INCOMPLETE

SUMMARY AND RECOMMENDATIONS

Uranium Exploration

Hand trenching and grid radiometric surveys on the Toke claims have outlined several areas containing radioactive soils that assay as high as 0.95% U_3O_8. However, none are sufficiently thick or extensive to constitute a target of economic interest. The source appears to be uranium in groundwater draining a porphyritic quartz monzonite stock immediately to the east, a theory that is partially confirmed by discovery of a radioactive aplite dike in the stock, from which a specimen assayed 0.153% U_3O_8.

Similar settings elsewhere in Yukon are being actively explored for uranium and at least two will be drilled in 1978. At one of these, potential uranium accumulations at the oxidizing-reducing interface along faults cutting the stock will be the target. The exploration potential is based on the concept that anomalous spring waters are an indication that uranium is readily available to produce economic concentrations in that particular area. The work on the Tote Toke claims should be filed as assessment and the claims maintained in good standing until this type of occurrence is better understood.

Tungsten Exploration

The unexpected discovery of tungsten mineralization in the Grass Lakes area late in the field season gave very encouraging preliminary results. The limited work done to date has outlined four areas containing tungsten mineralization and seven unexplored anomalies and resulted in the staking of two of the most promising targets as the Boot and Marmot groups. The tungsten occurs principally as scheelite and is seldom accompanied by sulphides. The showings are most inconspicuous and were only found through the recognition of the host skarn assemblages and reinterpretation of the augen gneiss unit as an intrusion.

A secondary, but interesting exploration target, is the good gold values obtained from the Boot claims. Limited assaying suggests a direct relationship between tungsten and gold while the geochemical screen analysis indicates the gold may be concentrated in a separate area.

An exploration program is recommended for 1978 that will evaluate the potential of this new tungsten district. It should consist of an initial program of systematic, close-spaced panning and silt sampling during spring runoff, when all creeks will be flowing, followed by detailed prospecting and sampling of the better targets with a combination of night lamping, geological mapping and geochemical sampling. A budget of $130,000 is recommended for the following 1978 program:

<u>Wages</u>

Crew chief, one senior and three junior assistants ------ $43,000

<u>Helicopter</u>

60 hours Bell Model 47G3/B2 @ $220/hr.
48 hours Bell Model 206B @ $350/hr.
including fuel ------------------------------------- 30,000

<u>Fixed Wing Aircraft</u> -- 5,000

<u>Assaying</u> -- 10,000

<u>Freight, Truck Rental and Expediting</u> ------------------------ 5,000

<u>Field Equipment</u>

Groceries, consummable supplies, camp equipment rental
or purchase $12,000
Ultraviolet lamps and broadband
scintillometer --------------- <u>5,000</u> ------ 17,000

Office Expenses

Map preparation and printing, telephone, accountings and supplies	$ 6,000
Management	14,000
	$130,000

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LTD.

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CHAPTER I - GENERAL

Introduction

The Firth Project was a uranium exploration program conducted in two widely separated areas in Yukon Territory, Barn Mountains and Grass Lakes, in 1977. The location of these two areas are showns on Figure 1 on the following page. The program was conceived and managed in the field by Uwe Schmidt for Archer, Cathro and Associates Ltd. on behalf of Chevron Canada Ltd. and resulted in the staking of one uranium target (NOR claims) in the Barn Mountains, one uranium property (Toke claims) in the Grass Lakes area, and the unexpected discovery of a new tungsten district and staking of two tungsten showings (Boot and Marmot claims) at the edge of the Grass Lakes area. The work in the two areas is described separately in this report.

Project Area

Most of the 1977 budget was allocated to reconniassance of the large Barn Mountains area, which encompassed all of Yukon and adjacent Northwest Territories north of 67°30' latitude and west of the Mackenzie River. The principal targets were a Proterozoic-Paleozoic unconformity, somewhat similar to a proven setting in the Wernecke Mountains to the south, and post-Devonian fresh water sediments derived from intrusions that were known by Archer, Cathro to have a higher than average uranium content. Several other targets of lesser interest were also selected including fresh water phospatic iron formations along the Yukon-NWT boundary. Archer, Cathro had in excess of 1000 sample splits from a 1970 reconnaissance stream sediment sampling program that were gifted to the project in return for its finders fee interest. More than 1100 claims were staked in this district by Aquitaine Co. of Canada Ltd. in late 1976 on uranium occurrences or anomalies near the intrusions.

The second area selected for exploration in 1977 was an 8 km radius of interest (200 square km) centered at the south end of the most westerly of the Grass Lakes, 100 km southeast of Ross River. It contained a uranium geochemical anomaly where organic soil assaying up to 0.9% U_3O_8 overlying a weakly radioactive stock was discovered in 1976 by Archer, Cathro on behalf of Ukon Joint Venture, which was financed by Chevron and Kerr Addision Mines Ltd. After Kerr Addison declined to participate in further exploration of this target, Chevron chose to include it with the Barn Mountain program in the Firth Project.

1977 Work Program

The program consisted of an extensive office study of the Barn Mountains project area before the field season which included a geological compilation and plotting of new geochemical data, followed by short field programs in each of the two areas. The important dates in this project are:

Barn Mountains

Jan. 1 - May 15	Office studies in Vancouver - basemap preparations, logistical planning, plotting assays and target selection.
May 15 - June 17	Field preparation in Whitehorse
June 18 - July 10	Field program

July 2	Earl Dodson visited the camp
July 7	Staked Nor claims.

<u>Grass Lakes</u>

July 27	Staked Toke claims
July 28-August 14	Field program for uranium
August 13	Discovery of first significant tungsten mineralization
August 20-31	Field program for tungsten
August 20	Staked Boot claims
September 9	Helmut Wober toured the tungsten showing
September 26	Staked Marmot claims

<u>Claim Status</u>

Claim Name	No. Claims	Mining District	Grant Numbers	Expiry Date
~~British~~ BARN Mountains AREA				
Nor 1-32	32	Dawson	YA10346-YA10377	18 July/78
Grass Lakes				
Toke 1-36	36	Watson Lake	YA21495-YA21530	20 July/78
Boot 1-24		Watson Lake	YA25436-YA25459	26 Aug/78
25-35		Watson Lake	YA25687-YA25697	7 Sept/78
38-39	37	Watson Lake	YA25688-YA25699	7 Sept/78
Marmot 1-24	24	Watson Lake	YA26131-YA26154	
Total claims	129			

Field Crew

The field crew was led by crew chief Uwe Schmidt. He was assisted in the Barn Mountains by geologist Earl Jensen and in the Grass Lakes area by Gary Matthews and Mark Hawley during the uranium phase and by Doug Eaton and Joan Cockell for the tungsten phase.

Helicopter Support

Considerable helicopter support was required in both project areas, both for airborne radiometric surveys and for supporting the prospecting, geochem sampling and claim staking phases of the work.

Barn Mountains

This work was supported with a Bell 206A helicopter on a short contract from Trans North Turbo Air (TNTA) of Whitehorse, crewed by pilot Kim Carswell and Mike Mallon. The start of this program was delayed for three days by an engine failure 165 km northeast of Dawson on the ferry flight north from Whitehorse. The airborne survey and prospecting were continually inconvenienced by extremely poor weather. A total of 71.4 hours of 206A flying was used in this program.

A Land Use Permit was applied for on April 22 to cover the fuel cache and campsite at Sam Lake. The processing of this application proved to be a very contentious political issue because (a) the project area lies within lands claimed by the Old Crow Band and (b) publicity surrounding the release of the Berger Report on the Mackenzie Valley Pipeline made the whole issue of native rights much more sensitive than it had been previously. The permit was subsequently issued and was cancelled on September 22 after a final inspection. The Firth crew maintained close liason during the field work with Dave Mosscrop of the Yukon Game Branch to avoid disturbing peregrine falcon nests. Copies of the correspondence surrounding this application are included in Appendix A at the end of this report.

Grass Lakes

This program was conducted from two campsites, one for the uranium work and the other for tungsten exploration. The first was situated on the most westerly of the Grass Lakes, within the Toke claim group. The second was situated on the Boot claims about 8 km to the west. Two STOL aircraft, a Pilatus Porter owned by Norcrown Air Ltd. and a Turbobeaver owned by TNTA, were based at Ross River during 1977. The nearest suitable lake to the Boot claims is Lampman Lake, 3.5 km to the north. No Land Use Permits were required for this work.

Weather

Barn Mountains

Weather in Barn Mountains consisted of two weeks of unusually poor conditions which included strong northerly winds, rain, snow, low clouds and fog. This pattern resulted from a persistent low pressure system that pushed the Beaufort Sea pack ice against the coast, delaying the start of ocean freighting and off-shore drilling season by over two weeks and resulting in record summer rainfall in Inuvik.

Grass Lakes

Weather during the 1977 program was unusually warm, sunny and dry whereas a more typical weather pattern in this area includes almost daily rain showers and thunder storms with strong winds in major valleys resulting in cloud buildup and fog during low pressure regimes. Snowfall is heavy and snowdrifts and slides hinder ground exploration until late June or early July. The first snowfall can be expected during the last week of August but mid-September is usually a practical time to end field work in higher areas. Lower areas to the north are often snow-free until the middle of October.

Competition

Barn Mountains

The only other exploration company encountered in this area during 1977 was Aquitaine, which conducted airborne radiometric surveys, prospecting and mapping traverses, both on their large claim blocks and regionally. The Aquitaine camp was located at Bonnet Lake, 39 km southeast of Sam Lake, which was often covered in low cloud or fog when Sam Lake was open.

Grass Lakes

An exploration crew from Cominco Ltd. was the only competitor encountered. Cominco carried out regional exploration with a Bell 47 helicopter from a camp on the southernmost of the North Lakes. Their work centered on known lead-zinc-copper showings and resulted in the staking of the Pack occurrence, 28 km southeast of the Boot claims.

Another Archer, Cathro crew camped on the Campbell Highway at Wolverine Creek, about 50 km northeast of the Toke claims, while conducting a uranium reconnaissance program for different clinet. Their contract helicopter was made available to the Firth crew when required.

Exploration Procedures

Barn Mountains

Emphasis was placed on airborne radiometric surveys, creek float prospecting, water sampling and regional prospecting, which were best suited for the widely spaced and large target areas. Surveys were conducted using a Bell 206A helicopter equipped with a Scintrex GAD-4 spectrometer, GSA-61 detector, Brush 220 two-channel recorder and a Hewlett-Packard single channel recorder. The GSA-61 detector used an 1852 cc tellurium-doped sodium-iodine crystal. The detector unit was mounted in the rear luggage compartment of the helicopter, while the spectrometer and one recorder were secured to the rear seat. The other recorder was placed in the front of the helicopter beside the operator/navigator.

The GAD-4 spectrometer has four output channels: total count, potassium, uranium and thorium. Of these, total count, uranium and thorium were recorded on the three channels available on the chart recorders. Values of uranium and thorium were "stripped" by the spectrometer to filter out gamma energies not generated by those elements.

Airborne reconnaissance targets were chosen on the basis of geology, previous uranium geochemistry and uranium concentration models. A contour flying survey technique was found to be the most suitable in the moderately rugged terrain encountered in the area. Mean elevation clearances during surveys were maintained at approximately 50 m. Anomalies were immediately ground checked by prospecting and geochemical methods, using either a Scintrex BGS-1 SL (43 cc crystal) or BGS-1S (13 cc crystal) hand scintillometer. The instruments were modified with earphones for audio output to make them more sensitive to variations in radioactivity, especially when prospecting near creeks or in strong winds. Areas of higher radioactivity were sampled geochemically for uranium content since hand-held scintillometers do not differentiate radioactivity from uranium, potassium or thorium sources. Creek waters were routinely sampled in areas of favourable geology. Airborne flight lines and uranium geochemistry are plotted on Figures ___ at 1:250,000 scale (inch to 4 miles).

Grass Lakes

(a) Uranium Exploration

Uranium exploration in Grass Lakes area differed from that in the Barn Mountains area only in its emphasis on grid soil geochemistry and detailed contour airborne radiometric survey. The airborne survey utilized the same equipment previously described for the British Mountains area except that it was mounted in a Bell 47 helicopter. The survey was flown at 500 foot contour intervals, which are plotted on present ~~1:250,000~~ 1:31,680 scale topographic maps.

Areas of anomalous response in "stripped" uranium radioactivity were later prospected and sampled geochemically. The results of this survey are plotted on Figure ____. Geochemical sampling on the Toke claims consisted mainly of a grid soil survey since reanalysis of soil and silt samples collected on previous programs had already provided a good reconnaissance coverage. Pits were dug for profile sampling at most sites of increased radioactivity.

(b) Tungsten Exploration

Exploration for tungsten relied mainly on panning and silt sampling to identify mineralized areas, followed by prospecting with an ultraviolet lamp both in daylight and darkness. Lamping the panning concentrates in the field gave a rapid estimate of scheelite potential and also served as a check on the reliability of silt sampling, whereas silt sampling ensured that any tungsten occurring as wolframite would not be overlooked. Soil samples were collected randomly during prospecting traverses, especially where talus fines were available. A small area on the Boot claims was also grid soil sampled. The tungsten exploration performed in 1977 is far from complete because the mineralization was found so late in the field season and much of the effort went into reconnaissance prospecting and staking.

CHAPTER III - GRASS LAKES AREA

Regional Geology

(A) GSC Interpretation

The Grass Lakes area is underlain by a variety of metamorphic rocks intruded by a porphyritic quartz monzonite stock of Cretaceous age. Prior to the publication of GSC Open File 486 in August of this year, the only geological mapping available for the project area was preliminary map 7-1960 published by the GSC in 1960. The new GSC map has subdivided the metamorphic rocks into an older group that were probably sedimentary, Windermere-equivalent rocks of Hadrynian or Cambrian age, and a younger group that includes Klondike schist-equivalent rocks of unknown age. The younger group may have been thrust tectonically to their present position (Allochthonous). The older suite below the thrust fault that is presumably still situated at its site of deposition is referred to as Autochthonous. Relationships are obscured by regional metamorphism and a strong structural overprint that are possibly related to movement of the Tintina Fault or overthrusting. Rock units and age relationships in the current GSC interpretation are shown in Table I on the following page.

The rock units, from oldest to youngest, are described as follows:

Autochthonous ? rock, Omineca Crystalline Belt

Unit Ᵽn-Augen Gneiss

Ᵽn is a light grey, coarse grained, feldspar-quartz-biotite augen gneiss that is considered to be the oldest unit by the GSC. Both it and the overlying biotite-garnet-muscovite schist unit (Ᵽ€sc) are thought to be autochthonous

TABLE I

GSC GEOLOGICAL INTERPRETATION IN FIRTH PROJECT AREA

(based on Open File 486, D.J. Tempelman-Kluit, et al, 1977)

	ERA	PERIOD	MAP UNIT	LITHOLOGY
Possibly Allochthonous?	Mesozoic	Cretaceous	Kqm	porphyritic biotite quartz monzonite
	(Intrusive into ꝐCsc, ꝐPK4, gradational to Ꝑn)			
	Paleozoic?	Age Unknon	ꝐPK2	siliceous phyllite, greywacke, marble
	(Contact between ꝐPK4 and ꝐPK2 is gradational)			
			ꝐPK4	muscovite-biotite feldspathic gneiss, micaceous quartzite, minor marble
	(CONTACT BETWEEN ꝐPK4 AND Ꝑn IS GRADATIONAL)			
Autochthonous	Paleozoic?	Cambrian?	ꝐꞒsc	biotite-garnet-muscovite schist
	(Contact between ꝐCsc and Ꝑn is gradational)			
	Hadrynian?	Windermere equivalent	Ꝑn	biotite-muscovite-quartz feldspar augen gneiss

meta-sedimentary rocks. Feldspar staining has shown that the largest white porphyroblasts are K-feldspar. Biotite is the main mafic mineral and it is aligned, along with feldspar augen and quartz, in one strong foliation plane.

Unit P€sc-Biotite-garnet-muscovite-schist

Biotite-garnet-muscovite schist is the characteristic rock type of this unit. Variations in mineral composition include carbonate lenses, diopside and garnet and variations in biotite-muscovite content. This unit is actually less abundant and more intermittent than suggested by GSC mapping.

Allochthonous ? rocks, Klondike Schist equivalent of unknown age

Unit PPK4-Chloritic gneiss and schist

A variety of rock types have been assigned to PPK4, including chloritic schist, gneiss, marble and skarn. The gneiss member contains abundant but variable amounts of quartz and a variety of micas, predominatly chlorite with some muscovite and biotite, and has little K-feldspar. It is easily differentiated from augen gneiss of unit Pn, which has no schist or carbonate component, has a uniform quartz content, is uniformly high in K-feldspar, and contains biotite as the only important mafic mineral. Porphyroblasts are uncommon in PPK4 gneisses and usually consist of quartz rather than feldspar. Complex folding is often observed on a small scale. Isoclinal, recumbent and shear folds are defined by irregular quartz lenses and mica. A later, weaker foliation is superimposed on earlier complex structures. In contrast to this Pn, augen gneiss has no polyphase deformation and biotite, feldspar and quartz are only aligned in one plane. Carbonate rocks in PPK4 show a variety of metamorphic effects. Some exposure of argillaceous carbonates show no significant metamorphism but others are altered to garnet-diopside skarn, calc-silicate hornfels and mica marbles and have been mapped separately as unit Psk by Firth Project. Skarn development and associated tungsten mineralization has been observed in several locations. The best examples occur on the Boot and Marmot claim groups and south of the Toke claims.

Unit PPK2-Chloritic schists and argillaceous carbonates

Unit PPK2 consists of black siliceous phyllites, chlorite schists, argillaceous carbonates and micaceous marbles. It differs from unit PPK4 in its absence of chloritic quartzofeldspathic gneisses. However, unit boundaries are difficult to draw in the field since carbonate rocks are common to both units and both are possibly allochthonous. Banded barite was found at one location on the Boot claim group, which may indicate a Devono-Mississippian age.

Unit Kqm-Porphyritic quartz monzonite

Plutonic rocks in the area are composed of coarse grained, porphyritic, biotite quartz monzonite and occur mainly in one central stock near Grass Lakes. A Cretaceous age has been assigned to the intrusive event by the GSC. Weathering of this unit has produced strong uranium soil anomalies on the Toke claims and tungsten bearing skarns have been developed at contacts of this stock with limy sections of PPK4. Mineralized areas on the Boot and Marmot claims and one unstaked occurrence south of the Toke group are examples of the latter.

Structure within the project boundary is dominated by the northwest trending Tintina Fault which passes 10 km south of Grass Lakes. The structural influence of this fault is best seen south of the fault in less metamorphosed units. Foliations north of the fault are parallel to it and a northerly trending set that are subsidiary structures of the Tintina Fault.

(B) Firth Project Interpretation

A reinterpretation of the regional geology is presented here that classifies the augen gneiss unit (Pn) as a foliated variety of the Cretaceous stock. This interpretation is supported by radiometric, geochemical, textural and structural studies conducted in the field during 1977. For prospecting purposes, the stocks and the augen gneiss bodies should be considered as equivalent rock units with different textural fabrics. The Firth Project geological model is presented on the following page and is based only on field observations and has not been conformed by any substantiative work such as age dating or petrological studies.

The similarity between the large phenocrysts in the quartz monzonite stock and the large augen in the gneissic rock was noted early in the program. Staining of selected specimens for potassium content has served to emphasize how similar these two rocks are in relative ratios of K-feldspar, plagioclase, quartz and biotite (Figures to on the following page). Quartz-tourmaline veins and feldspar-quartz-tourmaline pegmatites, which are characteristic of the porphyritic stock, have also been recognized in the augen gneiss (Figure Further similarity is seen in contact relationships, with high-temperature mineral assemblages observed at the margins of both porphyry and augen gneiss. Limy rocks have altered to garnet and diopside whereas secondary biotite is common in schists or gneisses.

TABLE II

FIRTH PROJECT GEOLOGICAL INTERPRETATION

(proposed geological model, using Open File 486 units)

ERA	PERIOD	MAP UNIT	LITHOLOGY
Mesozoic	Cretaceous	Kqm	porphyritic biotite quartz monzonite
(Intrusive into ⱣPK4 and ⱣPK2, gradational to Ᵽn)			
Mesozoic	Cretaceous?	Ᵽn	Biotite, feldspar augen gneiss
(gradational contact)			
Paleozoic	Devono-Mississippian	ⱣPK2	Rusty argillite and phyllite, chloritic schist, brown weathering impure carbonate
(gradational contact)			
		ⱣPK4	Chloritic quartzose gneiss, micaceous quartzite, interfoliated quartz-chlorite schist
		PsK	Micaceous marble, garnet-diopside skarn, calc-silicate hornfels
(gradational contact)			
Paleozoic?	Ordovician or older?	ⱣCsc	Biotite-garnet-muscovite schist, banded calc-silicate and chloritic schist

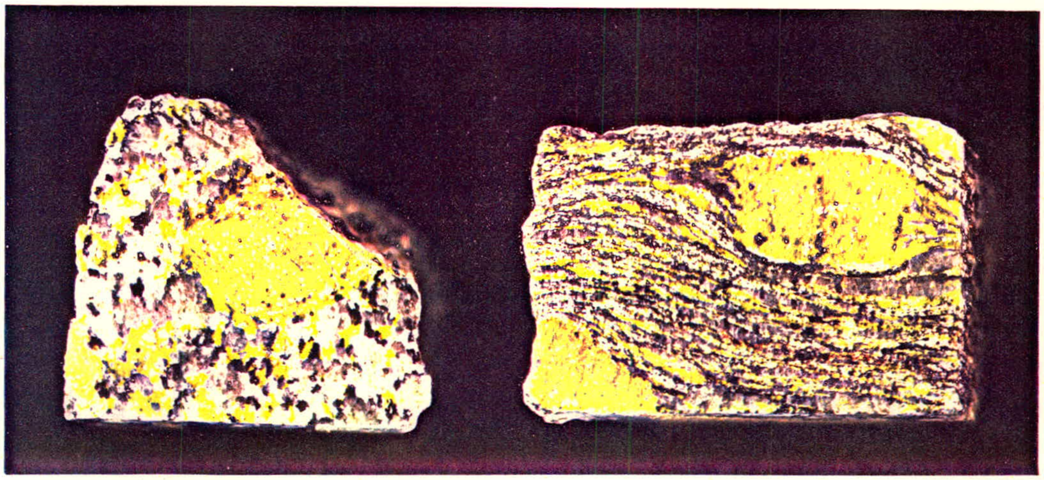


Fig.   Textures in stained quartz monzonite porphyry (Kqm) and augen gneiss (Ꝑn) yellow mineral is K-feldspar; white is plagioclase; green-grey is quartz and black is biotite.

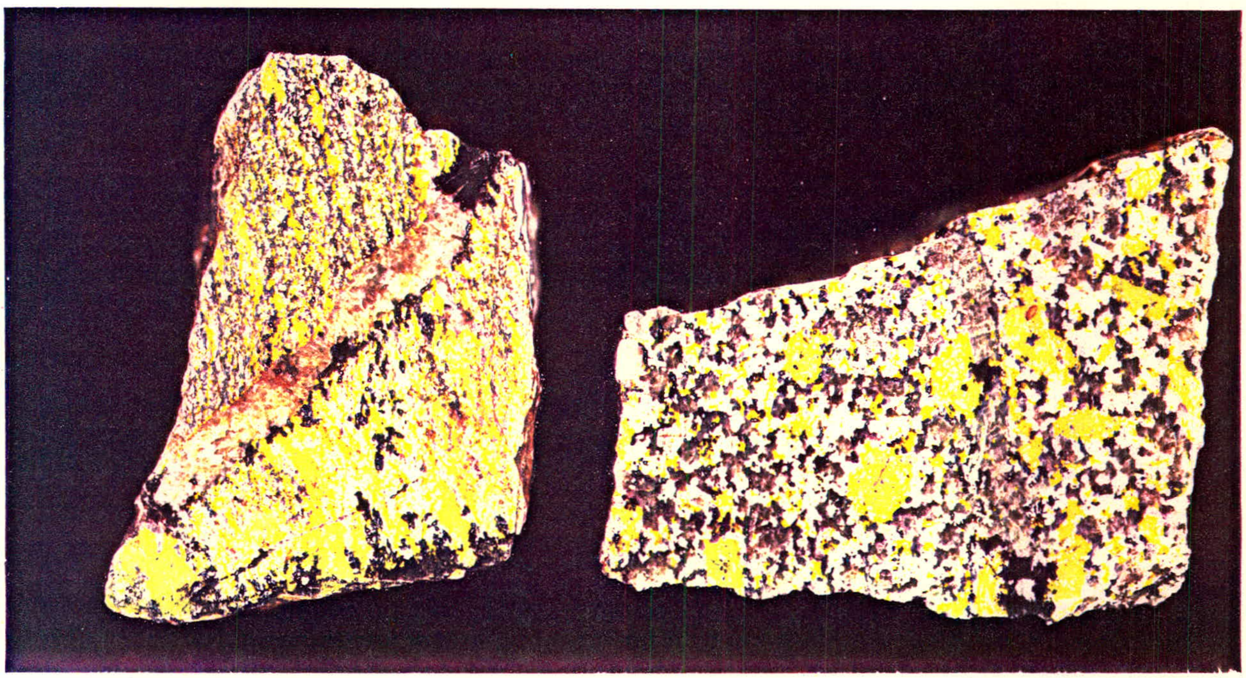


Fig.   Textures in stained porphyritc quartz monzonite (Kqm) cut by quartz tourmaline vein and augen gneiss (Ꝑn) cut by quartz tourmaline vein; yellow mineral is K-feldspar; white is plagioclase; green-grey is quartz; black in quartz vein is tourmaline; black in matrix is biotite; black mineral in gneiss is mainly tourmaline, biotite occurs at quartz, feldspar grain boundaries parallel to foliation.

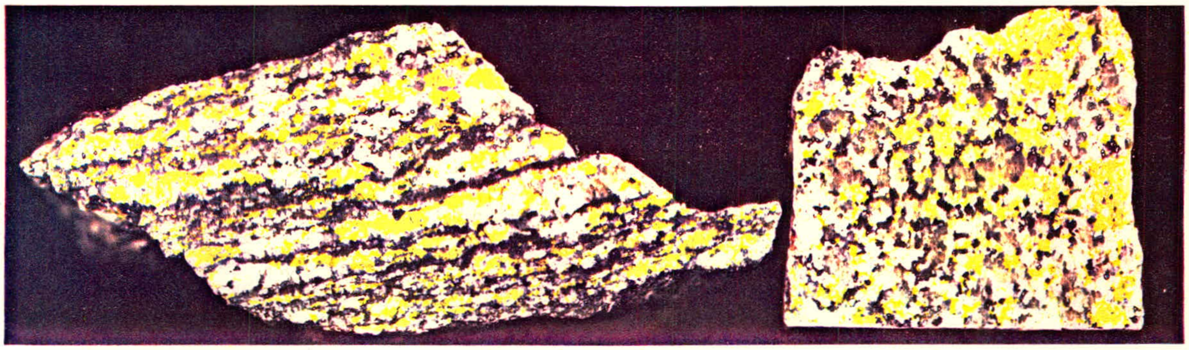


Fig. Textures in stained coarse grained quartz monzonite (Kqm) and coarse grained gneiss (Ꝑn); yellow mineral is K-feldspar; white is plagioclase; green-grey is quartz; black is biotite.

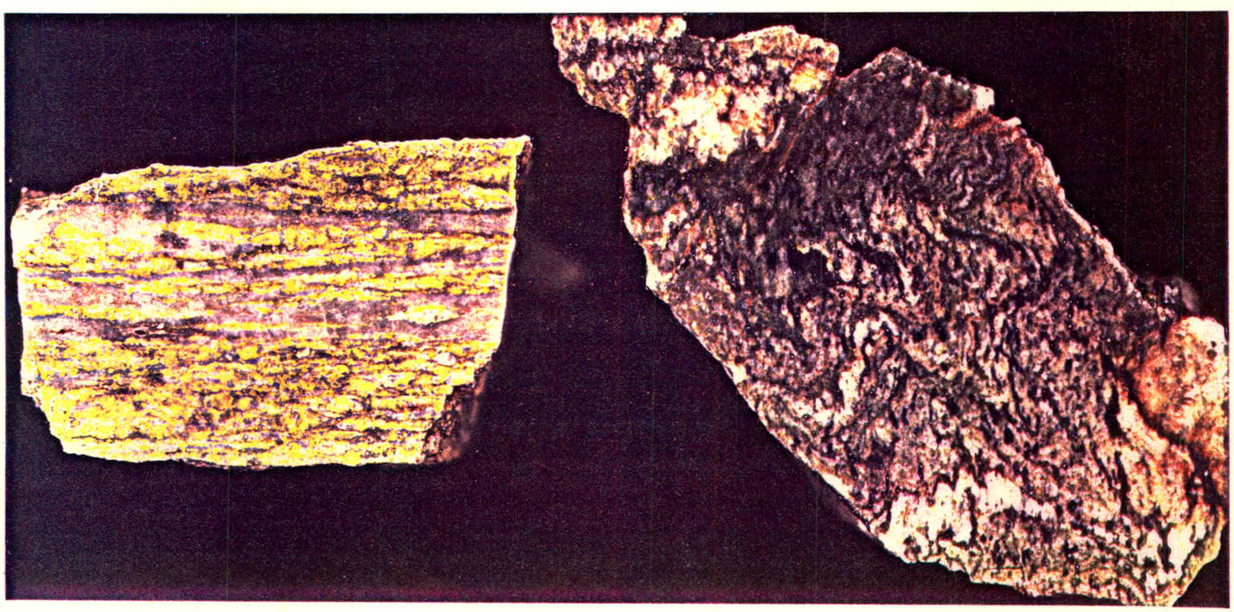


Fig. Stained augen gneiss (Ꝑn) with deformed quartz veins; yellow mineral is K-feldspar; white is plagioclase; green-grey is quartz; black is biotite occurring at quartz feldspar boundaries.

Fig. Quartzo-feldspathic gneiss (Ꝑ PK_4) displaying disharmonic minor folds; rock was stained but no K-feldspar is present; light grey is quartz; medium grey is plagioclase and blacks are micas, mainly chloritic biotite and minor muscovite.

Radiometric and geochemical similarities further support this interpretation. Radiometric background is the same over both porphyry and augen gneiss, high uranium concentrations have been found in soil in both igneous and gneissic terrane, and finally, both are associated with tungsten mineralization. The Piky occurrence and Lampman Lake geochemical anomaly are the best examples of tungsten associated with augen gneiss while the Boot and Marmot claim groups are representative of the porphyritic quartz monzonite association.

In the Firth Project model shown in Table II, units PЄsc, PPK2 and PPK4 are considered metamorphic equivalents of the original sedimentary section. Biotite-garnet-muscovite schist (unit PЄsc) simply represents the metamorphic aureole peripheral to either Kqm or Pn and its variable metamorphic composition is dependant on the composition of the intruded host rock. Limy sections have produced foliated skarns with garnet, diopside, biotite and other calc-silicate minerals while pelitic sections have formed garnet-muscovite schists.

These relationships are best shown diagrametically on the following page. Figure is a comparison between the 1960 and 1977 GSC mapping of units found within the project boundary. Figure is a diagramatic representation of the Firth Project interpretation. The same relationship between the porphyritic stock and augen gneiss probably extends outside the project boundary but no observations have been made to confirm this.

Deformation of a large cooling batholith of porphyritic quartz monzonite is one possible mechanism that could have produced the textural differences between quartz monzonite and augen gneiss. This deformation could have been caused by movement along Tintina Fault during crystallization of the batholith.

Figure <u>Unit Correlation of Old and New GSC Mapping</u>

AGE	UNIT	AGE	UNIT
Jurassic and/or Cretaceous	Unit 9 Biotite Quartz Monzonite	Cretaceous	Kqm Biotite Quartz Monzonite
	—— Intrusive Contact ——		—— Intrusive Contact ——
Unknown	Unit A Chloritic schist, phyllite, carbonate, micaceous marble	Unknown	(Allochthonous?) <u>Klondike Schist</u> ᵽPK2 Black siliceous phyllite ᵽPK4 Muscovite-biotite and chloritic quartzose gneiss
			—[Possible Thrust Plane]—
Unknown	Unit C Quartzose, micaceous gneiss, granitoid gneiss and augen gneiss	Cambrian? and Windermere?	(Autochthonous?) ᵽCsc Biotite-garnet-muscovite schist - - - - - - - ᵽn Biotite-feldspar augen gneiss

GSC Map 7-1960

Wheeler, Green and Roddick

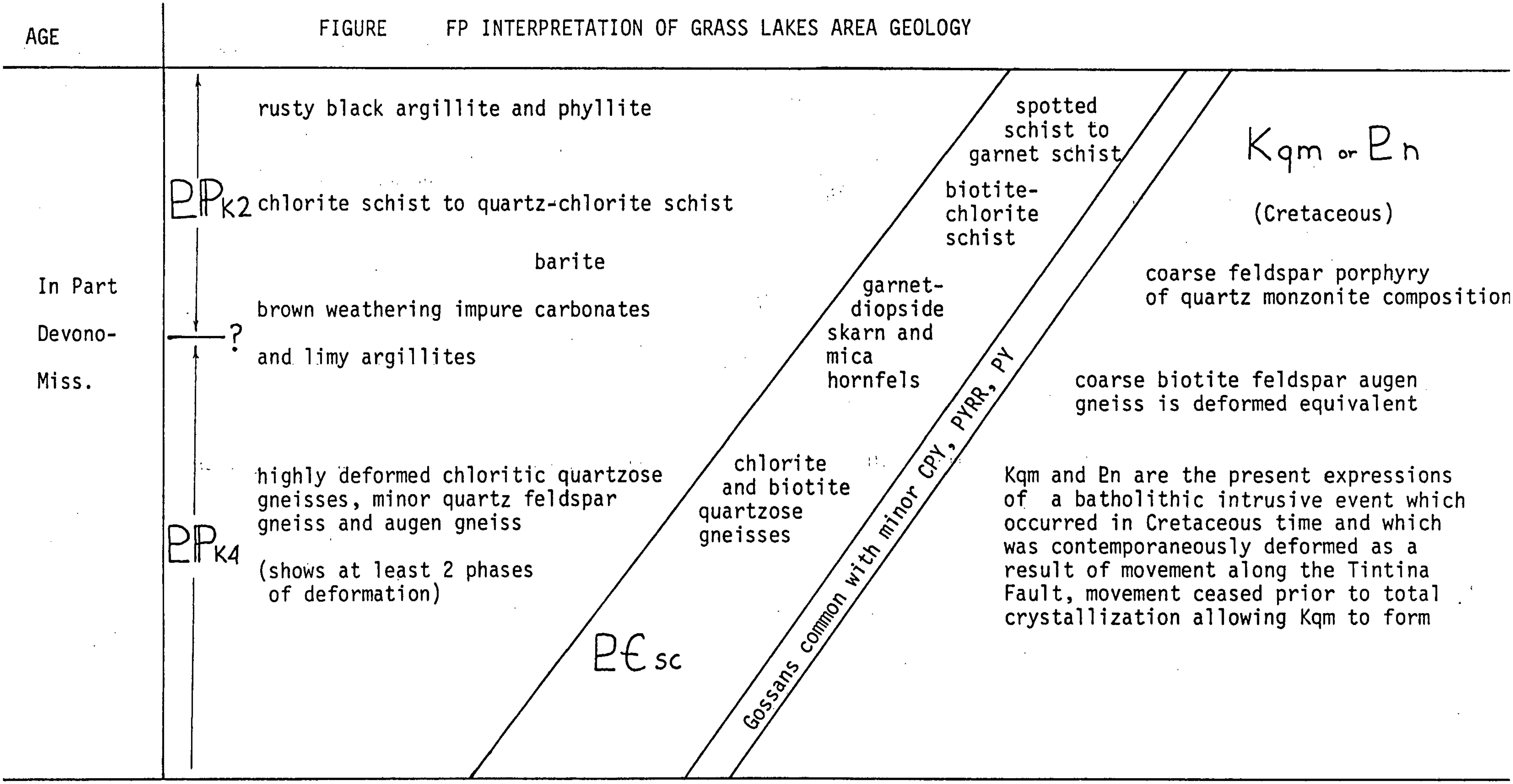
1960

GSC Open File 486

Tempelman-Kluit et al

1977

FIGURE FP INTERPRETATION OF GRASS LAKES AREA GEOLOGY



Geological subdivisions are based on GSC Open File 486 by D.J. Tempelman-Kluit et al

In such a situation, cooled intrusive material would be susceptible to deformation while molten phases would be unaffected. Movement along the Tintina may have ceased prior to the completion of crystallization of this batholith, allowing undeformed quartz monzonite stocks to crystallize within the gneissic body.

Strong foliation of mica is present in all metamorphic rocks. Biotite is the only abundant mica in augen gneiss unit Ꝑn while chlorite, muscovite and some biotite are present in the overlying units ꝐCsc, ꝐPK4 and ꝐPK2. Garnet, biotite and muscovite are common in ꝐCsc.

At least two periods of deformation have been recognized in units ꝐPK2, ꝐPK4 and ꝐCsc. The first phase consists of strong mica development and tightly spaced isoclinal, assymetric and disharmonic minor folds with amplitudes of about 20 cm. The second phase consists of planar deformation that has been superimposed on the folding. No additional mica development appears to have accomplished this phase. In areas where stress was applied perpendicular to axial planes, fold closure has resulted. In other areas, shear has paralled axial planes and has produced shear folds. Disharmonic folds have developed in areas of mixed composition such as quartzose and carbonate lenses.

On a regional scale, metamorphic units appear to be flat-lying or gently dipping. Minor folds have no large equivalents of the type that should have resulted from a gently dipping thrust fault. No evidence for such an event has been found within the project boundaries although good examples are reported to the southeast by the GSC.

Only one foliation is present in the augen gneiss, whereas two phases of deformation are represented in the other metasedimentary units. This suggests either that the gneiss is younger than the other foliated rocks, or that evidence of bedding or earlier foliations have been obliterated in the gneiss.

Uranium Exploration

Exploration for uranium in Grass Lakes area was a follow-up to the discovery of highly anomalous soils by Ukon Joint Venture in 1976. Previous work included local airborne radiometric surveys, ground prospecting traverses, grid soil sampling and a soil profile from a hand trench, which returned assays of up to 0.484% U_3O_8.

Toke Claim Group (61°23'N; 130°59'W)

The 1977 program commenced with the staking of the Toke 1-36 claim group to protect the entire drainage basin above the soil anomaly and permit the current work to be used for assessment credit. The program was designed to further define the geochemical anomalies, to explain the concentration mechanism, and to locate mineralized bedrock.

Field work began with the enlargement of the 1976 grid, which was extended 150 m to the north and 1350 m to the south for a total length of 2700 m. The base line was picketed at 50 m intervals using wooden laths and soil samples were taken at 150 m intervals along cross lines spaced 150 m apart to tie into the 1976 survey. Additional soil samples were collected at 50 m intervals between some cross lines, to further outline anomalies. The results, plotted on Figure show a background of about 10 ppm U and local weak anomalies of up to 375 ppm.

A complete radiometric survey was performed during the soil sampling, using Scintrex BGS-1S scintillometers (13 cc crystal). Radiometric readings were recorded at 25 m intervals on each line and the results are plotted on Figure Radiometric response was mainly in the range 50 to 80 cps but locally increased to 100 cps.

Soil profiles were obtained by hand pitting at 17 sites of high radioactivity and, in addition, the 1976 pit was deepened and resampled. Pits ranged in depth from 30 to 75 cm, depending on ground conditions. Results of this work are shown in Figure __ and __ following page __. The highest uranium assays were obtained from dark grey to black carbonaceous and organic soil horizons in the pits. The highest assay obtained in 1977 was 0.95% U_3O_8 in pit T1A, situated on the base line at line 0. Most pits intersected a volcanic ash horizon about 20 m below surface that was underlain by grey and black clay up to 30 cm thick and permeable mixed talus at the bottom. Only one pit (T8A) failed to reach the talus horizon. The assays show a direct relationship between uranium and organic content with both the volcanic ash and talus horizon usually giving lower values.

Radiometric and geochemical profiles suggest an upward migration of hydromorphic uranium that has been absorbed by charcoal and organic matter in the immediately overlying soil horizons. This type of carbonaceous trap for uranium has been well documented in the literature. Preliminary sampling of spring water encountered in pits T1E and T2B gave assays of 80 ppb and 6.5 ppb U.

PIT T1A 0 + 02S, 0 + 00 120 x 100 x 74 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	9	250	190
yellow-brown ash	8	350	39
dark grey-brown clay	11	500	(0.950%)
black charcoal bearing clay	4 - 6	500	(0.676%)
light grey brown, immature sandy clay with quartz monzonite boulders	40	250	360
Total Depth	74	200	

PIT T1B 0 + 02N, 0 + 00 100 x 90 x 49 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	5	170	35
yellow-brown ash	10	220	8
dark grey-brown clay	6	230	120
grey-brown and black charcoal bearing clay	12	260	(0.357%)
light grey-brown clayey sand with fist sized angular boulders	16	180	275
Total Depth	49		

PIT T1C 0 + 19S, 0 + 00 120 x 120 x 65 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	9	130	180
grey clay	4	170	310
intermittant yellow-brown ash	5	170	80
interbedded black and grey clay	17	170	310
light grey-brown sandy clay with large quartz monzonite boulders	30	160	15
Total Depth	65		

PIT T1D 0 + 20 S, 0 + 16W 70 x 70 x 49 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	12	110	80
yellow-brown ash	5	110	8.0
black carbonaceous clay	2	110	50
light grey sandy clay with large angular rock fragments	15	140	2.5
rusty sandy-clay with large angular boulders	15	140	13
Total Depth	49		

PIT T1E 0 + 09N, 0 + 03W 130 x 60 x 62 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	16	240	280
yellow-brown ash	5	330	37
dark grey-brown clay	11	480	(0.096%)
interbedded black and grey organic and carbonaceous clay	15	550	(0.605%)
light grey-brown clayey sand with small angular rock fragments	15	270	120
		* water sample	80 ppb
Total Depth	62		

PIT T2A 2 + 20 S, 0 + 30E 80 x 70 x 60 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	11	170	320
yellow-brown ash	4	225	23
dark grey brown clay with large boulders of quartz monzonite and intermittent organic and charcoal layers	31	260	260
rusty-grey sandy clay	3	200	58
Total Depth	49		

PIT T2B 2 + 35S, 0 + 52E 50 x 70 x 68 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	12	180	(0.213%)
yellow-brown ash	5	280	95
dark-grey and black organic clay	10	400	(0.123%)
dark grey and brown clay with large angular quartz monzonite boulders	26	550	(0.132%)
dark grey sandy clay with angular boulders	15	600	(0.287%)
		* water sample	6.5 ppb
Total Depth	68		

PIT T2C 2 + 25S, 0 + 48E 80 x 70 x 48 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	13	420	(0.104%)
yellow-brown ash	1	550	145
dark grey-brown clay with intermittent carbonaceous clay beds	19	850	(0.309%)
brownish-grey clay	11	720	(0.413%)
light grey-brown sandy clay	4	570	(0.218%)
Total Depth	48		

INCOMPLETE

Fig.

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HAND PIT SOIL PROFILES

T1A-E, T2A-C

TOKE CLAIM GROUP
FIRTH PROJECT

PIT T2D 2 + 16S, 0 + 46E 80 x 75 x 63 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	10	260	190
yellow-brown ash	7	340	85
dark grey-brown organic clays with intermittent carbonaceous and blue-grey clay beds	39	500	(0.148%)
grey-brown sandy clay with small rounded rock fragments	7	350	130
Total Depth	63		

PIT T3A 2 + 23S, 0 + 45W 70 x 80 x 77 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, grass	10	220	(0.120%)
yellow-brown ash	2	260	(0.073%)
dark grey organic clay	25	350	(0.121%)
light grey-brown sand with rounded and angular quartz monzonite boulders	40	190	150
Total Depth	77		

PIT T3B 2 + 23S, 1 + 12W 50 x 50 x 37 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
brown organic soil, roots	12	100	120
yellow-brown ash	2	110	31
dark grey organic clay	3	120	311
light grey-brown clayey sand with large quartz monzonite boulders	20	100	28
Total Depth	37		

PIT T4 3 + 05S, 0 + 12E 70 x 70 x 60 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, grass	8	240	250
yellow-brown ash	5	310	120
dark grey-brown organic clay	40	450	95
light grey-brown organic sand with boulders	7	330	120
Total Depth	60		

PIT T5 2 + 10N, 0 + 01W 85 x 75 x 66 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	9	290	(0.099%)
yellow-brown ash	13	340	330
grey-brown sandy clay	8	380	(0.187%)
grey-brown sandy clay with intermittent black carbonaceous clay beds and large boulders near bottom of pit	36	450	(0.178%)
		420	
Total Depth	66		

PIT T6 4 + 00S, 0 + 70W 90 x 70 x 51 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	14	200	195
dark grey organic clay	30	310	400
brown sandy clay with large boulders	7	230	70
Total Depth	51		

PIT T7 3 + 75N, 1 + 46W 60 x 55 x 40 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, moss	13	170	8
yellow-brown ash	12	220	60
dark brown organic clay with black carbonaceous horizons, large boulders and sand at bottom of pit	15	280	(0.084%)
Total Depth	40		

PIT T8 7 + 50S, 5 + 00W 90 x 100 x 87 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, grass	10	170	(0.119%)
yellow-brown ash	3	190	105
grey clay with orange-brown horizons	35	240	320
grey clay with intermittent organic horizons	4	390	(0.120%)
grey clay with orange-brown horizons	35	390	(0.058%)
Total Depth	87		

PIT T9 12 + 00S, 5 + 40W 100 x 100 x 73 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, grass	12	140	(0.251%)
dark grey organic clay with roots	6	150	(0.054%)
yellow-brown ash	2	150	220
grey clay with intermittent organic horizons and large quartz monzonite boulders	45	180	(0.061%)
sand and gravel	8	160	(0.044%)
Total Depth	73		

PIT T10 16 + 50S, 3 + 50W 100 x 100 x 58 cm

SOIL DESCRIPTION	THICKNESS (CM)	SCINT READING CPS (BGS-1S)	ASSAY PPM U (% U_3O_8)
peat, roots, grass	13	140	380
yellow-brown ash	5	170	55
dark grey organic rich clay with rounded quartz monzonite boulders	35	180	(0.107%)
sand and gravel	5	150	250
Total Depth	58		

INCOMPLETE

Fig.

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HAND PIT SOIL PROFILES

T2D, T3A, T4, T5, T6, T7, T8, T9, T10

TOKE CLAIM GROUP
FIRTH PROJECT

The source rock for the uranium is probably the porphyritic quartz monzonite stock that underlies the grid and outcrops immediately to the east. This stock forms steep, unvegetated cliffs and is well jointed to allow weathering, leaching and transport of uranium. The intrusive rock makes up the bulk of the boulders in the till at the base of the soil profiles and is interpreted as a pre-glacial talus fan. The boulders consist of large angular pieces of quartz monzonite porphyry with a permeable matrix of poorly sorted, immature, micaceous, clay-rich sands. The high feldspar and mica content and angular grains in the matrix suggest locally derived, non-fluvial deposition. Overlying sediments are either unsorted morainal or grey clays. Lateral moraines are common in the main valley and in large cirques. Distribution of moraines indicates a northward movement of ice in the main valley. Clay beds vary from grey to black depending on organic and charcoal content. Their depositions indicate quiet water conditions, possibly related to high lake levels or ponds in the irregular glacial sediment surface. Organic content is attributed to the later development of swamps, and at least one forest fire is indicated by charcoal fragments.

No radioactive rocks were found in any of the pits but approximately 20 radioactive boulders of aplite ranging in size from 30 cm to 1 m across were found in a small cirque in the northeast portion of the grid. The average radiometric response of these boulders was 250 cps, which is twice the local background of the porphyritic quartz monzonite. Three specimens of aplite assayed 60 ppm U, 85 ppm U and 0.153% U_3O_8, whereas the average assay of quartz monzonite was only 3 ppm U.

Aplitic dikes were also located in bedrock uphill from the float occurrence described above. The dikes are light brown, fine grained, contain minor pyrite and are intermittently radioactive. K-feldspar comprises about 40% of the rock, followed by 30% quartz, 20% plagioclase and 10% muscovite. Aplite dikes of this type are rare and were found in only one other place, an isolated talus boulder located in the upper cirque valley at the southeast corner of the grid. A sample from this boulder assayed 110 ppm U and gave a radiometric response of 250 cps over a background of 130.

Elsewhere on the Toke claim group, porphyritic quartz monzonite is the predominant rock type. It is characterized by large white phenocrysts of K-feldspar that range from 1 to 10 cm in length and average 4 cm. The matrix is made up of coarse, equigranular plagioclase, quartz, K-feldspar and biotite varying in grain size from 2 to 5 mm.

The only area of alteration seen on the property is located southeast of the grid and consists of carbonate and fluorite-bearing intrusive talus. Calcite occurs with green and purple fluorite along open fractures. Minor tourmaline-bearing quartz veins and quartz-feldspar-tourmaline pegmatities were also noted in the area.

Conclusions

Uranium assays of up to 0.95% U_3O_8 have been obtained from samples of organic-rich soil that appear to represent trapped hydromorphic uranium. The organic horizons are erratically distributed and proper groundwater conditions for the concentration of hydromorphic uranium are local and of insufficient volume to make this type of target economically attractive. Mineralization in bedrock is rare and only one radioactive occurrence has been found in bedrock in spite of good exposure. A local concentration of radioactive aplite float found downhill from this occurrence assayed as high as 0.153% U_3O_8.

One water sample collected from a pit assayed 80 ppb U, which is strongly anomalous. Insufficient water sampling has been done on the property to determine the extent of the anomalous water, although several assays were obtained that were very low. It is possible that high groundwater levels indicate mineralized bedrock that is presently not exposed.

TUNGSTEN EXPLORATION

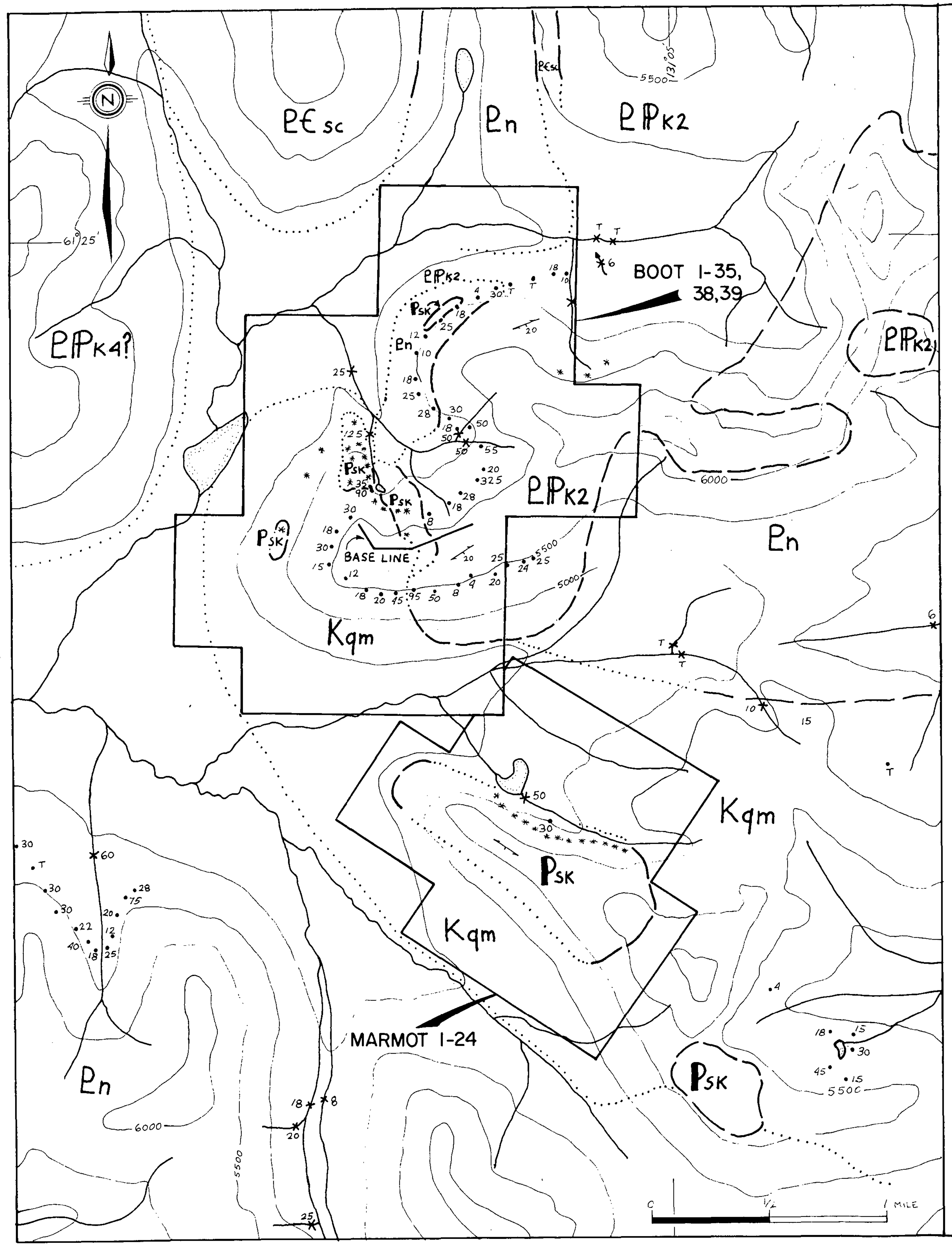
Boot Claim Group (61°24'N; 131°07'W)

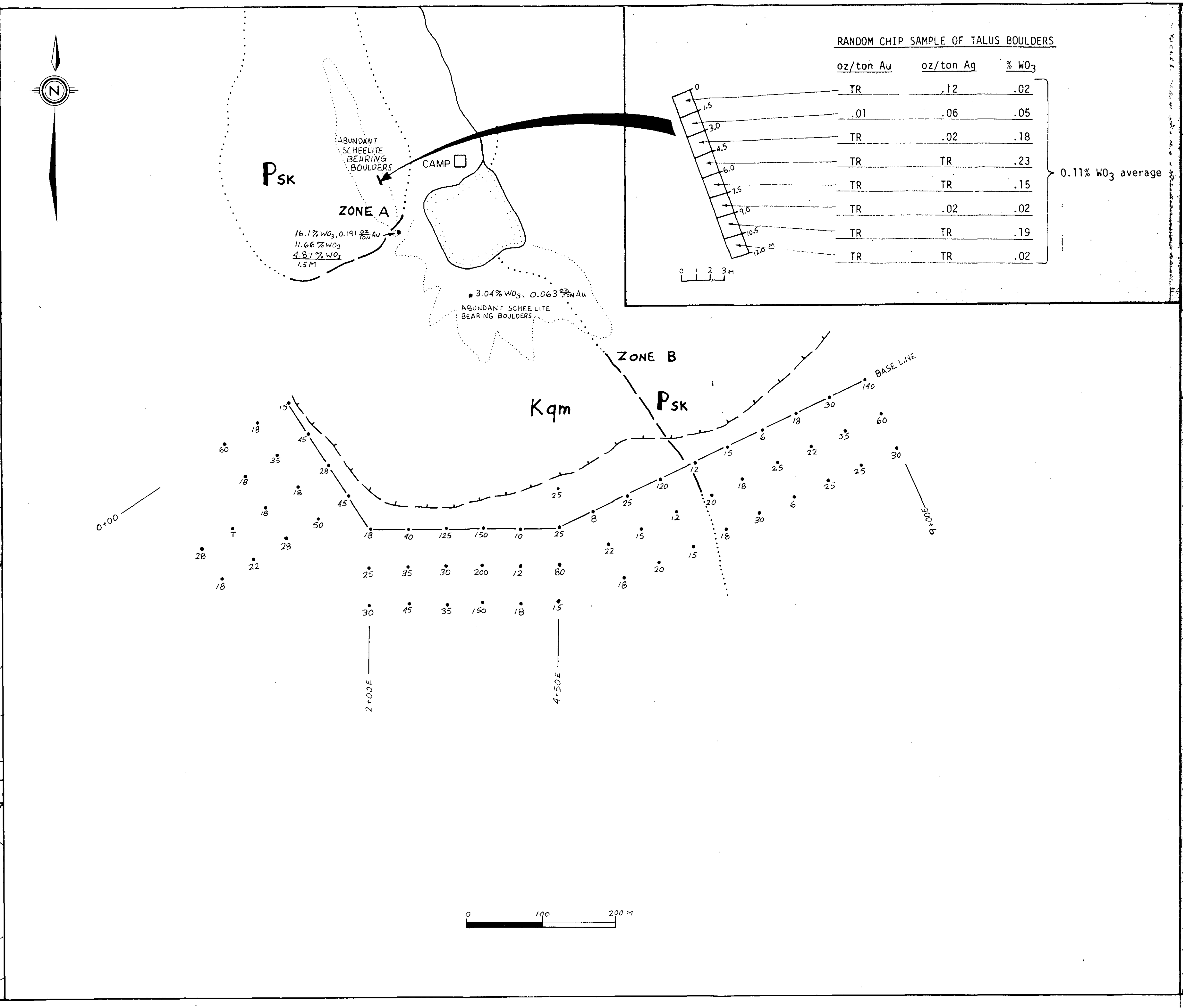
The first 24 Boot claims were staked on August 20 to cover a scheelite occurrence in skarn and intrusive rock. A preliminary program of prospecting, soil and silt sampling, night lamping and limited chip sampling was carried out following the staking and 13 protection claims were later added to the group.

The main showing (Zone A) is exposed in outcrop for about halfway down the west ridge of a north-facing cirque at a contact between skarn (Psk of EPK4) and a porphyritic quartz monzonite stock. The contact runs vertically up the ridge to the west and then swings north parallel to the ridge. Thus, the skarn is occurring as a relatively thin (100 m) veneer along the ridge. Compositional differences in the skarn suggest that the original beddding dips gently into the hillside.

The showing consists of a 1.5 m thick zone of unusually high grade scheelite mineralization occuring at the base of a 5 m by 5 m outcrop that is exposed through talus on the hillside. The zone is bounded to the south by quartz monzonite and is overlain by hornfelsed garnet-epidote skarn. Mineralization can be traced about 250 m to the north as float in talus. It occurs at progressively lower elevations to the north, which suggests that the zone has an attitude approximately parallel to bedding attitude of the skarn. The abundance of float suggests good continuity for the first 150 m.

The strongly mineralized host rock has the appearance of an altered foliated intrusion rather than a skarn. It contains about 15% secondary biotite in weakly aligned clots surrounded by a light coloured matrix that looks like altered

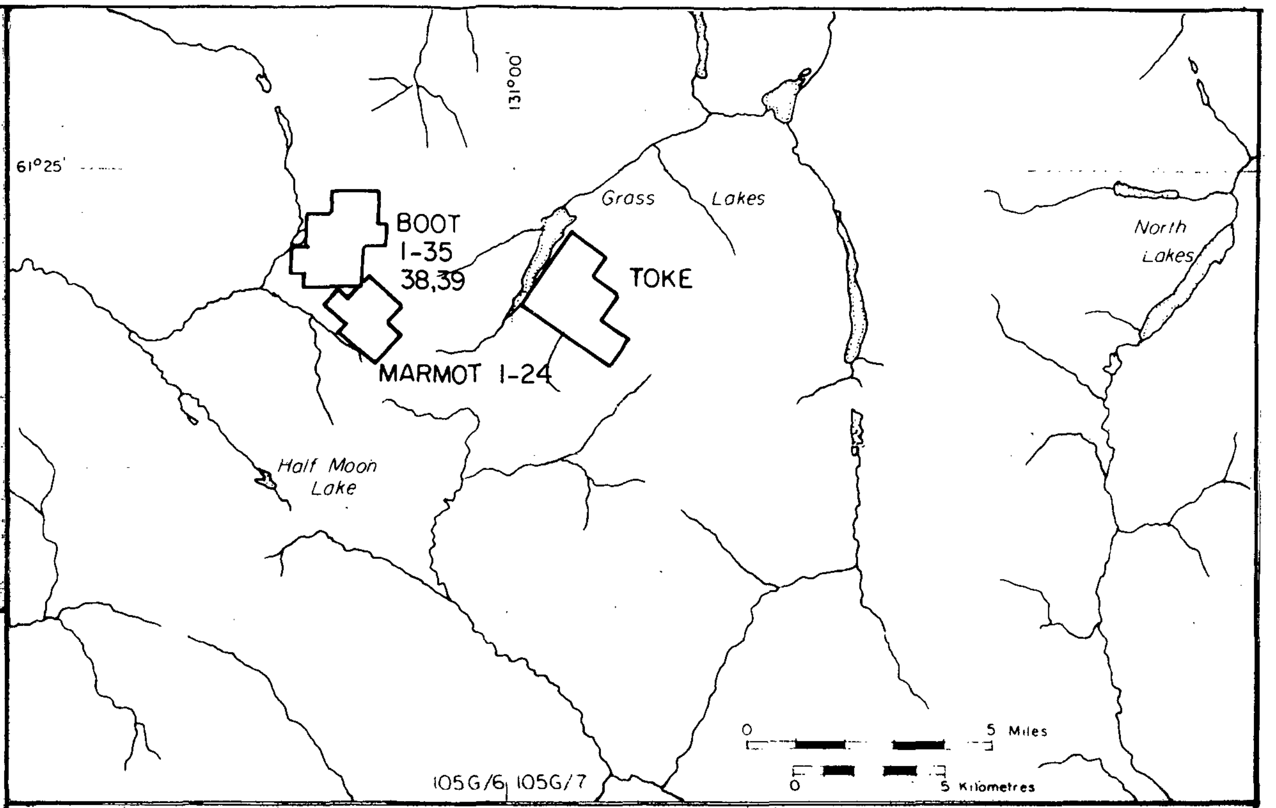




RANDOM CHIP SAMPLE OF TALUS BOULDERS

oz/ton Au	oz/ton Ag	% WO_3
TR	.12	.02
.01	.06	.05
TR	.02	.18
TR	TR	.23
TR	TR	.15
TR	.02	.02
TR	TR	.19
TR	TR	.02

0.11% WO_3 average



LEGEND

CRETACEOUS

Kqm — Porphyritic biotite quartz monzonite , white K-feldspar phenocrysts and coarse grained matrix

- (gradational contact) -

CRETACEOUS ?

ℓn — Very coarse grained biotite-feldspar augen gneiss with white K-feldspar porphyroblasts (deformed equivalent of Kqm)

PALEOZOIC ?

ℓЄsc — Biotite-garnet-muscovite schist

Psk — Garnet-diopside skarn, banded calc-silicate hornfels, micaceous marble

ℓℙK2 — Rusty black phyllite, chlorite schist, biotite-chlorite schist, limy argillite

ℓℙK4 — Chloritic quartzose gneiss, micaceous marble

* Float occurrences of scheelite located by night lamping

Foliation

Geological boundary; assumed, approximate

Break in slope

Rock / Soil / Silt — PPM W - analyzed by Chemex Labs Ltd., North Vancouver or % WO_3

T = < 4ppm

INCOMPLETE

Fig.

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GEOLOGY and TUNGSTEN GEOCHEMISTRY

BOOT and MARMOT CLAIM GROUPS

FIRTH PROJECT

To accompany a report dated Dec. 1977

feldspar (see Figure   A stained polished section shows an irregular wispy content of potassium feldspar. The rock is strongly limy and has a faint clay odour. The scheelite occurs as clusters of 1 to 2 mm euhedral grains associated with the biotite and as accumulations parallel to the foliation. The skarn overlying Zone A contains minor scheelite as disseminations and associated with three directions of narrow quartz veining. This type of mineralization is scattered throughout the talus and makes it more difficult than normal to trace Zone A on surface. A chip sample taken in daylight across 1.5 m of the Zone A outcrop assayed 4.87% WO_3 and 0.09 oz/ton Au, while two specimens of the best mineralization assayed 16.1% and 11.7% WO_3 respectively. The higher grade specimen also returned 0.191 oz/ton Au, 86 ppm Cu, 5 ppm Mo and 4 ppm Ag. A semi-quantitative spectrographic analysis of the same specimen indicated a weakly anomalous content of Bi, Sr and Ti. Both copper and molybdenum are unusually low for Yukon tungsten occurrences. Daylight sampling along 12 m of talus containing the maximum abundance of Zone A-type float gave an average of 0.11% WO_3, trace Au and 0.03 oz/ton Ag from eight assays that ranged from 0.02% to 0.23% WO_3, trace to 0.01 oz/ton Au, trace to 0.12 oz/ton Ag. Each sample represented an individual panel 1.5 m by 1.2 m and consisted of small chips from at least 50 talus boulders within the panel.

Zone B occurs 500 m southeast, where the contact between the instruion and gently dipping skarn crosses the cirque floor and extends vertically up the north-facing wall of the cirque. Little is known about this zone as it has only been seen in talus below the cliff and as float in an overburden-covered area above the cliff. The talus contains a few well-minerlaized boulders of foliated, biotite-rich rock almost idential to Zone A, as well as many skarn fragments containing low-grade disseminations and veinlets. Only one piece of the better-grade material was found on top of the ridge.

Talus from quartz monzonite on the cirque-wall and ridge between Zones A and B also contains minor scheelite, which occurs primarily as euhedral grains along planes of weakness and result in a spectacular display of mineralization, with little real grade, during night lamping.

Two sets of old claim posts were found on the ridge near Zone B. The older set was cut from stunted trees and probably dates from 1954. A second set made from 2 x 4 lumber was probably staked in 1966 during an extensive regional airborne mag and EM survey. Groundwork appears to have been limited to soil sampling.

Continue text on following page here

Geochemistry

Grid and contour soil sampling, silt sampling and minor creek and soil panning were used to determine the best exploration method for this type of occurrence. Creek panning with limited soil panning located several regional anomalies and proved to be the most efficient technique.

In the cold Yukon climate, tungsten mineralization weathers and disperses in the geochemical cycle as almost insoluble grains of scheelite and wolframite that generally become finer grained with increasing distance from source. As standard geochemical assays are commonly done on minus 80 mesh material, a sample with coarse scheelite near the mineralized source can be diluted by screening.

Two silt samples from the Boot claims were subjected to simple screen analysis to study the relationship between sample size and tungsten assay. The results, which are tabulated on the following page, show that good tungsten anomalies were obtained in all fractions although dramatic increases were observed in coarse fractions of the sample taken closest to the showing. Gold is strongly anomalous in one sample but does not show a direct correlation with the richest tungsten sample, suggesting that the two metals may not be intimately associated to the skarn. The number of samples that have been tested in this way is insufficient to draw firm conclusions but there is a tendency for the coarsest fractions to contain the most tungsten close to the bedrock source. Silt samples taken on the Boot claim group in conjunction with panning showed good correlation with scheelite estimates in pans. Soils were also tested by panning below the main showing and a pan concentrate from a soil sample site assaying 90 ppm W contained approximately 400 scheelite grains.

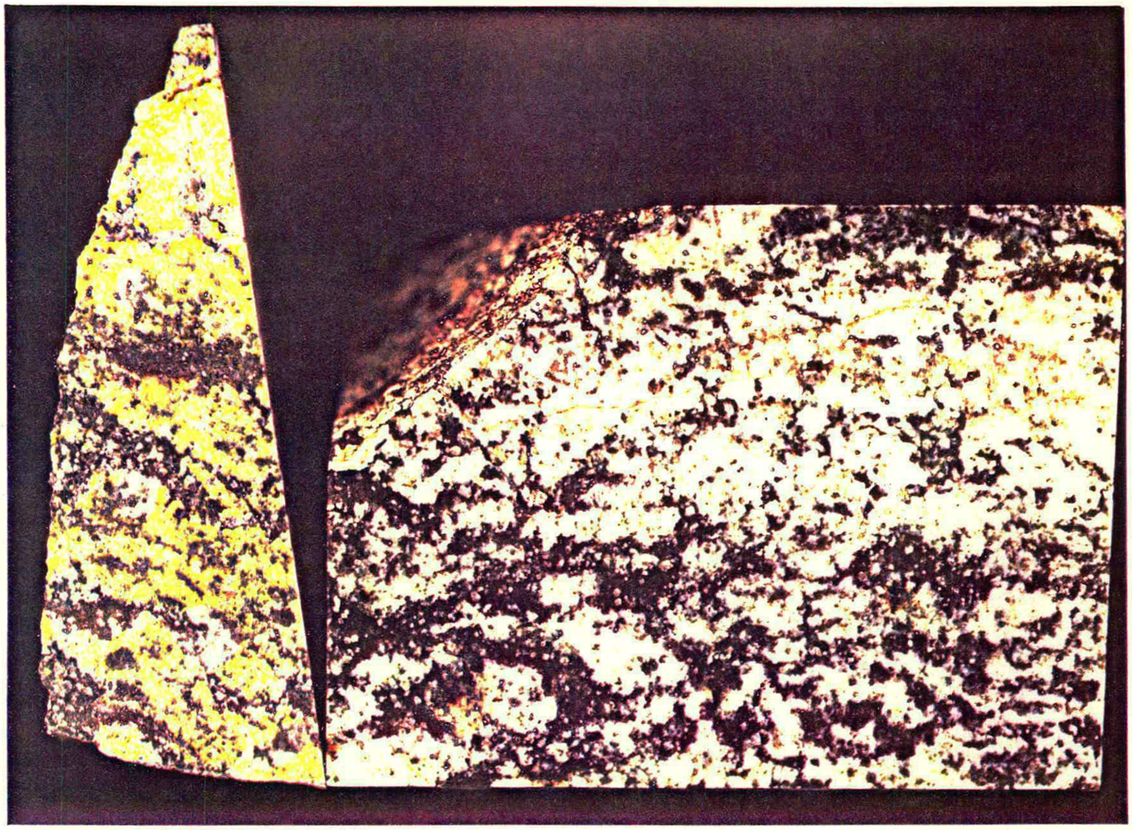


Figure Stained and unstained specimen of tungsten mineralization from zone A outcrop, Boot claim group. Black weakly aligned areas are clots of biotite containing euhedral Scheelite crystals. White areas are highly altered feldspars with inclusions of chloritized biotite (yellow-green) and irregular K-feldspar content (yellow).

Figure Screen Analysis of Silt Samples near Zone A, Boot Claim Group

	-6 +12	-12+20	-20+32	-32+80	-80	
400 m downstream from Zone A	150 15	300 <15	500 NSS	350 NSS	125 <15	ppm W ppb Au
800 m downstream from Zone A	25 300	22 160	30 60	60 < 15	25 <15	ppm W ppb Au

NSS = not sufficient sample

Soil samples were collected both on a small grid and randomly while prospecting. Only the minus 80 mesh fraction was analyzed from each sample. Background in this district is about 2 to 5 ppm over intrusive or gneissic rocks and assays greater than 10 ppm are considered to be anomalous. The grid is situated on a plateau south of the cirque and is above timberline, which is about the 5500 foot elevation. Intrusive rock is usually masked by a moss and lichen cover and weathers readily to felsenmeer and deeply fractured sub-outcrop. Only traces of scheelite were seen on the grid during night lamping. Samples were collected at a 50 m spacing on lines 50 m apart and the results are plotted on Figure . Most of the samples were anomalous in tungsten, with six exceeding 100 ppm W and only assaying 200 ppm W. This compares with 35 and 90 ppm W obtained from two soils immediately below mineralization at Zone A.

Contour sampling of soil of talus fines also produced good contrast. This method was used outside the grid area on the Boot claims and during preliminary examination of unstaked areas of mineralization. The highest soil value obtained during this work, 325 ppm W, was obtained northeast of the grid. Soil values elsewhere on the claims range up to 95 ppm W.

Marmot Claim Group (61°23'; 131°05')

Twenty-five claims were staked on September 26 to cover an area of skarn mineralization that adjoins the Boot claim group to the south. Calcareous sedimentary rocks of unit ЕPK4 in contact with the quartz monzonite intrusion have been altered to skarn, white marble and banded calc-silicate hornfels (Psk). The skarn outcrops along a northwest trending ridge and dips gently to the southwest away from the intrusion. The contact itself is hidden under talus. Interest was first drawn to this area by an anomalous panning sample from the creek draining the contact that contained 35 coarse and approximately 75 fine scheelite grains. A silt sample taken at the same site assayed 50 ppm W and a nearby soil sample assayed 30 ppm W. An overnight fly-camp was then set up at this site and the area night-lamped.

Abundant fragments of scheelite-bearing skarn were traced in talus for a length of about 1000 m. Most of the scheelite is associated with calc-silicate minerals such as garnet, diopside and calcite together with chlorite, muscovite and quartz. Purer limestone beds have been altered to white marble. Only one night of prospecting has been done on these claims. The decision to stake this occurrence was made by Chevron at the end of the field program because of its proximity to the Boot property.

Unstaked Geochemical Anomalies and Mineral Occurrences

Nine geochemically anomalous areas and tungsten mineral occurrences were found by creek panning and silt sampling in a two day helicopter-reconnaissance program. Only two of the areas were prospecting with night-lamping, one of which was subsequently staked as the Marmot claim group. The probability of further tungsten discoveries in the area is good because some of the anomalies are stronger than the response obtained from known mineralized areas. The localities are shown on Figure and are described below:

Anomaly A (61°27'; 131°09')

The headwaters of two small, north-facing cirque valleys are strongly gossaned along the contact between augen gneiss (Ꝑn) and foliated biotite-garnet-muscovite skarn. Talus fragments were examined and one soil sample panned on the south end of a small tarn in the most northwesterly cirque contained 25 coarse and 50 fine scheelite grains in the concentrate. No further work was done. This area was staked in 1966 as part of a geophysical program on a nearby lead-zinc-copper skarn showing. No sulphides were seen during the 1977 work.

Anomaly B, Lampman Lake (61°26'; 131°09')

An unnamed lake north of the Boot claims was named Lampman Lake by the Firth crew. A panning concentrate at the mouth of a creek which flows into the east side of the lake contained at least 100 coarse and 30 fine scheelite grains. Two silt samples collected at different times gave conflicting results. The first assayed 30 ppm W, which is lower than expected from the panning results, while the second assayed 325 ppm W. Four coarse fractions of the latter sample assayed only 8 ppm to 45 ppm W and less than the detection limit in gold. Two differences between this anomaly and the Boot showing are the lack of gold and the high tungsten assay in the minus 80 mesh fraction, which suggest that the source is some distance away. No skarn float was found at the Lampman anomaly. The anomalous stream drains a contact between Pn augen gneiss and PCsc muscovite-chlorite-garnet schists. No further exploration was done.

Three other anomalies occur in the area. A small stream to the east originating in the same contact contained 10 coarse and 6 fine scheelite grains in a pan and had a geochemical response of 20 ppm W. Panning concentrate from two drainages to the west of Lampman Lake contained 30 and 20 grains of scheelite, respectively. The first assayed 10 ppm W in silt and drains a weakly metamorphosed carbonate section of unit PPK4. The other creek was not geochemically sampled. The high response in panning concentrates and silts around Lampman Lake has outlined an important anomaly that should have high priority in 1978.

Anomaly C (61°22'; 131°09')

Anomalous creek pans were encountered in a 50 square km area southwest of the Boot claims. Creek pan concentrates ranged from 16 to 75 scheelite grains in larger drainages and 20 to 25 colours in short drainages while geochemical assays ranged from 10 to 45 ppm W. A night lamping traverse in the headwaters of the most northwesterly drainage resulted in the discovery of abundant mineralized float, which consisted primarily of scheelite in quartz veins. A few specimens contained wolframite as well. Host rocks in the area are augen gneiss with minor chloritic schist and some diopside-rich skarn. An occurrence of scheelite in outcrop showed three directions of mineralization, two associated with quartz veins and the third parallel to foliation in augen gneiss. Tourmaline and molydenite occurring in separate quartz veins were also found in this cirque. One contour soil sampling traverse done in the northern part of the anomalous area returned values ranging up to 110 ppm W. Surrounding drainages are anomalous as well, indicating a broad area of interest. The presence of scheelite, wolframite, molybdenite and tourmaline in quartz veins occurring within augen gneiss supports the theory that it was originally an intrusive.

Part of Anomaly C had been staked previously. In 1966 Cassiar Asbestos Corp. L. staked in this area to cover pyrite and molybdenite bearing quartz veins in schist. Scheelite was found by panning during follow up work but was never found in place and was apparently considered to have little importance. The scheelite found by Cassiar occurred in the creek just east of the cirque where scheelite was found by Firth Project during night lamping. This appears to be the only previous discovery of scheelite in the project area prior to the current work.

Anomaly D (61°23'; 131°05')

Weakly anomalous silt and pan samples were obtained from two north-draining creeks east of the Marmot claim group. The creeks drain part of the porphyritic quartz monzonite stock that occurs on the Toke claim group. Silt samples ran 10 to 20 ppm W while estimates of scheelite in concentrate were 9 and 3 grains respectively. A soil sample later returned 75 ppm W in the eastern drainage while a rock sample of the intrusive assayed 15 ppm W.

Anomaly E (61°22'; 131°05')

Anomaly E is located immediately southeast of the Marmot claim groups and appears to be related to a pendant of the same skarn-forming unit in contact with quartz monzonite. Two creeks to the north returned 15 and 20 ppm W in silt and contained 11 and 100 scheelite fragments per pan, respectively. Assays of soil below the skarn pendant ranged from 15 to 45 ppm W. No further work was done.

Anomaly F (61°20'; 131°07')

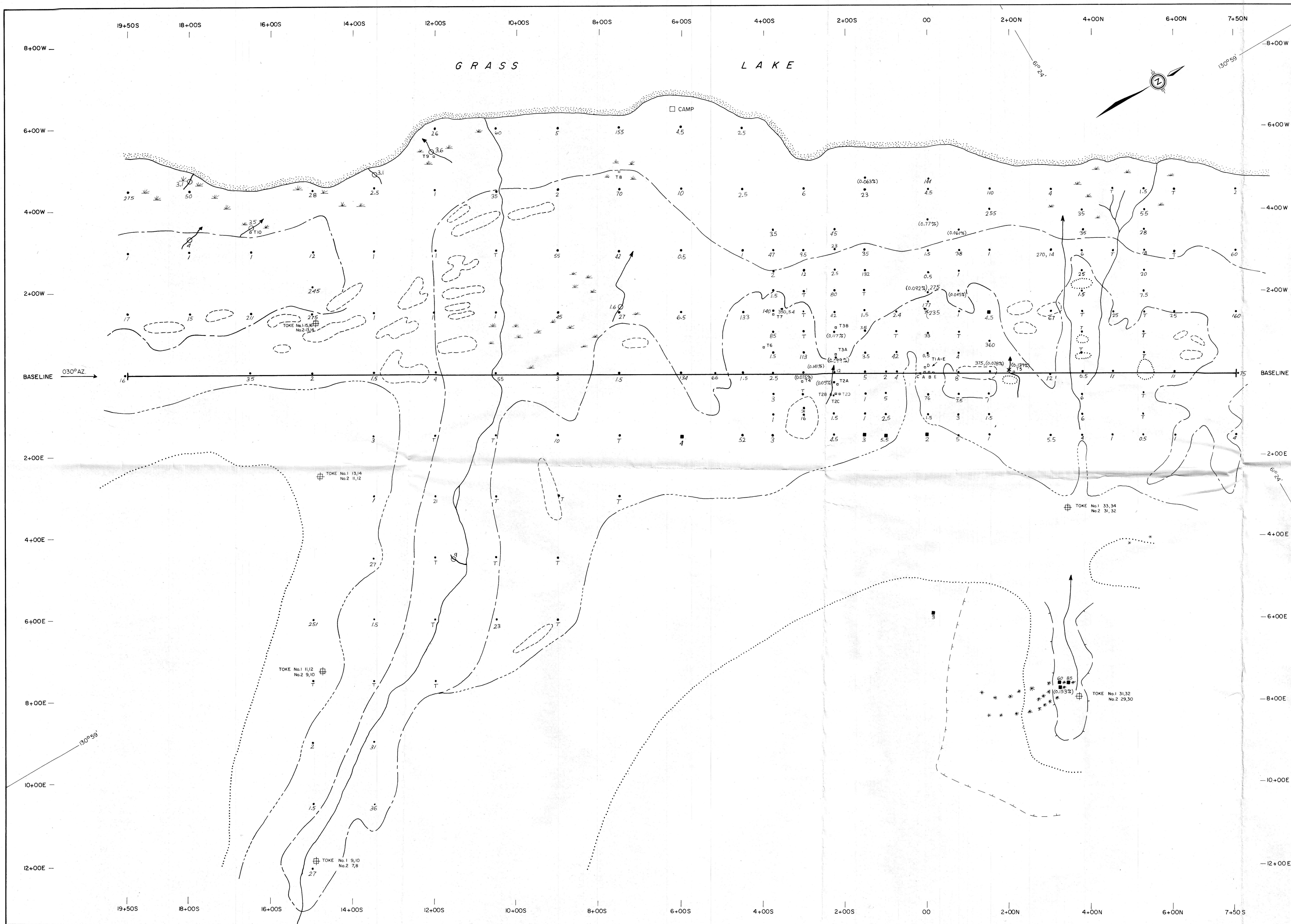
Sixteen scheelite fragments were found in a pan concentrate from a large creek, which is lightly anomalous. However, a silt sample assayed 45 ppm, which is highly anomalous. The area is entirely underlain by augen gneiss (unit Pn). No follow up work has been done here.

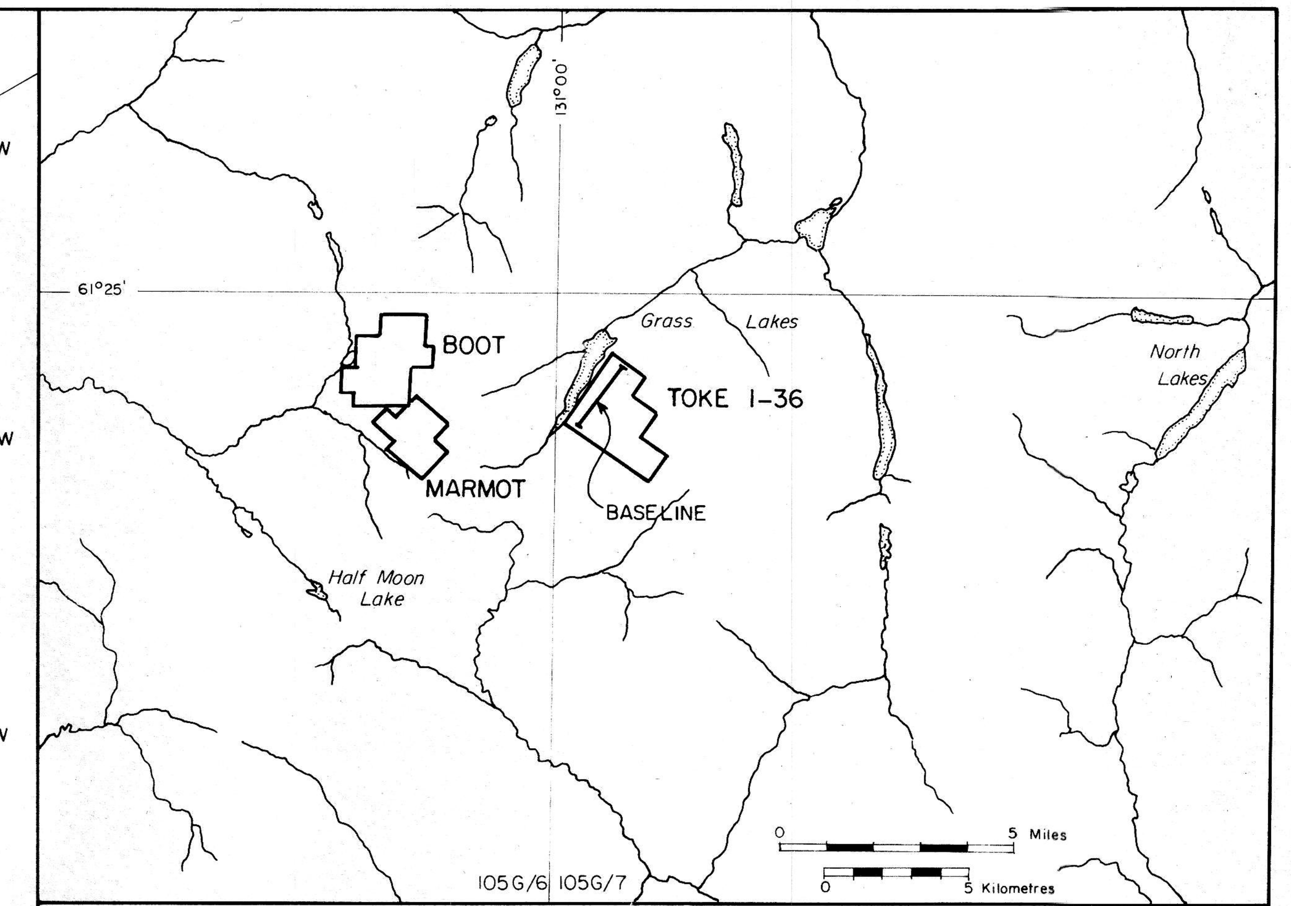
Anomaly G (61°20'; 130°59')

Anomaly G consists of two anomalous creeks on either side of a contact between augen gneiss (unit Pn) and garnet-muscovite-chlorite schist (unit PCsc). The western creek draining augen gneiss returned 15 ppm W from silt and showed 13 scheelite grains in a pan concentrate, while the eastern drainage produced 40 scheelite grains in a pan and assayed 50 ppm in silt. No follow up work was done.

Anomaly H (61°24'; 130°55')

Anomaly H consists of two adjoining soil samples assaying 20 ppm and 15 ppm W respectively. A pan concentrate in the main drainage downstream from the soil anomaly gave a moderately anomalous count of 15 coarse and 15 fine grains of scheelite but a silt sample returned only 4 ppm W. No further work was done.





LOCATION MAP

LEGEND

- rock — in ppm U or (% U_3O_8)
- soil
- silt
- water in ppb U
- T < 0.5 ppm U

(analysed by Chemex Labs Ltd. North Vancouver)

- radioactive float occurrence
- break in slope
- base of slope
- limit of talus
- limit of outcrop
- approximate limit of trees
- swamp
- lateral moraine
- hand pit
- claim posts

INCOMPLETE

Fig.

ARCHER, CATHRO & ASSOCIATES LTD

0124-93960
7N27.48
C4
765
c.1

URANIUM GEOCHEMISTRY

TOKE CLAIM GROUP

FIRTH PROJECT

SCALE 1:5000

100 0 100 200 300 400

Metres

To accompany a report dated Dec. 1977


GRASS LAKE
CAMP
BASELINE 030° AZ.
Kqm
LOCATION MAP
BOOT
MARMOT
TOKE 1-36
BASELINE
Grass Lakes
North Lakes
Half Moon Lake
105G/6, 105G/7
LEGEND
CRETACEOUS
Kqm coarse grained, porphyritic biotite quartz monzonite with white K-feldspar phenocrysts
light brown aplite dikes
PALEOZOIC ?
PPk4 micaceous quartzose gneiss
foliation
waist-level reading of radioactivity using a Scintrex BGS-1S (13 cc) KI (Tl) scintillometer
radioactive float occurrence in counts per second
approximate geological boundary
break in slope
base of slope
limit of talus
limit of outcrop
approximate limit of trees
swamp
lateral moraine
hand pit
claim posts
Fig. INCOMPLETE
ARCHER, CATHRO & ASSOCIATES LTD
GEOLOGY and RADIOMETRIC SURVEY
TOKE CLAIM GROUP
FIRTH PROJECT
SCALE 1:5000
Metres
To accompany a report dated Dec. 1977

LEGEND

7729.1 start — end: Flight line location and numerical designation

50: Airborne anomaly in counts per second, stripped U channel (using GSA-61 1853 cc NaI[Tl] and GAD-4 spectrometer)

Fig. INCOMPLETE

ARCHER, CATHRO & ASSOCIATES LTD

AIRBORNE RADIOMETRIC SURVEYS

GRASS LAKES AREA

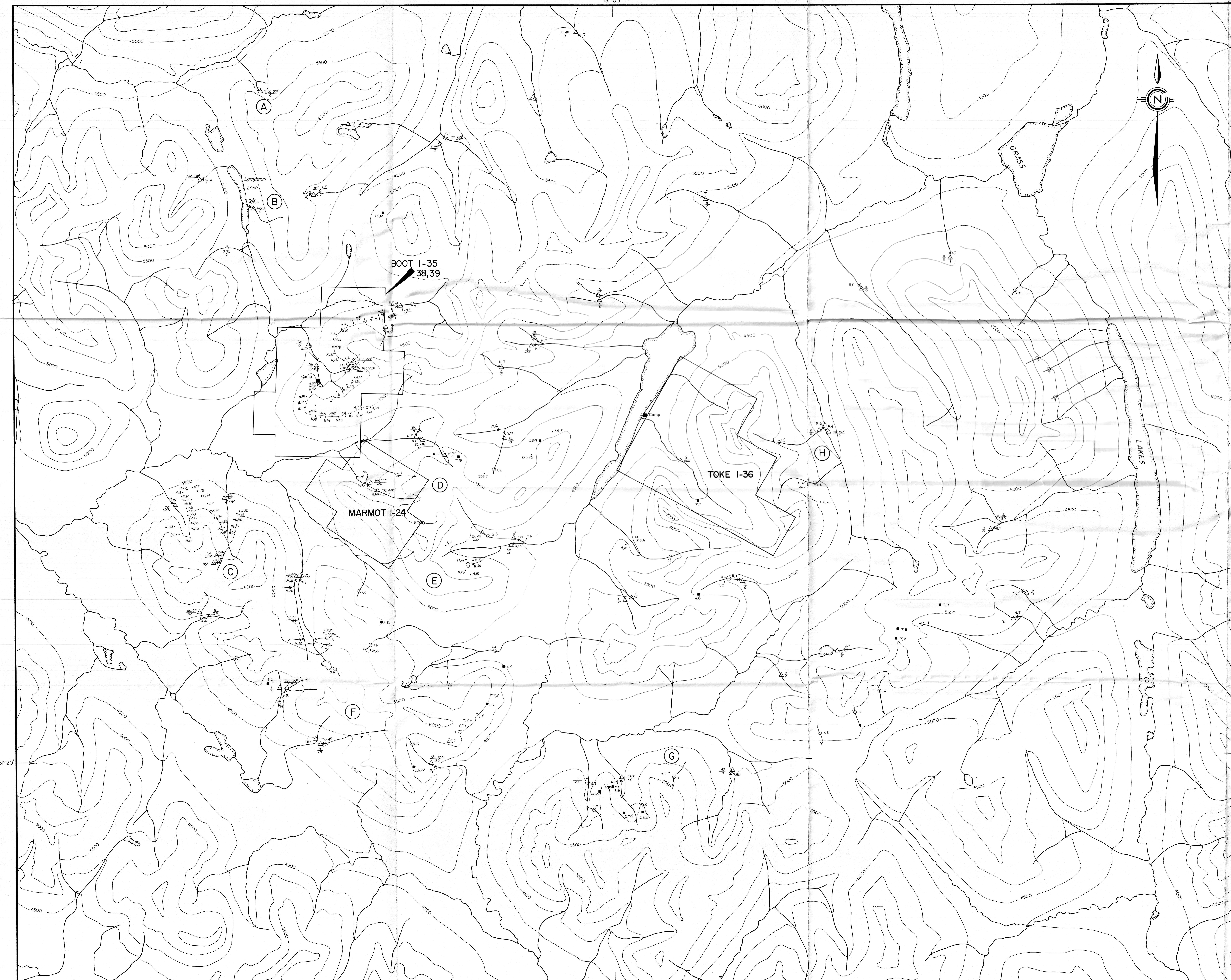
FIRTH PROJECT

Scale 1:31,680

1/2 0 1/2 1 Miles

1/2 0 1/2 1 2 3 Kilometres

To accompany a report dated Dec. 1977



LEGEND

△ panning concentrate with estimate of $\frac{\text{scheelite content}}{\text{zircon content}}$

C= coarse F= fine

water in ppb U, T = <0.2

silt, soil, rock — in ppm U,W T, T = <0.5, <4
N = not analyzed

Geochemical analysis by Chemex Labs Ltd, North Vancouver, B.C.

(A) geochemical or panning anomaly

Fig. INCOMPLETE

ARCHER, CATHRO & ASSOCIATES LTD

CREEK PANNING, URANIUM and TUNGSTEN GEOCHEMISTRY

GRASS LAKES AREA

FIRTH PROJECT

Scale 1:31,680

1/2 0 1/2 1 Miles

1/2 0 1/2 1 2 3 Kilometres

To accompany a report dated Dec. 1977