# MAR 19770021: JOHNSON LAKE

Received date: Dec 31, 1977

Public release date: Jan 01, 1979

N.T.S. 74-E-9

# PRELIMINARY GEOLOGICAL EVALUATION

on the

# JOHNSON LAKE PROPERTY, NORTHEASTERN ALBERTA

QUARTZ MINERAL EXPLORATION PERMIT NO. 6876090003

May 15, 1977



TAIGA CONSULTANTS LTD.

CALGARY, ALBERTA

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SUMMARY

The Johnson Lake Property straddles the Precambrian Shield - Phanerozoic contact.

The most recent deposits overlying the property are of Pleistocene age. These surficial deposits are underlain by a Devonian carbonate sequence at the base of which lies a (Pre) Devonian sand and conglomerate which in turn overlies the weathered Precambrian basement. South of the Devonian outcrops, a Lower Cretaceous section of relatively unconsolidated sands and clays with minor interlayered coal horizons is present.

The Precambrian basement rocks consist dominantly of granitic and mylonitic rocks. However, reconnaissance mapping by L. P. Tremblay of the G.S.C. (Map 16-1961; Geology, Firebag River Area) and detailed mapping by J. D. Godfrey of the Research Council of Alberta (Geology of the Marguerite River District, 1969) further suggest the presence of one or more narrow metasedimentary belts of arkosic to pelitic rocks. This possibility is also supported by aeromagnetic data.

A number of potential targets that are favorable to host economic concentrations of uranium may be postulated for the property. These include epigenetic or replacement-type deposits associated with:

(a) Precambrian lithologically favorable basement structural traps.
(b) The weathered Precambrian - Phanerozoic interface.
(c) The Devonian - Cretaceous interface.
(d) Cretaceous sandy and bitumen-rich horizons.

In view of the thick mantle of overburden the potential uranium targets are such that they are not directly detectable; therfore, a remote sensing-type exploration program is required to thoroughly evaluate the property's uranium potential.

## INTRODUCTION

As part of a continuing research program, Wollex Exploration Ltd. and Taiga Consultants Ltd. examined the southern margin of the Canadian Shield of Alberta and Saskatchewan for its potential to host uranium deposits. At a preliminary stage of investigation, it was considered that the Johnson Lake area (Maps 1 and 2) had a number of co-existing parameters favorable enough to justify property acquisition and an exploration program.

As a result of this evaluation, one maximum size permit was applied for. Quartz Mineral Exploration Permit No. 6876090003 was granted to Taiga Consultants Ltd. on the 29th day of September, 1976.

The schedule of application and dates are tabulated below:

Township 99, Range 3, West of the 4th Meridian

Sections 6, 7 & 8 and 15 to 36 inclusive

Township 100, Range 3, West of the 4th Meridian

Section 1; NE, SE & SW 1/4's of section 2; NW, SW & SE 1/4's of section 3; sections 4 to 9 inclusive; W 1/2 section 10; N 1/2 section 11; and section 12

Township 99, Range 4, West of the 4th Meridian

Sections 1 to 4 inclusive, sections 9 to 16 inclusive, sections 21 to 28 inclusive, and sections 33 to 36 inclusive

Township 100, Range 4, West of the 4th Meridian

Sections 1 to 4 inclusive, sections 9 to 15 inclusive, and sections 23 & 24

TOTAL: 76.5 Sections (48,960 acres, more or less)

Date of Application: January 30, 1976

First Anniversary Date: September 29, 1977

Recorded in the name of: TAIGA CONSULTANTS LTD.
Suite 205, Fina Oil Building
736 - 8th Avenue S.W.
Calgary, Alberta T2P 1H4

## LOCATION AND ACCESS

The Johnson Lake property is located approximately 65 miles northeast of Fort McMurray and is accessible only by float or ski-equipped aircraft.

A forestry airstrip, which is used to service a fire lookout station, is located two miles south of the southeast corner of the property. The present utilization and condition of the strip should be checked prior to mobilization of the field program.

A winter tractor road is located approximately 25 miles west of the permit. Extension and upgrading of this route would provide a connection with an all-weather highway servicing the tar sands north of Fort McMurray.

## PHYSIOGRAPHY

Maximum relief within the property is in excess of 400 feet. Elongated northeast trending hills are common to most of the permit. The hills present within the southern portion of the permit, which have considerable relief, may reflect Cretaceous sub-crop.

Lakes are quite scarce within the permit area. Only five are present which have a maximum dimensions greater than one mile and all are elongated in a northeast-southwest direction.

## GLACIAL GEOLOGY

The surficial geology is summarized on Map 2 which is excerpted from Research Council of Alberta (R.C.A.) Map 34 by L.A. Bayrock. The majority of the permit is underlain by fluted and drumlinized outwash sands and gravels. Considerable late and/or postglacial erosion of this material is evident from the aerial photographs. This erosion is indicative of the unconsolidated nature of this material. The presence of sandy material is further indicated by the local development of aeolian deposits.

The last ice advance, as evidenced by the drumlinized material, was from the northwest.

In addition to the fluted outwash, minor areas of undisturbed ice contact deposits are also present.

## VEGETATION

The vegetation consists primarily of sparse to medium stocked jack pine and deciduous growth to a maximum height of 60 feet. Minor areas of potentially productive pine growth are present; however, development is extremely patchy and would be of value only for local exploitation.

Muskeg development is only local in nature. The most evident areas of muskegs are present along northeast trending valleys. The majority of the muskeg areas appear to be relatively dry, possibly containing scrub spruce.

## HISTORY OF EXPLORATION

A review of assessment work filed at the Research Council of Alberta indicates that the northernmost portion of the Property (i.e., the Precambrian basement exposure north of Johnson Lake, N 1/2 of Twp. 100, R 3 to R 5 inclusive) was previously held as Quartz Mineral Exploration Permits No. 117 & 118 by Radex Minerals Ltd. In 1969 both permits were flown with a Scintrex Beech Baron mounted spectrometer (4 crystals 5" x 4", 660' spaced lines). No significant anomalies were obtained within the limits of the present permit and there is no record of ground follow-up.

The basement lithologies have been mapped by L.P. Tremblay (G.S.C. Map 16-1961) and by J.D. Godfrey (R.C.A. Map 1969). The surficial geology was mapped by L.A. Bayrock 1969, 1970,(R.C.A. Map 34).

The phanerozoic rocks within the region have not been mapped in sufficient detail to ascertain distribution of specific lithologies. Regional Phanerozoic terrain has been mapped by M.A. Carrigy and R.Green, (R.C.A. 1965). M.A. Carrigy discusses the Phanerozoic geology in considerable detail in R.C.A. Memoir 1 (1959). This discussion,however, is primarily applicable to the geology south of the permit area.

## REGIONAL GEOLOGY

Rocks of early Precambrian to Cretaceous age are present within the Permit area. Outcrops of granite and mixed gneisses have been noted in the northern extremity of the property. The regional magnetic map suggests that a band of gneisses, which display high magnetic relief, underly the central portion of the permit. These gneisses are, at least in part, probably sedimentary in origin.

A northeast oriented magnetic depression which trends through Johnson Lake displaces other magnetic features and probably reflects a northeast trending strike-slip fault with handed displacement.

The Precambrian assemblage consists of a northwest trending complex of net sedimentary gneisses. These have been intruded by granite and granite gneisses which are in turn cut by quartz, pegmatite and aplite veins and diabase dykes. These rocks are similar in appearance to the Tazin Group rocks north of Lake Athabasca. K-Ar age dates have placed these rocks in the Churchill Province of the Precambrian shield.

The Precambrian unconformity surface has a regional southwest dip in the order of 30 feet to the mile. Locally, steep dips and moderate relief have been observed on the unconformity surface.

Beds of detrital sand, often arkosic & red weathering, overlie the Precambrian basement. In turn, these are apparently overlain by the Methy Formation in the permit area. The Prairie Evaporite sequence apparently pinches out prior to reaching the property.

The Methy Formation (Middle Devonian), which consists of a hard, buff colored dolomite in the McMurray area, varies in thickness from 113 to 227 feet. Thin stromataporoid, coral and algal units are locally present. Sulphides are rare with one minor occurrence of galena noted at Whitemud Falls (Twp. 89, R 1, W4M).

There is a major break in the stratigraphic sequence between Devonian and Lower Cretaceous strata. Several periods of sub-aerial erosion may have taken place during this hiatus.

The Lower Cretaceous formations described in available literature are stratigraphic sections in the McMurray area and thus are not directly attributable to the permit area.

At the base of the McMurray Formation, is a coarse feldspathic sand. This unit consists dominantly of coarse grained, well rounded quartz grains and feldspar cleavage fragments. Smokey quartz grains are numerous with "chips of woody material" locally abundant. Clusters of sand grains cemented by marcasite are also common.

These sands are generally overlain by a black-grey, carbonaceous shale with much marcasite and "woody material".

The heavy mineral assemblage suggests a Shield source to the north and east.

The McMurray Formation is a lower Manville equivalent. A source for the sediments of the lower Manville is likely the continental Shield area to the northeast.

Overlying the McMurray is the Clearwater Formation, which locally consists of dark grey silty shales and siltstone of marine origin.

## ECONOMIC GEOLOGY

A number of favorable settings which could host uranium deposits are present within the Permit area. Specifically, the presence of major unconformities is of considerable importance in the deposition of uranium in sedimentary environments. Within the property boundaries there are at least two major unconformities, namely the Cretaceous - Devonian break and the Devonian - Precambrian break.

Selection of the Phanerozoic margin as a potential environment for uranium concentrations is based on having favorable host situations within the Phanerozoic rocks and favorable source rocks within the adjacent Precambrian units.

Weathering of uraniferous Precambrian rocks could yield sufficient uranium for economic concentrations in a number of different environments; for example:

1) Precambrian regolith (granite wash).
2) Karst or solution breccias in Devonian carbonates.
3) Cretaceous sandstones (Colorado Plateau-type deposits).
4) Cretaceous lignites.

Analagous to the Athabasca environment, the presence of Aphebian supracrustals and the intersection of fault structures with the Shield edge would form the most favorable target areas. Certainly another potential target would be Cretaceous paleo-drainage channels. The presence of a "Tazin"-type Precambrian Shield within the northern portion of the Pemit could host classic Uranium City-type vein occurrences.

## RECOMMENDED EXPLORATION PROGRAM

In the writer's opinion the property warrants a detailed investigation in that no significant surface exploration has apparently been undertaken to date in this vicinity. The recommended exploration program contained herein consists of:

### Stage 1 (Lake Sediment and Lake Water Geochemistry)

A lake bottom sediment and lake water geochemical sampling program should be undertaken, and the results evaluated, prior to the commencement of the prospecting phase of this project.

A four day survey with a float-equipped helicopter and a sampling technique nearly identical to that of the G.S.C. is recommended. Suggested sample density is one per square kilometer for a total of approximately 100 samples. Multi-element analysis is also suggested (i.e.: U, Ni, Co, As, Mo. Pb, and Zn).

Upon receipt of the geochemical results, priority target areas will be selected and the optimal density of ground follow-up coverage will be determined.

### Stage 2 (Prospecting Program)

Both the scope and the density of the prospecting coverage will be based on the detailed geochemical results. Within the Permit, outcrop exposures are relatively sparse; boulder prospecting techniques will augment the outcrop prospecting and geologic mapping.

Radioactive occurrences located by prospecting will be further evaluated by the senior geologist. If boulder occurrences are located, an initial effort will be made to locate their source. If outcrop occurrences are located, they will be subjected to detailed geological and geophysical investigation. Initial trenching programs will also be conducted during this stage.

If target areas are delineated within heavily drift covered areas, radon 222 exploration techniques (e.g. radon emanometer & degassing system), VLF E.M. and magnetometer surveys will be utilized.

### Stage 3

At the completion of the Stage 1 and 2 programs, the property will have been evaluated on a reconnaissance basis with the more favorable targets examined in detail. Geochemical samples and Radon 222 data will have been collected in sufficient detail to evaluate overburden areas and locate

regionally anomalous zones which require additional exploration.

A Stage 3 program would consist of follow-up of favorable results on previously completed work. At present, no definite program or cost estimate can be advanced for such work. Additional exploration which may be required could include more detailed boulder prospecting, more detailed Radon 222 surveys to define targets, basal-till overburden geochemistry, and magnetic and electromagnetic surveys. The resultant priority targets would likely be subjected to further investigation by rotary or percussion drilling (if beneath Athabasca sandstone), or by diamond drilling (if a crystalline basement target).

R. N. Netolitzky, P. Geol.
May 15, 1977

JOHNSON LAKE PROPERTY, ALBERTA

QUARTZ MINERAL EXPLORATION PERMIT NO. 6876090003
(48,960 acres)

PROPOSED EXPLORATION BUDGET - 30 DAY FIELD SEASON

SUMMARY

| | |
|---|---|
| PREFIELD & OFFICE | $ 1,200.00 |
| STAGE 1 (GEOCHEM SURVEY) | 6,056.00 |
| STAGE 2 (PROSPECTING PROGRAM) | 27,300.00 |
| SUB-TOTAL | 34,556.00 |
| Contingency Allowance | 3,444.00 |
| TOTAL | $38,000.00 |
| STAGE 3 (DETAILED FOLLOW-UP PROGRAM) | $50,000.00 |

JOHNSON LAKE PROPERTY, ALBERTA

QUARTZ MINERAL EXPLORATION PERMIT NO. 6876090003

(48,960 acres)

PROPOSED EXPLORATION BUDGET - 30 DAY FIELD SEASON

PRE-FIELD & OFFICE

| | | |
|---|---|---|
| a.) Review & compilation of all available information from published maps & reports and assessment files | $ 200.00 | |
| b.) Acquisition of aerial photographs & enlargements, compilation of base maps, airphoto interpretation, pre-field preparation (including logistics of equipment rental, purchasing of disposable supplies, etc.) and hiring of field personnel. | 1,000.00 | |
| | $1,200.00 | $1,200.00 |

STAGE 1 (LAKE SEDIMENT & LAKE WATER GEOCHEMISTRY SURVEY)

Lake bottom sediment (7 element analysis) and lake water (U analysis only) sampling program at an average density of 1 sample per square kilometer, for a total of 100 samples.

| | | |
|---|---|---|
| 1) Helicopter: Bell 206B, float-equipped<br>Assuming a minimum of 18 samples per hour = 6 hours<br>6 hours x $275.00/hour (contract rate) | $1,650.00 | |
| 2) Sample Analysis:<br>Sediments: 7 element analysis, including sample prep. & freight on samples to Calgary: $11/sample<br>Lake waters: U analysis only; including sample bottles & freight on samples to Calgary: $4/sample<br>Estimated: 100 samples x $15.00/sample total | 1,500.00 | |
| 3) Helicopter mobilization & demob.<br>(split charges with Old Fort Island property, Alta.) | 600.00 | |
| 4) Fuel: 8 hrs. x 22 gal./hr. x $1.00/gal. | 176.00 | |
| 5) Fuel supply flight, including mobilization of camp equipment for pilot & technician (split charges with Old Fort Island property) | 150.00 | |
| 6) Mobilization & demob. of technician to Fort McMurray, thence to Permit (split charges with Old Fort Island property) | 300.00 | |
| 7) Salary: 1 senior technician @ $100/day x 4 days | 400.00 | |
| 8) Room & board: 2 men x $35/day x 4 days | 280.00 | |
| 9) Radio, sediment sampler, miscellaneous | 1,000.00 | |
| | $6,056.00 | $6,056.00 |

ESTIMATED COST PER SAMPLE = $60.56

STAGE 2 (PROSPECTING PROGRAM)

| | | | | |
|---|---|---|---|---|
| 1) | Disposable supplies (sample bags and bottles, batteries, flagging, drafting supplies, naphtha, boat gas, oil, etc.) | | $ 300.00 | |
| 2) | Equipment Rentals: | | | |
| | Radon Emanometer & degassing equipment @ $20/day | $ 600.00 | | |
| | 4 Total-Count Scintillometers @ $7/day each | 840.00 | | |
| | 1 Differential Spectrometer @ $8/day | 240.00 | | |
| | Prospecting & camp equipment @ $7 per man day (fixed) | 770.00 | | |
| | 1 Radio or radio-telephone @ $150/month | 150.00 | | |
| | | $2,600.00 | 2,600.00 | |
| 3) | Food: $10.00/man/day (fixed rate) x 110 man-days | | 1,100.00 | |
| 4) | Assaying & geochemical analysis (grab samples, rock chip samples, muskeg & stream sediments, soils, and trench bulk samples) | | | |
| | Estimated: 400 geochem samples (U analysis only) | | | |
| | 400 x $4.00/sample (U - fluorometric analysis) | 1,600.00 | | |
| | Estimated: 50 rock samples (U assay only) | | | |
| | 50 x $15.00/sample (U - chemical assay) | 750.00 | | |
| | | $2,350.00 | 2,350.00 | |
| 5) | Mobilization & demob. of crew & equipment from LaRonge, Saskatchewan (split charges with Old Fort Island property) | | 1,000.00 | |
| 6) | Aircraft Support: 3 service flights at weekly intervals, plus a provision for standby aircraft (Beaver @ $135 per hour, min. 4 hrs./day) for crew placement and pick-up. | | 4,000.00 | |
| 7) | Personnel* | | | |
| | 1 program supervisor/geologist @ $200/day x 20 days | $4,000.00 | | |
| | 1 senior prospector @ $100/day x 30 days | 3,000.00 | | |
| | 1 junior prospector @ $ 80/day x 30 days | 2,400.00 | | |
| | 1 junior field assistant @ $50/day x 30 days | 1,500.00 | | |
| | | $10,900.00 | 10,900.00 | |
| 8) | Prospectors' Incentive Bonus for locating significantly mineralized ($U_3O_8$) boulders and outcrops: @ $25/boulder and $100/outcrop. Say, 50 boulders and 3 outcrops (pre-set max. allowance, and dispersement at discretion of project supervisor) | | 1,550.00 | |
| 9) | Telephone & Radio calls, postage, freight, etc. | | 400.00 | |
| 10) | Expediting charges @ 5% of all third-party invoices (excluding salaries, prospectors' incentive bonus & costs of final report preparation). Estimated: | | 700.00 | |
| 11) | Postfield compilation of field information, preparation of final reports & maps (including drafting and reproduction charges) and recommendations for further work. | | 2,400.00 | |
| | | | $27,300.00 | 27,300.00 |

| | | |
|---|---|---|
| | SUB-TOTAL | $34,556.00 |
| 12) Contingency Allowance @ 10% | | 3,444.00 |
| | TOTAL | $ 38,000.00 |

STAGE 3 (DETAILED FOLLOW-UP PROGRAM)

Contingent upon obtaining favorable results from Stage 2 above, provision should be made for undertaking detailed evaluations of mineralized occurrences and/or geochemical anomalies with geophysical techniques (possibly seismic, electromagnetic, proton magnetic, or additional radon gas surveys) and rotary or percussion drilling.

Such follow-up programs would be conducted during the fall of 1977 or at the beginning of the 1978 field season.

Estimated Provision: $ 50,000.00

NOTE: Proposed expenditures for individual items are estimates only (i.e. aircraft and assaying charges) and as such will not be charged to the project in this manner. Instead, monthly billings to E. & B. Explorations Ltd. will be itemized and supported by third-party invoices & receipts, plus a 5% charge for expediting services.

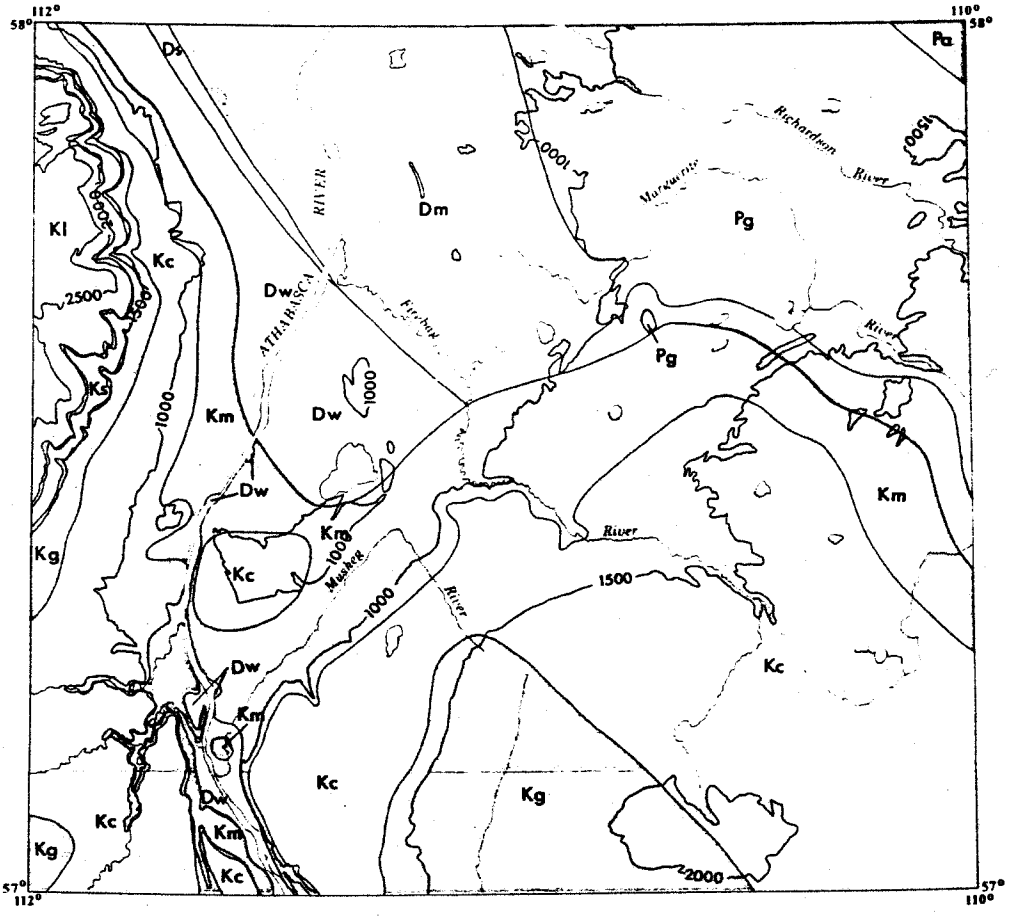
*Personnel per diem rates are in accordance with the recommended schedule of fees published by the Alberta Association of Professional Engineers, Geologists, and Geophysicists.

1977 0021
Map #1

# BEDROCK GEOLOGY

M. A. Carrigy and R. Green. 1965

Scale 1:1,000,000




## LEGEND

### CRETACEOUS

- Kl — Labiche Formation: *dark grey shale and silty shale*
- Ks — Shaftesbury Formation: *dark grey shale, silty shale*
- Kg — Grand Rapids Formation: *fine-grained sandstone, siltstone and silty shale*
- Kc — Clearwater Formation: *dark grey silty shale, siltstone*
- Km — McMurray Formation: *quartzose sandstone, siltstone; oil impregnated*

### DEVONIAN

- Dw — Waterways Formation: *argillaceous limestone and grey shale*
- Ds — Slave Point Formation: *grey and brown limestone, dolomitic limestone*
- Dm — Middle Devonian (undivided): *includes brown dolomite, gypsum, anhydrite*

### PRECAMBRIAN

- Pa — Athabasca Formation: *medium- to coarse- grained sandstone*
- Pg — Granitic plutonic rocks

Geological boundary .....

Surface contour (contour interval 500 feet) ..... —1000—

PROTEROZOIC PALAEOZOIC

| | |
|---|---|
| 5 | METHY FORMATION: dolomite |

ARCHAEAN

| | |
|---|---|
| 4 | Athabasca sandstone |
| 3 | Basalt dykes and sills (may be younger than 4) |
| 2 | Garnetiferous red and white granite and pegmatite; 2a, in part fine- to medium-grained garnetiferous quartz-feldspar-biotite gneiss; 2b, graphic; 2c, gneissic and impure; some pegmatite and remnants of gneiss; 2d, porphyroblastic; 2e, in part fine-grained bedded quartzitic rock |
| 1 | Regularly to irregularly interbanded, highly granitoid, garnetiferous quartz-feldspar-biotite gneiss and biotite-rich porphyroblastic (microcline-perthite) gneiss; 1a, includes small areas of granite and pegmatite |

Outcrop visited

Low-level observation flights

Outcrop seen from the air but not visited

Loose slabs, probably from near-by unexposed bedrock

Geological boundary (assumed)

Bedding (dip known, top of bed unknown)

Foliation, banding (inclined, vertical, dip unknown)

Crossbed (strike and dip indicated)

Syncline

Glacial striae

Moraines (recessional and annual)

Drumlin (direction of ice-movement known)

Fossil locality

Geology by L. P. Tremblay, 1960

Provincial boundary

Township boundary (surveyed)

Township or range boundary (unsurveyed)

Boundary monument

Intermittent lake and stream

Marsh or swamp

Rapids

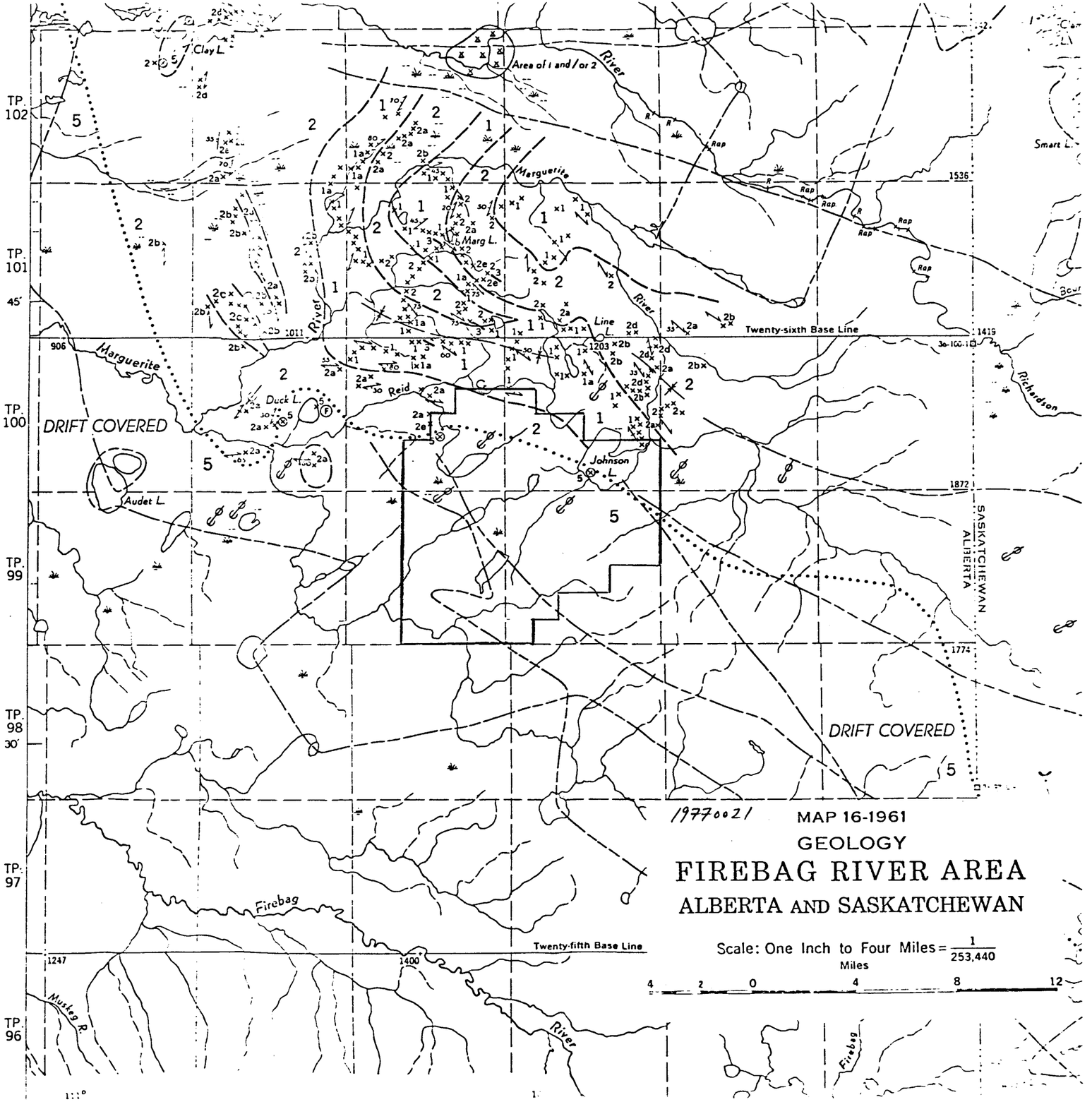
Height in feet above mean sea-level

Cartography by the Geological Survey of Canada, 1961

Approximate magnetic declination, 26° 10' East

Geographical names subject to revision

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa




1977-0021

MAP 16-1961

GEOLOGY

# FIREBAG RIVER AREA

## ALBERTA AND SASKATCHEWAN

Scale: One Inch to Four Miles = $\frac{1}{253,440}$

Miles

4 2 0 4 8 12

1977 no 21

MAP 34

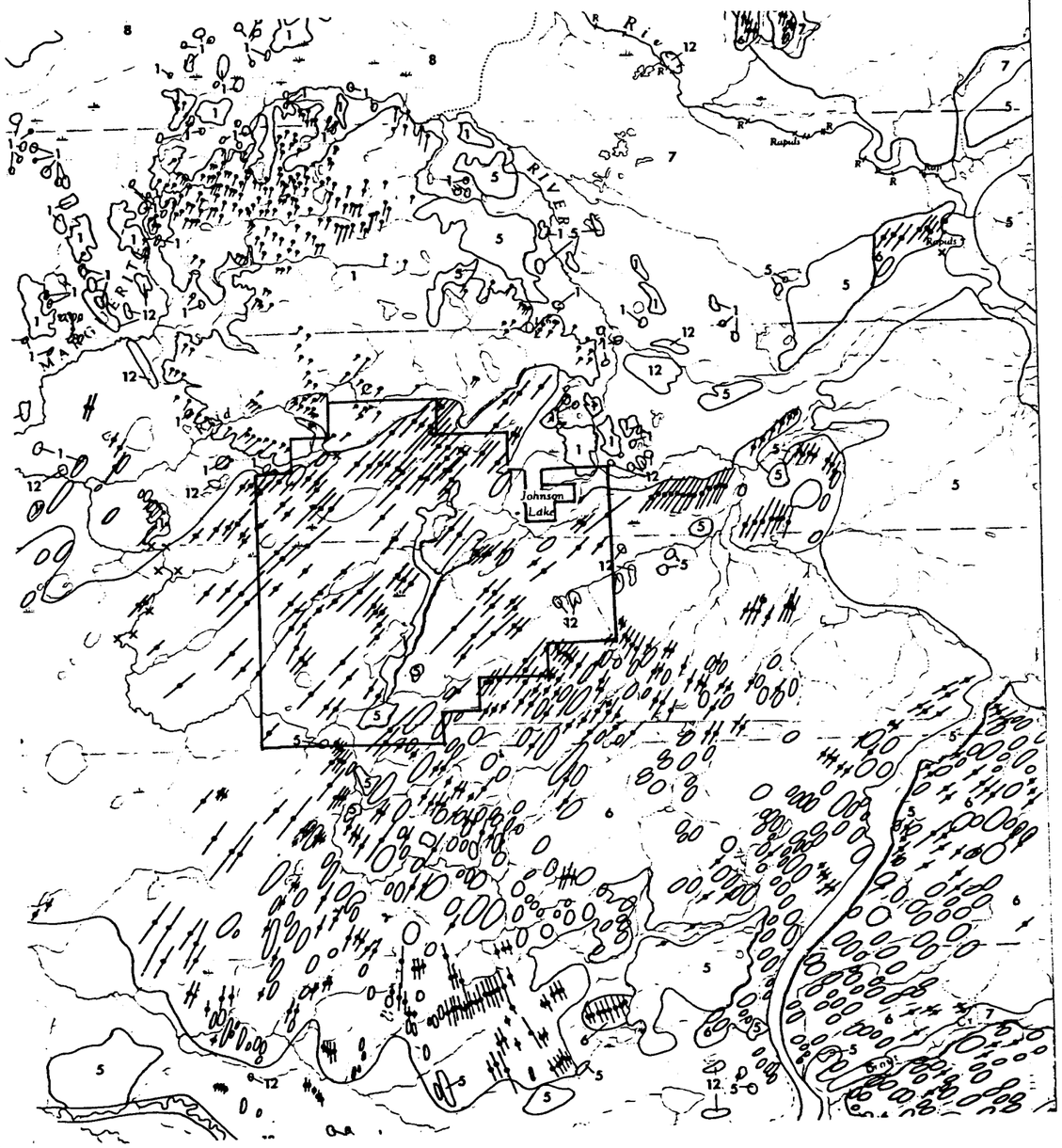
# SURFICIAL GEOLOGY
# BITUMOUNT
## NTS 74E

SCALE 1:250,000

1 Inch to 4 Miles Approximately

Miles 5 0 5 10 15 20

Kilometres 5 0 5 10 15 20 25 30




AEOLIAN DEPOSITS

12 Aeolian sand, dunes: *medium-grained quartzitic sand in sheet and dune form; thick in dunes, 2 to 10 feet in sheet sand*

## PLEISTOCENE

GLACIOLACUSTRINE DEPOSITS

11 Mixed: *bedded silt, clay and sand with pebbles and till-like layers; overlying till*

10 Silt and clay: *bedded silt and clay with minor sand; overlying till*

GLACIOFLUVIAL DEPOSITS

9 Meltwater channel sediment: *medium- to coarse-grained sand, overlying thin gravel and lag gravel containing many large boulders; in part, early Athabasca River sediments*

8 Outwash sand: *medium- to coarse-grained sand with pebbles and small gravel lenses; generally thin; surface level to gently undulating*

7 Outwash sand and gravel: *sand and gravel to gravel forming outwash plains; generally thick; surface level to gently undulating; some discontinuous terraces*

6 Outwash sand and gravel overridden by glacier: *fluted and drumlinized outwash of sand and gravel to gravel, with many large boulders; generally thick to very thick; topography undulating to rolling*

5 Ice-contact deposits: *sand and gravel to gravel, numerous very large boulders; rolling topography, individual hills reach heights of several hundred feet; includes kame moraine, eskers, moulin kames, crevasse fillings, and other related ice-contact glaciofluvial deposits; form end moraines of glacier advances*

GLACIAL DEPOSITS

4 Hummocky moraine: *till composed of mixed sand, silt and clay with gravel; generally thick; topography undulating to gently rolling*

3 Colluviated ground moraine: *till composed of sand, silt and clay, mantling colluviated steep slopes; partly bedded near surface; stable slope; generally thin*

2 Ground moraine: *till composed of sand, silt and clay with gravel, variable in thickness; topography level to undulating*

## PRECAMBRIAN

1 Granite, gneiss and metasedimentary rocks: *outcrops form hills and knolls; generally bare with glacial deposits on the lee side of outcrops*†

Geological boundary; defined, approximate, assumed

Abandoned beach

Channel scarp (ticks indicate downslope side)

Bedrock outcrop (not Precambrian)

Crag and tail (head of symbol indicates stoss side)

Crevasse filling

Drumlin (outline to scale)

Glacial fluting

Karst area

Sink hole

† Detailed Precambrian geology is presented in RCA Map "Geology of the Marguerite River District", by J. D. Godfrey, 1970.

**Geology by L. A. Bayrock, 1969, 1970**