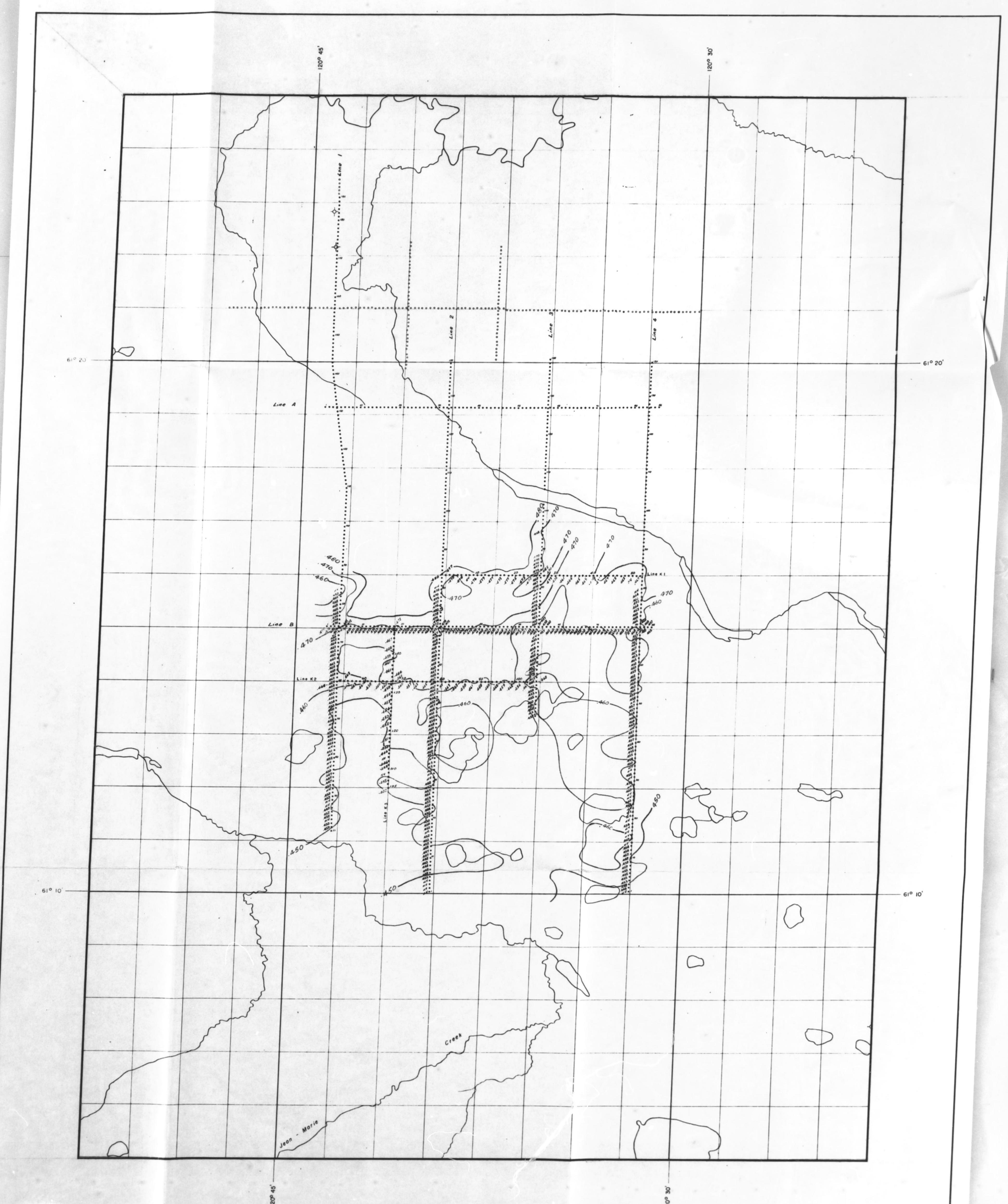


BPOG Operations Ltd. 

AREA	Cormack Lake, NWT
HORIZON	Surface Elevation (values in ft)
TYPE OF MAP	
ELEVATION DATUM	Sea Level
CONTOUR INTERVAL	
TOPOGRAPHIC DATUM	
TOPOGRAPHIC CORRECTION VELOCITY	
INTERPRETED BY	
SCALE	1 in = 1 mi
ENCLOSURE NO.	REPORT NO. 3-6036
DATE	DRG NO. GP 2888
MAP REFERENCE NO	95 - H - 287



GPS 6056

BPOG Operations Ltd		BP
AREA: Cormack Lake, N.W.T.		
HORIZON: Jean Marie to Flattener (top of carbonate + 1)		
TYPE OF MAP: Isochron		
ELEVATION DATUM:		
CONTOUR INTERVAL: .010 sec		
TOPOGRAPHIC DATUM:		
TOPOGRAPHIC CORRECTION VELOCITY:		
INTERPRETED BY:	A LeBis	
SCALE:	1 in. = 1 mi.	PARTY NO.
ENCLOSURE NO. 3	REPORT NO. S-421	ORG. NO. GP 2688
DATE: Oct 1969		MAP REFERENCE NO. 95-H-287

Seismic Surveys

in

CORMACK LAKE AREA

N.W.T.

*Abstracted for  
Geo-Science Data Index*

Date \_\_\_\_\_

Operator: BPOG Operations Ltd.

Prime Contractor: For 1969 Shooting  
Northern Geophysical Ltd.

For 1971 Shooting  
Kenting Petroleum Geophysics

On Permits: 4245 and 4656

Date of Report: April 20, 1972

Project No.: 39-6-4-69-1 dated February 10, 1969  
39-6-4-69-2 " " 18, 1969  
39-6-4-71-1 " January 5, 1971

Author: H. W. Penny, Field Supervisor  
Kenting Petroleum Geophysics  
A. P. LeBis, Geophysicist  
A. D. Calkins, Seismologist



*[Signature]*  
B. J. Walker, P. Eng.  
Chief Geophysicist  
BPOG Operations Ltd.

April 20, 1972.

ENCLOSURES

1. Shot Point Location, Elevation and Permit Map
2. Top of Carbonate + 1 Structure (Corrected Time)
3. Jean Marie to Carbonate + 1 (Isochron)

### Purpose of Survey and Methods

This survey was conducted to evaluate the possibility of reef buildup on the Cormack Lake area. The shooting was 300% coverage, 110 feet between traces. For most of the survey area, one reflection only may be expected which is associated with the top of the Nahanni. The Nahanni is overlain by Fort Simpson shale of constant velocity (11,000 ft/sec). The Jean Marie laying on top of this shale gives a good reflection that can be picked in the southern part of the survey, but is usually too shallow to be accurately timed. The Nahanni was used as a flattener on the stacked sections. The Nahanni being the only good reflection, it was decided to attempt a structure map, with the idea that the reflection will show the top of high velocity material and that a reef will then appear as a structural high. It was hoped that a careful observation of the reflection character would enable us to distinguish reef buildup from a Nahanni high.

### Static Corrections, Discussion of WZ

The decision to use a structure map put great emphasis on static corrections. Unfortunately these corrections appeared to be difficult and in some cases impossible to define accurately.

The first break arrivals show at least three different velocities, 7000 ft/sec, 9000 to 11000 ft/sec, and 13000 to 15000 ft/sec. The 13000 to 15000 ft/sec layer is apparent on all the southeastern part of the survey. The 11000 ft/sec appears only on the northwest on Lines 1 and 2. The 7000 to 9000 ft/sec

layer (probably drift) very likely covers the whole area but has an extremely variable thickness and in places (Line 1, S.P. 75-130, Line A, S.P. 7-32) is the only velocity apparent on the first breaks. A few isolated long shots in this area show a thickness of up to 1000 feet for this low velocity layer which is enough to render all corrections doubtful and inaccurate. The surface geology showed that layers of different velocities are outcropping in the survey area.

#### Discussion of Results

On the average, the records are of a fair quality, a notable exception being the zones of muskeg where results are very poor. Nevertheless, the reflection associated with the top of Carbonates is multilegged. The character of the first phase may be changing and thus the interpretation of faults is made difficult. In places, differences in WZ thickness are enough to shift one trace by more than half a period, when compared with the next trace. In spite of good energy, the interpretation is doubtful in such a case. A test of automatic statics in conjunction with deconvolution gave mixed results, raising as many problems as it solved. On top of these difficulties, the bad quality of uphole time readings accounts for some questionable structural values. The solutions to overcome these problems are not simple or obvious. To obtain reliable structural values, a good knowledge of the near surface would be required. Long refraction shots are the simplest way of achieving this objective, but as seen above may be

of doubtful value in case of quickly increasing thickness of the WZ, or of outcropping of layers of different velocities.

The survey area has been divided into two zones. The correlation of structural values from one zone to another being impossible with reasonable accuracy. The limit is an east-west line parallel to Line B and about one mile north. South of this line, the apparent velocity on the first breaks is close to 14000 ft/sec, and it is possible to pick a shallow reflection.

The northern part is separated from the south by the phenomenon described in detail in paragraph 2. The area surveyed appears to be a monocline dipping gently southward at a rate of about 50 ft/mile. The faulting is gentle (150' of vertical slip), and structural features are not easily correlated from one line to the other.

The time structure values for the 1971 survey tied readily with the 1969 shooting and are probably accurate to better than 10 msec. An automatic programme was tested on Line K1 to plot the first breaks and determine thickness of weathering and structural static corrections. This programme was quite successful and gave results in good agreement with manual computation.

The flattened sections were obtained without undue trouble. Ambiguities in tying the records were resolved by careful plotting of possible alternatives both in surface position and marker position to separate the effects of change in W-Z from time structural changes. This method enabled us to define a very small structure, 800 feet wide, probably graben shaped (although the faulting on the west side is questionable and is more probably a flexure) between S.P.28 and 30

on Line K1, although the throw of the faulting is only 50 feet.

No other structural features were uncovered either by the time structure map of the flattener (Encl. 2 Revised) or by the isochron Jean-Marie to Flattener (Encl. 3 Revised).



A. P. LeBis  
BPOG Operations Ltd.

Telephone 252-6696 Area Code 403

GEOPHYSICAL

October 13th, 1971.

DATE REC'D. *DHS 1971*

BP OIL & GAS LTD.,  
335 - 8th Avenue, S.W.  
Calgary 2, Alberta.

FILE

INITIALS

Attention: Mr. D.J. Walker

Dear Sir:

Re: Cormack Lake, N.W.T. - Field Report 1971 Shooting

In reply to your letter of October 4th, 1971 please find the information you requested for your Government report on the Cormack Lake project.

Statistical Data

Starting Date - January 24th, 1971  
Completion Date - January 28th, 1971

Production

Miles Shot - 12.3 miles  
Number of Shots - 148  
Average Daily Prod. - 29.6/day  
Days Worked - 5  
Weather Days - 0  
Down Days (Equip.) - 0

Equipment

6 - 3/4 ton 1970 4 x 4 Ford truck  
(2 reel trucks, 1 each shooting & P.M., 2 survey units)  
1 - 1½ ton 1968 G.M.C. recording truck  
2 - D-6 Caterpillar bulldozer  
7 - Drill units mounted on Dodge & Ford trucks  
2 - Water trucks with 1000 gal. water tanks  
(The geophysical instruments were T.I. - DFS 111's)

Personnel

1 - Party Manager  
1 - Clerk/computer  
2 - Surveyors  
2 - Rodmen  
1 - Shooter  
1 - Operator  
1 - Jr. Operator

Cont: . . . . .

Personnel - Cont: . . . .

2 - Reel truck drivers  
5 - Recording helpers  
7 - Drillers  
7 - Drill helpers  
2 - Water truck drivers  
4 - Bulldozer operators

Navigation

A TIA theodolite, rods and chains were used to locate the new lines and tie them to a bench mark on the Fort Simpson Highway and existing control in the area.

Field Procedures

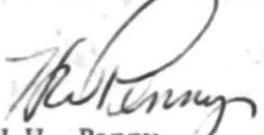
The Shooting parameters were as follows:-

1320 - 0 - 1320 split spreads 24 trace  
Geophone group interval - 110'  
300% C.D.P.  
Single holes  
Charge - 1½ lbs.  
Hole depth - 45'  
Shot point interval - 440'

I believe the above covers the information you requested. If there is any other information we can help you with, please contact us.

Yours very truly,

KENTING PETROLEUM GEOPHYSICS,



H.W. Penny,  
Field Supervisor.

HWP:jlf

Field Report on Shooting in Cormack Lake Area in 1969

Prime Contractor: Northern Geophysical Ltd. Crew #3  
5911 - 5th Street S.W.  
Calgary, Alberta.

Starting Date: February 21, 1969 (approx.)  
Completion Date: March 6, 1969

Production

Miles shot: 58.7  
No. of shots: 711  
Recording days worked: 10  
Average daily prod. 5.87 miles per recording day  
Weather days down: 0  
Equipment days down: 0

Equipment

Description of equipment is not available  
Recording truck equipped with geophysical instruments  
Cable truck  
Shooting truck  
Survey vehicle  
7 Drill Trucks  
2 Water trucks  
6 Bulldozer units

Personnel

At least one of each in the following categories:

Recording Observer  
Junior Recording Observer  
Recording helpers  
Cable truck driver  
Shooter  
Shooting helper  
Surveyor  
Survey helper  
Driller  
Drill helper  
Water truck driver  
Bulldozer operator

### Navigation

Theodolite  
Rods  
Chains

The program was tied to existing geophysical control which had been tied to well locations in the area.

### Field Procedures

The shooting parameters were as follows:

1540' - 330' - 0 - 330' - 1540' 24 trace split spreads  
Geophone group interval 110'  
Geophones per group - 9 14-cycle phones  
Common depth point coverage - 300%  
Shot point interval - 440'  
Single holes  
Hole depth - 45'  
Charge - 5/8 pounds per hole

The statistical report for Northern's shooting was prepared from available information.



A. D. Calkins  
BPOG Operations Ltd.