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Mineral Assessment of the proposed Frances Lake Special Management Area, Yukon

A. Fonseca

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Preface

This report summarizes results of geological fieldwork performed (2000, 2001) and the detailed mineral assessment in the proposed Frances Lake Special Management Area by the Mineral Resources Branch, Government of Yukon. The purpose of the study was to produce a guide to the mineral potential of the area to assist with proposed land planning in the area. The Yukon Geological Survey is pleased to release this information in this report.

The information is being released as originally prepared and may not conform to current Yukon Geological Survey publication standards. Please note that this report does not include information from any studies that may have been carried out in the area since the mineral assessment was conducted. Special Management Area boundaries and names may have changed since the study was completed. This report was not previously released to the public due to the confidential nature of the Land Claim negotiation processes.

Mineral Assessment
of
Frances Lake Area

Internal Report
Prepared by A. Fonseca
December, 2001

Table of Contents

Executive Summary

Yukon Government, Liard First Nations, and Ross River Dena Council agreed to create a 1500.94 km^2 Special Management Area designated as Natural Environment Park over Frances Lake. A 1710.8 km^2 Study Area surrounding the Core Area was also agreed to, but its designation of protection is uncertain. The Frances Lake SMA covers an area of significant Pb-Zn-Cu mineralization and multi-element geochemical anomalies, abuts to Cominco's advanced Fin prospect, and encloses quartz claims over the Matt Berry deposit, owned by Barytex International.

Field work conducted in the summers of 2000 and 2001 by YTG Mineral Resources Branch showed that:

- Mineralization in the Matt Berry deposit is related to a previously unreported volcanic belt that extends over 30 km to the northwest;
- Matt Berry deposit has characteristics of VMS-style deposits, such as those in the Finlayson Lake Belt;
- The style of deformation interpreted for the Matt Berry suggests repetition of the mineralized unit at depth;
- Maxi prospect (in the proposed Study Area) is a significant exploration target, that deserved further exploration work;

A detailed mineral assessment of the area bounded by Robert Campbel Highway and Nahanni Range Road shows the highest mineral potential along a belt in the western part of the area, which coincides with the core of the proposed SMA. An examination of the detailed mineral potential map resulted in the following recommendations:

- The proposed protected area be shifted to the northeast, where there are large tracts of land with lower mineral potential, and equally easy road access;

YTG Mineral Resources Branch should carry further field work to map intrusive phases in the northern-most portion of Billings Batholith, and to establish the source of a pronounced geochemical anomaly south of Simpson Tower.

Introduction

This report summarizes the current land status of Frances Lake SMA, results of geological fieldwork performed in the proposed Frances Lake Special Management Area during the summers of 2000 and 2001.

Land Status

Yukon Government, Liard First Nations, and Ross River Dena Council agreed to create a Special Management Area designated as a Natural Environment Park over Frances Lake (Figure 1). The Special Management Core Area consists of 1500.94 km^2 that are to be withdrawn from disposition upon finalization of the Liard First Nation and Ross River Dena Council Final Agreements. Interim protection may be installed previous to finalization of the Final Agreements. The core area is surrounded by a 1710.8 km^2 study area of uncertain level of protection. As of December, 2001, the YTG Land Claims negotiator in charge of Liard First Nation is considering extinguishing the study area. It is unclear whether this means that only the core area will be considered for the SMA, or if the current study area will be incorporated into a larger core area.

A map notation of a proposed Territorial Park Reserve including both arms of Frances Lake, Mt. Hunt, Simpson Tower, and Lackie Lake was created in December, 1972. The map notation enclosed quartz claims over the Matt Berry deposit and several other quartz claim blocks that expired since. The claims owned by Barytex Resources over the Matt Berry deposit are the only active mineral claims in the area, as of December, 2001. Cominco's Fin property is adjacent to the northwest corner of the Study area.

Access Considerations

The SMA core area is bounded by the Robert Campbell Highway to the west, and the study area is bounded by the Nahanni Range Road to the south. The SMA also includes the Upper Canyon (105H-03-001) flooding notation, identified for future hydroelectric development.

FIELD WORK

Fieldwork towards a mineral resource assessment of Frances Lake SMA concentrated in areas of most significant mineral occurrences within and adjacent to the core and study areas: Matt Berry deposit, Simpson Tower, Maxi showing, Fluke skarn, and Anderson Creek skarn.

Geological work involved mapping at 1:10,000 (Matt Berry), 1:20,000 (Simpson Tower contact aureole), 1:50,000 (Anderson Creek and Maxi areas) scales, field checks at 1:250,000 scale (Nipple Mountain and Cenozoic Basalts), and collection of samples for geochemical analyses (ICP-MS, W-assay, research-grade trace elements); radiometric analyses (Pb-Pb and U-Pb); conodont dating; and petrographic analyses.

Regional Geology and mineralization of Frances Lake area

Frances Lake map sheet (105H) was mapped at 1:250,000 scale by Green and others (1966), and Blusson (1965). The maps are antiquated, and lack observations on the nature of geological contacts. Recent interpretations by Gordey and Makepeace (2000) (Figure 2) are based on Bluson's map, which has insufficient or faulty observations.

The Frances Lake SMA is located at the western edge of Selwyn Basin. Gordey (1992) defines Selwyn Basin as a topographic low that existed from late Precambrian through Middle Devonian time, bounded to the west by Pelly-Cassiar carbonate Platform, and to the east by Mackenzie Platform. More loosely, Selwyn Basin refers to the geographic area where siliciclastic and carbonate deposition took place under different tectonic environments. It includes Earn Group and Triassic syn-orogenic clastic sediments.

Throughout its existence, three main extensional events affected Selwyn Basin, producing down-dropped blocks and second order basins where black shale, chert, and black limestone commonly deposited. Late Proterozoic to Early Cambrian extension resulted in shedding of a thick (>2000 m) turbidite sequence (Yusezyu Formation) represented mainly by grits and limestone, but containing abundant shale beds. Cambro-Ordovician

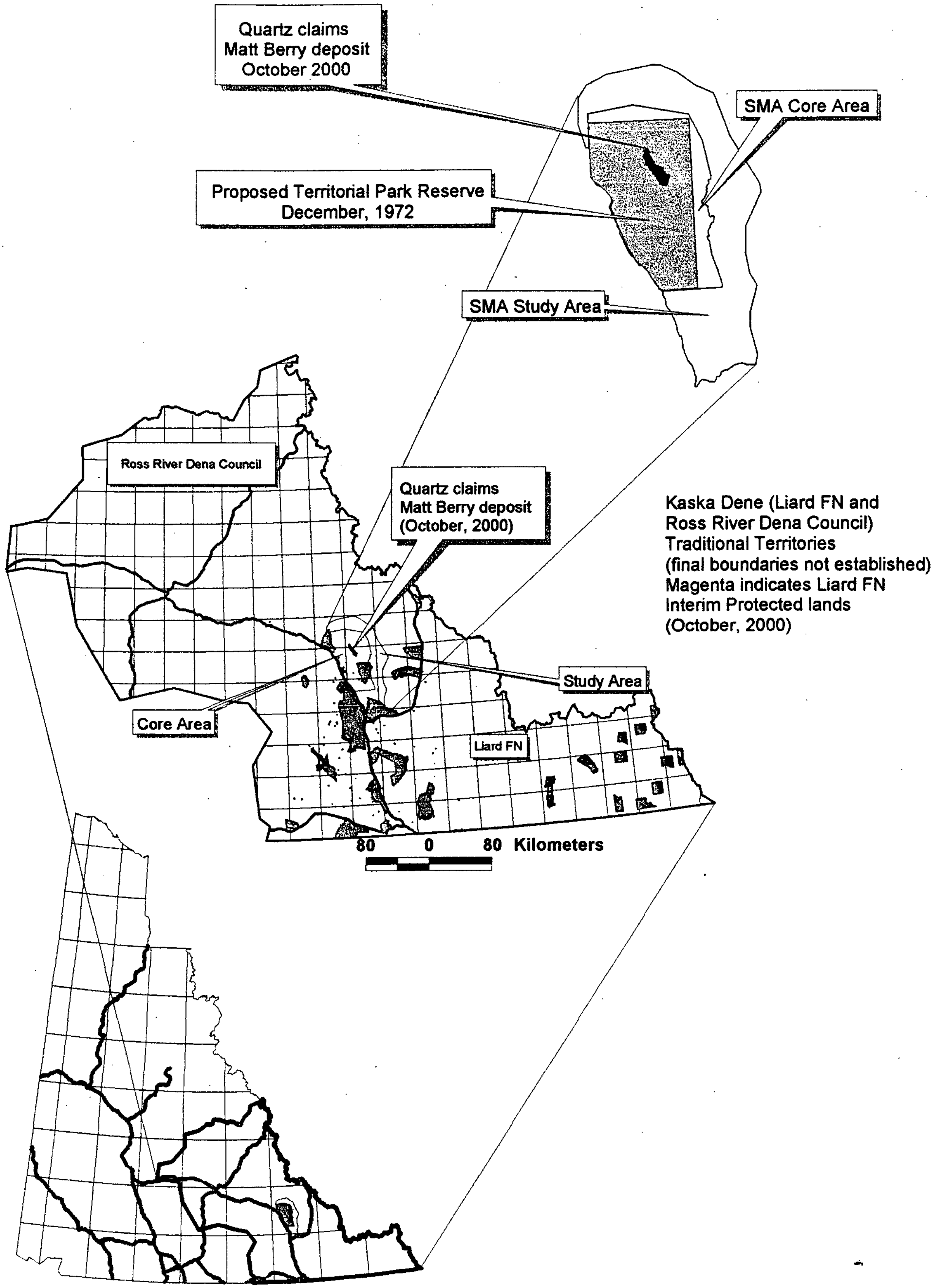


Figure 1. Location map showing Frances Lake SMA (Core and Study Areas and Kaska Dena Traditional Territories.
Insets show currently interim protected lands, active quartz claims, SMA Core and Study Areas, and map notation of a Proposed Territorial Park Reserve (December, 1972).

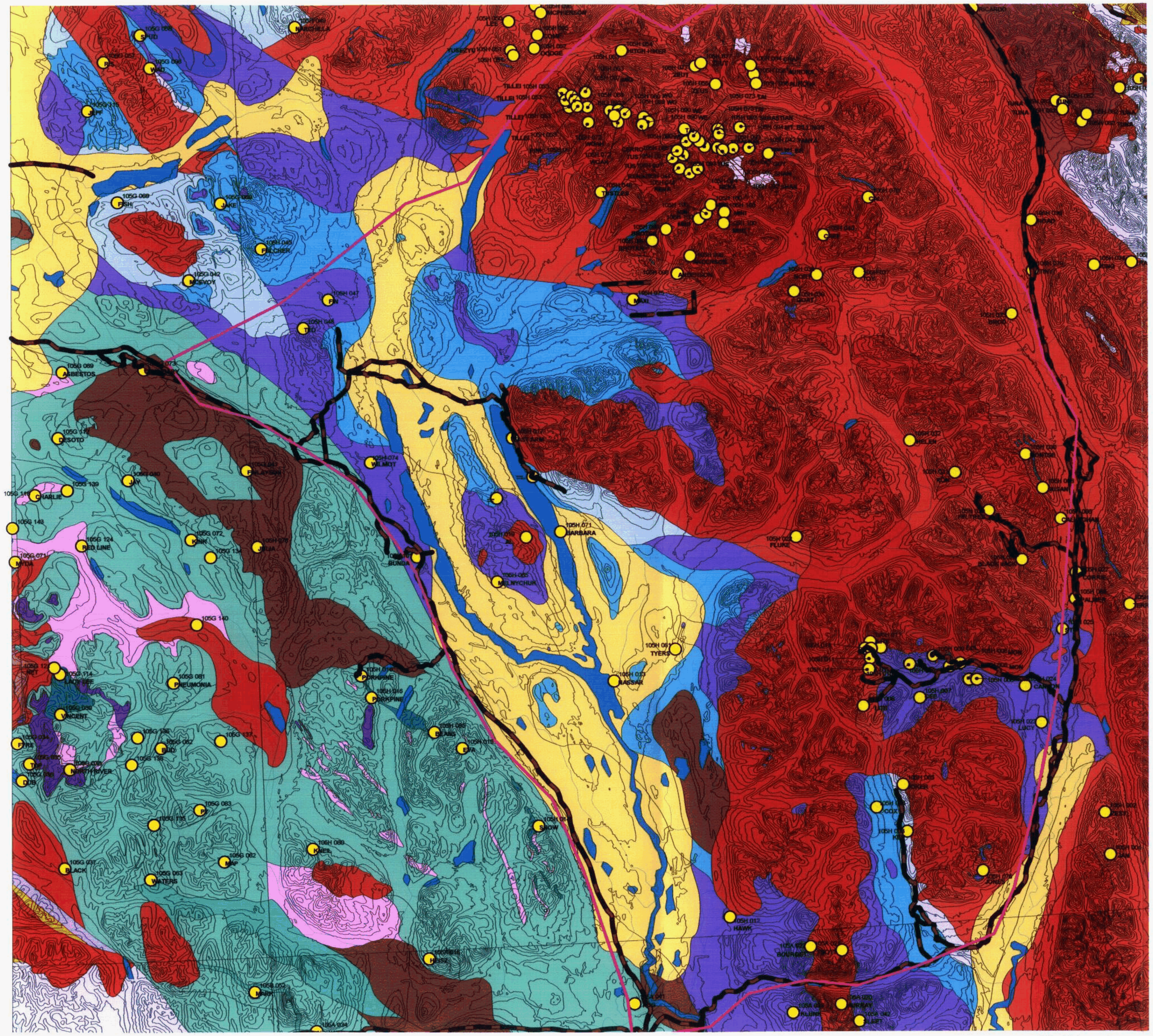


Figure 2. Geological Map of Frances Lake Area. Area of mineral assessment outlined in magenta.

0 30 Kilometers

QUATERNARY

Q — QUATERNARY: unconsolidated glacial, glaciofluvial and glaciolacustrine deposits; gluviatile silt, sand, and gravel, and local volcanic ash, in part with cover of soft and organic deposits

NORTH AMERICA

MAGMATIC ROCKS

MID-CRETACEOUS

mKS — SELWYN SUITE: plutonic suite of intermediate (g) to syenitic (y) compositions

mKC — CASSIAR SUITE: medium to coarse grained, equigranular to porphyritic rocks of largely felsic (q) composition; includes minor (?) amounts questionably of more intermediate composition (g)

MID-CRETACEOUS

ITR1 — SELWYN SUITE: plutonic suite of intermediate (g) to syenitic (y) compositions

EARN BASIN

DEVONIAN AND MISSISSIPPIAN

DME — EARN: complex assemblage of submarine fan and channel deposits (1), (5) within black siliceous shale and chert (2), (4) and including separated small occurrences of felsic volcanic rocks (3); barite common, and many occurrences of stratiform Pb-Zn

SELWYN BASIN

ORDOVICIAN TO LOWER DEVONIAN

ODR — ROAD RIVER: black shale and chert (1) overlain by orange siltstone (2) or buff platy limestone (3); locally contains beds as old as Middle Cambrian (4)

UPPER CAMBRIAN AND ORDOVICIAN

COR1 — RABBITKETTLE: basinal limestone (1) that may locally include older and younger basinal pelitic strata undivided (2)

LOWER CAMBRIAN

ICG1 — GULL LAKE: dominantly fine clastic assemblage (1) with local volcanic units (2)

UPPER PROTEROZOIC TO LOWER CAMBRIAN

PCH1, PCH2 — HYLAND: consists upwards of coarse turbiditic clastics (1), limestone (2) and fine clastics typified by maroon and green shale (3); may include younger units (4) includes scattered mafic volcanic rocks (5)

MACKENZIE PLATFORM

LOWER CAMBRIAN

ICS — SEKWI: limestone, locally wavy bedded an nodular; limestone conglomerate slope breccia; massive grey dolostone; medium- to thick-bedded quartz sandstone; purple siltstone; bright orange weathering, fine crystalline dolostone

UPPER PROTEROZOIC TO LOWER CAMBRIAN

uPCV — VAMPIRE: dark brown weathering, thin-bedded, argillaceous fine-grained sandstone and siltstone, minor interbedded medium- to coarse grained white to light grey orthoquartzite; phyllite, slate, and argillite

CASSIAR PLATFORM

SILURIAN TO MIDDLE DEVONIAN

SDM1 — MCEVOY: buff, platy siltstone (1) overlain by carbonate and quartzite (2)

MIDDLE SILURIAN TO MIDDLE DEVONIAN

SDA1 — ASKIN: platy dolomitic siltstone (1) overlain by dolostone and orthoquartzite (2) with rare volcanics (3)

UPPER CAMBRIAN AND LOWER ORDOVICIAN

CDS2 — ST. CYR: poorly understood, fine clastic and carbonate assemblage, (1) to (5), with only general similarities to equivalent strata elsewhere in Cassiar Mountains; overlain by strata typical of Earn, Tay and Jones Lake assemblages elsewhere

UPPER CAMBRIAN AND LOWER ORDOVICIAN

COK1 — KECHIKA: basinal fine grained calcareous pelitic strata (1) with locally intercalated mafic volcanics (2)

LOWER CAMBRIAN

ICR — ROSELLA: resistant, thick bedded to massive, limestone and argillaceous limestone; local archaeocyathid buildups, trilobite fragments, oolites, and pisolites; pisolitic massive dolomite and limestone; marble, calc-silicate, calcareous phylite and minor schist

UPPER PROTEROZOIC TO LOWER CAMBRIAN

PCI1, PCI2 — INGENIKA: consists upwards of coarse quartzose clastics overlain by fine clastics (1), a marble horizon (2), and fine clastic strata (3); laterally equivalent similar fine clastics (4) are mostly (?) correlative to the upper part of this succession

SLIDE MOUNTAIN TERRANE

CARBONIFEROUS TO PERMIAN

CPA1 — ANVIL: dominantly oceanic assemblage of mafic volcanics (1), ultramafics (4), chert and pelite (2), limestone (3) and gabbroic rocks (5)

YUKON-TANANA TERRANE

PROTEROZOIC AND PALEOZOIC

PPa2, PPa3 — AMPHIBOLITE: metamorphosed mafic rocks including amphibolite (1) and ultramafic rocks (2) of unknown association; i.e., may belong in part or entirely to Nisling, Nasina and Slide Mountain assemblages and (3), mafic-ultramafic intrusions within Nasina assemblage

LATE DEVONIAN TO MISSISSIPPIAN

DMgPE, DMqPE — PELLY GNEISS SUITE - NORTHEAST: variably deformed granitic rocks of predominantly felsic (q) to intermediate composition (g) northeast of Tintina Fault

DEVONIAN, MISSISSIPPIAN AND(?) OLDER

DMN1, DMN3 — NASINA: graphitic quartzite and muscovite quartz-rich schist (1), (3)-(5), and(?) (6) with interspersed marble (2) and probable correlative successions (7) - (9); eclogite occurrences (10)

LATE PROTEROZOIC AND PALEOZOIC

PPN3, PPa — NISLING: assemblage characterized by mica quartz feldspar schist (1) and abundant locally thick limestone members (2); (3) includes possibly equivalent strata northeast of Tintina Fault extension is well documented in the Anvil district, where sub-basins contain the Faro, Grum, Vangorda, and Swim deposits. A regional, sub-Rabbitkettle Formation unconformity suggests that extension was widespread. Ordovician-Silurian extension lead to SEDEX mineralization in the Howards Pass area (Anniv and XY deposits). In Frances Lake map sheet, Ordovician to Silurian extension produced the Maxi prospect.

In Middle Devonian time, the source of clastic sediments changed drastically from westerly- (continent) derived to northerly- and northwesterly- derived, possibly in response to Ellesmerian orogeny. Earn Group turbidites flooded Selwyn Basin, Pelly-Cassiar Platform, and western Mackenzie Platform. Extension of Selwyn Basin during deposition of Earn Group sediments gave rise to SEDEX deposits in the Mac Pass area (Tom and Jason), and to the Matt Berry deposit in Frances Lake map sheet.

Siluro-Devonian rocks in the Frances Lake area have a different, shallower-water character from Road River Group rocks throughout the rest of Selwyn Basin. Siluro-Devonian limestone, calcareous shale, and possibly quartz-arenite are interpreted (Gordey and Makepeace ,2000) as McEvoy Platform – a high-standing block to the west of Selwyn Basin, and are correlated with Askin Group of Cassiar Platform.

Mafic and felsic volcanism occurred in Selwyn Basin during the deposition of Earn Group turbidites. The Marg VMS deposit and adjacent areas constitute the best documented volcanic district in Selwyn Basin, and is hosted in a thin felsic volcanic unit within a thicker, mafic sequence. The volcanic rocks are overlain by Keno Hill Quartzite. The entire sequence is intensely deformed and metamorphosed in the Tombstone strain zone (hanging-wall of Tombstone Thrust). Frances Lake SMA contains a Devono-Mississippian volcanic belt that is described in this report.

Mesozoic deformation started in Permo-Triassic time, and ended before emplacement of mid-Cretaceous granitic batholiths and plutons. Two, and locally three phases of penetrative regional deformation affected Selwyn Basin rocks in the Frances Lake map sheet. In mid-Cretaceous time, Billings Batholith and smaller granitic plutons and stocks of Tay River plutonic suite intruded Selwyn Basin strata, and produced large contact metamorphic aureoles and local skarn and vein prospects.

Cenozoic strike-slip movement along Tintina Fault juxtaposed metamorphic rocks of Yukon-Tanana Terrane (Finlayson Lake district) to those of Selwyn Basin. Cenozoic magmatism produced basaltic rocks that crop out in the southern area of Frances Lake SMA.

Core Area – Geology and Mineralization

Matt Berry deposit

The Matt Berry deposit is an unusually copper-rich, small tonnage SEDEX deposit. Calculated reserves are 533,434 tonnes grading 6.1% Pb, 4.8% Zn, and 102.9 g/t Ag. No copper grades are quoted in the reserves.

Location and Access

The Matt Berry deposit is located on a promontory the northeastern shore of the East Arm Frances Lake. Access is by float plane from Finlayson Lake, or by boat (approximately 60 km) from the Frances Lake Campground. Remains of an old exploration camp are located on the Thompson Creek promontory, immediately northwest of the deposit.

Work History

Galena-sphalerite-rich float in the Thompson Creek area was first reported by Dawson (1887). The area was first staked in 1944. Between 1966 and 1969, Matt Berry Mines Limited carried out trenching, and EM surveys, and drilled 29 holes (2298 m). Between 1970 and 1971, the property was under option of Inco and Metallgesellschaft (now Inmet), which drilled 4 holes (426.7 m). In 1974, Anvil Mining Corporation conducted soil sampling and geophysical surveys (mag and gravity). In 1978 Welcome North Mines Limited conducted a pulse-EM survey. In 1979, Sovereign Metals Corporation in a joint venture with Cominco conducted trenching, geological mapping, geochemical surveys, and drilled 5 holes (1229 m). Sovereign changed name to Barytex Resources, which currently owns the claims. Pulse Resources optioned the property in 1986; and conducted magnetic and geochemical surveys and staked the Beth claims (1987); cut base-lines and staked the Binti claims (1988); conducted geological mapping, soil sampling, and geophysical surveys (1989); and drilled 4 holes (303 m, 1991). After Pulse Resources dropped the option, Barytex Resources Corporation cut 53 km of line (1993), and staked the Pat claims (1994), which lapsed since.

Geology and Mineralization

A trench exposes a 45 cm thick massive sulphide bed on the south shore of Thompson Creek (Plate 1). The sulphide bed consists of mainly galena, sphalerite and quartz, with local chalcopyrite and bornite. Mineralization thickens, and is open to the east, and is hosted in dark grey to black phyllite to carbonaceous phyllite of Earn Group. Sulphide-bearing quartz veins up to 1 m thick cross-cut carbonaceous phillites to the south of the deposit, along the eastern shore of Frances Lake.

An examination of drill core from Pulse Resources' 1991 exploration program revealed the existence of a previously unreported quartz-sericite-augen schist unit (Plate 2). Abundant angular quartz grains (Plate 3) and quartz and sericite replacing elongate feldspar crystals (Plate 4) suggest that the protolith was a quartz and feldspar bearing felsic volcanic rock. SW-NE-oriented cross-sections show the felsic volcanic unit consistently underlying the mineralization (Figure 3). Trace element geochemical plots of the felsic volcanic unit suggest a within-plate, setting for their emplacement (Figure 4).

Two Pb-Pb analyses of galena from the Matt Berry deposit were used to constrain the "Shale Curve" of Godwin and Sinclair (1982) and yielded a Devonian age, suggesting that the mineralization is hosted in Earn Group. A U-Pb analysis from the felsic volcanic unit in drill core yielded an Ordovician age (~481 Ma, J. Mortensen, pers. comm.). Matt Berry constitutes the only record of Road River age volcanism in Selwyn Basin.

Structural Geology

Easterly to east-northeasterly-directed thrusting brings the mineralized sequence closer to surface towards the east (Figure 3). The variable thickness of low-grade to barren phyllite between the quartz-eye felsic volcanic unit and the mineralization is interpreted as the result of folding along an approximately EW-axis. This interpretation implies repetition of the mineralization at greater depth, and is in line with structural observations recorded in the Matt Berry showing area.

Three foliations are observed in outcrop (Plate 5), suggesting that three phases of deformation affected the deposit. The earliest phase of deformation produced a moderately developed penetrative foliation (S_1) that is folded along NS-trending axes, crenulated, and kink-folded. The second phase of deformation produced NS-trending folds that affect the first phase foliation and bedding, and a very well developed penetrative foliation (S_2) that is crenulated. The third phase of deformation produced folding of S_0, S_1, and S_2 along NW-trending axes, ENE-directed thrusting, and a poorly developed spaced cleavage.

Ore Petrography

A reflected light petrographic survey of ore from the Matt Berry showing demonstrated the copper-rich nature of the deposit. Locally, chalcopyrite makes up to 2% of the rock volume (Plate 6). Typical paragenesis in the showing is: quartz → sphalerite → quartz,chalcopyrite, pyrite → galena → covelite, marcassite, quartz, sericite. Chalcopyrite also occurs as exholutions in sphalerite. Principal gangue minerals are quartz, carbonate, and sericite. Volcanic textures were also observed in the contacts of ore and host rock (Plate 7).

Findings and Deposit Model

The previously unreported felsic volcanic unit that underlie the Matt Berry deposit may represent a new metallogenic district in western Selwyn Basin. The proximity to this volcanic unit, unusually high copper grades, and small tonnage suggests that Matt Berry represents a hybrid deposit type that has characteristics of SEDEX- and VMS-type mineralization. The Wolverine deposit in Yukon-Tanana Terrane is another hybrid SEDEX-VMS deposit (S. Piercey, pers. comm.). The volcanic unit underlying the Matt Berry deposit extends northwesterly for at least 30 km, and is exposed in Cominco's Quest and Fin SEDEX prospects (D. Rhodes, pers. comm). Proposed Pb-Pb analyses of galena in the ore and of pyrite in the volcanic unit will show conclusively whether or not there is a

Plate 1. Matt Berry showing. Galena-sphalerite-chalcopyrite mineralization exposed in a trench.

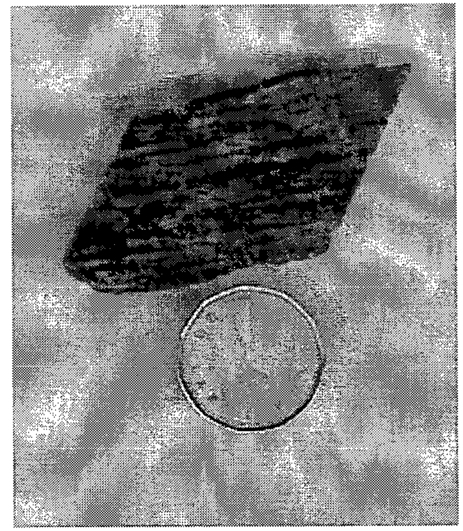


Plate 2. Strongly deformed, quartz-sericite-augen schist.

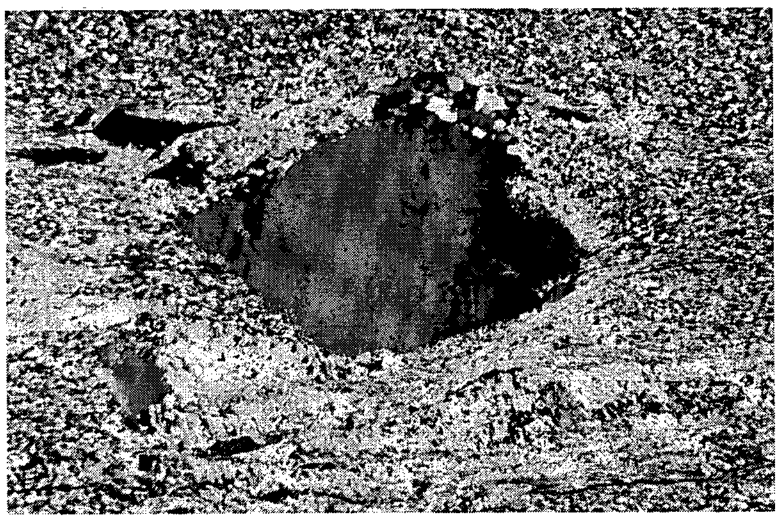


Plate 3. Angular quartz forming eye in felsic metavolcanic rock. Field of view = 7.2 mm.

Plate 4. Quartz and sericite replacing elongated feldspar grains in felsic metavolcanic unit. Field of view = 7.2 mm.

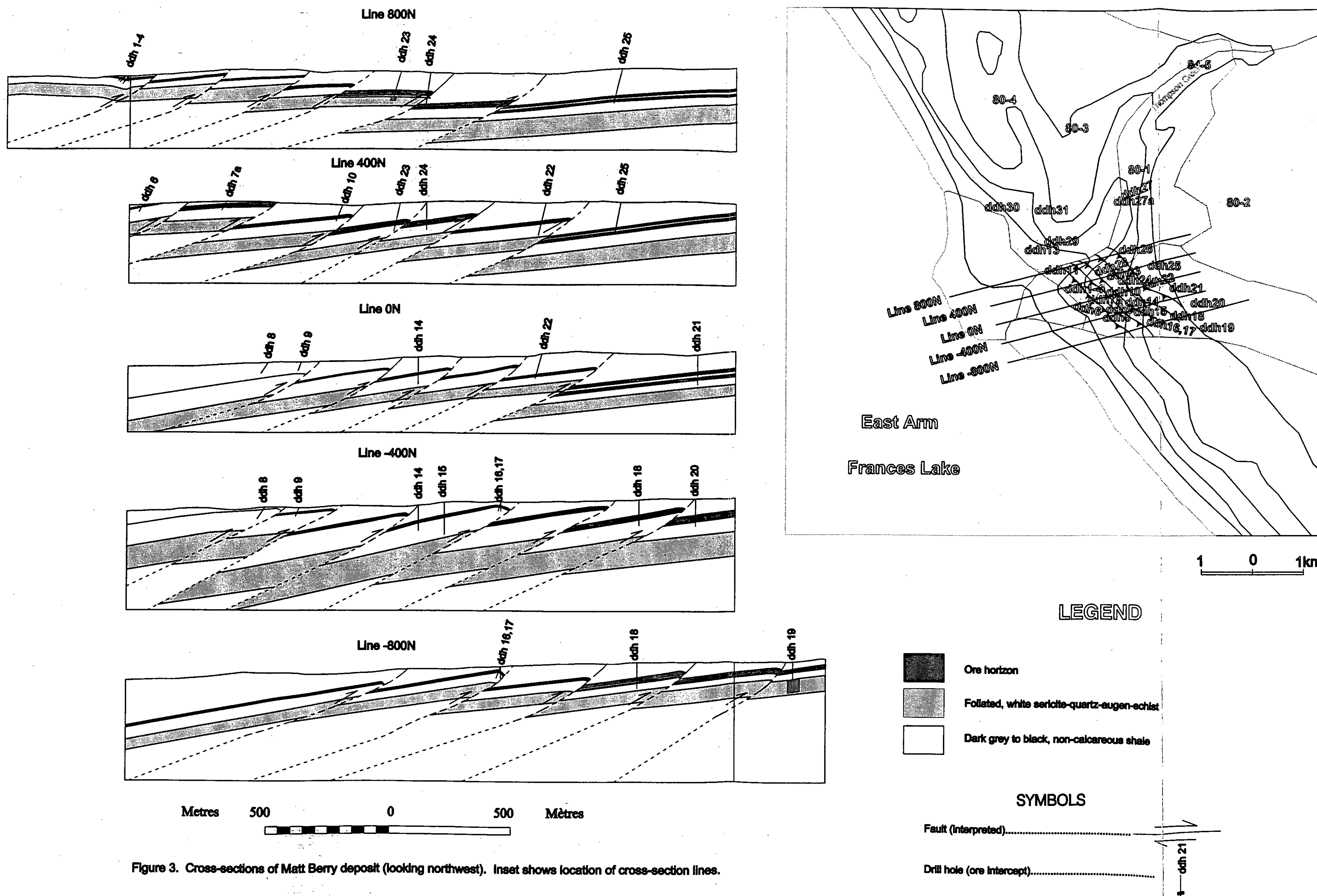


Figure 3. Cross-sections of Matt Berry deposit (looking northwest). Inset shows location of cross-section lines.

Plate 5. Outcrop along East Arm Frances Lake shore, south of Matt Berry deposit. Second phase foliation is a folded and steeply dipping widely spaced cleavage. Third phase foliation is sub-horizontal, and sub-parallel to bedding. Field of view = approximately 15 metres.

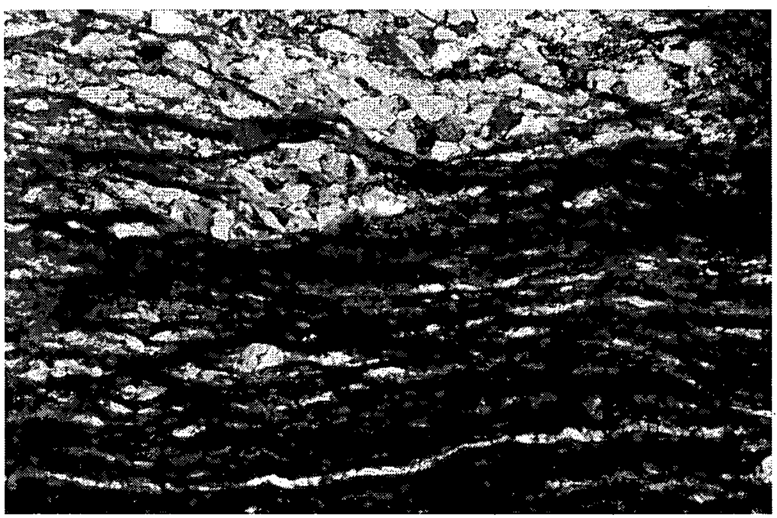


Plate 7. Angular quartz along the contacts of the Matt Berry ore zone.

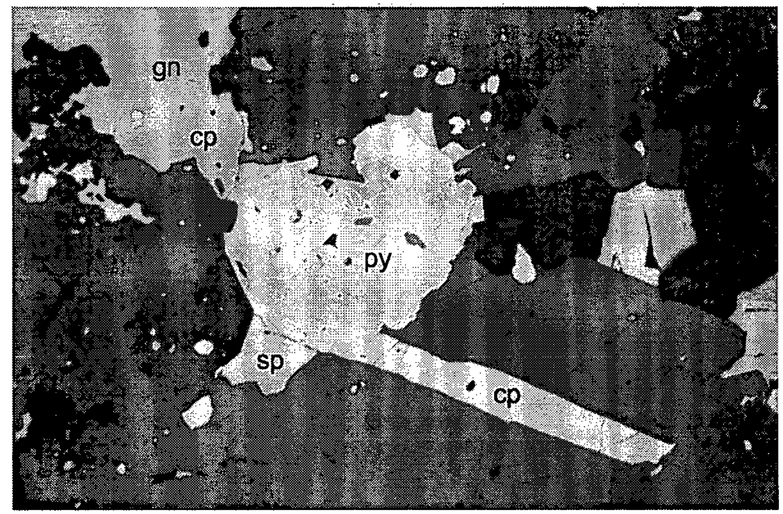


Plate 6. Large chalcopyrite crystal interstitial to pyrite, carbonate, quartz, and sphalerite. Field of view = 1.75 mm.

genetic relation between volcanism and SEDEX mineralization.

Simpson Tower

Recessive, medium grey limestone, shale, and calcareous shale correlated with McEvoy Platform form sparse outcrops in the densely vegetated low elevations of Simpson Tower (Plate 8). The contact between McEvoy crinoidal limestones and overlying dark grey chert-pebble-conglomerate is exposed at Maple Creek. Siliciclastic rocks forming the most extensive outcrops above tree-line show intense hornfels and calc-silicate alteration, and are folded along axes with seemingly random orientations and shallow plunge (Plate 9). Fold hinges are defined by segregation of quartzose, calc-silicate, and biotite layers. Folds are interpreted as resulting from the intrusion of a large magmatic body at depth. Two granite stocks are exposed in the central portion of Simpson Tower. Local sulphide mineralization (e.g., May occurrence MINFILE # 105H 019) includes py, po, and cp in intensely oxidized, calc-silicate altered rocks (Plate 10). Rare calcite-quartz veins reach up to 70 cm width, and are cross-cut by chalcedony stringers. Figure 5 is a geological map of the Simpson Tower area. Several samples of vein, hornfels, and skarn were collected for ICP analyses (Appendix II).

Nipple Mountain

A thick, intensely jointed, coarsely laminated, white, massive subangular to subrounded quartz-arenite forms a resistant cliff at the centre of Nipple Mountain. The outcrop area forms an anticline along a roughly NS-trending axis. To the south, quartz-arenite is overlain by recessive, medium grey limestone. The stratigraphic position of the quartz-arenite with respect to dark phylites (probably Earn Group) hosting the Matt Berry deposit is uncertain. The current interpretation (Gordey, 2000) is that rocks of Nipple Mountain are part of McEvoy Platform, and unconformably underlie Earn Group. Alternatively, if the arenite sits stratigraphically above Earn Group rocks, it may represent equivalent lithology to the Keno Hill Quartzite. Proposed conodont dating of limestone overlying the quartz-arenite could resolve this problem.

Cenozoic Basalts

Outcrops of mafic rocks in the southeastern part of the SMA core and study areas were interpreted by Gordey (2000) as a klippe of Slide Mountain Terrane. Field and petrographic observations show that the rocks are undeformed, autochtonous basalt to gabbro, likely of Cenozoic age. Similar rocks are exposed along the Robert Campbell Highway, by the Tuchitua Road Camp.

Study Area – Geology and Mineralization

Maxi *sedex prospect*

LOCATION AND ACCESS

Maxi showing is located on a tributary of Anderson Creek, approximately 2.5 km southeast of a lake where Utah Mines' exploration camp and core rack still stand. Access to the old Maxi camp is by float plane or helicopter to Maxi Lake. The showing is in a densely vegetated area, where helicopter access may be difficult. Figure 6 is a geological map of Maxi and Anderson Creek prospects. Field work in 2001 concentrated in verifying and following-up on mapping done by Utah Mines Ltd. in the 1970s.

WORK HISTORY

Maxi and Midi claims were staked in 1977 by Welcome North Mining Limited. Welcome North performed geological mapping at 1:10,000 scale, geochemical sampling, geophysical surveys (magnetics and EM), and trenching. Later in 1977, Vestor Exploration Limited and Pacific Cassiar Exploration Limited staked claim blocks surrounding the original Maxi claims. Between 1978 and 1979 Utah Mines Ltd. drilled a total of 2147 m in 15 diamond drill holes, and conducted geological mapping, geochemical and geophysical (magnetics, IP, and EM) surveys, and trenching. Utah Mines dropped the option in 1980. Currently there are no active claims in the area.

GEOLOGY AND MINERALIZATION

Exhalative pyrite, pyrrhotite, sphalerite and minor galena mineralization occurs along a steep creek canyon in interbedded black shale and black limestone (Plate 11). Rocks in the canyon dip steeply to the north. Pellitic rocks

Plate 8. Simpson Tower (looking west from Matt Berry deposit). Vegetated, lower areas have sparse outcrops of McEvoy platform silty limestone; higher elevations have well exposed shale, sandstone, limestone, and chert-pebble conglomerate of Earn Group.

Plate 9. Strongly oxidized, calc-silicate altered outcrop in Simpson Tower.

Plate 10. Ductile folds in calc-silicate altered quartz-arenite (Simpson Tower).

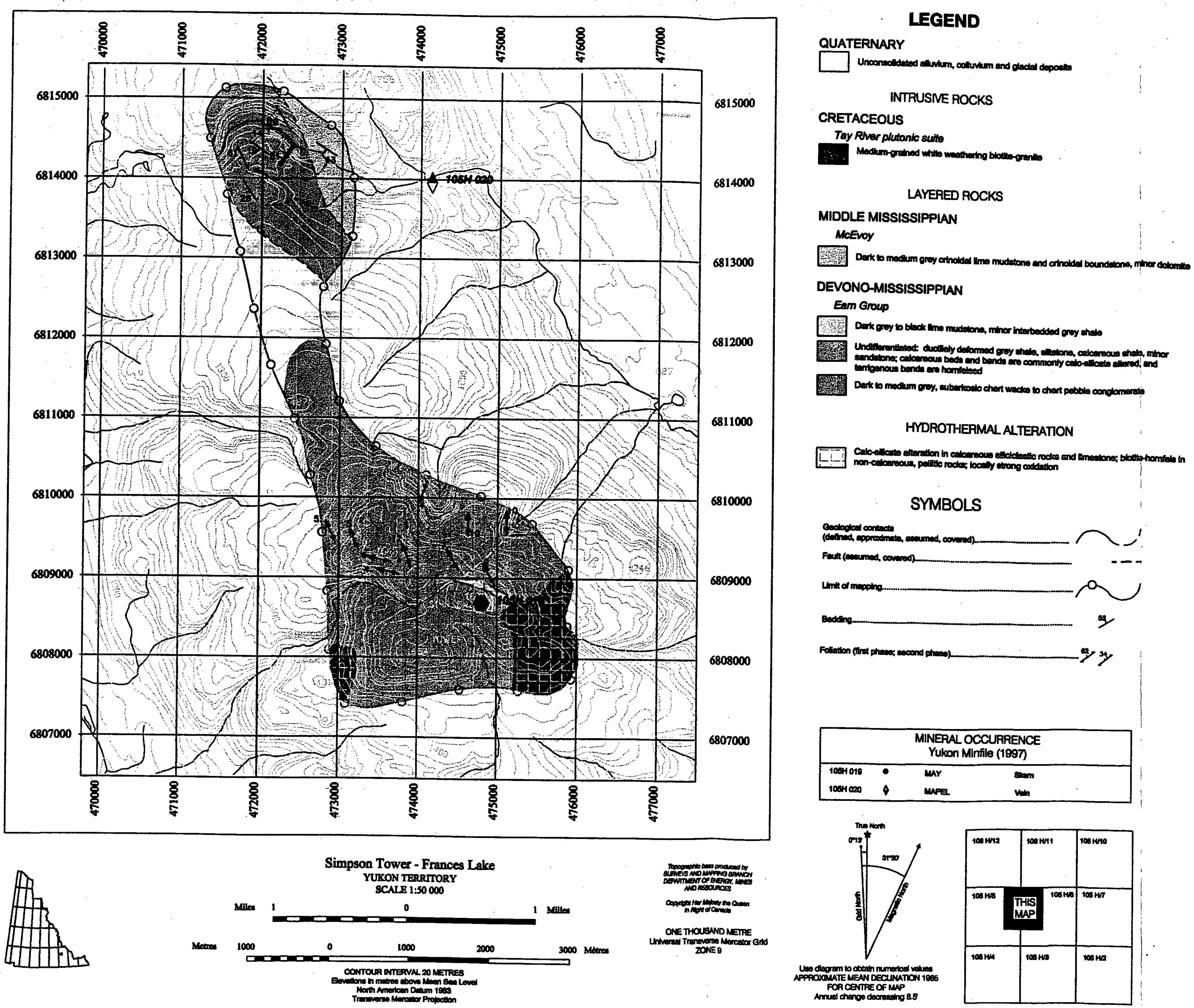


Figure 5. Geological map of Simpson Tower. 1:50 000 scale.

have a very developed phyllitic cleavage that is sub-parallel to bedding, and axial planar to second phase intrafolial folds. Foliaform pyrite and chalcopyrite is common in quartz-rich domains within black shales, and less common in gray shales and limestone. Quartz-carbonate veins contain pyrite, pyrrhotite, sphalerite, and galena. The sedimentary rocks are underlain by a fine- to medium-grained granitic intrusion, which is likely part of the Mt. Billings Batholith. Two Pb-Pb analyses of galena from the Maxi prospect were used to constrain the "Shale Curve" of Godwin and Sinclair (1982) and yielded a Silurian age. The Pb-Pb age is consistent with detailed mapping by Utah Mines which indicates that the host rock to Maxi prospect is equivalent to Gordey's (1993) Steele Formation.

An initial examination of the core drilled by Utah Mines, and stored in the old exploration camp (Plate 12) showed that core logging and sampling were inappropriate. Many mineralized intervals remain unsampled in the core boxes. Diamond drill hole XC-6 alone contains over 50 m of finely disseminated sulphide and carbonate. Four rush ICP analyses of core samples from Maxi prospect yielded Zn values between 0.03 and 0.11%.

FINDINGS

The Maxi prospect is the most significant mineral occurrence in the study area. Wide intervals of unsampled, mineralized core in the old camp suggests that the prospect has not been properly tested. Maps of the 1979 drill hole collars were not filed for assessment, and Utah Mines no longer has that data. Further research and analyses of core samples are required in order to reconstitute the geometry and extent of the mineralization.

Fluke skarn prospect

Blue-gray weathering, recrystallized limestone beds up to 15 m thick have skarn alteration adjacent to light tan weathering, coarse-grained dikes of granitic composition (Plates 13, 14). Macroscopic and microscopic alteration minerals include garnet, diopside, magnetite, pyrite, pyrrhotite, and minor sphalerite. Limestone constitutes a minor lithology within a thick sequence of strongly hornfelsed, predominantly medium- to dark-gray shales and siltstones. The siliciclastic rocks have a well developed, SW-dipping second phase foliation that is generally sub-parallel to bedding, and a poorly developed, folded first phase foliation. Gordey and Makepeace (2000) interpreted the pelitic rocks as Yusezyu Formation (Hyland Group). Alternatively, these rocks may be strongly altered Earn Group. Figure 7 is a geological map of the Fluke prospect.

Mineral showings adjacent to the study area

Anderson Creek Skarn

Garnet, diopside, wollastonite, and minor scheelite form brown, white, and green bands within 2-5 m of monzonitic dikes and stocks. A series of fine- to medium-grained dikes cross-cuts and metamorphoses the sedimentary rocks. Skarn is developed in a thick, purple-gray weathering, silty-banded limestone that resembles Rabbitkettle Formation (Plate 15), and is underlain (not clear if structurally or stratigraphically) by strongly hornfelsed siliciclastic rocks. The sequence dips steeply to the southwest, and is folded isoclinally (Plate 16) along northeast-trending axes. Fold vergence is to NW. A southwesterly- to westerly-dipping foliation is poorly developed as a phyllitic cleavage in narrow pellitic bands, and as spaced cleavage in limestone and siliciclastic hornfels. Sulphides are restricted to narrow, rusty, silicified zones up to 25 cm wide. Sulphide-rich zones cross-cut bedding, and were only been observed within 1 m of dikes or intrusive margins. Small enclaves of siliciclastic rock in the intrusion are pervasively altered to a gneissic composition, but retain original bedding and foliation orientation.

Detailed mineral assessment

A detailed mineral assessment workshop took place in Whitehorse, in November, 2001. Figure 8 shows the resulting mineral potential map of Frances Lake area. Four mineral exploration geologists considered to have the largest experience and knowledge of the area and its mineral deposit types were invited to participate as expert mineral potential estimators. The experts were shown a MINFILE map with the 1972 Proposed Frances LakeTerritorial Park notation, and told that the mineral assessment was being carried out because of the existence

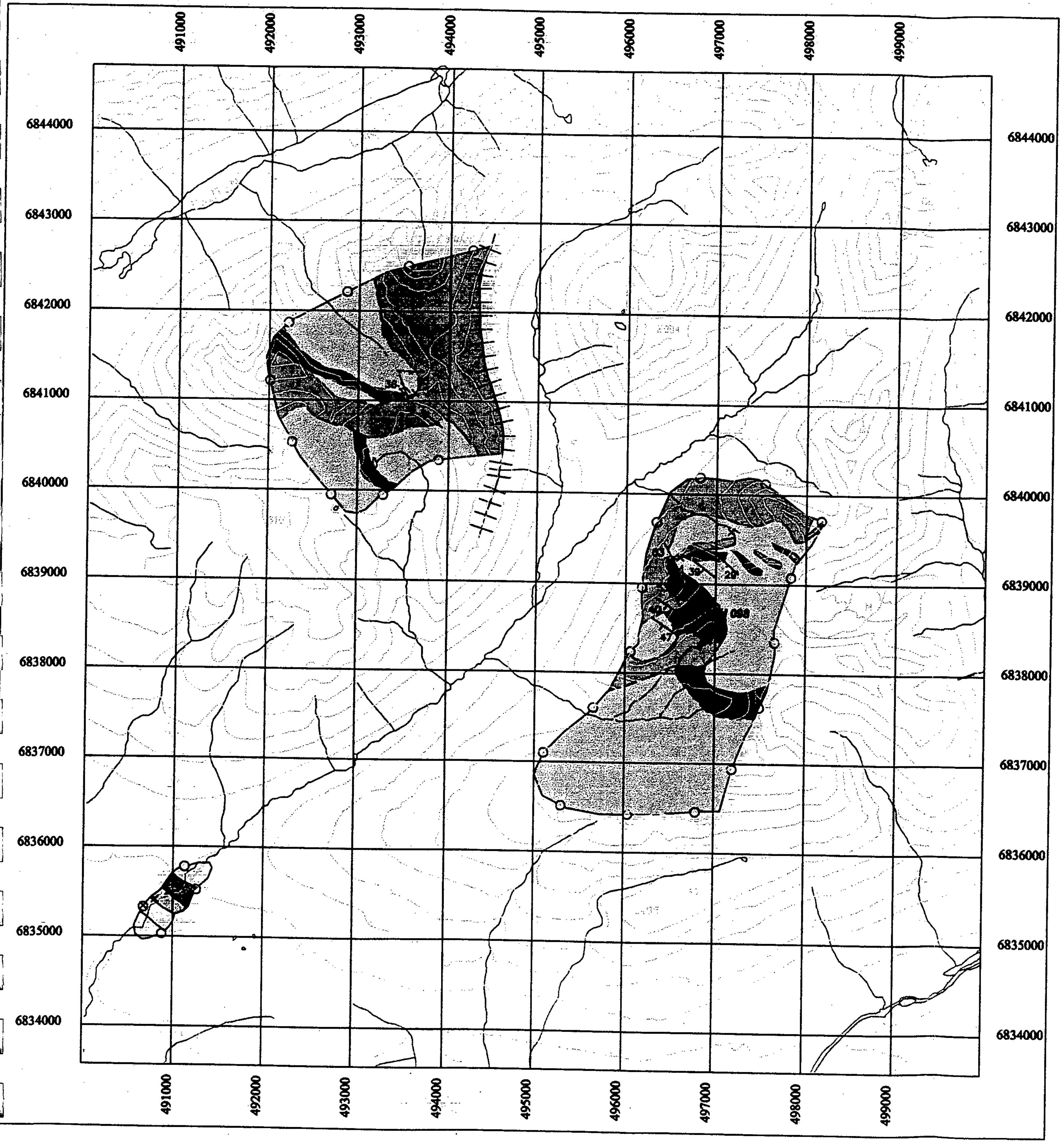


Figure 6. Geological map of Anderson Creek and Maxi prospects. 1:50 000 scale.

LEGEND

INTRUSIVE ROCKS

CRETACEOUS

Tay River plutonic suite

- Medium-grained biotite-quartz-monzonite and biotite-granite (batholith and dikes)

LAYERED ROCKS

DEVONO-MISSISSIPPIAN

Road River Group

- Dark to medium grey shale, minor finely banded grey silty lime mudstone and calcareous shale
- Medium to dark grey, finely bedded lime mudstone
- Finely interbedded medium to dark grey shale, and dark grey to black lime mudstone

LATE PROTEROZOIC TO EARLY CAMBRIAN

Hyland Gp (?)

- Medium grey-brown shale, siltstone, minor fine-grained subarkose wacke
- Grey weathering white limestone

SYMBOLS

Geological contacts (defined, approximate, assumed, covered)

Fault (assumed, covered)

Limit of mapping

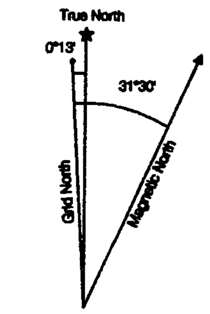
Bedding 52

Foliation (first phase; second phase) 82 34

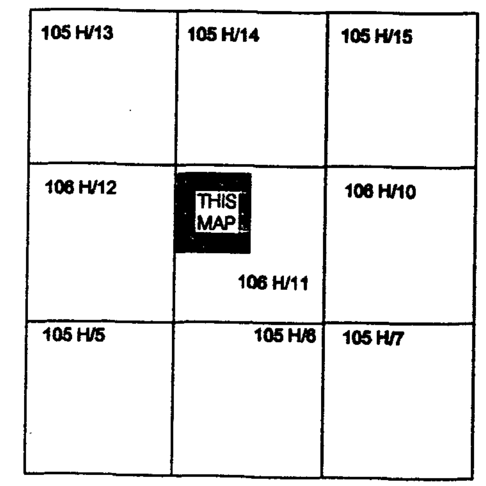
MINERAL OCCURRENCE Yukon Minfile (1997)			
105H 098	◐	ANDERSON	skarn

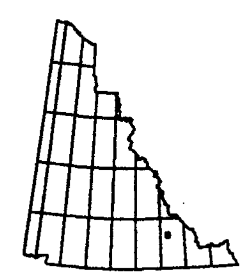
Topographic base produced by SURVEYS AND MAPPING BRANCH DEPARTMENT OF ENERGY, MINES AND RESOURCES

ONE THOUSAND METRE
Universal Transverse Mercator Grid
ZONE 9



Use diagram to obtain numerical values
APPROXIMATE MEAN DECLINATION 1985
FOR CENTRE OF MAP
Annual change decreasing 8.5'

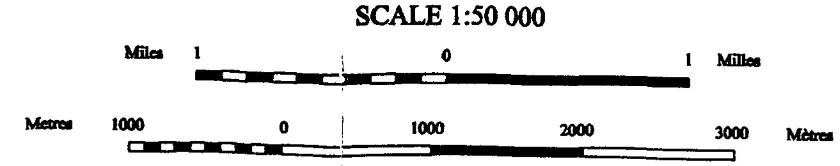




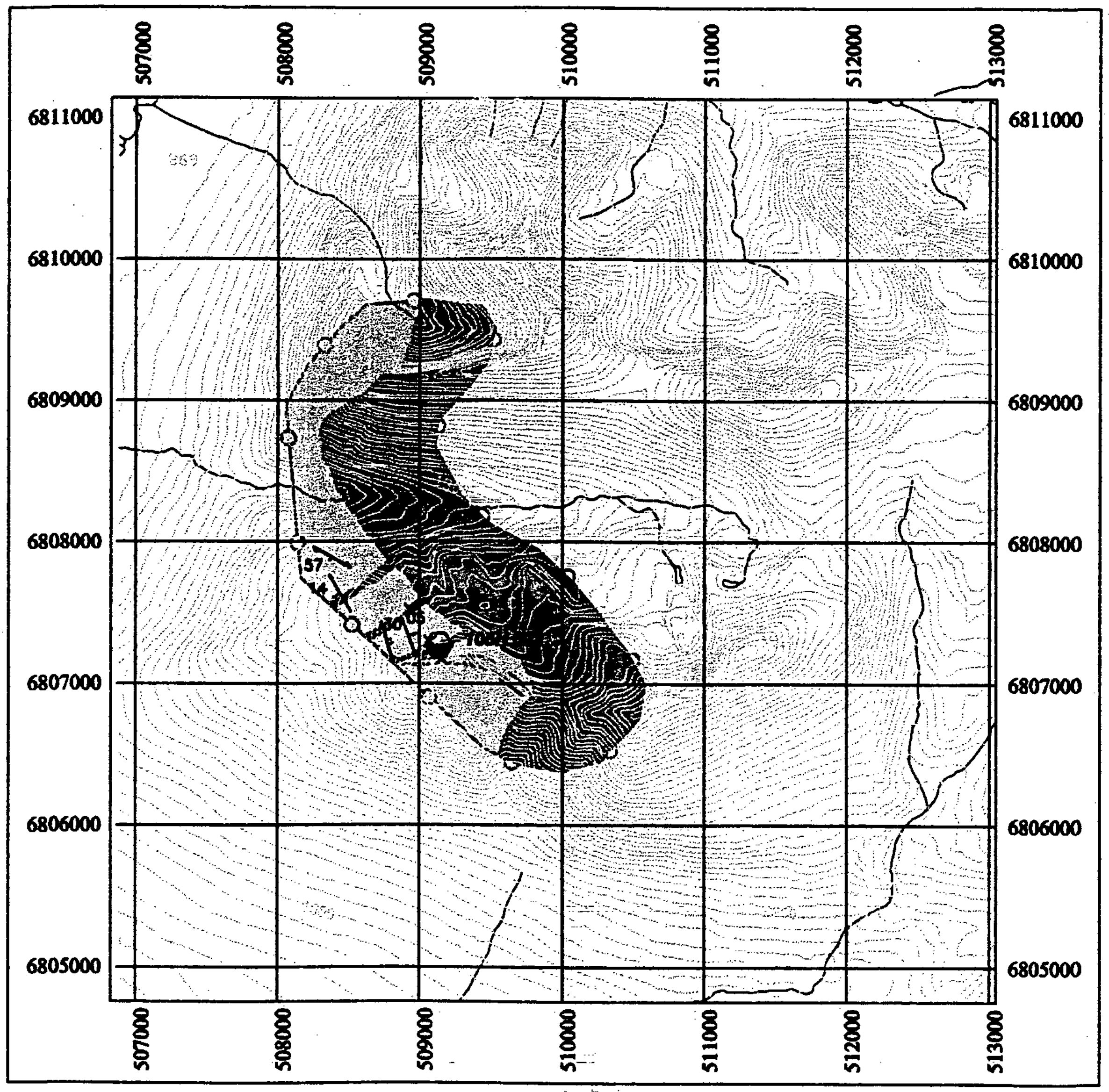
Anderson Creek and Maxi Prospects - Frances Lake

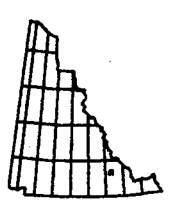
YUKON TERRITORY

SCALE 1:50 000



CONTOUR INTERVAL 20 METRES
Elevations in metres above Mean Sea Level
North American Datum 1983
Transverse Mercator Projection





Fluke Skarn - Frances Lake
YUKON TERRITORY
SCALE 1:50 000

Miles 1 0 1 Miles

Metres 1000 0 1000 2000 3000 Mètres

CONTOUR INTERVAL 20 METRES
Elevations in metres above Mean Sea Level
North American Datum 1983
Transverse Mercator Projection

Topographic base produced by SURVEYS AND MAPPING BRANCH DEPARTMENT OF ENERGY, MINES AND RESOURCES

ONE THOUSAND METRE
Universal Transverse Mercator Grid
ZONE 9

LEGEND

INTRUSIVE ROCKS

CRETACEOUS

Tay River plutonic suite

Medium- to coarse-grained, white-weathering biotite-granite (dikes and batholith)

LAYERED ROCKS

LATE PROTEROZOIC TO EARLY CAMBRIAN

Hyland Group (?)

Medium grey-brown shale, calcareous shale, minor limestone. Contact metamorphism is moderate to strong.

White-weathering, micritic limestone, locally skarn altered

HYDROTHERMAL ALTERATION

Skarn alteration in limestone; biotite-hornfels in siliciclastic rocks; intense oxidation

SYMBOLS

Geological contacts (defined, approximate, assumed, covered)

Fault (assumed, covered)

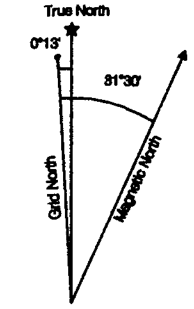
Limit of mapping

Bedding

Foliation (first phase; second phase)

MINERAL OCCURRENCE Yukon Minfile (1997)			
105H 022		FLUKE	skarn

105 H/12	105 H/11	105 H/10
105 H/5	105 H/6	105 H/7 THIS MAP
105 H/4	105 H/3	105 H/2



Use diagram to obtain numerical values
APPROXIMATE MEAN DECLINATION 1985
FOR CENTRE OF MAP
Annual change decreasing 8.5'

Figure 7. Geological map of Fluke showing. 1:50 000 scale.

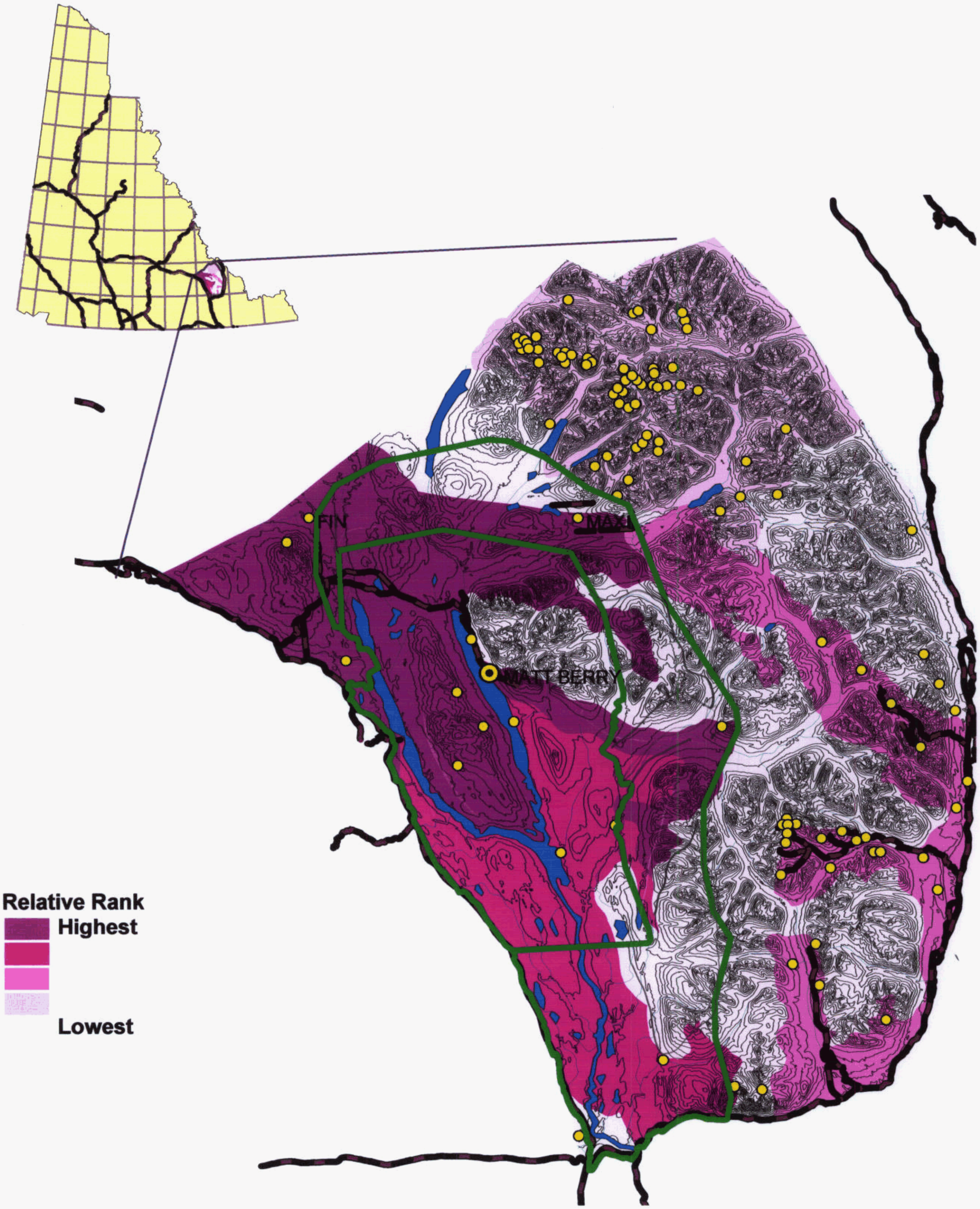


Figure 8. Detailed mineral potential map of Frances Lake area, displaying the outlined of the proposed Frances Lake SMA Core and Study areas. 1:750,000 scale

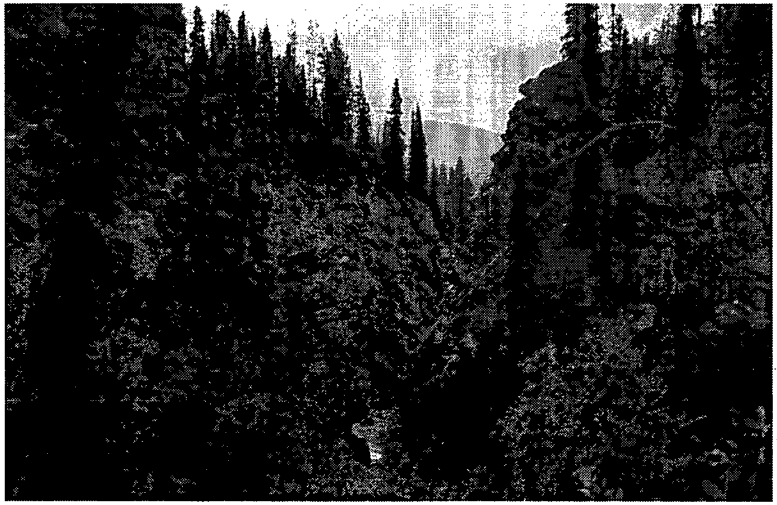


Plate 11. Steep Canyon along a tributary of Anderson Creek, where the Maxi prospect is located.

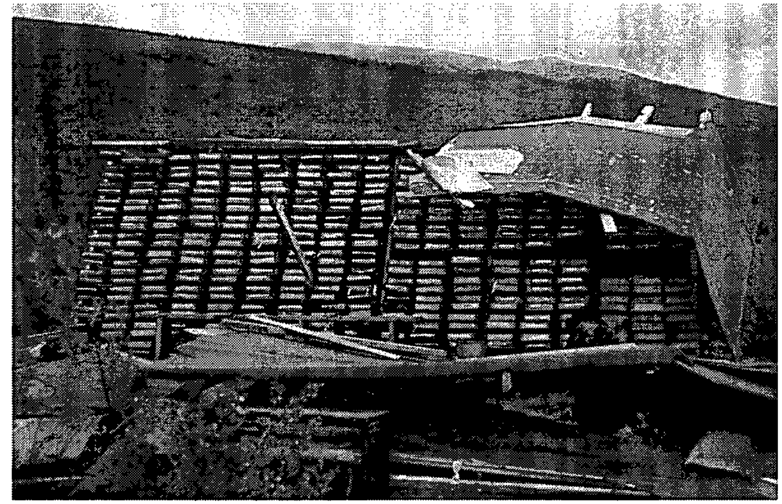


Plate 12. Collapsed core rack at the old Utah Mines' Maxi camp.

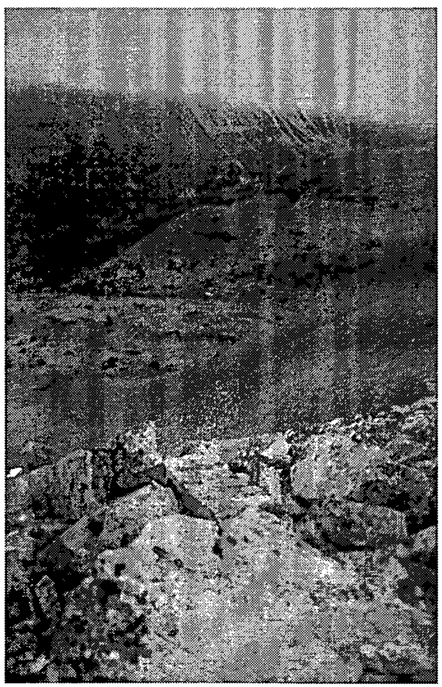


Plate 13. Granitic dike (white) causes skarn alteration in the Fluke Prospect. Looking northeast.

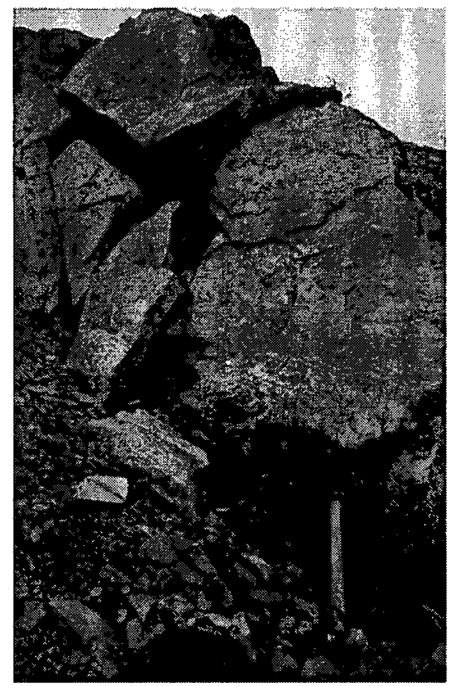


Plate 14. Intense oxidation and garnet-skarn alteration in white weathering limestone, near dike contacts (Fluke prospect).

Plate 15. Silty-banded limestone, resembling Rabbitkettle Formation.

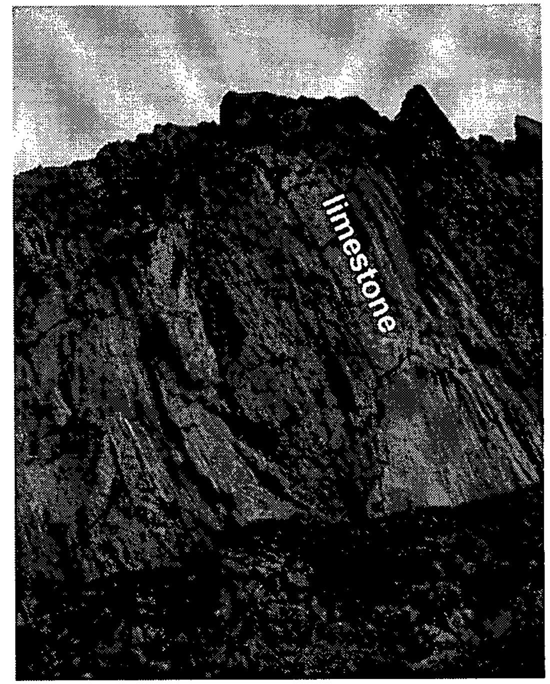


Plate 16. Tightly folded sedimentary sequence, looking southeast. Field of view approx. 50 m.

of a map notation in an ecoregion unrepresented by YPAS Goal 1 areas. They were not shown outlines of current park proposals, and are not aware of the SMA process.

Methodology

An area extending far beyond the northern and eastern limits of the study area was divided into 22 tracts, each representing a package of rocks that is either fault-bounded, or constitutes a unique domain with respect to lithological, geochemical, or geophysical characteristics. Paul Macrobbie and Bruce Mawer (from Cominco Ltd., now Teck-Cominco), Tony Hitchins (former Canada Amax geologist), and Greg Holland (former BHP-Utah Mines Ltd. geologist) participated as expert mineral potential estimators. The assessment workshop lasted three days. After examining and discussing all the geoscinetific information available for each tract, the panilists decided upon a list of deposit models pertinent to the tract, and filled in evaluation forms for likelihood of new discoveries of the median tonnage for each deposit type in the tract. The forms were utilized to maintain focus on mineral deposit models and explorability of the tract, and reduce personal biases. No statistical simulation was performed using the evaluation forms. At the end of the third day, the panelists ranked the tracts relative to each other unanimously, from highest to lowest mineral potential.

Limitations

Mineral potential maps portray the best estimation at the time of the assessment. Since we are assessing a hidden resource, it is important to realize that the geological knowledge base is in a constant state of growth, and mineral deposits may one day be found in rocks that we once thought to have lower potential.

Results and conclusions

The mineral potential map displays the relative mineral potential within the SMA. The mineral potential of the highest-ranking tracts is due to the presence of the Matt Berry deposit (open to the east), and the existence of drilled sedex prospects in three stratigraphic units: Road River Group – Duo Lake Formation (Matt Berry deposit); Steele Formation (Maxi Prospect); and Earn Group (Fin Prospect). The southeastern portion of the assessment area contains a large number of drilled sedex prospects that resulted in high potential evaluations. The western and southeastern portions of the assessed area have the highest mineral potential, are easily accessible, and if excluded from the proposed SMA may attract further exploration efforts. A northern area that contains numerous Mo- and W-skarn showings was considered a lower potential area, given the thorough level of exploration that those showings are perceived to have received, and the limited thickness of limestone units. The experts concluded that detailed mapping of intrusive phases should be carried out by YTG geologists if the area with the skarn showings is to be considered for protection.

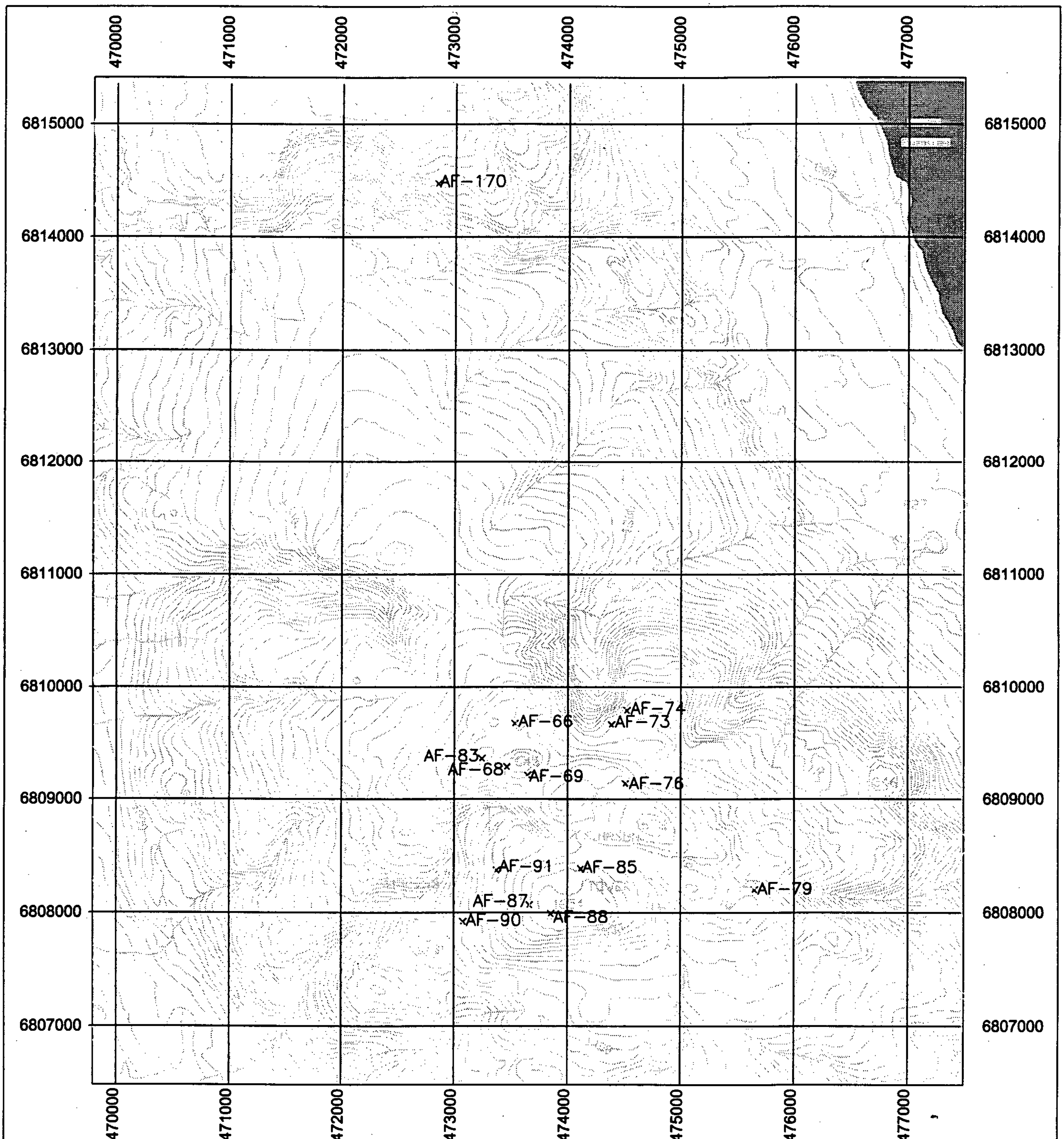
Recommendations

The expert panelists formulated the following recommendations:

- Tracts in the two highest mineral potential categories be excluded from any protected area proposals;
- Road-based field work be carried out to follow-up on a multi-element geochemical anomaly in the western-most part of the assessment area (immediately east of Robert Campbel Highway and south of Simpson Tower);
- Helicopter-supported field work be carried out in the northern portion of the assessment area, to map in detail possible different intrusive phases, and to document the thickness, character, and abundance of limestone units;

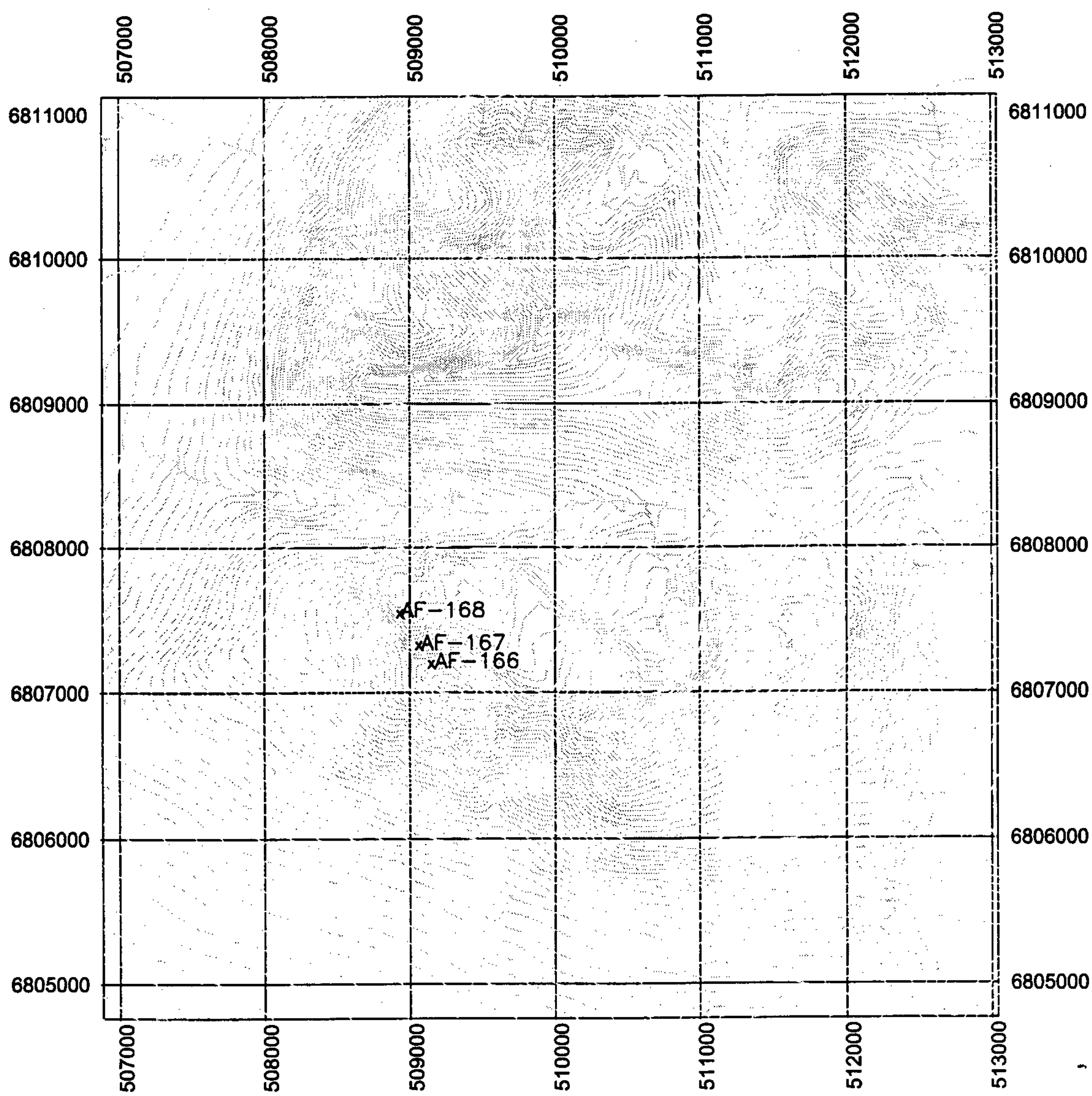
Acknowledgements

Steve Piercey, Daniele Heon, Gary Stronghill and Scott Heffernan volunteered to assist in the fieldwork. Cominco geologists Bruce Mawer, Dereck Rhodes, and Paul MacRobbie provided maps and expert advice on the geology and mineralization in the Frances Lake area. Mike Burke assisted in obtaining information on the Maxi prospect. Don Murphy and Maurice Colpron submitted geochemical and geochronological samples to respective laboratories, and interpreted analytical results. JoAnne VanRanden provided information on the Land Claims negotiations and interim protected lands. Shirley Abercrombie and Monique Schoniker provided administrative support for the fieldwork.



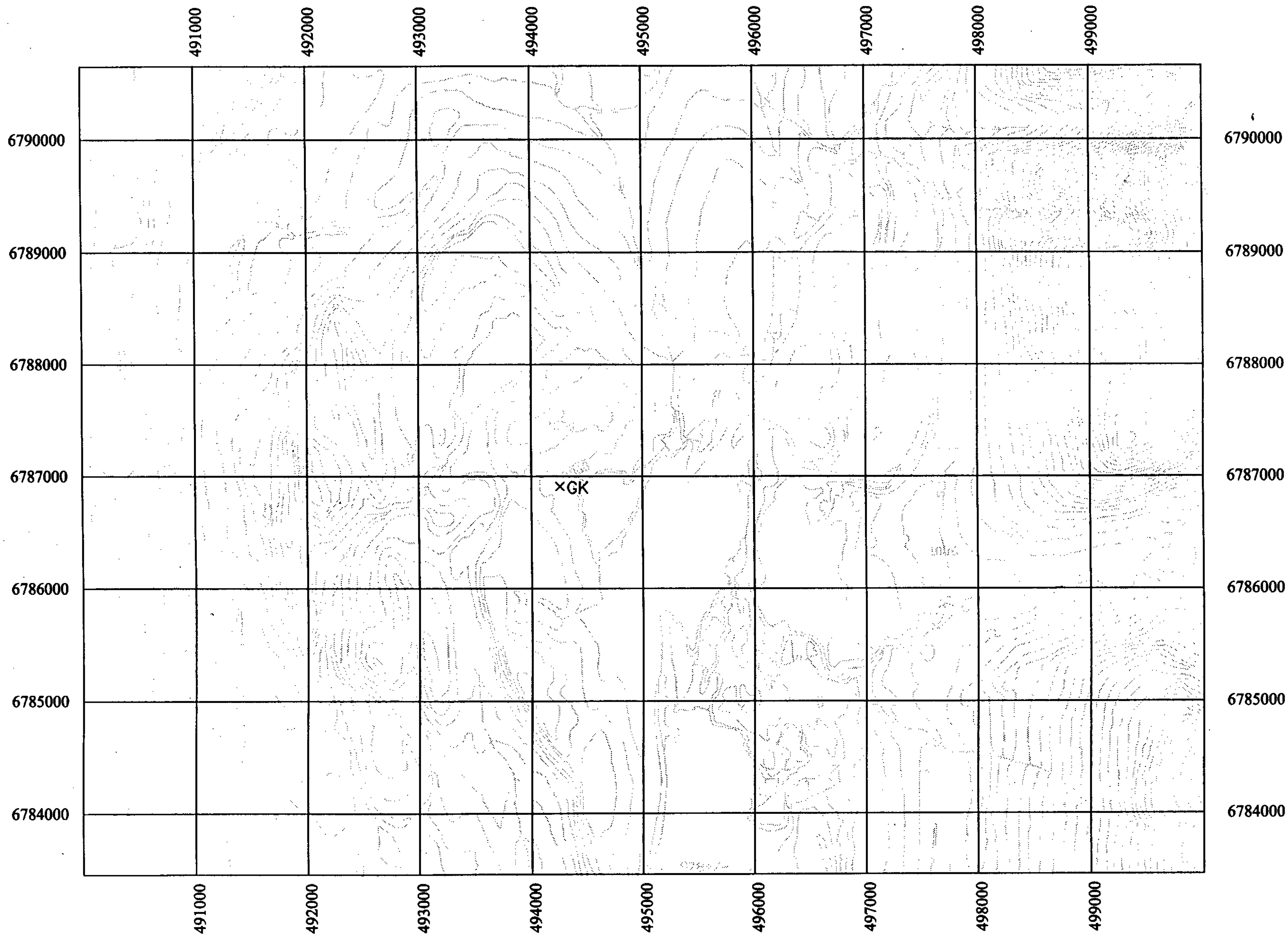
Simpson Tower - Sample location

scale 1:50,000



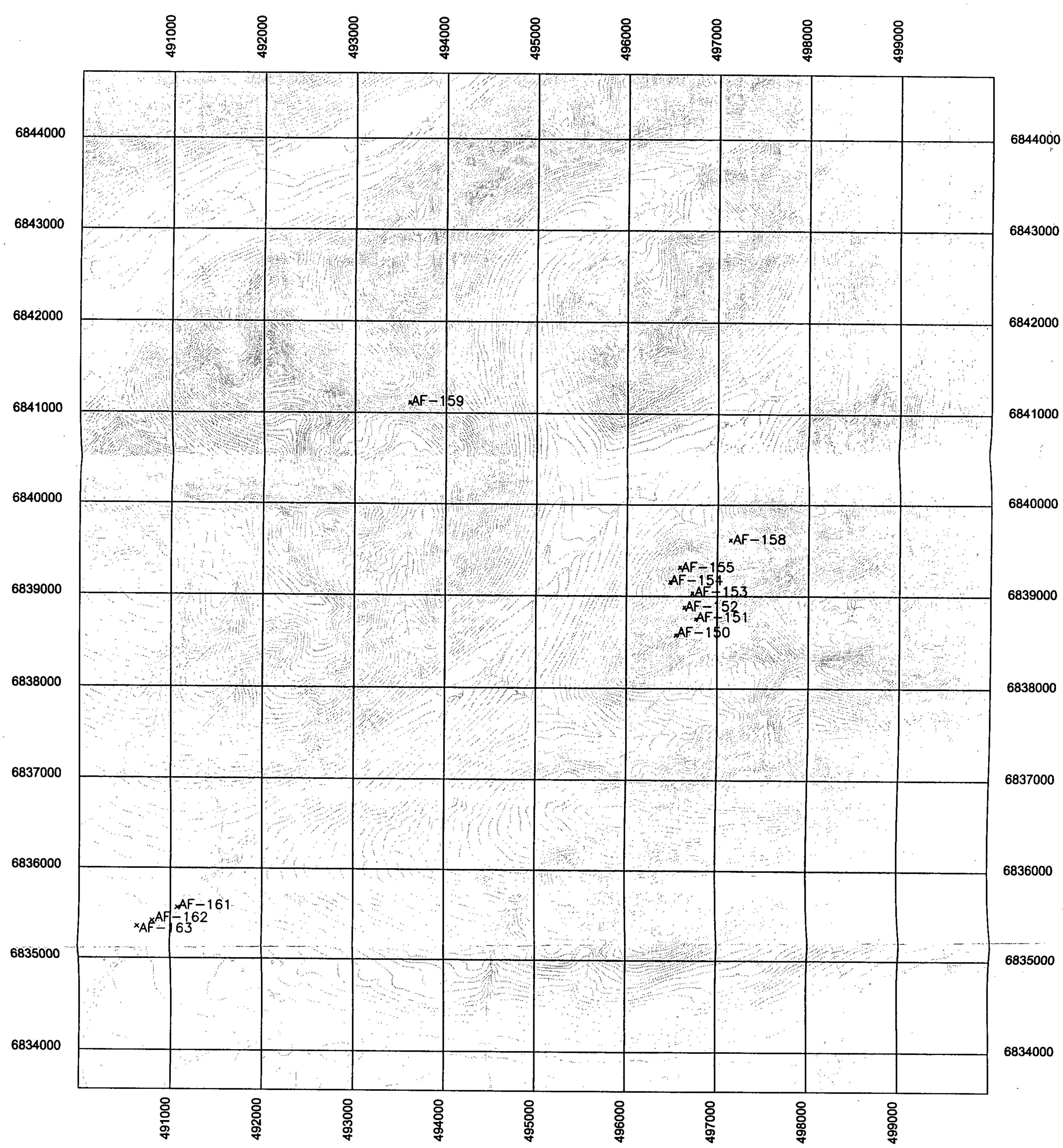
Fluke - Sample location

Scale 1:50,000



Cenozoic Basalt - Sample location

Scale 1:50,000



Maxi and Anderson - Sample location

scale 1:50,000

Appendix VI - ICP analyses of rush samples from Maxi prospect

TITLE 01-11-00 14:00:58 V00-02040.0 M. BURKE 30/10/00
CLIENT GOV. OF CANADA -INDIAN & NORTHERN AFFAIRS -GEOLOGY
PROJECT NONE GIVEN #SAMPLES: 4
SPECIAL VALUES
IS Insufficient Sample
-9 No Value Recorded
Values above the upper limit are shown as +uplimt
Values below the lower limit are shown as -lolmt (ie not detected)
DETERMINATIONS

ELNAME	METHO	ECO	UNI	#SAM	LOLMT	UPLIMT	COMMENTS
01 Ag	ICP	EA5	PPM	4	6.5	500.0	Results Reported
02 Cu	ICP	EA5	PCT	4	0.01	15.00	Results Reported
03 Pb	ICP	EA5	PCT	4	0.01	15.00	Results Reported
04 Zn	ICP	EA5	PCT	4	0.01	15.00	Results Reported

SAMPLE PREPS
40 SAMPLE TYPE=R ROCK
41 PA2= 4 CRUSH/SPLIT & PULV.
****
FORMAT (1X,A8,3X,A1,3X,A1,3X,A20,1X,4(1X,A7,2X,A1,1X))

BEGIN	Type	Frac	Sample ID	Ag	Cu	Pb	Zn
20400001	R	2	XC6 30.5-31.5	-6.5	-0.01	0.01	0.11
20400002	R	2	XC6 53-54	-6.5	-0.01	-0.01	0.08
20400003	R	2	XC6 137-138	-6.5	-0.01	-0.01	0.03
20400004	R	2	XC6 145.5-147.3	-6.5	-0.01	-0.01	0.11

END

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PH[illegible](604[illegible]3-3[illegible] FAX[illegible])25[illegible]/16
(ISO 9002 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Yukon Geology Program File # A004450

Economic Dev. (F-3), P.O., Whitehorse YT Y1A 2C6 Submitted by: Anna Fonseca

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	S %	Ga ppm	Au** ppb
AF-74B	1.8	325	506	628	2.5	35	61	1586	10.80	1	<1	<2	4	97	10.1	.6	68.7	80	1.83	.019	13	19	.64	20	.058	<1	1.03	.061	.08	1	<1	1.3	<1	4.06	6	16
AF-76A	1.0	135	19	28	.5	30	23	77	4.37	<1	1	<2	2	64	.4	<.5	.7	15	1.66	.018	4	14	.47	60	.045	<1	2.08	.062	.06	1	1	.6	<1	2.55	5	3
AF-83A	3.7	115	<2	28	.4	26	14	105	2.81	1	1	<2	7	286	<.2	3.1	9.9	48	4.29	.043	14	53	.61	143	.115	1	6.45	.610	.38	1	2	4.8	<1	1.05	14	3
AF-87A	24.2	79	2	37	.3	83	18	126	3.74	6	12	<2	4	125	<.2	1.4	1.1	309	2.12	.279	18	40	.83	150	.221	<1	2.74	.146	.58	4	1	4.4	<1	1.05	9	5
AF-88A	4.4	567	<2	52	.8	26	35	123	9.46	52	1	<2	8	143	.4	2.5	126.4	50	2.34	.041	13	69	1.20	30	.146	<1	4.65	.292	.82	6	1	7.3	3	5.58	13	200
Scull	21.0	204	1286	1070	2.5	57	15	911	4.73	62	7	<2	4	184	7.0	3.1	1.5	87	2.58	.290	8	31	.82	29	.004	5	.69	.030	.26	8	1	4.0	1	3.14	2	<2
AF-103A	5.1	106	6	13	.3	10	3	193	1.08	78	<1	<2	2	12	.3	1.7	15.5	4	.06	.025	5	22	.02	21	.001	2	.14	.007	.06	4	<1	.3	<1	.02	1	27
AF-106A	4.5	1444	13	54	.5	11	21	699	7.69	4	<1	<2	13	182	<.2	<.5	159.3	14	2.03	.042	28	40	.43	17	.052	<1	3.46	.109	.03	820	1	2.5	2	3.67	10	187
AF-111A	3.6	67	4	20	<.1	19	4	151	1.25	212	1	<2	11	15	.6	.6	.5	6	.14	.012	16	21	.17	61	.032	<1	1.04	.023	.26	16	<1	1.0	<1	.15	3	5
AF-119A	2.5	465	6	30	.5	13	8	671	4.99	21	1	<2	6	130	<.2	1.7	3.3	42	1.28	.035	18	32	.42	121	.087	2	2.39	.101	.23	36	1	3.9	1	.22	10	178
AF-120A	3.9	68	9	4	.8	7	<1	31	2.36	27442	1	10	9	5	<.2	223.9	9.7	5	.01	.006	19	18	.01	37	.003	<1	.22	.004	.14	3	<1	.8	<1	.23	<1	9589
AF-121A	7.1	709	4	25	.9	29	12	401	5.45	50	2	2	11	323	<.2	3.1	221.1	41	3.97	.188	18	45	.36	92	.080	4	5.17	.233	.15	25	2	3.5	1	1.76	15	1895
AF-123A	4.2	50	13	36	.2	17	5	519	3.18	484	1	<2	7	7	<.2	4.4	2.6	12	.03	.012	15	23	.04	41	.001	8	.44	.006	.13	2	<1	1.5	1	.02	1	63
AF-136A	13.6	91	23	28	1.0	10	<1	38	2.21	25	5	<2	13	62	.2	3.3	<.5	58	.13	.128	47	21	.37	476	.001	4	1.30	.011	.24	2	<1	2.6	<1	.05	4	5
AF-147A	2.5	50	7	52	.1	32	11	130	2.82	64	2	<2	15	20	.2	1.7	.7	23	.10	.027	29	25	.59	226	.026	2	1.31	.031	.49	1	<1	2.7	<1	.58	5	3
RE AF-147A	2.5	49	6	53	.1	31	11	124	2.82	62	1	<2	14	19	.2	1.6	<.5	22	.10	.027	28	25	.57	220	.024	3	1.27	.030	.47	1	<1	2.6	<1	.56	4	12
AF-150C	3.1	115	3	34	.3	22	15	446	2.79	4	1	<2	13	209	<.2	2.4	<.5	28	3.19	.041	39	35	.47	88	.127	2	5.05	.126	.11	4	1	3.4	<1	.66	13	<2
AF-151A	4.1	118	7	55	.3	21	12	267	2.89	8	2	<2	19	329	<.2	2.0	<.5	57	2.99	.040	52	54	.64	43	.179	<1	4.21	.144	.33	4	1	5.5	<1	.37	12	3
AF-152A	3.3	47	2	53	.3	22	13	126	2.02	2	1	<2	12	388	<.2	3.7	7.8	44	4.79	.039	34	45	.36	16	.172	4	5.47	.186	.09	4	1	4.0	<1	.54	15	10
AF-153A	1.1	26	2	<1	.4	6	4	184	.44	3	<1	<2	3	873	<.2	6.7	<.5	6	20.98	.038	11	6	.08	4	.033	6	.94	.087	.04	<1	<1	1.0	<1	.04	3	4
AF-154A	3.0	58	6	35	.3	17	9	377	1.95	1	2	<2	13	620	<.2	4.4	.6	26	6.81	.060	35	33	.32	70	.139	4	5.18	.402	.23	3	1	4.2	<1	.43	13	2
AF-155A	3.1	78	9	67	.3	23	11	227	4.34	3	3	<2	18	290	<.2	2.0	<.5	54	3.36	.058	40	62	.80	33	.191	3	5.43	.248	.29	1	1	10.3	1	.75	15	6
AF-158A	5.1	22	9	20	.2	3	<1	176	1.95	<1	1	<2	6	14	<.2	<.5	.5	69	.05	.006	22	74	.54	28	.022	<1	1.17	.030	.35	7	<1	5.9	<1	.33	6	7
AF-159A	3.3	18	6	14	.4	6	1	214	1.56	3	1	<2	5	434	<.2	2.3	<.5	34	7.78	.040	10	36	.27	18	.085	3	1.18	.058	.08	1	<1	3.7	<1	.10	5	7
AF-159B	4.0	7	41	12	.1	7	2	274	1.24	1	3	<2	11	22	<.2	<.5	<.5	2	.35	.051	16	20	.04	94	.001	<1	.45	.053	.21	8	<1	.8	<1	.53	1	7
AF-161A	.8	9	4	176	.4	10	5	539	2.02	4	<1	<2	3	363	.8	6.2	<.5	16	18.26	.019	7	18	2.03	66	.011	3	1.53	.008	.23	<1	1	3.7	<1	<.01	3	6
AF-161B	4.7	128	8	97	.9	48	7	76	2.81	7	5	<2	4	194	.9	3.6	<.5	80	5.05	.900	22	61	2.86	343	.003	<1	2.50	.012	.28	2	1	3.4	<1	.03	5	14
AF-162A	1.4	27	12	66	.5	7	13	905	4.18	40	1	<2	6	189	.3	2.9	<.5	80	5.26	.060	11	46	2.15	152	.001	<1	1.89	.006	.31	<1	<1	10.7	1	.51	5	11
AF-163A	6.5	40	34	470	.6	21	5	1165	2.10	16	1	<2	5	45	1.7	<.5	<.5	95	.99	.078	14	35	.48	173	.014	2	.97	.007	.21	9	<1	1.9	<1	.17	3	<2
AF-166A	1.9	71	15	58	.6	8	29	2044	4.65	6	<1	<2	<1	91	.2	5.4	1.1	9	16.78	.001	5	9	.07	9	.006	<1	.24	.004	.01	2	<1	4.8	<1	.48	2	13
AF-166B	2.5	4	9	81	.2	19	14	291	3.31	1	1	<2	15	59	.2	2.1	<.5	79	.93	.053	20	33	.97	275	.223	<1	2.79	.192	.70	3	1	10.1	1	<.01	9	3
AF-168B	2.0	3	7	11	.1	5	1	115	.46	4	<1	<2	15	10	<.2	<.5	<.5	9	.43	.154	10	26	.07	37	.041	1	.46	.079	.15	1	<1	1.3	<1	<.01	2	4
AF-CCR1	2.4	39	368	477	.7	10	13	1274	4.04	20	2	<2	8	45	3.4	.7	<.5	107	1.15	.091	22	20	1.55	504	.005	6	2.32	.053	.21	2	<1	11.0	<1	.27	8	7
AF-CCR2	10.0	117	22	211	.5	41	10	268	5.14	71	2	<2	9	17	1.0	1.6	<.5	59	.10	.010	32	21	.11	668	.002	3	.56	.044	.21	<1	<1	6.3	3	.23	3	14
STANDARD C3/AU-R	27.0	69	38	169	5.7	36	12	767	3.27	58	25	<2	21	28	24.9	17.6	23.8	80	.59	.093	18	176	.62	156	.086	19	1.87	.042	.17	15	2	4.3	1	.03	8	478
STANDARD G-2	1.5	3	3	46	<.1	7	4	509	1.95	17	2	<2	4	73	<.2	<.5	<.5	41	.63	.099	8	78	.59	225	.128	<1	.91	.077	.49	3	1	2.5	<1	<.01	5	-

GROUP 1DX - 0.50 GM SAMPLE LEACHED WITH 3 ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR, DILUTED TO 10 ML, ANALYSED BY OPTIMA ICP-ES.
UPPER LIMITS - AG, AU, HG, W = 100 PPM; MO, CO, CD, SB, BI, TH, U & B = 2,000 PPM; CU, PB, ZN, NI, MN, AS, V, LA, CR = 10,000 PPM.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: ROCK R150 60C AU** GROUP 3B - 30.00 GM SAMPLE ANALYSIS BY FA/ICP.
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: NOV 1 2000 DATE REPORT MAILED: Nov 15/00 SIGNED BY............D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

 Data ✓ FA ____

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
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GEOCHEMICAL ANALYSIS CERTIFICATE

Yukon Geology Program File # A102900 Page 1

Economic Dev. (F-3), P.O., Whitehorse YT Y1A 2C6 Submitted by: Anna Fonseca

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Tl ppm	Hg ppm	Au** ppb	Ta* ppm	W* ppm
AF 3	2	27	55	728	.6	19	11	1810	2.13	19	<8	<2	4	316	9.7	6	<3	12	8.09	.023	12	51	.45	39	<.01	3	.34	.03	.12	<2	<5	1	<2	.6	4
AF 4A	7	7	16	76	<.3	24	9	1869	2.53	41	<8	<2	3	24	.9	9	4	15	4.49	.026	10	78	.04	56	<.01	3	.38	.01	.25	3	<5	1	7	.5	7
AF 7	1	52	14	54	<.3	22	11	1420	3.87	6	<8	<2	7	369	.8	4	<3	23	20.81	.031	32	22	.77	35	<.01	<3	1.73	.01	.15	<2	<5	1	9	.7	7
AF 8	12	46	811	344	10.3	3	<1	175	2.34	929	<8	<2	15	40	9.3	<3	53	10	.10	.029	28	80	.04	58	<.01	<3	.55	.04	.33	2	<5	<1	7	1.7	25
AF 10	1	20	15	83	<.3	32	12	268	4.32	12	<8	<2	10	14	.2	<3	<3	19	.15	.054	50	45	1.38	151	.01	<3	2.55	.02	.25	<2	<5	1	<2	1.7	3
AF 11	3	3	27	50	<.3	4	5	524	1.99	2	<8	<2	15	11	<.2	<3	<3	13	.31	.069	32	59	.15	30	<.01	<3	.82	.02	.22	2	<5	1	<2	1.5	3
AF 12	3	6	22	281	<.3	8	3	357	1.50	<2	<8	<2	9	22	.5	<3	<3	22	.44	.039	19	108	.26	36	<.01	<3	.63	.03	.17	<2	<5	<1	3	.8	4
AF 14B	2	16	3	51	<.3	5	3	214	.81	<2	<8	<2	10	574	.6	<3	4	13	11.79	.051	25	51	.14	23	.08	3	1.73	.06	.09	3	<5	<1	<2	1.4	4
AF 15	2	100	7	61	<.3	16	10	317	3.24	<2	30	<2	11	191	.2	<3	<3	25	2.25	.219	35	88	.57	25	.10	<3	2.98	.26	.12	2	<5	1	<2	16.2	4
AF 15B	3	33	12	45	<.3	16	8	160	1.41	<2	<8	<2	10	536	<.2	<3	3	22	4.49	.059	30	46	.20	19	.16	<3	2.28	.12	.09	3	<5	<1	2	2.1	3
AF 15C	3	39	8	35	<.3	18	9	156	2.05	<2	<8	<2	8	426	<.2	<3	<3	31	2.70	.035	25	89	.21	22	.18	4	2.98	.17	.14	2	<5	<1	<2	1.7	6
AF 15D	1	36	3	22	<.3	16	9	173	1.77	<2	9	<2	5	857	<.2	<3	<3	27	8.86	.058	20	46	.10	11	.15	<3	2.84	.13	.06	<2	<5	<1	<2	1.5	5
AF 16	1	63	8	16	<.3	22	11	138	2.09	<2	<8	<2	15	243	<.2	<3	3	21	2.03	.037	41	72	.13	41	.16	3	2.57	.15	.07	3	<5	1	2	3.9	6
AF 16B	3	48	10	33	<.3	34	20	70	4.93	<2	<8	<2	6	1123	.2	<3	<3	29	3.84	.038	18	64	.21	11	.20	13	4.80	.52	.09	3	<5	1	4	3.6	5
AF 17D	1	40	5	76	<.3	14	6	193	3.35	8	<8	<2	17	20	.2	<3	<3	10	.10	.032	41	44	.95	111	.02	<3	1.75	.02	.24	2	<5	1	4	1.9	3
RE AF 17D	1	42	7	80	<.3	15	7	202	3.52	10	<8	<2	17	21	.3	<3	<3	10	.10	.032	43	47	1.01	118	.02	<3	1.86	.02	.25	2	<5	2	<2	2.0	4
AF 24	2	<1	3	3	<.3	12	2	713	2.44	<2	<8	<2	<2	372	.2	<3	<3	<1	13.41	.015	3	40	3.89	17	<.01	<3	.59	.02	.01	<2	<5	1	2	.1	2
AF 26B	2	40	22	47	<.3	49	45	65	3.29	9	<8	<2	13	298	.2	<3	<3	32	2.31	.086	9	56	.57	87	.19	<3	2.96	.35	.25	3	<5	1	4	3.4	4
AF 27B	2	18	15	116	<.3	55	19	264	5.50	67	<8	<2	18	10	<.2	<3	<3	69	.18	.060	62	94	1.18	384	.27	<3	3.20	.04	1.97	3	<5	1	<2	2.1	8
AF 27C	3	18	<3	12	<.3	8	2	263	.78	5	8	<2	<2	15	<.2	<3	<3	7	2.58	.008	1	115	.02	9	.01	<3	.12	<.01	.03	4	<5	<1	<2	<.1	7
AF 28A	1	7	14	47	<.3	19	8	1562	3.58	7	<8	<2	2	567	.3	<3	<3	6	14.57	.049	9	23	.57	87	.01	<3	.58	.01	.13	<2	<5	1	<2	1.5	6
AF 28B	3	907	<3	16	.7	9	1	54	.60	4	<8	<2	<2	5	<.2	<3	<3	5	.10	.006	<1	114	.01	18	<.01	<3	.05	<.01	.02	3	<5	<1	6	.1	6
AF 29A	3	56	<3	65	<.3	47	18	364	4.31	2	<8	<2	9	38	.2	<3	<3	59	.53	.028	24	89	1.07	647	.28	<3	2.79	.09	1.57	3	<5	1	6	1.6	6
AF 30A	<1	11	3	25	<.3	8	5	787	.90	2	<8	<2	9	346	.3	<3	<3	11	13.26	.030	13	53	.13	77	.03	<3	.71	.04	.12	<2	<5	<1	3	.8	4
AF 32A	3	84	11	44	.3	27	12	437	2.65	<2	<8	<2	8	105	.3	<3	<3	29	1.44	.041	10	88	.42	224	.06	<3	2.48	.12	.31	3	<5	<1	<2	.8	3
AF 33A	3	52	9	29	.3	12	4	321	2.63	<2	<8	<2	3	56	<.2	<3	<3	11	.79	.033	4	113	.58	140	.04	<3	2.01	.18	.45	3	<5	<1	3	.2	4
AF 38B	8	44	4	120	<.3	56	14	83	2.17	4	<8	<2	7	7	1.5	<3	<3	118	.04	.024	19	105	.59	157	.07	3	1.81	.03	.47	5	<5	1	3	1.5	5
AF 38C	9	65	5	132	<.3	66	17	143	2.85	5	<8	<2	8	6	.5	<3	<3	132	.04	.030	23	135	.75	243	.10	4	2.39	.03	.65	3	<5	<1	8	1.6	6
AF 39A	7	77	9	53	.6	11	4	216	2.37	2	<8	<2	7	97	.8	<3	<3	27	.72	.110	11	68	.48	127	.12	<3	1.11	.03	.20	2	<5	1	6	1.1	5
AF 40B	7	12	<3	43	<.3	11	2	136	2.58	3	<8	<2	10	9	<.2	<3	<3	67	.03	.043	29	55	.67	530	.10	3	1.54	.02	.64	3	<5	<1	3	1.1	14
AF 41A	10	8	5	28	<.3	6	<1	71	1.90	13	<8	<2	4	23	<.2	3	<3	51	.01	.057	8	112	.22	319	.01	<3	.40	.03	.11	2	<5	1	16	.6	11
AF 41B	4	123	13	52	1.2	23	<1	238	5.62	9	<8	<2	3	64	.9	7	<3	49	.16	.066	7	98	.33	452	.05	5	1.00	.02	.10	2	<5	<1	18	.3	5
AF 42A	2	73	7	17	.3	9	3	2285	4.25	10	<8	<2	<2	552	.4	<3	<3	<1	19.15	.041	8	9	3.87	51	.03	33	.25	.01	.10	5	<5	2	5	.2	6
AF 42B	3	53	<3	45	<.3	29	14	98	3.28	90	<8	<2	9	134	<.2	<3	4	63	2.03	.078	25	88	.78	198	.21	5	3.35	.15	.73	3	<5	<1	26	4.8	6
STANDARD C3/AU-R/SO-16	27	65	35	165	5.9	39	13	809	3.33	55	23	3	21	28	23.2	14	24	84	.56	.096	18	178	.63	156	.09	17	1.85	.04	.17	23	<5	2	481	1.8	23
STANDARD G-2	3	3	3	43	<.3	9	4	548	1.98	<2	<8	<2	4	69	<.2	<3	<3	40	.64	.099	8	81	.62	231	.13	3	.91	.07	.51	3	<5	1	-	-	-

GROUP 1D - 0.50 GM SAMPLE LEACHED WITH 3 ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR, DILUTED TO 10 ML, ANALYSED BY ICP-ES.
UPPER LIMITS - AG, AU, HG, W = 100 PPM; MO, CO, CD, SB, BI, TH, U & B = 2,000 PPM; CU, PB, ZN, NI, MN, AS, V, LA, CR = 10,000 PPM.
AU** GROUP 3B - 30.00 GM SAMPLE ANALYSIS BY FA/ICP. TA* & W* GROUP 4B - REE - LiBO2 FUSION, ICP/MS FINISHED.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: ROCK R150 Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: AUG 27 2001 DATE REPORT MAILED: Sept 8/01 SIGNED BY.......... D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

 Data FA