25-6-4-31

# GEOPHYSICAL REPORT

# TATHLINA PROSPECT

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A 1969 to 1970 Reflection Seismograph Survey of Permit No. 4604.

by

Contractor: SEISMOTECH 64 LIMITED
March 1969 and February 1970.

for

Operator: UNION OIL CO. OF CANADA LTD.

Author: R.S. Ball, Area Geophysicist
January 1971.

Project No: 28-6-4-69-1 & 28-6-4-70-3

## TABLE OF CONTENTS



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## INTRODUCTION

The reflection seismograph survey of the Tathlina Prospect was designed to obtain a general subsurface appraisal of Permit 4604. An access road west from the Mackenzie Highway was opened into the permit. Surface conditions were such that on the northern part of the permit, where numerous beaver dams and very rough muskeg were encountered, extensive detours as well as two river crossings on the Cameron River were required.

## STATISTICAL DATA

### I. PRODUCTION

| | 1969 | 1970 |
|---|---|---|
| Commencement date | 15 March | 15 February |
| Date of completion | 27 March | 27 February |
| Field recording time (hours) | 100½ | 50 |
| Moving and driving time (hours) | 97 | 21 |
| Total time (hours) | 197½ | 71 |
| Number of locations recorded | 336 | 135 |
| Number of locations per 10-hour day | 33.51 | 27 |
| Total subsurface coverage (miles) | 28.00 | 11.5 |
| Subsurface coverage per 10-hour day | 2.79 | 2.75 |
| Maximum surface elevation (feet) | 1256 | 1171 |
| Minimum surface elevation (feet) | 909 | 942 |
| Total footage drilled | 44,055 | 32,830 |

### II. EQUIPMENT

A) Bulldozers:

1969

2 - D6C Caterpillar tractors

2 - D7 (17A) Caterpillar tractors

1970

1 - D7 (17A) Caterpillar tractor

1 - D7E Caterpillar tractor

B) Drills:

1969

3 - Mayhew Rotary Drills

1 - Failing Rotary Drill

2 - Carey Top-Drive Drills

1970

3 - Mayhew Rotary Drills

2 - Failing Rotary Drills

1 - Winter-Weis Drill

Drilling conditions were generally good. Clay, some sand, and gravel, and occasional boulders were found in most holes.

C) Recording:

1969

Amplifiers - S.I.E. PT-800, Binary Gain

Tape Drive - S.I.E. PDR-89, 9-track SEGA format

1970

Amplifiers - T.I. DFS III, Binary Gain

Tape Drive - T.I. 508, 9-track, EPR-A format

Geophones - Mark L-10, 14 HS in strings of 18 per group.

## III. NAVIGATION

Horizontal and vertical control were obtained from a benchmark at ; the northeast corner of Section 36-131-21-W5M and tied to the northeast corner of Section 32-131-21-W5M. All hanging lines were double run and all ties were within acceptable tolerance. The 1970 survey was tied to the 1969 survey. Latitudes and departures were computed from 117°30' North latitude and 60°30' West longitude.

## IV. WEATHER CONDITIONS

Weather conditions were generally good during both surveys, with the exception of a blizzard which occured in 1969 just prior to the camp move from the area. A blizzard also occurred in 1970 during the move out of the area and stranded the crew for 2 days. Essential supplies were dropped by air.

## FIELD PROCEDURES

| | |
|---|---|
| Sample Rate | .002 seconds |
| Gain Release Rate | .060 seconds (1969) .030 seconds (1970) |
| Filters | 1969: 16 Hz Lo cut 124 Hz Hi cut<br>1970: 12 Hz Lo cut 124 Hz Hi cut |
| Spread Length | 1320' to 0 to 1320' |
| Coverage | 300% CDP |
| Shot Point Interval | 440' |
| Station Interval | 110' |
| Geophone Interval | 13' (220' coverage per station) |
| Hole Spacing | 1969: 3 hole patterns<br>Lines A and B - 2 holes 55' on either side of shot point with an additional hole 165' north or east.<br>Line C - 3 holes in line 110' apart.<br>1970: 3 holes in line 55' apart. |
| Hole Depth | 50' (1969), 80' (1970) |
| Charge Size | 1½ lbs. per hole. |

## DATA PROCESSING

Processing of the 1969 data (Lines A, B and C) was initially accomplished by the Cendac Processing Center; processing of the 1970 data (Lines AA and D), and the reprocessing of the 1969 data was handled by the Union Oil Company of Canada Limited Computer Center to produce structure sections. Normal processing procedures and data handling were followed (demultiples, normal moveout removal, digital filter, drift corrections and common depth point stacking). Cendac also used deconvolution but, in view of the shallow section with only one identifiable reflection, it is felt that use of deconvolution is not valid.

A correction datum elevation of 800' and datum velocity of 7500'/sec. were used. The velocity function, consisting of two-way time (in seconds) and average velocity (in feet/second) pairs, is as follows: (.068, 14,000), (.095, 14,600), (.160, 14,700), (.253, 12,600), (.318, 12,800), (.534, 11,800), (.553, 11,900), (.609, 12,500), (.912, 12,700), (2.000, 12,700). The interval velocities (in feet/second) for the Tathlina, Twin Falls, Hay River, Slave Point, and the Precambrian geological formations were 10,000, 13,200, 10,400, 19,300, 19,800 respectively.

## RESULTS AND INTERPRETATIONS

Record quality ranged from poor to good with the best overall quality occurring on Line B. The Shell Alexander No.2 sonigram was used as an aid for primary reflection identification. The Slave Point event was the only identifiable primary reflection. A second reflection appears to initiate from the Twin Falls horizon, but is masked by interfering energy, and cannot be mapped. This is true for the Hay River shale event as well. An unusual high velocity (16,000'/sec.) material occurs just below the base of the drift (which varies in thickness from 100' to 300' over the prospect). Thus the first breaks do not present a problem, but the large reflection coefficients given by this upper high velocity formation and the Twin Falls event are ideal for multiple incitement.

The only map made was a Slave Point time structure map. Seismic control was not sufficient to establish the correct map polarity and hence a map of each polarity was completed.

Seismic control is not sufficient to establish the validity, extent and orientation of an apparent Slave Point structural high that is centered at or near the intersection of Lines A and D. The only other feature on the map is a possible northeast - southwest fault which appears to intersect Line D, shot point 21 and Line A, shot point 403 with a Slave Point throw of 18 and 23 milliseconds respectively. However, since there is only one identifiable reflection on the seismic sections, it is difficult to determine whether such a zone of reflector discontinuity represents a fault or is due to some other cause.

## SUMMARY AND CONCLUSIONS

The Slave Point formation is the only mappable horizon. Events above the Slave Point are masked by multiple energy while events below the Slave Point don't seem to have a sufficient velocity and/or density contrast to incite a reflection. Anomalies mapped are a possible fault and a probable Slave Point structural high, but additional reflection seismograph work is needed to validate them.

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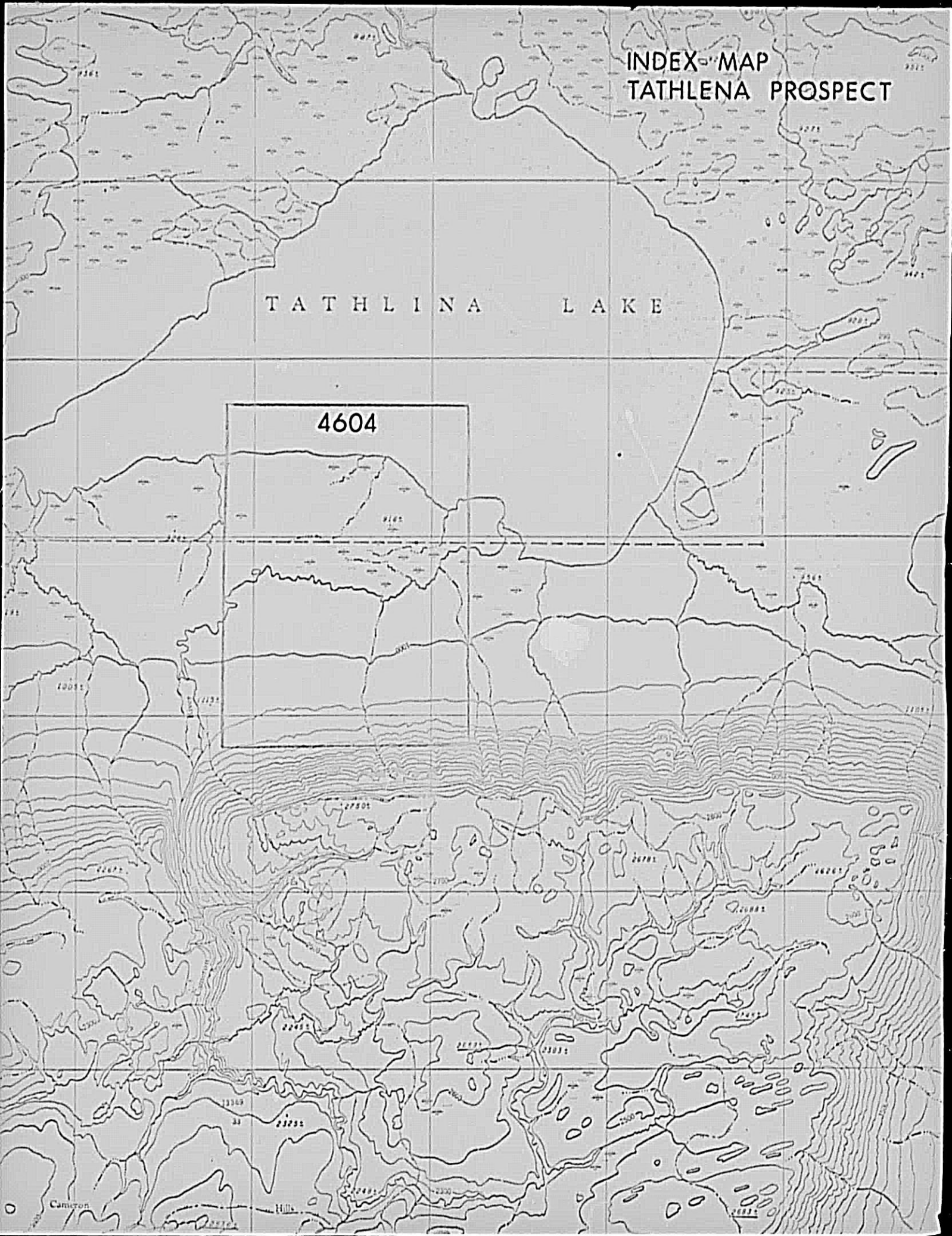
RSB/bp/ml


INDEX MAP
TATHLENA PROSPECT
TATHLINA LAKE
4604
Cameron Hills