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ROOT RIVER AREA

Northwest Territories

Seismic Reflection Survey
Report

Project Number 673-6-4-72-8

September 1972

AQUITAINE COMPANY OF CANADA LTD.

SEISMIC REFLECTION SURVEY REPORT

ROOT RIVER

NORTHWEST TERRITORIES

for

AQUITAINE COMPANY OF CANADA LTD.

contracted by

NORTHERN GEOPHYSICAL LTD.

March - April 1972

Permit Number 5645

and

Lease Numbers 840-70 to 843-70

Project Number 673-6-4-72-8

Report by

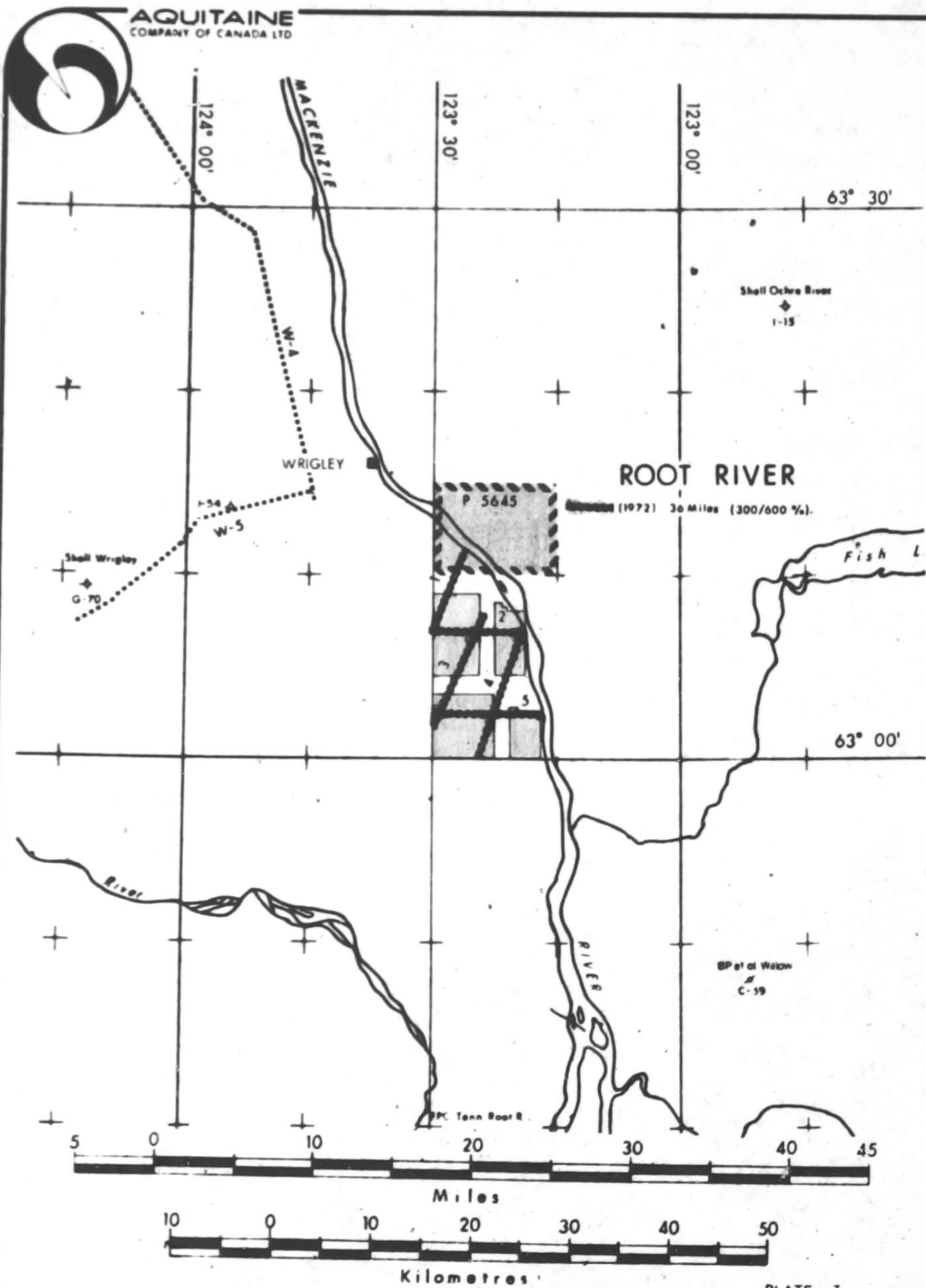
E.B. Puskas

September 1972



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1. Surface Elevation Map	
2. Horizon C (Hume ?) Time Structure Map	
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INTRODUCTION

The Root River prospect is located in the Northwest Territories immediately southeast of Wrigley. The prospect area lies within the boundaries of latitude $63^{\circ}00'$ and $63^{\circ}15'$ and between longitude $123^{\circ}15'$ and $123^{\circ}30'$. Access is by way of the Pancana Industries Ltd. road system from Fort Simpson to Wrigley and Pacific Western Airlines from Edmonton to Fort Simpson and Arctic Air from Fort Simpson to Wrigley airport.

The area has moderate timber cover and rolling terrain.

No previous geophysical data was shot over the permit and leases. The current program consisted of approximately 36 miles of reconnaissance shooting, three southwest-northeast diagonal lines and two east-west lines (Plate I). The object of the survey was to evaluate the leases for possible hydrocarbon entrapment.

Field operations conducted by Northern Geophysical Party N-1 commenced on March 15th, 1972 and were completed on April 11th, 1972. Line cutting commenced on March 15th. Drilling commenced on April 2nd and was completed on April 10th. Recording commenced several days later on April 6th and was completed on April 11th.

The seismic camp was located near the intersection of line 2 and 3 at approximately $63^{\circ} 07'$ latitude North and $123^{\circ} 25'$ longitude West.

FIELD PROCEDURES

The crew worked from a mobile trailer camp located at the north end of the prospect. The camp remained at one location during the duration of the survey. To minimize travel time the equipment was left out in the field during the night and a 206 Bell Helicopter was used to fly the entire crew to and from the field. Including sub-contractors, 45 field personnel worked under the direction of Party Manager, J.W. Corbett. The operations supervision was

carried out by E.B. Puskas for Aquitaine Company of Canada Ltd. and by I.P. Bishko for Northern Geophysical Ltd.

Surveying

A Wilde theodolite was used for horizontal and vertical control. Both the horizontal and vertical control was tied to a bench mark located near the Wrigley airport. The control lines were shifted to get the best topographic fit since the entire survey misfit the topographic features due to uncertainty of the bench mark co-ordinates. An identification tag with permit, shotpoint and line number was nailed to the nearest tree, at each shotpoint. All shotpoints and stations were surveyed.

Bulldozing

Bulldozing equipment was supplied by Keen Industries. They commenced work on line 1. The entire program was pre-cut.

Four caterpillar tractors (three Wide Pad D6C and one D7E) were used for line cutting and clearing. The bulldozing was double shifted with the day shift cutting new line and the night shift clearing up the new cut line. After the completion of the line cutting, one D6C caterpillar tractor was retained to aid the seismic equipment up the hills where necessary and to do the required cross-ditching on hill sides.

Drilling

Northern Geophysical Ltd. and sub-contract drills were used. The equipment consisted of seven rigs, five air-water drills and two top drives. A 1500-gallon water truck assisted in the drilling operations.

At each shotpoint location a single hole was pre-drilled to a depth of 60 feet and pre-loaded with 15 lbs of high velocity dynamite (Geogel 60%). Initially, the shotpoints were drilled 440 feet apart to give a 600% sub-surface coverage. However, the limited time available prior to spring break-up and the operations slow down due to encountering difficult drilling,

necessitated changing the hole spacing to 880 feet to give a 300% sub-surface coverage.

Throughout the prospect, the drilling was single shifted. Difficult drilling was encountered due to loose and cemented gravel along the Mackenzie River towards the east end of lines 2, 4 and 5 (Plate I). Shale was encountered towards the west and drilling improved considerably.

Recording

The data was digitally recorded with a S.I.E. Model PT-800 binary gain recording system using a PDR 89 tape system with a 9-track digital tape transport. At each station, a string of nine Mark L-2, 14 cps geophones were used. A Mandrel remote control firing system was used to transmit the firing order from the recorder to the shooter and transmit back time break and up-hole signals. A dry-write camera provided field read-after write monitor records. All records were recorded with a 16-124 field filter.

The recorded spread consisted of 24 groups. The shotpoints were located on a group in the center of the spread between traces 12 and 13. The group across the hole was dropped for each shot. The distances between groups were 220 feet and 440 feet between group 12 and 13. Shotpoints were drilled every 440 feet (600% CDP) on the north end of line 3 and 4 and on the east end of line 2. For the remaining program all shotpoints were drilled 880 feet apart for a 300% sub-surface coverage. A half mile split spread was used. (Plate III, IV and V).

Data Processing

The initial record write-up was done in the field office by a computer clerk. The field data was processed and plotted in Calgary using the Aquitaine in-house computer system. Structure sections were prepared on all lines using an automatic computer program to correct for weathering, drift, elevation and

datum. A datum plane of +800 feet and a datum velocity of 10,500'/sec was used for the corrections. The velocity function for N.M.O. corrections was derived from a Δt analysis of the field records. All sections were displayed as Galvo-variable with a final playback filter of 15-20-60-65.

R.B. Cruz & Associates Ltd. was sub-contracted by Aquitaine to do the data preparation for weathering corrections, trim static picking and dressing the final sections.

Working Conditions

The temperature remained very mild as spring break-up was approaching. The road and cut line conditions remained fair during the survey.

Generally, the working conditions were complicated by the warming weather, hard gravel drilling and rolling terrain which necessitated the use of a caterpillar to tow the equipment up the hills.

The crew worked seven days a week. A vehicle was used to haul supplies from Fort Simpson. Generally good radio communication existed by single side band through Fort Nelson or Hay River Mobile.

RESULTS AND CONCLUSIONS

The current seismic program was not tied into any wells or seismic control since no well or seismic control exists in the immediate vicinity of the leases (Plate I). Reflection identifications were made by jump correlating from the Sigma line W-4 located approximately 10 miles west of the Root River leases. The reflection were tentatively identified as Horizon C (Hume ?) and Horizon E (Cambrian ?). A good strong reflection was obtained from Horizon C which was correlated throughout the area. The reflection obtained from Horizon E deteriorates towards the east as the lines approach the Mackenzie River.

The field data was generally good to locally poor. Very poor record

quality was obtained near the Mackenzie River.

Several fault systems are indicated by the seismic control. The faulting on both Horizon C and E appear to be independent of each other. On the south-west lease, a thrust fault with a southwest thrust appears to be present at the Horizon C level. Due to the reconnaissance nature of the seismic control the fault orientations are not adequately determined. Westward dip is indicated by both the Horizon C and Horizon E time structure maps.

RECOMMENDATIONS

A thorough geological study should be made over the area. Additional seismic coverage is required to fully determine the fault pattern on the leases.

RESPECTFULLY SUBMITTED,

AQUITAIN COMPANY OF CANADA LTD.



E. B. Puskas, Project Geophysicist

REVIEWED AND APPROVED:



D. G. Aubin, Chief Geophysicist.

SUMMARY OF SUB-CONTRACTORS

Seismic Line Cutting and Clearing

Keen Industries Ltd.

Fort Simpson, N.W.T.

Slashing and Line Clean-up

Keen Industries Ltd.

Fort Simpson, N.W.T.

Surveying

Felix Seismic Surveys Ltd.

Edmonton, Alberta

Drilling

Seisform Drilling Ltd.

Wetaskiwin, Alberta

Aquarius Drilling Ltd.

Calgary, Alberta

Catering

Crown Caterers

Peace River, Alberta

EQUIPMENT SUMMARY

TECHNICAL

- 1 PT800 - 24 trace digital binary gain amplifiers
- 1 PDR89 tape transport - 9 track - SEG (A) format
- Remote firing units
- 120 strings - Mark L-2 (14 Hz) geophones
- 20 - 4 takeout cables - 220 ft. station interval

VEHICLES

- 1 - Recording Truck - 2 ton GMC 940 - dual
- 1 - Shooting Truck - 1 ton - F350 - dual
- 2 - Cable Trucks - 1 ton - F350 - dual
- 2 - Survey Trucks - F250 - 4 x 4
- 1 - Party Manager Unit - F250 - 3/4 ton
- 1 - Service Unit - F350 - 1 ton - dual
- 1 - Shift Change Unit - F250 - 3/4 ton with heated van

DRILLING

- 5 - Mayhew 1000 - rotary - air-water drills
- 2 - Mayhew Top Drives
- 1 - 1500 gallon water truck

DOZING

- 3 - Wide Pad D6C Caterpillar Dozers
- 1 - D7E Caterpillar Dozer

AIRCRAFT

- 1 - 206 Bell Okanagan Helicopter

MISCELLANEOUS

- 2 - Explosive storage magazines
- 2 - Cap storage magazines
- 1 - 1500 gallon GMC fuel truck
- 1 - 2000 gallon fuel sloop
- 3 - 500 gallon fuel tanks

CAMP

- 1 - Kitchen
- 1 - Sleeper Utility
- 1 - Office Sleeper
- 2 - Sleepers
- 1 - Power Plant (2 - 30KVA generators)
- 1 - Sleeper Kitchen

CREW COMPOSITION SUMMARY

FIELD PERSONNEL

1 - Party Manager

Surveying

(4 men)

2 - Surveyors

2 - Rodmen

Recording

(10 men)

1 - Senior Observer

1 - Junior Observer

1 - Shooter

1 - Shooter's Helper

1 - Reel Truck Driver

5 - Recording Helpers

Drilling

(15 men)

7 - Drillers

7 - Drill Helpers

1 - Spare Water Truck Driver

Bulldozing

(8 men)

8 - Operators

Catering

(3 men)

1 - Cook

1 - Cook's Helper

1 - Camp Attendant

Additional Personnel

(5 men)

1 - Computer Clerk

1 - Mechanic

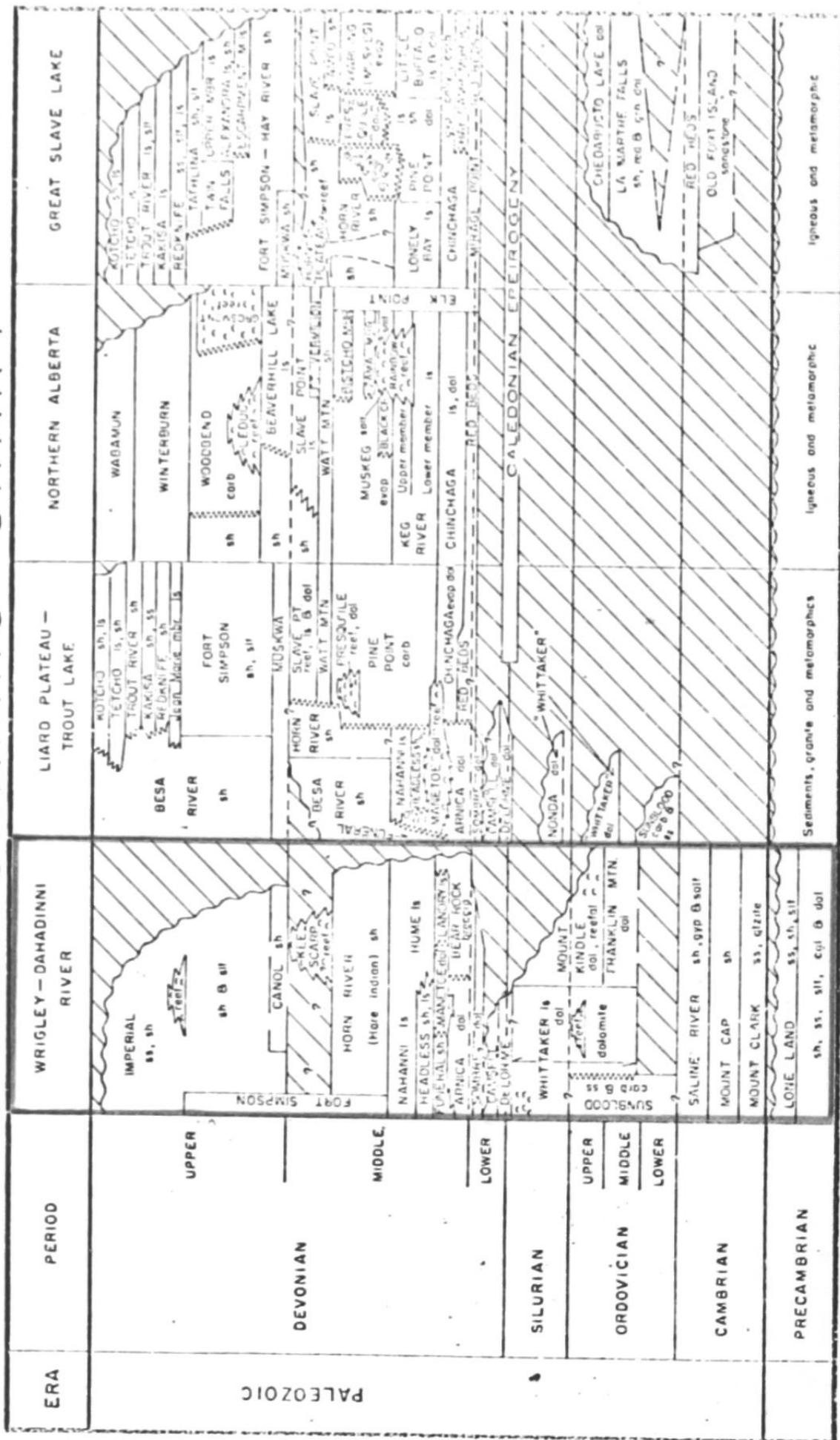
1 - Mechanic's Helper and Supplyman

2 - 206 Okanagan Helicopter pilot & Mechanic

STATISTICAL SUMMARY

Operating days in area -----	28
Total recording days -----	6
Recording hours (field hours) -----	61
Total hours (field and travel) -----	119
Miles of coverage -----	35.3
Total profiles shot -----	261
Number of profiles per recording hour -----	4.5
Coverage per day (miles) -----	5.9
Total caps used -----	287
Total dynamite used (pounds) -----	3799
Average dynamite used per profile -----	14.5
Drilling hours (field hours) -----	437
Total hours (field and travel) -----	837.5
Total drilling footage -----	15,831
Number of holes drilled -----	265
Drilling footage per hour -----	36.2
Number of holes per hour -----	0.6
Average hole depth (feet) -----	59.7

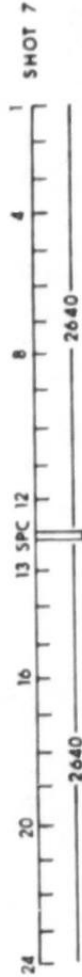
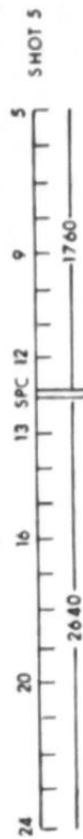
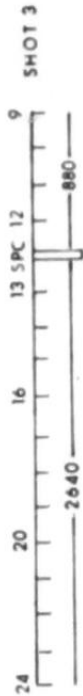
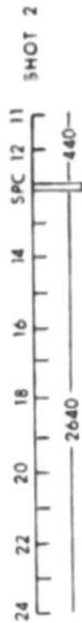
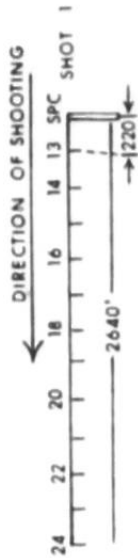
STRATIGRAPHIC CHART



NORTH/EAST

CABLE LAYOUT SHOWING ROLL IN/OUT
(FOR 600 % ONLY)

SOUTH/WEST

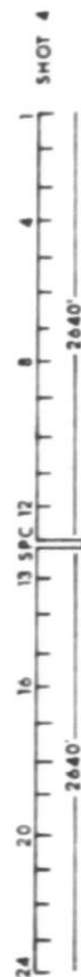


NORMAL SPLIT SPREAD

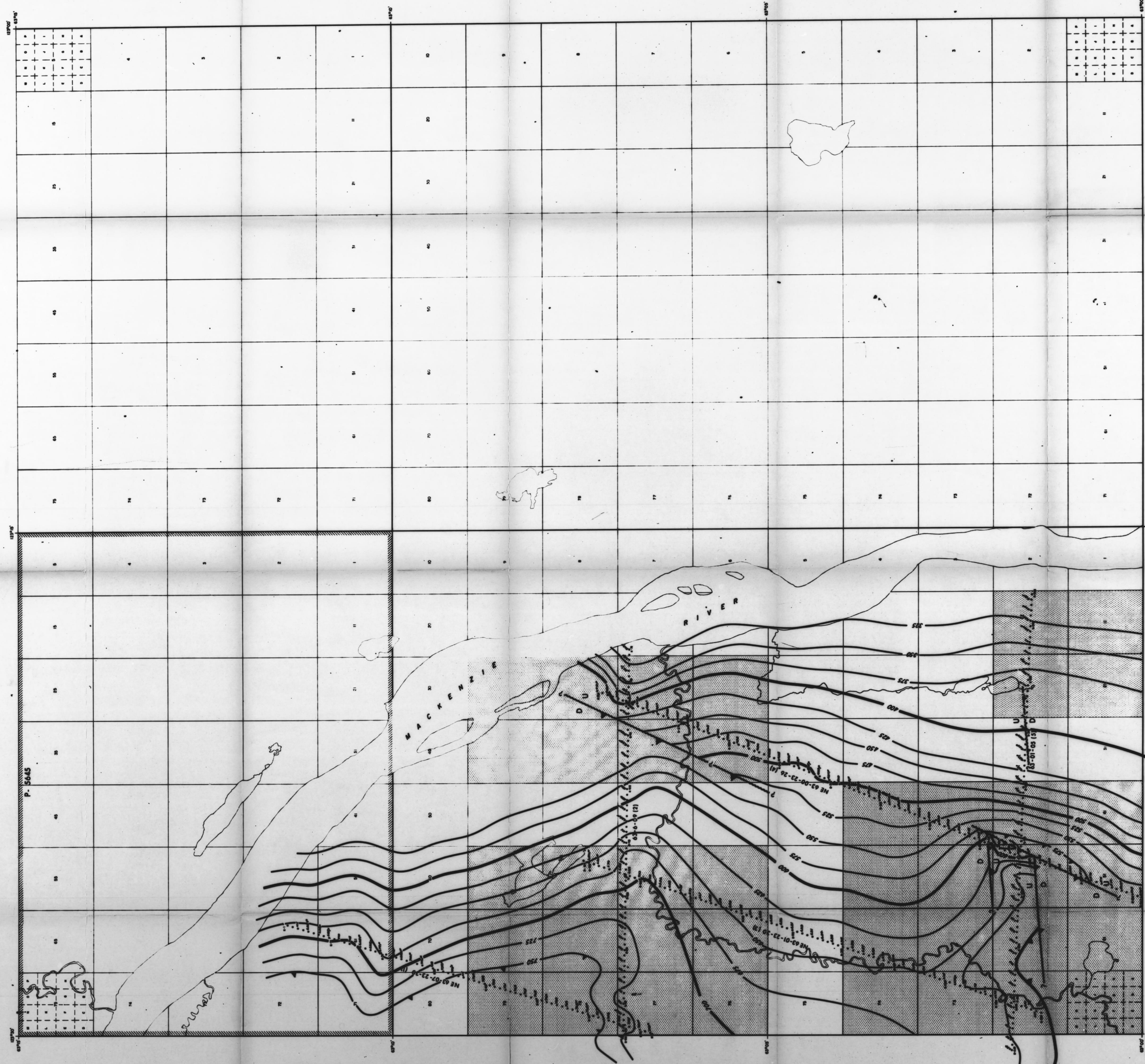
SOUTH/WEST

NORTH/EAST

CABLE LAYOUT SHOWING ROLL IN/OUT
(FOR 300% CDP SHOOTING)



NORMAL SPLIT SPREAD



AQUITAINE COMPANY OF CANADA LTD.

95-0-3
ROOT RIVER
HORIZON "C" (HUM?) STRUCTURE

DATE	1973
BY	W. J. H. H.
CHECKED BY	W. J. H. H.
APPROVED BY	W. J. H. H.

673-6-4-32