identified by extrapolation of geological data.

An attempt was made to carry the reef known to be present at the well. However, this task proved fruitless as the reef is, apparently, encased in limestones and anhydrites, with little or no velocity contrast between these formations and the dolomite reef.

Throughout the survey area, anomalous energy patterns and slashes were noted. In the main, these are believed to be horizontal reflections from near surface shooting hazards (muskeg bottoms, sides of hills, creek bottoms, etc.) and were not associated with structure or changes in lithology.

H. FINDINGS

No positive regional tilt is discernible from the records or the contoured maps.

The remarkable feature of the maps is the tremendous structure indicated. The two most interesting structural anomalies are located at Shot Point K3 along Line 2 and at Shot Point M8 along Line 7.

As discussed previously, it is difficult to ascertain if full reef is present beneath Shot Point M8. However, on the basis of the first test, this is an optimistic assumption, although there is no concrete seismic data to support this postulation.

A fault of approximately 500 feet of throw to the south enhances this second feature (at Shot Point M8).

A possible fault, down thrown to the west, is an alternate interpretation running almost north-south between Shot Points H 10 & H 11, Q 3 and M 9 & M 10. This alternate interpretation would certainly detract considerably from this anomaly.

Along Line 5, structural highs between Shot Points L4, L5 and L6 although considerably deeper in the section, could be a lead to significant biohermal reef growth.

The highs indicated, particularly on the Middle Devonian maps on the east ends of the east-west trending lines may be inherent structure from underlying biohermal reef growth.

Other faults of 200 foot throw and less may have been interpreted as synclines or steep dips.

I. RECOMMENDATIONS

1. More seismic control is necessary to prove or disprove the presence of the secondary fault discussed above.

2. Line 10 should be extended to establish the direction of the major fault.

3. Some evidence of additional minor faulting exists but requires more control to be outlined.

4. A line west to the Root River would establish the amount of west dip of the anticline.

Respectfully submitted,

VELOCITY SURVEYS LIMITED

J. M. MURCHISON

Approved

F. C. McConnell, P. Eng.